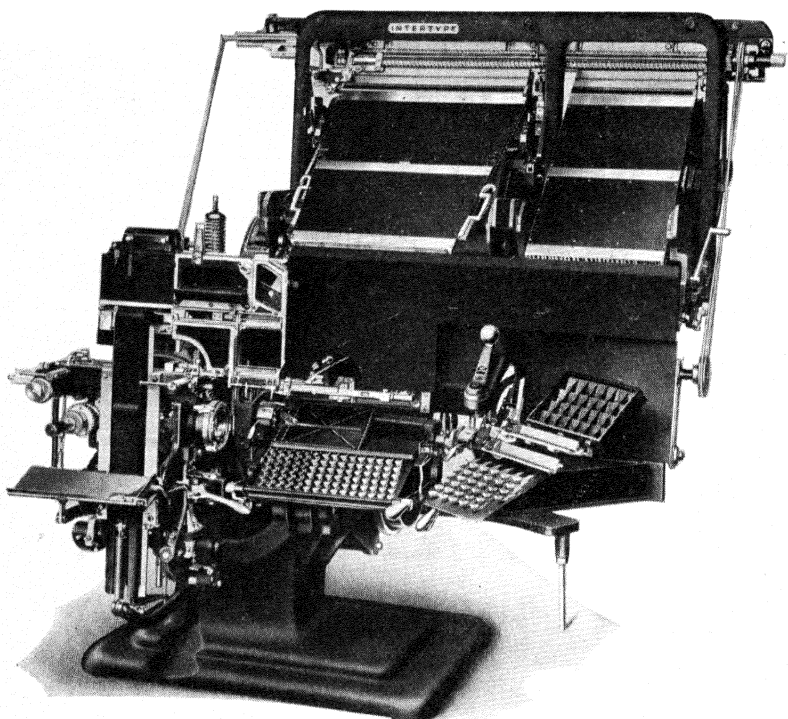


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THE INTERTYPE



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THE INTERTYPE

ITS FUNCTION
CARE, OPERATION AND
ADJUSTMENT



Section II

Casting Mechanism

INTERTYPE CORPORATION

Brooklyn, New York

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Introduction

THE INTERTYPE is a line casting and composing machine. It performs three distinct functions: (1) it assembles matrices in lines; (2) it casts lines of type or slugs; and (3) it distributes the matrices. Three main mechanisms, connected in a series by secondary mechanisms, carry out these actions in a continuous sequence. As soon as one mechanism completes its action, the next begins and so on until the matrices are distributed. The three main mechanisms are known as the ASSEMBLING, the CASTING, and the DISTRIBUTING mechanisms.

In the planning of this book, it has been decided to issue the material in a number of separate sections, each of which will deal with a single basic mechanism. The chief purpose in adopting this procedure is to make the material available immediately as it is completed instead of withholding it for a later publication in a single volume. There are a number of additional advantages in following this plan. In presenting each mechanism as a unit, the relationship between the parts of each mechanism will be more clearly perceived and the material will be more easily understood. Also the problems of reference will be minimized because the volumes will be small and easily handled.

Following the publication of the first section (the assembling mechanism), therefore, this present volume on the casting mechanism is the second of a series of volumes on the Intertype. The third volume will deal with the transfer and distributing mechanism, and the fourth with the magazine shifting mechanism. In addition to presenting the standard mechanisms of the Intertype in this manner, the special equipment applied to the machine will be classified according to the mechanism to which it is related. These attachments will be presented in their proper sequence and relationship to the main mechanisms.

Broadly speaking, Intertype machines fall into two distinct groups, the *single distributor* and the *double distributor* or mixer group. Naturally, the mechanical construction of the different mechanisms in the two groups of machines varies, and both types of construction will be described under their respective headings.

How the Intertype Operates

The Intertype casts lines of type or slugs instead of individual types such as are used for hand composition. The slugs are cast from matrices punched with the various characters needed for type composition. After the line of matrices has been assembled and the slug has been cast, the matrices are returned automatically to a magazine until they are needed again.

ASSEMBLING

As the operator depresses the keybuttons on the keyboard, matrices are released from the magazine. The matrices drop on a moving belt called the matrix delivery belt, which carries them to the assembling elevator in front of the operator. The assembling elevator, in cooperation with the assembler slide, assembles the matrices in a line preparatory to casting the line of type.

When the operator has filled out the line of matrices in the assembling elevator, he raises the elevator to the delivery slide. The slide carries the line of matrices to the casting mechanism and then returns to normal position, ready to receive the next line of matrices. Meanwhile the operator has started to set his next line, the line just sent in being handled automatically by the machine from this point on as described below.

CASTING

The delivery slide carries the line of matrices into the first-elevator jaw, which lowers immediately, carrying the line of matrices to a position in front of the mold in which the slug is to be cast.

The mold contains a cavity of the size and length of the desired slug. The back of this cavity aligns with a passage leading from the metal pot, which is filled with molten metal. The first elevator presents to the front of the mold cavity that part of the matrices in which the characters are punched. The mold advances against the matrix line, and the metal pot, which also moves forward, locks against the back of the mold. Then the pot pump forces molten metal into the mold cavity, casting a slug, which bears characters as they are arranged in the line of matrices.

In order to understand the entire casting operation, it is necessary to go back to the assembling of the line in the assembling elevator. Besides depressing the keys on the keyboard for the matrices desired, the operator also depresses a spaceband key after each word. Each time the spaceband key is depressed, a spaceband drops into the line in the assembling elevator. Spacebands serve two main purposes: they separate the groups of matrices which form the words, and they justify (spread out) the lines so they will all be of even length. A spaceband consists of a short sleeve and a long wedge, the inner surfaces of which are tapered. When the line of matrices is carried from the assembling elevator to the

casting mechanism, the spacebands are carried with it. The short sleeves of the spacebands rest between the word groups, while the long wedges hang about two inches below the matrix line.

Just before the slug is cast, the justification bar pushes upward against these wedges, spreading out the space between each word an equal amount. This is called justification of the matrix line.

After the slug is cast, the disk which carries the molds is turned three-quarters of a revolution, carrying the slug in the mold with it. As the mold disk turns, a knife behind it trims the bottom of the slug. When the mold disk stops, an ejector blade comes forward and pushes the slug out of the mold into the galley. As the slug is ejected from the mold, it passes between two parallel trimming knives, which trim it on both sides.

DISTRIBUTING

While the slug is being trimmed and ejected, the line of matrices from which it was cast is being returned to the magazine. The first elevator, which held the line of matrices in front of the mold, rises to the transfer channel, while a long arm known as the second elevator swings down from the top of the machine and comes to rest on the transfer channel. The matrix line is now transferred from the first elevator to the second elevator.

The second elevator, supporting the matrices by their teeth on a V-shaped bar, lifts them to the distributor box at the top of the machine. The matrices are then lifted one by one out of the distributor box to the distributor bar, which extends across the top of the magazine. Three revolving distributor screws parallel to the distributor bar engage three of the lugs of each matrix (two upper and one lower) and move the matrices along the bar. The bottom of the distributor bar is V-shaped and the matrices are moved across it supported by their teeth. When a matrix reaches a point directly above its channel in the magazine,, there is a gap in the teeth in the distributor bar corresponding to the combination of teeth cut in the matrix. The matrix is thus released and drops into its proper channel in the magazine. Each character, of course, has a different combination of teeth, and the gaps in the distributor bar are cut to correspond. In the meantime, the spacebands, not having teeth, remain in the transfer channel, and while the matrices are lifted up to the distributor box, the spacebands are returned to the spaceband box at the right of the transfer channels.

The operations just described (the casting of the slug and the distribution of the matrices) are entirely automatic. The operator only has to finger the keys and raise the assembling elevator as each line of matrices is assembled.

Chapter II

THE CASTING MECHANISM

The Delivery Slide

The second major mechanism of the Intertype machine is the casting mechanism. Up to this point we have followed the course of the matrices and spacebands through the various parts of the assembling mechanism to the assembling elevator. The assembled line must now be conveyed to the casting mechanism, where a slug or type bar will be cast. The line of matrices and spacebands is carried to the casting mechanism by the delivery slide, which is the connecting link between the assembling and casting units of the machine.

The delivery slide is mounted in the face plate and rests directly above the assembling elevator when in normal position. The slide consists of a long finger 1, Fig. 31, a short finger 2, a notched adjusting rod 3 and several beveled blocks 4 attached to a series of sliding bars. The beveled blocks run in two grooves milled in the face plate and support the slide in its movements to and from the casting mechanism. The adjusting rod 3, mounted between the long finger and the short finger, contains notches one cm apart. The delivery slide can be adjusted for lines of different length by raising the adjusting detent 5 and moving the long finger along adjusting rod 3. The short finger is never adjusted because the assembled line always ends at the same place.

The delivery slide is connected to the delivery lever 7 through a link 6 with a detachable flat spring. Lever 7 is pinned to shaft 8, which is connected by spring arm 9 to a spring 10 inside the machine column. When the line of matrices and spacebands is raised to the delivery slide, the assembling elevator bears against lug 2 of delivery pawl 1, Fig. 30, lowering the right end of the pawl out of engagement with the short finger 3. As soon as the pawl is tripped, spring 10, Fig. 31, acting upon the delivery slide through lever 7 and link 6, moves the slide rapidly to the left through the delivery channel into the first-elevator jaw. The speed of the delivery slide is brought under control as it enters the delivery channel by an air cushion device 12, which is connected to shaft 8 through a link and cam roll arm 15. As the shaft and cam roll arm are turned by spring 10, the piston forces air out of cylinder 12 through an adjustable vent 13. This cushions the stroke of the delivery slide as it enters the first-elevator jaw, at which point it is stopped by screw 14 on the face plate.

When the delivery slide enters the first-elevator jaw and banks against stop screw 14, Fig. 31, cam roll 16 pushes pawl 17 off upper stopping lever 18. This permits the clutch to operate and the cams begin to revolve. The first elevator descends to the vise with the line of matrices and spacebands in the first-elevator jaw. As the first elevator seats on the vise cap, the delivery slide is returned to normal position. The revolving delivery cam 19 bears against cam roll 16 on arm 15 until the high point 20 of the cam is reached. At this point on the cam the short finger 3, Fig. 30, is overthrown $1/16''$ past delivery pawl 1 and spring 4 raises the pawl in front of the short finger. The slide remains in normal position

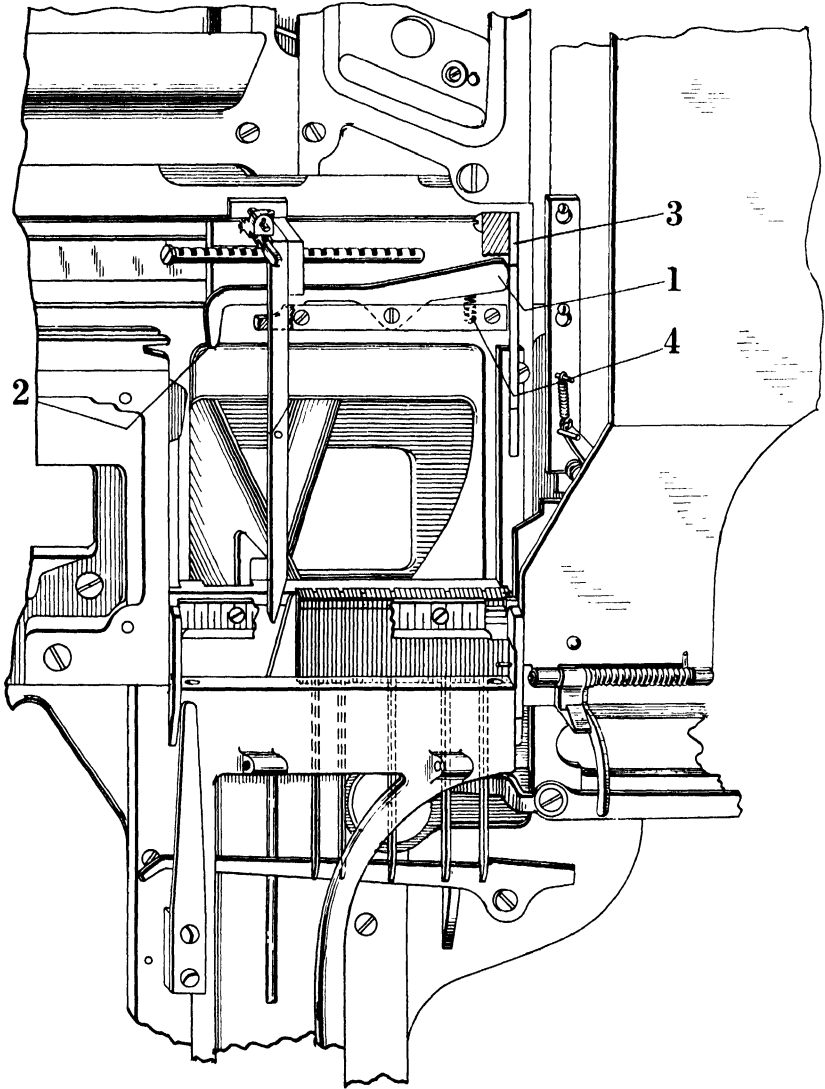


Fig. 30. Showing the Delivery Slide in normal position above the assembling elevator

until the delivery pawl is tripped again when the next line is raised in the assembling elevator. If the following line is sent in before the cams have made one complete revolution, cam roll 16, Fig. 31, bearing against the dwell 21 of the delivery cam, will hold the line in the delivery channel. As the delivery cam 19 returns to normal position, the shape of the cam will permit the delivery slide to move into the first-elevator jaw.

Adjustments: The Return Stroke. When the delivery slide returns to normal position the short finger 3, Fig. 30, should move $1/16''$ past the right end of de-

livery pawl 1. This adjustment is made with the delivery slide in normal position. Disconnect the pot pump plunger and run the machine ahead until the high point 20 of delivery cam 19, Fig. 31, is directly opposite cam roll 16. Loosen the two clamping screws 22, move cam roll arm 15 until roll 16 touches the cam, then tighten the screws. Back the machine by hand until there is $1/16''$ space

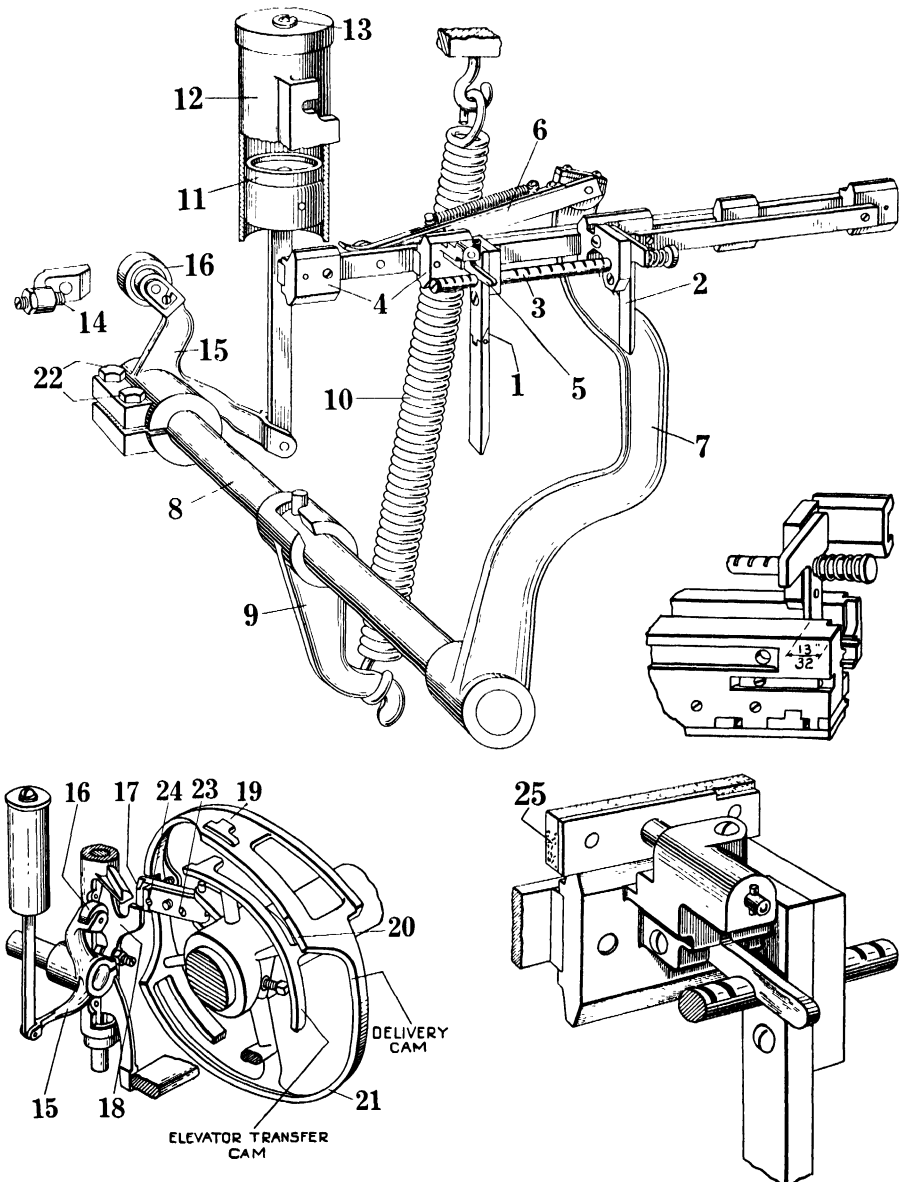


Fig. 31. Perspective View of the Delivery Slide and Related Parts in Assembly

THE INTERTYPE

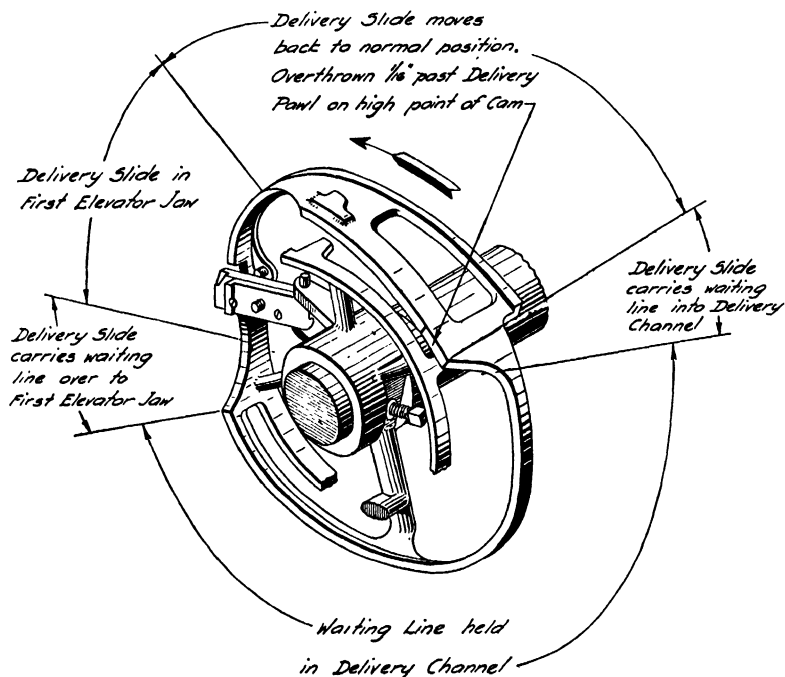


Fig. 31a. The Delivery and Elevator Transfer Cam, showing the surfaces of the delivery cam which promote the main movements of the delivery slide

between roll 16 and cam 19, loosen screws 22 again and move arm 15 until roll 16 touches the cam. Tighten the two clamping screws. The overmotion of the delivery slide at the end of its return stroke should not exceed $1/16''$. While this adjustment is being made, the pot mouthpiece will be in contact with the mold. It is advisable, therefore, to make this adjustment when the pot is cold or to place a dummy mold in operating position.

The Casting Stroke. When the delivery slide has made its extreme stroke to the left, the short finger should be $13/32''$ inside the first-elevator jaw as shown in the detail drawing, Fig. 31. This adjustment is made by means of stop screw 14, against which the delivery slide banks at the end of its casting stroke.

Stopping Pawl Plate Adjustment. Before making this adjustment, see that the casting and return strokes of the delivery slide are set properly and that the stopping pawl is $15/16''$ from the edge of the cam. If these three basic adjustments are correct, set plate on stopping pawl 17, Fig. 31, so that roll 16 pushes the pawl $1/64''$ clear of upper stopping lever 18 when the delivery slide is banking against stop screw 14. To obtain this adjustment, loosen screw 23, adjust screw 24, then tighten screw 23.

Delivery Air Cushion Cylinder Vent. The speed of the delivery slide should be regulated so that it will come to a gradual stop as it enters the first-elevator jaw. The vent 13, Fig. 31, on top of cylinder 12 can be adjusted to obtain the required effect. Before making this adjustment, however, make sure that the

piston packing is soft and fits the cylinder snugly. The packing can be softened with oil, but new packing should be applied whenever excessive wear appears.

Maintenance. The casting stroke of the delivery slide will be annoyingly slow if gum and dirt are allowed to accumulate on beveled edges of the slide blocks and in the grooves in the face plate in which the blocks move. The slide should be removed from the machine and cleaned thoroughly under such conditions. Run the machine ahead until the first elevator rests on the vise cap. Remove the delivery slide stop. Trip the delivery pawl and let the slide run over to the left. Disconnect the delivery lever link from the link stud in the back of the slide and draw the slide out of the face plate grooves. Clean the edges of the beveled blocks and the grooves in the face plate with high test gasoline. See that all the screws in the various parts of the delivery slide are tight. Roughen the surface of the friction shoe leather 25, Fig. 31, with a piece of emery cloth. The purpose of this shoe is to prevent the long finger from moving until the matrix line has closed up against it. Rub a small amount of graphite on the edges of the beveled blocks and return the slide to the machine.

The Delivery Channel

The purpose of the delivery channel is to support the matrices and spacebands in their proper positions while the delivery slide is conveying the line to the first-elevator jaw. The delivery channel, Fig. 32, contains three levels of rails,

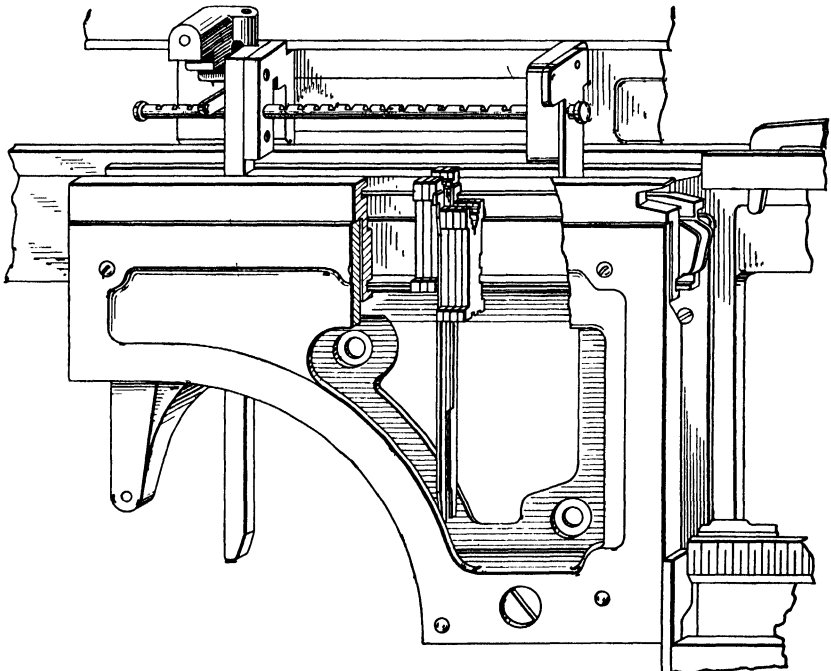


Fig. 32. Showing the Rails in the Delivery Channel which support matrices in normal and auxiliary position, and the grooves which support the spacebands by their sleeve lugs

two of which support the matrices in normal and auxiliary position, and the third of which supports the spacebands by their sleeve lugs. When the assembled line is raised in the assembling elevator to the delivery slide, the matrices align with the rails in the delivery channel corresponding to the positions in which they were assembled. The spacebands, having but one position, always enter the same grooves in the delivery channel. The assembling elevator should be raised as gently as possible to the delivery slide. If it is raised continually with too much force, the matrices and spacebands will be jarred out of alignment with the rails in the delivery channel, and the rails will be burred as the lines are carried over to the first-elevator jaw. Burrs at the ends of the delivery channel rails should be removed with a piece of fine emery cloth, but this will be unnecessary if the assembling elevator is handled properly.

The First Elevator

The line of matrices and spacebands is carried by the delivery slide through the delivery channel into the first-elevator jaw. The first-elevator jaw consists of a front jaw 1, Fig. 33, a back jaw 2 and a separating block 3 held together by

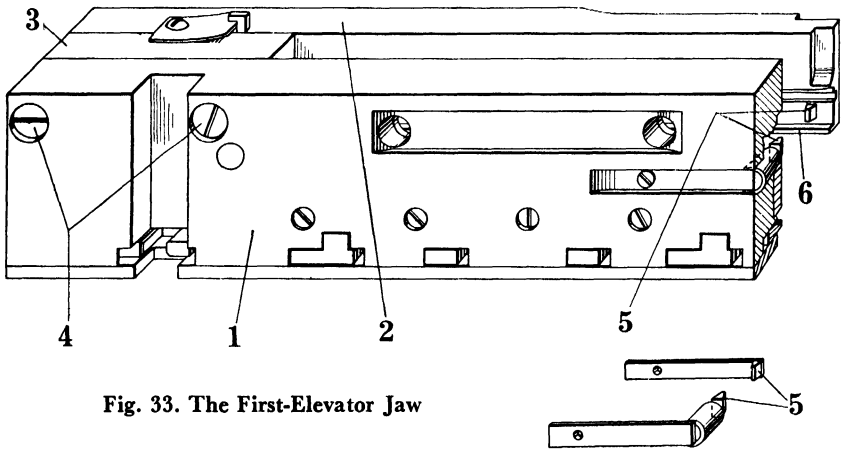


Fig. 33. The First-Elevator Jaw

screws 4 at the left-hand end of the jaw. The assembled jaw is held securely on the first-elevator slide by a key and two screws passing through the front jaw into the slide. There are two detents 5 at the open end of the jaw which are held in place by flat springs (detail drawing). The detents are moved outward by the entering line of matrices and spacebands, but spring back in place again as soon as the last matrix is within the jaw. The detents are made in triangular form and can be turned to present new edges as they wear. The purpose of the detents is to retain end matrices in the jaw during its movements from normal to casting position, and from casting to transfer position. An adjustable line stop 4, Fig. 34, serves the same purpose at the left-hand end of the jaw. The position of the matrices is always constant at the right but varies at the left, according to the length of line being set.

The first-elevator jaw contains rails which align with those of the delivery

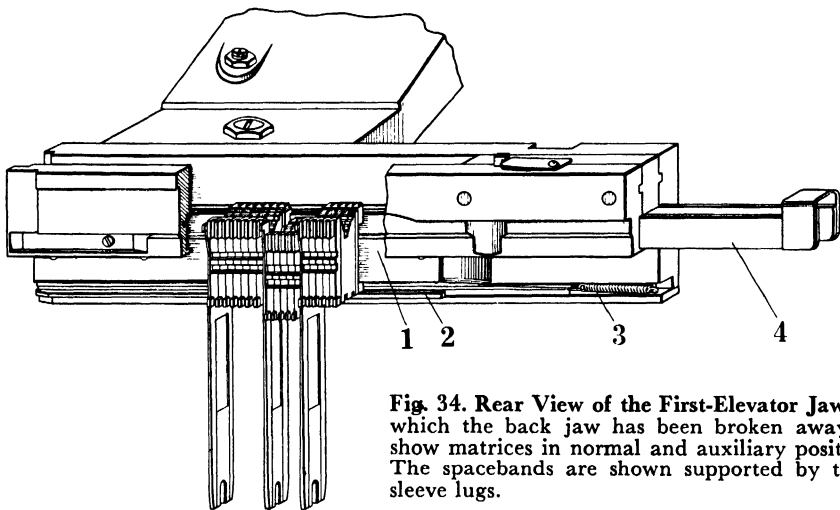


Fig. 34. Rear View of the First-Elevator Jaw, in which the back jaw has been broken away to show matrices in normal and auxiliary position. The spacebands are shown supported by their sleeve lugs.

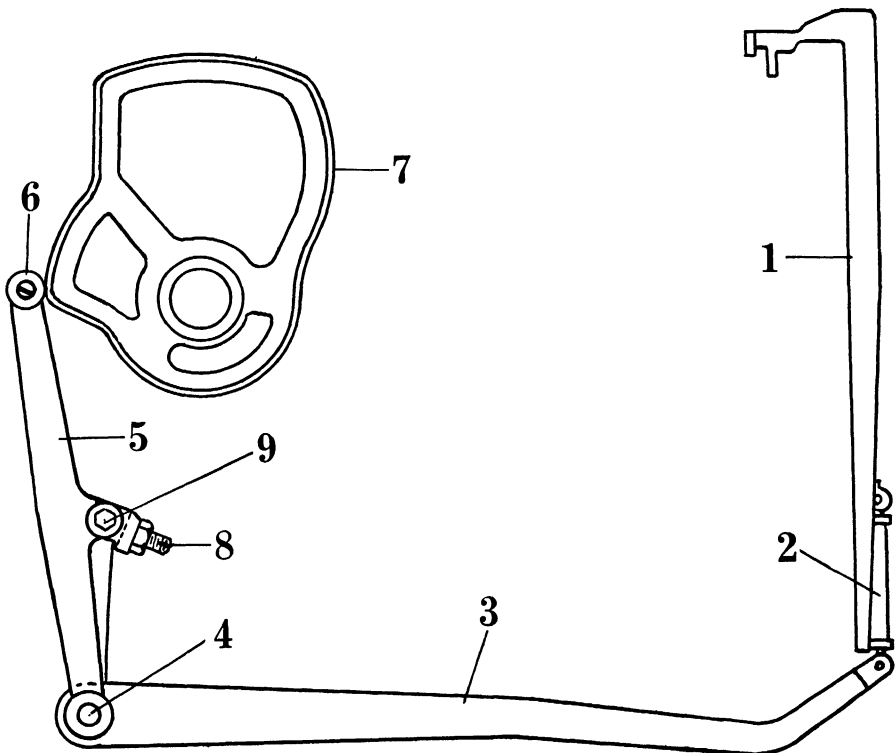


Fig. 35. Side View of the First Elevator and Related Parts in Assembly

channel and support the matrices and spacebands in the positions in which they were assembled. On the back jaw 2, Fig. 33, there is a lip 6 which supports the matrices in normal position. The corresponding part of this rail in the front jaw is called the adjusting bar 1, Fig. 34, which is held in place by five screws. The bar not only helps to support the matrices in normal position but also serves as a banking point for the matrices during alignment. The duplex rail 2 is movable and supports matrices in auxiliary position. This rail is made movable so that matrices in auxiliary position can be dropped to normal position just before the line is transferred to the second elevator. The duplex rail is drawn from under these matrices by an operating bar fastened to the first-elevator slide guide. Spring 3 returns the duplex rail to place as the first elevator descends from transfer to normal position. The first-elevator jaw also contains grooves into which the lugs on the spaceband sleeves fit. The short sleeves of the spacebands are held in position by their lugs so that only the long wedges can move during justification of the matrix line.

The first-elevator jaw is fastened to the first-elevator slide 1, Fig. 35. The slide is held in a vertical position on the front of the vise frame by two gibs, which guide the slide in its upward and downward movements. The first-elevator slide is connected at its lower end to a link 2, which consists of two eyebolts, a

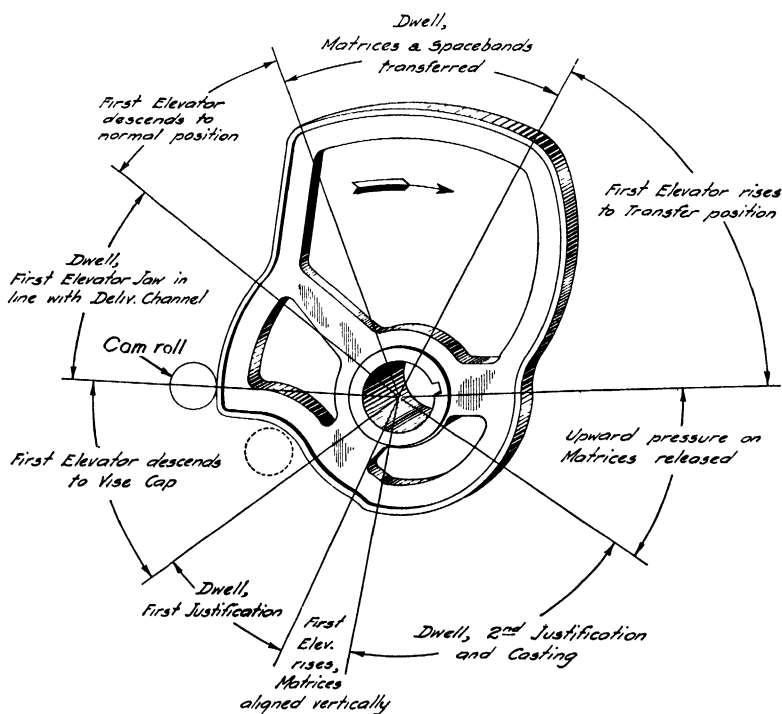


Fig. 35a. The First-Elevator Cam, showing the surfaces of the cam which promote the main movements of the first elevator. When the cam roll is in the position indicated by the dotted lines, the vise frame can be lowered to second position.

spring and a cylinder. The function of this link is to provide overmotion when the first elevator rises to align the matrices and when it seats at transfer position. The lower end of the link is connected by a pin to the first-elevator lever 3, which is pivoted on shaft 4 at the rear of the machine. Lever 3 is connected to the first-elevator auxiliary lever 5, on which is mounted a cam roll 6 which rides on the first-elevator cam 7.

The first elevator, through its connection with the first-elevator cam, makes four strokes or movements during one revolution of the cams. As soon as the delivery slide has carried the line of matrices and spacebands into the first-elevator jaw and the cams begin to revolve, the first elevator descends to the vise cap and positions the matrix line in front of the mold. This is called the casting stroke. The second stroke takes place when the first elevator rises about .010" to align the matrices against the mold. The third stroke occurs when the first elevator rises from casting to transfer position, and the fourth when it descends to normal position with the first-elevator jaw opposite and in alignment with the delivery channel. All of the upward movements of the first elevator are controlled positively by the first-elevator cam. All of the downward movements are controlled by the weight of the first-elevator slide itself as permitted by the shape of the cam.

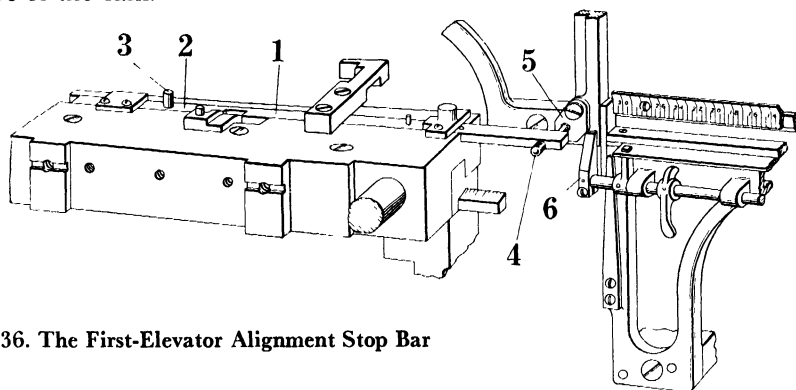


Fig. 36. The First-Elevator Alignment Stop Bar

When the first elevator descends to the vise cap with the matrix line, an adjustable screw in the first-elevator head banks on a device known as the first-elevator alignment stop bar 1, Fig. 36. When the operator is setting straight roman composition in the smaller sizes of type, the screw in the first-elevator head banks on the stop bar at point 2, holding the first-elevator jaw in normal position on the vise cap. The chief use of the alignment stop bar, however, is in connection with headletter, display and special alignment matrices, which are usually punched in auxiliary position. Although these matrices are supported on the normal or lower rail in the first-elevator jaw, they are presented to the auxiliary alignment groove in the mold body by alignment stop 3, which holds the first-elevator jaw in its respective position on the vise cap. When display matrices are being used, stop bar 1 is moved to the right by means of knob 4. This positions alignment stop 3 directly under the banking screw in the first-elevator head. Also when bar 1 is moved to the right, duplex rail stop plate 5, operated by a pin in the end of the bar, swings behind duplex rail stop lever 6. The pur-

pose of the stop plate is to prevent the operator from assembling matrices on the assembling elevator duplex rail when alignment stop 3 is in operative position. If it were possible to do this, the matrices would be positioned too high in relation to the mold and their lugs would not enter the alignment grooves in the mold body. The alignment stop bar is valuable also whenever a large amount of italic or bold-face composition in the smaller sizes of type is being done. The operator may assemble all of the matrices on the normal or lower rail in the assembling elevator, and the first elevator will present the matrix line to the auxiliary alignment groove in the mold body as long as the alignment stop 3 is in position under the banking screw in the first-elevator head.

Adjustments: First-Elevator Slide Gib. The first-elevator slide is held in a vertical position on the front of the vise frame by two gibs. The right-hand gib is doweled and fixed in position. The left-hand gib is adjustable and should be set so that there will be about .005" clearance between the gib and the beveled edge of the slide. Care should be taken, however, that there is an equal amount of play at both the top and bottom ends of the gib. If the clearance at both ends is unequal, the first-elevator jaw will not be parallel with the mold and matrices will not align properly. This condition will make it difficult to adjust the side trimming knives, because the letter characters will be at an angle to the constant side of the slug instead of parallel with it. To test the parallelism of the first-elevator jaw with the mold, place a new thin pi matrix in each end of the jaw. Run the machine ahead until the first elevator seats on the vise cap. Depress the mold cam lever handle and pull the mold disk forward until the locking studs enter the stud block bushings on the vise frame. The lower back lugs of the two pi matrices will then be in engagement with the alignment groove in the mold body. Tap the mold disk about .010" back from the vise frame and lift the first elevator up by hand. While holding the elevator up, grasp each matrix in the jaw with a pair of tweezers and feel how they bind. If they do not bind equally, the left-hand gib should be reset until the required clearance and parallelism are obtained.

Alignment of First-Elevator Jaw With Delivery Channel. The rails in the first-elevator jaw should be exactly aligned with or a trifle lower than the corresponding rails in the delivery channel when the machine is in normal position. The position of the first-elevator jaw, which is fixed on the first-elevator slide, is controlled by an adjusting screw 8, Fig. 35, in the first-elevator auxiliary lever

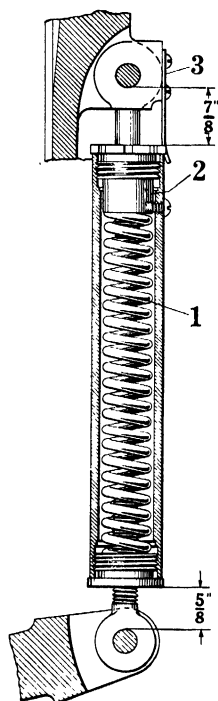


Fig. 37. The First-Elevator Lever Link, showing the $\frac{7}{8}$ " and $\frac{5}{8}$ " eyebolt settings which must be maintained at all times to insure proper compression of spring 1. To obtain these settings, remove the link from the machine and turn the eyebolts. The upper link bushing, screwed into nut 2, bears against spring 1 and cushions the movements of the first-elevator slide when it aligns the matrices vertically and when it raises the matrices and spacebands to transfer position. Spring 3 holds the casing in position after the eyebolt settings have been made.

5. Readjustment of this screw will rarely be necessary unless the nut works loose. Whenever it is necessary to realign the first-elevator jaw with the delivery channel, however, the screw in the first-elevator auxiliary lever should *not* be adjusted until the settings of the first-elevator lever link eyebolts have been inspected. Remove the link from the machine and check the $\frac{5}{8}$ " and $\frac{7}{8}$ " settings of the eyebolts as indicated in Fig. 37. If the settings are incorrect, turn the eyebolts until the required measurements are obtained. *These settings must be maintained to provide for proper compression of the lever link spring.* Replace the link, and with the machine in normal position, turn the auxiliary lever adjusting screw 8, Fig. 35, until the rails in the first-elevator jaw are in line with or a trifle below the corresponding rails in the delivery channel. Tighten the nut on the adjusting screw and tighten the auxiliary lever connecting screw 9, which holds the first-elevator lever and the auxiliary lever in proper relationship to each other.

Downstroke Banking Adjustment. When the first-elevator jaw positions the matrix line between the vise jaws and the mold disk comes forward, there should be .010" clearance between the toes of the matrices and the top of the alignment groove in the mold body. Place a *new* pi matrix in each end of the first-elevator jaw. Disconnect the pot pump plunger and run the machine ahead until the first elevator rests on the vise cap. Depress the mold cam lever handle and pull the mold disk forward until the locking studs enter the stud block bushings on the vise frame. Tap the mold disk back slightly and feel how much play there is between the toes of the matrices and the groove in the mold body by lifting and lowering the first elevator by hand a few times. If there is more or less than the required amount of play, adjust screw 2, Fig. 38, in the first-elevator head until the .010" clearance is obtained, then tighten the nut on the screw.

Maintenance. The maintenance of the first elevator and its cooperating mechanisms consists mainly in keeping the parts clean and working freely. The surfaces of the first-elevator jaw, especially those surfaces which come into contact with the vise cap and the first-elevator slide guide, should be cleaned with high-test gasoline whenever dirt and gum begin to accumulate. Careless use of tools on the jaw will raise burrs on its surface. Such burrs should be removed with a piece of fine emery cloth, but this will be unnecessary if the jaw is treated with care. The movable duplex rail in the front jaw is held in place by six screws and a cap at the base of the jaw. If the rail works stiffly remove it from the jaw, clean it with high-test gasoline and rub a small amount of graphite on its riding surfaces. The beveled edges of the first-elevator slide should be cleaned occasionally with gasoline and lubricated with a very light film of oil. Oil the hole in the first-elevator lever shaft bearings occasionally, and make sure that the first-elevator cam roll is revolving freely. Keep the surface of the first-elevator cam clean at all times.

The Vise Automatic

When the first elevator makes its downward stroke to the vise cap, the matrix line must be presented to the mold in such a position that the toes of the matrices will enter the grooves in the mold body when the mold disk advances to the matrix line. In the normal operation of the machine, this is provided for by an adjustable banking screw 2, Fig. 38, in the first-elevator head, which holds the

first elevator in a positive position when it is resting on the vise cap. If an obstruction prevents the first elevator from making its complete downstroke, however, the matrices will be positioned too high in relation to the mold. The toes of the matrices would be damaged under such conditions were it not for a safety device known as the vise automatic, which stops the machine when an overset line or other obstruction prevents the first elevator from seating fully on vise cap.

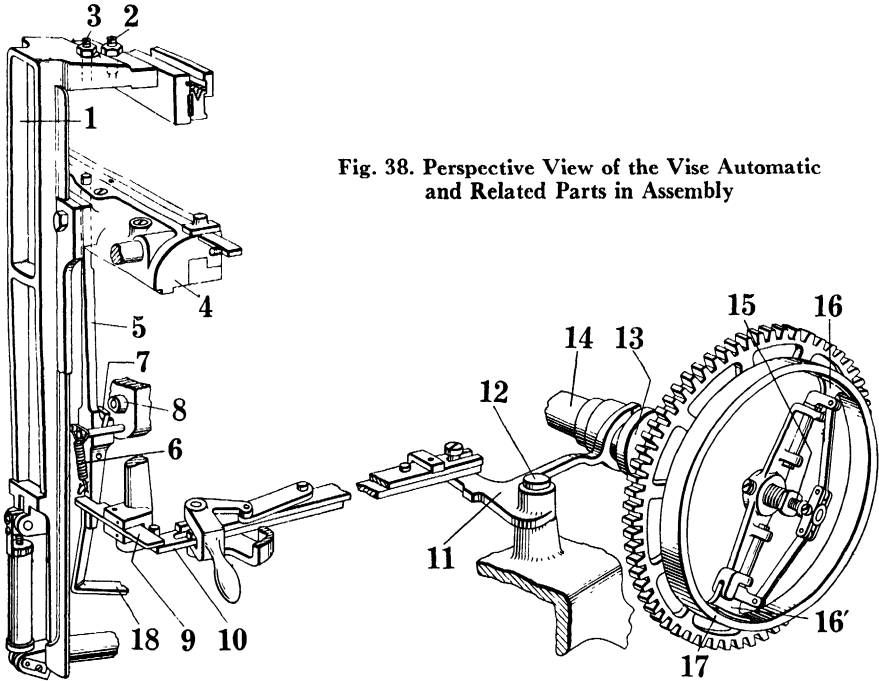


Fig. 38. Perspective View of the Vise Automatic and Related Parts in Assembly

The vise automatic consists of a number of rods and levers arranged in a series beginning at the vise frame in the front of the machine and ending with the driving mechanism. Vise automatic stop rod 5, Fig. 38, is mounted in the vise frame. The upper end of the rod passes through a hole in the vise cap 4 and is held above the surface of the cap through action of spring 6. Mounted in stop rod 5 there is a steel pawl 7 with a sharp edge, which faces the back end of a device known as the vise automatic stop mold disk dog 8. The dog projects through a hole in the vise frame and faces the mold disk at its other end. Normally the first-elevator slide 1 descends to position the matrix line between the vise jaws and is stopped at the end of its downstroke by screw 2, which banks on the alignment stop bar in the vise cap 4. Just before screw 2 banks on the stop bar, vise automatic stop screw 3 in the first-elevator head depresses stop rod 5. The edge of pawl 7 clears the dog 8, which is pushed back towards the stop rod by the advancing mold disk, and the machine completes its revolution as though the device were not present.

If an obstruction prevents the first elevator from seating fully on the vise cap, however, vise automatic stop screw 3 cannot depress stop rod 5 far enough. This leaves pawl 7 directly in line with dog 8. The advancing mold disk pushes the dog against the pawl, which causes the lower end of stop rod 5 to bear against stop lever 9. Lever 9 in turn bears against a pin in connecting bar 10, the rear end of which engages a stud in the forked lever 11. The forked lever, pivoted on shaft 12, swings through a small arc and bears against flange 13 on driving shaft 14. Flange 13 is connected by a screw to clutch rod 15 within the hollow end of the driving shaft. The pressure of forked lever 11 on flange 13 moves clutch rod 15 out from driving shaft 14. This draws friction shoes 16 and 16' away from the inner rim of driving gear pulley 17, which stops the machine until the obstruction under the first-elevator slide is removed.

The mold disk makes two main forward strokes to the vise frame. It advances against the matrix line so that the slug can be cast, and later it moves forward to the vise frame so that the slug can be ejected. When the disk advances for the cast, pawl 7 in stop rod 5 is depressed under dog 8 by screw 3 in the first-elevator head. When the disk advances to ejecting position, however, another device is provided to prevent the vise automatic from operating. The extension 18 on stop rod 5 serves this purpose. Before the mold disk advances, the vise closing lever (not shown) banks on the extension 18 and pulls the stop rod down so that the dog will clear the pawl.

Adjustment of Vise Automatic. The vise automatic, as described above, is a safety device designed to stop the machine if the first-elevator slide fails to make its complete downstroke to the vise cap. Since the proper operation of the vise automatic depends entirely on the downstroke of the first elevator, the adjustment of the banking screw 2, Fig. 38, in the first-elevator head should always be checked before attempting to adjust the vise automatic. *The downstroke banking adjustment of the first elevator must be positive at all times.*

When the first elevator descends to the vise cap and banks on screw 2, Fig. 38, vise automatic stop screw 3 should depress stop rod 5 just far enough to permit dog 8 to pass over pawl 7. The clearance between the dog and the pawl should not exceed $1/64''$. To obtain this adjustment, disconnect the pot pump plunger and run the machine ahead until the first elevator rests on the vise cap. Adjust screw 3 in the first-elevator head until the edge of pawl 7 is about $1/64''$ below the sharp edge of dog 8, then tighten the nut on the screw. When the adjustment is made, place a thin-space matrix on the exact spot on the alignment stop bar where screw 2 banks and pull the starting lever. If the adjustment is correct, dog 8 will strike pawl 7 and stop the machine. If the machine does not stop, some part of the vise automatic mechanism is probably worn. See if the spring inside the dog and vise automatic stop rod spring 6, Fig. 38, have the proper tension. If either spring is weak, replace it with a new one. If the edge of pawl 7 is rounded, reverse the pawl in the rod to present a new edge.

The edge of the pawl should rest $1/32''$ above the edge of the dog when the machine is in normal position. The upper position of stop rod 5 is limited by a shoulder on the rod at its upper end. On machines that have been in use for a long period of time, it is sometimes necessary to file the shoulder on the rod very slightly to permit spring 6 to raise the pawl to the required position.

The Vise Frame

The vise frame is pivoted at the lower end on a shaft which also serves as a bearing for the pot legs. On the vise frame are mounted the first-elevator slide, the vise closing attachment, the justification rods and block, the mold disk locking stud blocks, the knife block, the knife wiper and front mold wiper, the slug galley and slug lever, and the vise cap and vise jaws. The vise cap is fastened to the top of the vise frame and contains a groove in which the vise jaws slide. The vise cap and the vise frame support the first-elevator jaw and other parts of the casting mechanism when the matrix line is justified and ready to be cast. Two vise locking screws, threaded through both ends of the vise cap, lock the vise frame securely to the frame of the machine. The right-hand screw engages a stud attached to the machine column and the left-hand screw engages a stud on the mold gear arm. When both screws are turned to the left, the vise frame is held rigidly against the frame of the machine.

Opening the Vise Frame. The vise frame can be opened to two positions. When the machine is in normal position, the vise frame can be opened to first position simply by turning the vise locking screw handles to the right and lowering the frame until it banks on the vise frame rest. The inside of the frame is easily accessible in this position. The mold disk and mold disk slide also can be pulled out far enough in this position to enable the operator to inspect or clean the front and back of the molds and the pot mouthpiece. Simply depress the mold cam lever handle and pull the disk forward. To lower the frame to second position, disconnect the pot pump plunger and run the machine ahead until the first elevator seats on the vise cap and stop the machine before the mold disk moves forward. Turn the vise locking screw handles to the right, open the frame to first position, withdraw the vise frame rest and lower the frame to second position. When the frame is in this position, the mold disk and mold disk slide, the metal pot and other parts can be removed from the machine when necessary. To pull the mold disk and slide forward or to remove it entirely from the machine, remove the ejector lever link and depress the mold cam lever handle.

The Mold

As the first elevator descends and carries the line of matrices and spacebands between the vise jaws the mold disk turns one-quarter of a revolution, bringing the mold in use to a horizontal position in front of the matrix line. There are two general types of molds, the universal adjustable mold and the triangular shelf mold. The universal adjustable mold, which casts solid slugs from 5 to 14 points in body thickness, is the most commonly used mold. It consists mainly of the mold body 1, Fig. 39, the mold cap 2 and two liners 3 and 4. The body 1 is fastened to the mold disk by four screws 5. The liners 3 and 4 are located on the top of the mold body by two dowels 6. The dowel 7 in the mold cap fits into one of the two intersecting holes in the right-hand liner and locates the mold cap accurately in relation to the liners and mold body. The mold cap 2 is held down upon the liners by nuts 8 and swivel bolts 9. The right-hand or constant liner 4 varies in thickness but is always of the same length. The left-hand liner 3 varies both in thickness

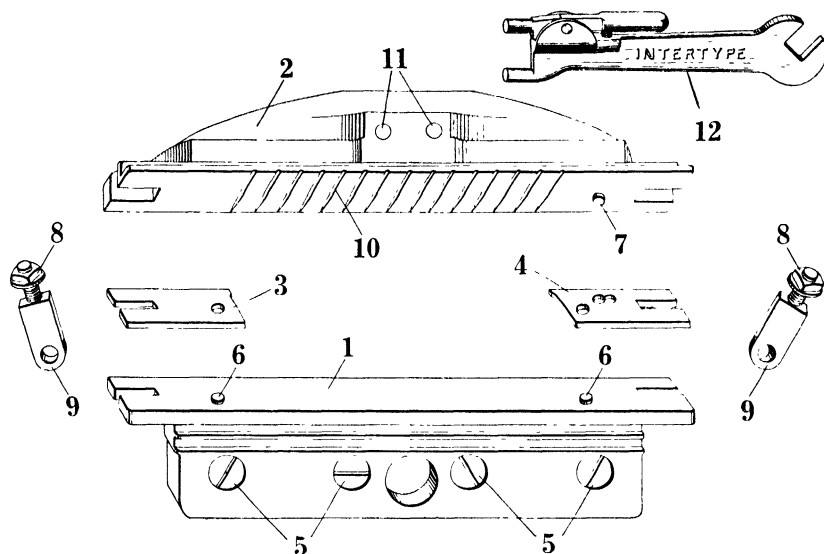


Fig. 39. An Intertype 30-Em Universal Adjustable Mold

and in length. The thickness of the liners determines the size of the body of the slug; the length of the left-hand liner determines the length of the slug. The underside of the mold cap 2 contains tapering grooves 10 which form ribs on the slug. These ribs are trimmed to accurate body size by the right-hand knife when the slug is ejected from the mold.

The triangular shelf mold cap 1, Fig. 40, is used mainly for the larger sizes of slugs from 10 to 48 points in body thickness. This type of cap is recessed a varying number of points, depending upon the size of the slug to be cast. The purpose of the recessing in the cap is to decrease the amount of type metal used in casting slugs and consequently to facilitate the process of "chilling" molten metal into slugs. The recessing in the cap is designed also to produce a solid triangular shelf of type metal under the face of the slug. This shelf, shown at 2, supports the face of the slug rigidly under dry mat pressure. A small adaptor or stop-off block 3 is used with this type of mold to stop off the type metal at the left-hand end of the mold cavity. The block is located by a small dowel 4, which fits into a hole 5 in the left-hand liner. Left-hand liners of any length made with this hole can be used with other Intertype molds. Intertype liners and ejector blades can be used interchangeably with universal adjustable molds, recessed molds, advertising figure molds and triangular shelf molds. These exclusive features of Intertype mold design lower operating costs and enable the operator to make mold changes quickly and efficiently.

To change the liners or mold cap on an Intertype mold, simply loosen nuts 8, Fig. 39, and swing the swivel bolts 9 away from the mold. The mold cap can then be lifted off by inserting the forked end of the mold cap wrench 12 in the two holes 11 in the mold cap. Remove the liners, wipe off the top of the mold

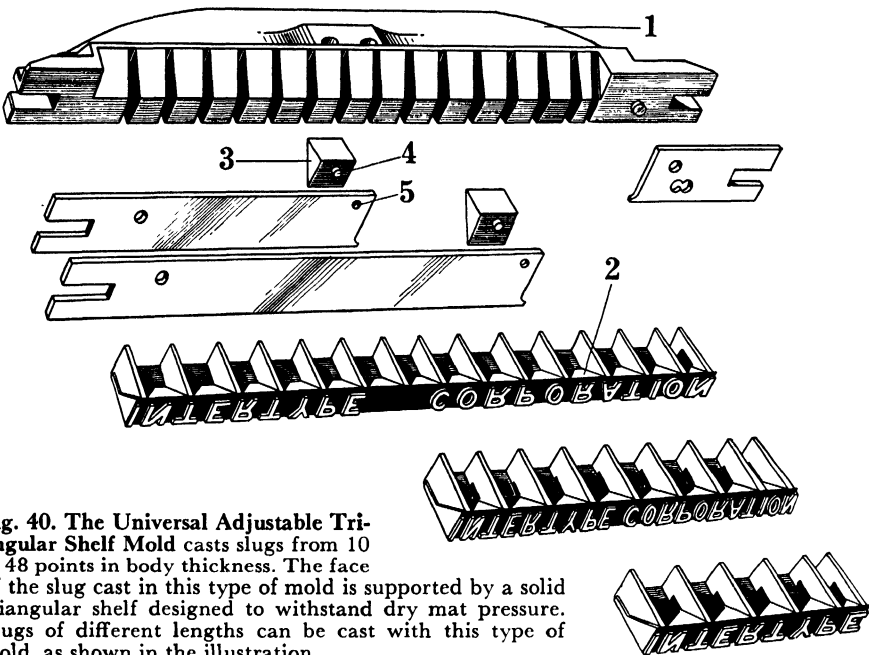
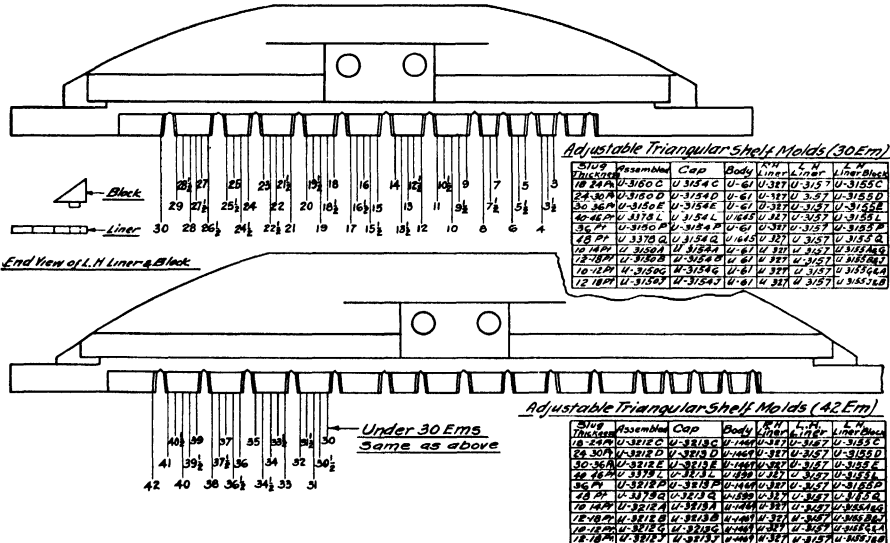


Fig. 40. The Universal Adjustable Triangular Shelf Mold casts slugs from 10 to 48 points in body thickness. The face of the slug cast in this type of mold is supported by a solid triangular shelf designed to withstand dry mat pressure. Slugs of different lengths can be cast with this type of mold, as shown in the illustration.



Lengths of Slugs which can be cast with Standard Adjustable Triangular Shelf Molds.
If any other lengths are required they must be specified when ordering.

body, insert the new liners and replace the mold cap. Swing the swivel bolts back to a vertical position and turn the nuts until they bind firmly but not too tightly on the mold cap.

Care of the Mold. Intertype molds are manufactured under rigid standards of precision which insure a high degree of accuracy in all important dimensions of the mold. If molds are used with the care and consideration which fine parts

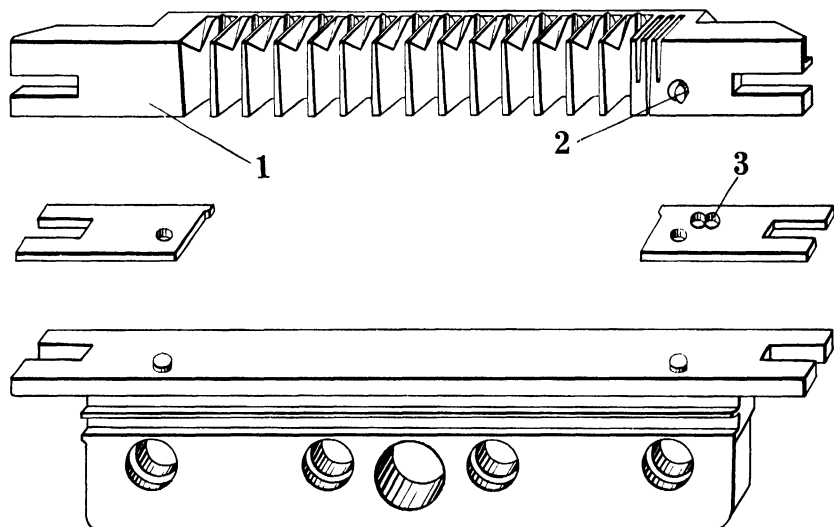


Fig. 41. View of the Old-Style Recessed Mold. Left-hand liners of different lengths can be used with this type of mold, making it possible to obtain large slugs of varying lengths, including half-em measures. This is accomplished by the use of an elliptical dowel 2 in the mold cap 1. The dowel fits into either of two intersecting holes 3 in the right-hand liner, enabling the operator to shift the mold cap from one position to another in order to align the ribs in the mold cap with the ends of the liners.

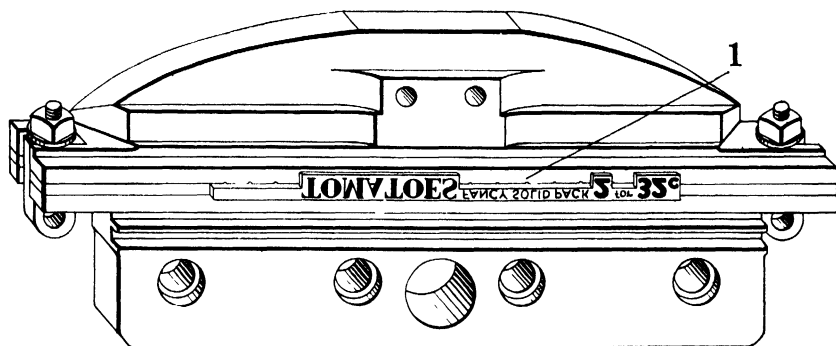


Fig. 42. The Advertising Figure Mold is used for casting large overhanging display characters on a slug body of smaller size. The overhanging characters cast against a wide lip 1 on the mold cap and are supported by the slug immediately following. The number of points it is possible to overhang on a mold of this type varies with the width of the lip on mold cap.

deserve, they will give satisfactory service. Molds are made of carefully tempered steel designed to withstand the normal casting temperature of the type metal. If excessive heat is applied to the mold, however, the temper will be drawn from the parts. For this reason, gas torches should not be used near the mold and *the machine should never be left with the pot mouthpiece against the mold for any length of time.*

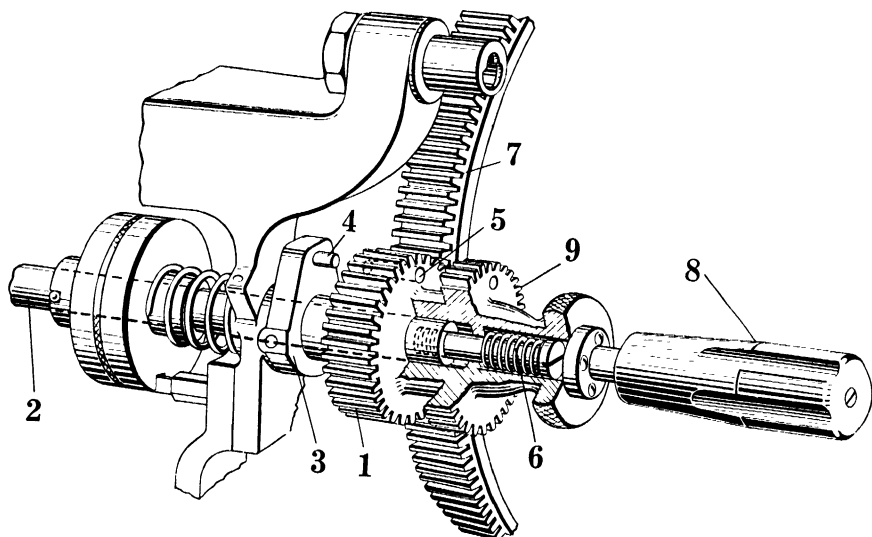


Fig. 43. Showing the Relationship Between the Mold Disk Driving Pinion and the Mold Driving Pinion Shaft. The shaft 2, as shown in Fig. 46, is turned by a series of pinions which are set in motion by two segments on the mold turning cam. Pinned to the front end of shaft 2 (this figure) is a flange 3 with a pin 4 in its front edge. The pin is normally seated in a hole 5 in the mold disk driving pinion 1 through action of spring 6, which continually urges the pinion towards the flange 3.

To change the mold by revolving the mold disk 7, simply pull out handle 8, which will disengage pin 4 from hole 5. The mold disk can be revolved by hand as long as handle 8 is held out. The mold disk is geared to the mold disk driving pinion at a ratio of four to one. To change from one mold to an adjacent mold, therefore, will require one full turn of pinion 1. When the desired mold on the disk comes to position, spring 6 will re-engage pinion 1 with pin 4.

When the vise frame is opened to first position, the mold disk can be pulled forward about two inches. The mold disk pinion 9 keeps the mold disk in time with the driving pinion when this is done. If the disk is entirely disengaged from pinions 1 and 9, however, always retine the disk by matching the punch mark on pinion 9 with one of the punch marks on the edge of the mold disk.

After the mold has been in use for a certain length of time, the casting surfaces of the mold body and cap will gradually become coated with a greyish film of oxide. This oxide film, commonly regarded as a detriment, is really of great benefit to the mold because it insures easy ejection of slugs. When the casting surfaces of the mold are new and perfectly clean, the steel has a considerable affinity to type metal. After twenty-five or thirty slugs are cast in rapid succession without permitting the mold to cool, ejection becomes difficult because the type metal adheres closely to the highly finished mold surfaces. It is this metal adhesion which must be prevented. There is a systematic procedure which should

be followed for "breaking in" a new mold. When the mold is placed on the mold disk, five to ten slugs should be cast and as soon as ejection becomes difficult, the mold should be permitted to cool for a few minutes. Eight to ten slugs can then be cast and the mold should be permitted to cool again. This process is carried on until the casting surfaces of the mold body and cap take on an oxide discoloration. The discoloration is of a brownish-red color at first and is usually obtained after about fifty slugs have been cast by the gradual process described above. As additional slugs are cast, the oxide film becomes greyish in color and extends from the back of the mold to the front. Once this film is formed, it will act as an insulating layer between the mold surfaces and the slugs and ejection will be easy from then on.

It is sometimes necessary to polish the mold in order to remove small particles of metal which adhere to the mold body and cap. When mold polish is used, it should be applied to the mold surfaces with a flat pine stick. The stick should be moved in circular strokes and should be held flat on the surface being polished. Tilting the stick will tend to round the edges of the mold. After the parts have been cleaned, remove the polish with a cloth. Most of the oxide film formed on the casting surfaces of the mold will be removed when mold polish is used. Consequently, before the mold is placed in use again, it should be subjected to the gradual "breaking in" process described above until a new film is formed.

The Mold Disk and Mold Disk Slide

The molds are mounted on the mold disk 1, Fig. 44, which has teeth 2 cut in its circumference. The mold disk is mounted on a stud 3, which passes through

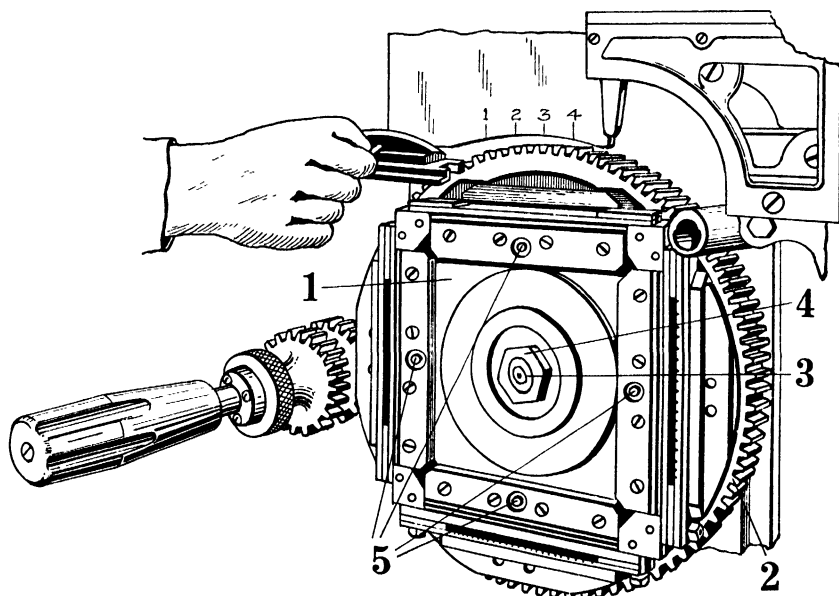


Fig. 44. Showing how an Intertype mold cap is removed when the liners are being changed. All parts of the mold are completely accessible for cleaning before new liners are inserted.

the center of the disk and is fastened at the front by a nut 4. At the rear of the disk the stud revolves in a bearing in the mold disk slide arm, 1, Fig. 45. A left-hand nut 2 on the end of the stud holds the mold disk in proper relationship to its bearing. On the outer end of the arm is mounted the back knife 3, which trims the slug to type height. The arm 1 is part of a casting known as the mold disk slide 4. The upper and lower edges of the slide are beveled and run in beveled bearings on the left side of the machine column. There is a semi-circular notch 5 at the rear end of the mold disk slide into which fits a roll on the mold cam lever (not shown). Another roll on the opposite side of the lever fits into a cam groove in the mold cam and driving gear. The mold cam lever is suspended at the top on a hinge pin in the mold cam lever handle. The lever can be raised far enough by means of the handle to disengage the roll from the notch in the mold disk slide. The slide and disk can then be pulled forward a few inches or removed entirely after disconnecting and removing the ejector lever link.

Movements of the Mold Disk and Mold Disk Slide. The mold disk, as stated above, is mounted on an arm which is part of the mold disk slide casting. The slide serves two main functions: it moves the mold disk forward to the vise frame and back from the frame at the proper time, and its arm serves as a bearing in which the mold disk stud is free to revolve. The mold disk makes a number of

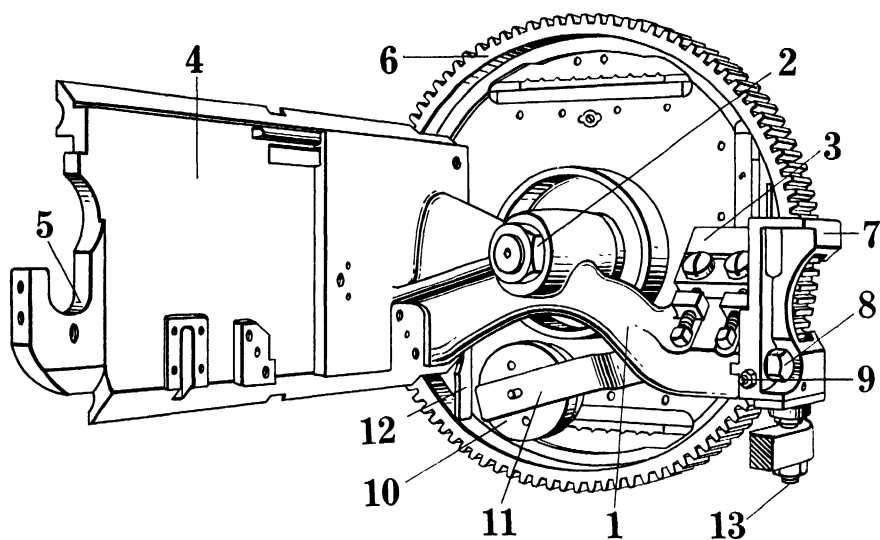


Fig. 45. Perspective View of the Mold Disk, Mold Disk Slide and Related Parts in Assembly. The movements of the mold disk slide 4 and the mold disk 6 are described fully in the text. The mold disk guide 7, fastened to the outside end of arm 1 by screw 8, steadies the mold disk when the base of the slug is being trimmed by the back knife 3. The guide should be set so that its front lugs contact the rim of the mold disk without binding. To obtain this adjustment loosen screw 8, turn screw 9 and tighten screw 8. Always make sure that guide 7 is correctly adjusted and that screw 8 is tight before attempting to adjust the back knife 3.

Inside container 10 is a wiper felt, which is held against the mold disk through action of spring 11. The function of the felt is to wipe the back of the molds as the disk revolves. The mold disk scraper 12 prevents metal shavings from lodging between the mold disk slide and mold disk.

forward, backward and rotary movements during one revolution of the cams. As the first elevator descends and carries the line of matrices and spacebands between the vise jaws, the mold disk turns one-quarter of a revolution, bringing the mold in use to a horizontal position in front of the matrix line. The mold disk then moves forward to within .010" of the matrix line, the toes of the matrices entering the alignment grooves in the mold body. First justification and vertical alignment of the matrices take place when the mold disk is in this position. After the first elevator has lifted the matrices slightly to align them vertically, the metal pot advances and pushes the mold against the matrix line, aligning the matrices facewise. The pot and the mold disk move back, providing freedom for second justification of the matrix line. The mold advances against the aligned and justified matrix line and then the pot locks against the back of the mold. After the slug is cast, the pot withdraws from the mold and the mold disk backs completely away from the vise frame. The mold disk turns three-quarters of a revolution, carrying the slug in the mold past the back knife to ejecting position. The mold disk moves forward again, its locking studs entering the stud block bushings on the vise frame. The slug is ejected from the mold and the disk backs away from the frame to normal position. The two rotary movements of the mold disk are caused by two segments on the mold turning cam, which engage a bevel pinion on a short shaft inside the mold gear arm. A spur gear on the bevel pinion shaft meshes with a pinion on the mold driving pinion shaft and turns the shaft whenever either segment engages the bevel pinion. The forward and backward movements of the mold disk and mold disk slide are caused by the mold cam, which moves the slide and disk through two rolls on the mold cam lever.

The Mold Disk and Mold Driving Mechanism

The mold disk, as described above, makes two rotary movements during one complete revolution of the cams. The disk turns one-quarter of a revolution, bringing the mold in use to a horizontal position in front of the matrix line in preparation for the cast. After the slug has been cast, the disk turns three-quarters of a revolution, carrying the slug in the mold to ejecting position. These partial revolutions are caused by a short segment 1, Fig. 46, and a long segment

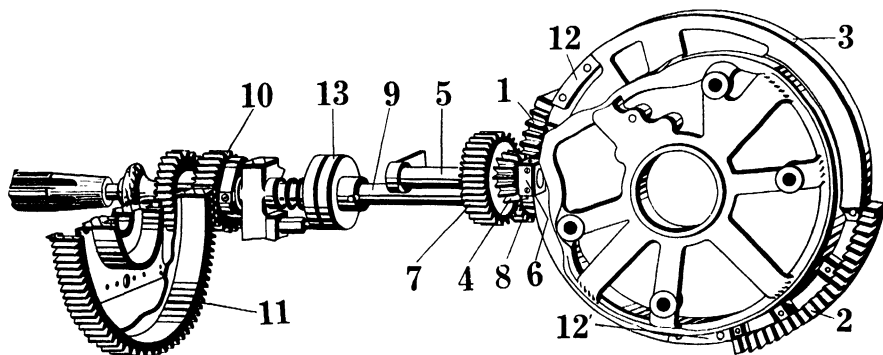


Fig. 46. Side View of the Vise Closing and Mold Turning Cam and the Mold Driving Mechanism in Assembly

2, which are fastened in different positions on the mold turning cam 3. During the revolution of cam 3, each segment meshes at the proper time with a bevel pinion 4 mounted on a shaft 5 inside the mold gear arm. A square block 6 and a spur gear 7 are attached to the bevel pinion. The spur gear is always in mesh with the mold driving pinion 8, which is pinned to the mold driving pinion shaft 9. On the front end of shaft 9 is mounted the mold disk driving pinion 10, which meshes with the teeth of the mold disk 11. When either segment meshes with the bevel pinion 4, shaft 9 revolves through action of spur gear 7 and pinion 8, causing the mold disk to turn through its connection with pinion 10. The short segment turns the mold disk one-quarter of a revolution and the long segment turns the disk three-quarters of a revolution.

When the mold disk completes each rotary movement, it must stop in such a position that the mold disk locking studs 5, Fig. 44, will be directly in line with the stud block bushings 1 and 2, Fig. 47, on the vise frame. The square block 6, Fig. 46, serves this function. The block has two hardened facings fastened on two of its sides. Just in back of each segment on the mold turning cam is mounted a steel shoe 12 and 12' held in place by screws passing through adjustable screw bushings (detail drawing, Fig. 50). As segments 1 and 2, Fig. 46, pass out of en-

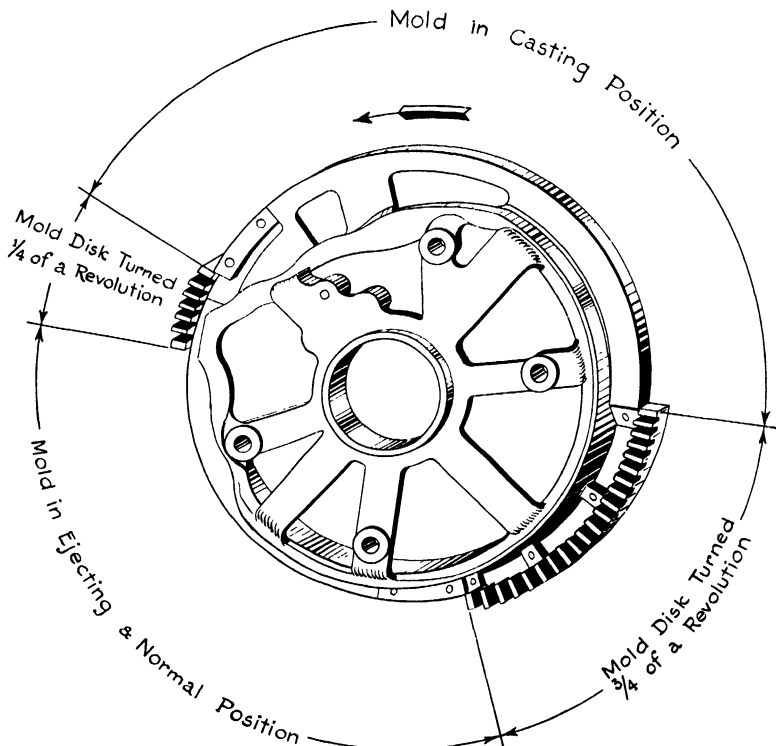


Fig. 46a. The Vise Closing and Mold Turning Cam, showing the parts of the mold turning cam which promote the rotary movements of the mold disk

gagement with bevel pinion 4, the facings on the square block engage shoes 12 and 12' snugly. This action stops the mold disk in such a position that its locking studs will enter the stud block bushings freely when the mold disk slide moves the disk forward to the vise frame at casting and ejecting position. Depressions

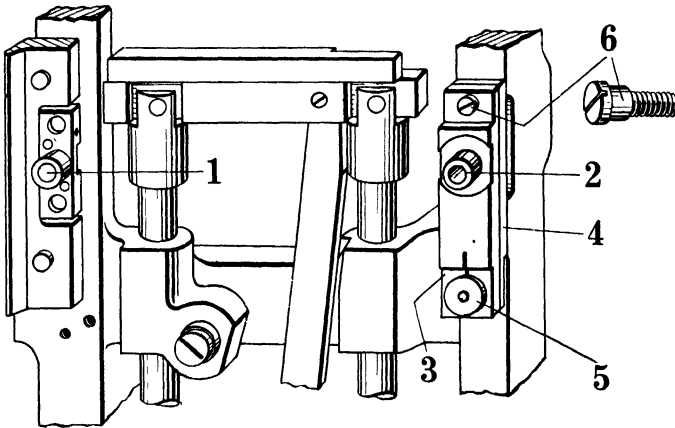


Fig. 47. Showing the mold disk locking stud bushings 1 and 2, which hold the mold disk in position when it is forward at casting and ejecting position. The right-hand bushing 1 is mounted on a single fixed block. The left-hand or floating stud block consists of two plates 3 and 4 joined at the bottom by a hinge stud 5. The upper end of plate 3 can move slightly from side to side as permitted by the shoulder on screw 6.

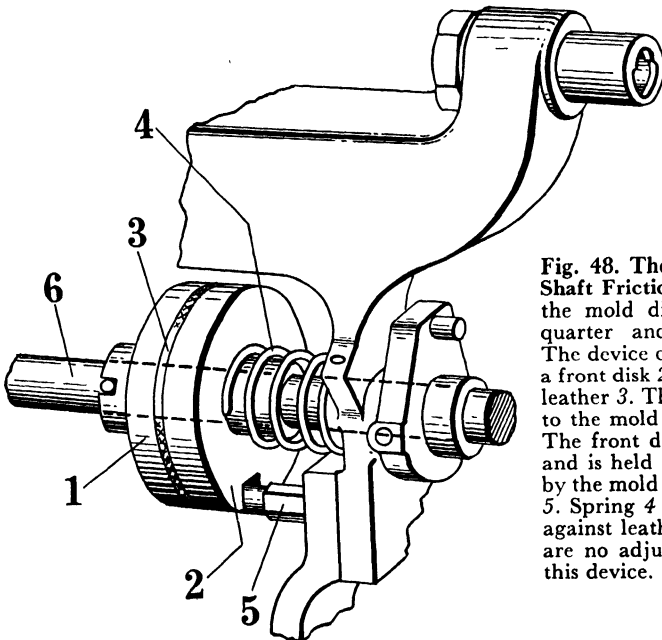


Fig. 48. The Mold Driving Pinion Shaft Friction Disk, which steadies the mold disk as it completes its quarter and three-quarter turns. The device consists of a back disk 1, a front disk 2 and a circular piece of leather 3. The back disk 1 is pinned to the mold driving pinion shaft 6. The front disk 2 is free on shaft 6 and is held in a stationary position by the mold gear arm support screw 5. Spring 4 constantly urges disk 2 against leather 3 and disk 1. There are no adjustments to be made on this device.

are provided at certain points on the mold turning cam to permit the square block to turn when the segments are in engagement with the bevel pinion. At the front end of shaft 9 is mounted a friction disk 13, which consists of two disks, a circular piece of leather and a spring. The purpose of this device is to take up any lost motion between the gears and pinions on the shaft and to steady the mold disk as it completes each rotary movement. The details of the friction disk are shown in Fig. 48.

Adjustments: The Back Knife. The function of the back knife 1, Fig. 49, is to trim the base of the slug so that the slug will be type high. The knife is clamped to the outer end of the mold disk slide arm 2 by two screws 3. The knife can be adjusted in relation to the back of the mold by means of two screws 4. The back knife should be set square with the back of the mold and its trimming edge should bear very lightly against the mold surfaces. A good method to follow in making this adjustment is to use red lead on the back of the mold. Wipe the mold surfaces with a clean cloth, apply a thin coat of red lead to the mold cap

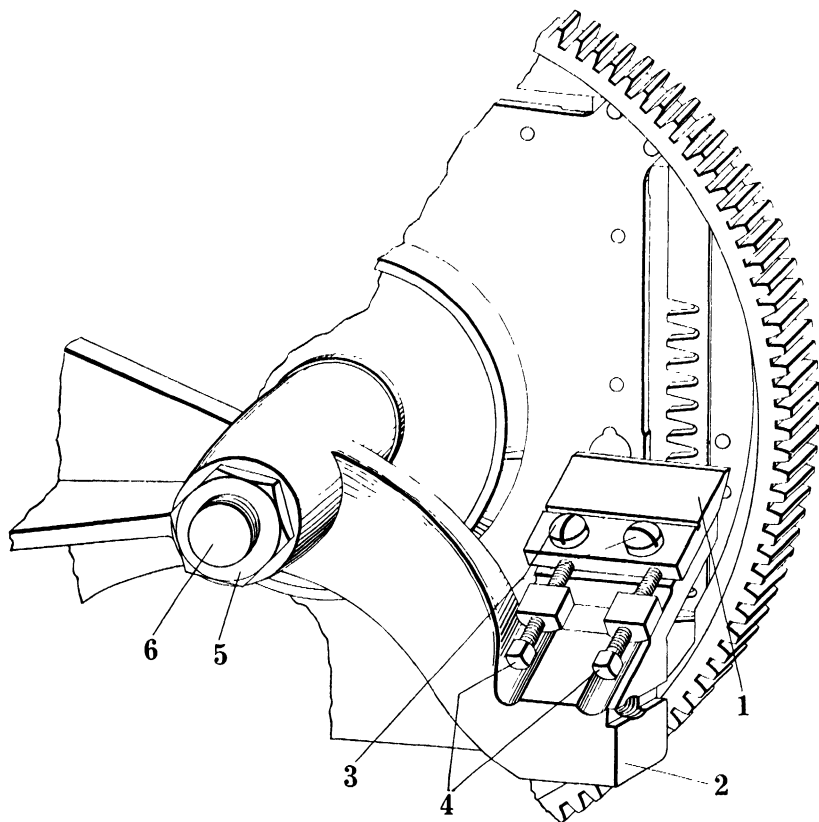


Fig. 49. View of the back knife, which trims the base of the slug so that the slug will be type high. The adjustment of the back knife is described in the text. Nut 5 screwed on the end of stud 6 holds the mold disk in proper relationship to its bearing in the mold disk slide arm 2. If it is necessary to remove the mold disk from its bearing, unscrew nut 5 from the stud. The stud and nut have left-hand screw threads.

and mold body and turn the disk slowly by hand until the red lead comes into contact with the knife. If the knife is set correctly, it will remove the red lead without binding against the surfaces of the mold.

The Mold Turning Cam Shoes. When the facings on square block 6, Fig. 46, engage the steel shoes 12 and 12' on the mold turning cam 3, there should be about .002" clearance between the parts. The clearance should not exceed this amount. This adjustment, which is the same for both shoes, can be obtained by means of two screw bushings threaded into the rim of the mold turning cam under each shoe. The shoe 12 in back of the short segment 1, Fig. 46, should be adjusted first. Remove screws 1, Fig. 50, adjust bushings 2 (detail drawing) and replace the shoe and the binding screws. Turn the machine forward by hand until the shoe engages the facing on the square block. The two parts should fit snugly with a very slight amount of clearance. In making this adjustment, it is important that the two bushings under shoe be turned an equal amount so that the shoe will be parallel with the facing on the square block. After the shoe has been adjusted for clearance, therefore, check its parallelism by measuring with a micrometer the distance from the outside surface of the cam to the inside surface of the shoe at both ends of the shoe as indicated by the curved arrows, Fig. 50. The measurements must be the same at both ends. The same method should be followed in setting the shoe in back of the long segment.

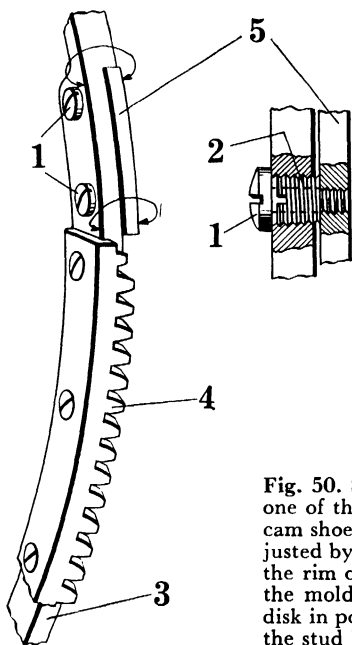


Fig. 50. Section of the rim of the mold turning cam 3, showing one of the mold turning segments 4 and one of the mold turning cam shoes 5. The detail drawing shows how the shoe 5 can be adjusted by means of adjustable screw bushings 2 threaded through the rim of the mold turning cam. These shoes engage facings on the mold turning bevel pinion square block and stop the mold disk in position so that the mold disk locking studs will align with the stud block bushings on the vise frame.

The Mold Disk Slide and Related Mechanisms

The forward and backward movements of the mold disk and mold disk slide, as stated previously, are promoted by a cam groove known as the mold cam, which moves the slide and disk through two rolls on the mold cam lever. The mold cam lever 1, Fig. 51, is pivoted at the top on a hinge pin 2 in the mold cam lever handle 3. Mounted on an eccentric stud 4 at the bottom of the lever is a cam roll 5, which runs in the cam groove in the mold cam and driving gear 6. On the opposite side of the lever is mounted another roll 7, which fits into a semi-circular notch at the rear end of the mold disk slide 8. As cam 6 revolves, the shape of the cam groove causes roll 5 to move the slide and disk forward and backward through roll 7 on lever 1. The five main forward and backward move-

approximately .010" in thickness.) Turn the machine forward by hand until roll 5, Fig. 51, is on the high point of shoe 9. When the machine is in this position, the paper strips should bind slightly as they are pulled upward. If the paper strips bind too much or do not bind at all, the stud 4 is out of adjustment. The stud can be turned in its bearing by means of a handle 12 after nut 13 is loosened. Pushing the handle towards the front of the machine will draw the mold away from the vise jaws; pulling the handle towards the back of the machine will move the mold closer to the vise jaws. After the adjustment has been obtained, tighten the nut on the stud, being careful that the stud does not move while tightening the nut. In replacing the first-elevator back jaw, make sure that it is flush at both ends with the front jaw.

The mold cam roll eccentric stud adjustment is a basic setting and should be checked periodically to make sure that it is always correct. Proper justification and alignment of matrix lines depend to a great extent upon the condition of this adjustment. Like other basic settings on the machine, *the mold cam roll eccentric stud adjustment should be positive at all times.*

Mold Cam Lever Handle. Threaded through the mold cam lever handle 3, Fig. 51, is a screw 14, which banks against stop pin 15. The purpose of the screw is to take up any lost motion when the mold withdraws with the slug. With the

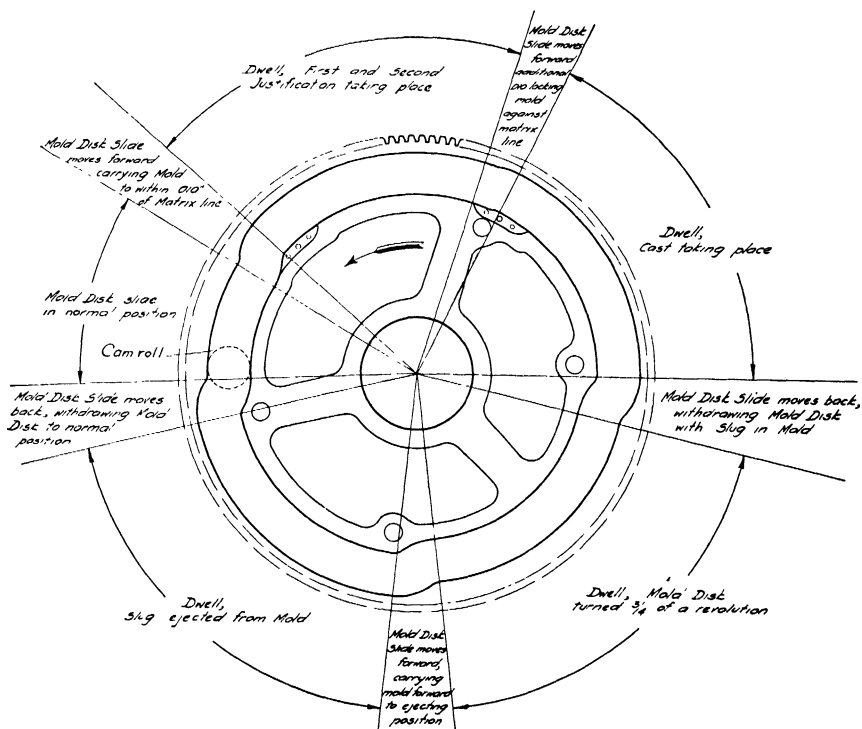


Fig. 51a. The Mold Cam and Driving Gear, showing the surfaces of the mold cam which promote the forward and backward movements of the mold disk and mold disk slide.

machine in normal position, adjust screw 14 until there is about .010" play between the screw and pin 15, then tighten the nut on the screw.

Mold Disk Guide Support Screw. Mold disk guide support screw 13, Fig. 45, serves as a bearing for the mold disk guide 7 and it supports the mold disk slide 4 on the left-hand side. The screw should be adjusted in relation to the guide so that when the disk 6 moves forward to the vise frame, the mold disk locking studs will enter the stud block bushings on the vise frame smoothly. To obtain this adjustment, run the machine ahead until the first elevator seats on the vise cap. Pull out stop pin 15, Fig. 51, and depress the mold cam lever handle 3. Pull the mold disk forward until the locking studs enter the stud block bushings on the vise frame. Turn screw 13, Fig. 45, until the circular disk on top of the screw just touches the mold disk guide 7. Push the disk back and pull it forward a few times to observe whether the locking studs enter the stud block bushings freely. If they do not, adjust screw 13 until the required condition is obtained, then tighten the nut on the screw.

Mold Disk Slide Safety Attachment

The purpose of the mold disk slide safety attachment is to stop the machine automatically when the mold disk is prevented from making its normal forward movement to the vise frame at casting position. There are a number of obstructing conditions which will interfere with the normal operation of the mold disk and the mold disk slide. If a display mold is placed in operation and the first-elevator alignment stop bar is not moved to the proper position, the mold cap will bank against the first-elevator jaw and will prevent the mold disk from moving forward. Similarly, if a matrix or spaceband lodges between the mold disk and the vise frame, the normal forward movement of the mold disk and slide will be obstructed. The mold disk slide safety attachment is designed to stop the machine automatically when any of these abnormal conditions is present. When the obstruction is removed, the machine operates as though the safety device were not present.

First Style Mold Disk Slide Safety Attachment. The first style safety attachment operates the clutch mechanism through mold cam safety lever 7, Fig. 52, which is pivoted on the mold cam lever 1. As was described previously, the mold cam lever connects the mold disk slide 2 with the mold cam 3 through two rolls 5 and 6. Roll 6 is mounted on an eccentric stud in the mold cam lever. Roll 5 is mounted on the mold cam safety lever 7, which is pivoted on a hinge pin 8 in the mold cam lever 1. Spring 9 holds safety lever 7 in the proper position with respect to lever 1 and also establishes a positive relationship between rolls 5 and 6. The purpose of the spring is to permit overmotion if the forward movement of the mold disk is obstructed. In the normal operation of the machine, the mold cam 3 moves the mold disk and mold disk slide forward to casting position when roll 6 is on the high point of shoe 4. If nothing obstructs the movement of the mold disk and slide, the machine will complete its revolution as though the safety device were not present.

When the mold disk is prevented from making its normal forward movement to the vise frame, however, the mold disk slide is held back a corresponding dis-

tance and becomes immovable. As shoe 4 contacts roll 6, therefore, the pressure which normally moves the slide and disk forward is transferred to the mold cam safety lever 7. Roll 5, banking against the immovable slide 2, causes safety lever 7 to swing through a small arc until the lower end of the lever banks against the mold disk slide safety stop lever 10. Spring 9 permits the overmotion necessary for the movement of safety lever 7. Lever 10 is pivoted on a hinge pin 11 in a fixed bracket 12. The lower end of the lever bears against screw 13 in the automatic stop forked lever 14. The forked lever in turn bears against flange 15 on driving shaft 16. Links 18 and 18' then draw friction buffers 19 and 19' away from the inner rim of driving gear pulley 20, thereby stopping the machine. Whenever the mold disk slide safety attachment operates, it is necessary to back the machine in order that the obstruction to the forward movement of the mold disk can be removed. At the same time, spring 9 will return lever 7 and roll 5 to normal position.

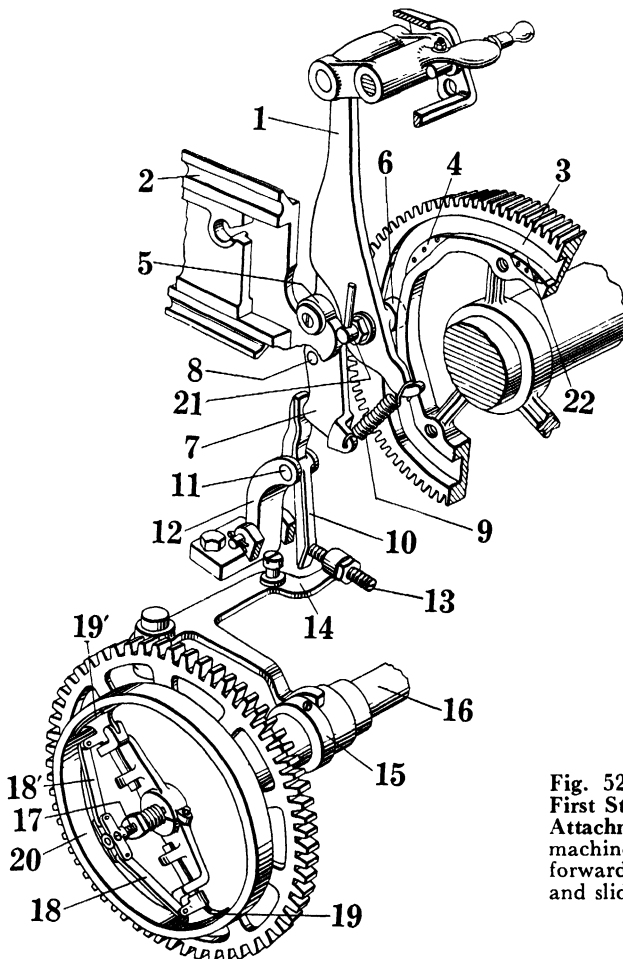


Fig. 52. Perspective View of the First Style Mold Disk Slide Safety Attachment. This device stops the machine automatically when the forward movement of the mold disk and slide is obstructed.

Adjustment of First Style Mold Disk Slide Safety Attachment. Two basic adjustments should be checked before setting the mold disk slide safety attachment. First, see that the mold cam roll eccentric stud 21, Fig. 52, is adjusted so that when roll 6 is on the high point of shoe 4, the face of the mold will advance to within .010" of the vise jaws. Next, see that there is 15/32" space between flange 15 and the bearing in the cam shaft bracket and that there is 1/32" space between flange 15 and forked lever 14 when the starting and stopping lever is pulled all the way out. If these basic adjustments are correct, turn the machine forward by hand until roll 6 is on the high point of shoe 22. With the starting and stopping lever out and the power off, adjust screw 13 until there is 1/32" space between the end of the screw and lever 10, then tighten the nut on the screw. A dummy mold should be placed in operating position while this adjustment is being made because the mouthpiece will be locked against the back of the mold. A regular mold would be overheated by the mouthpiece.

To check the setting, turn the machine forward by hand until the first elevator descends to the vise cap and before the mold disk moves forward. Place a 1/16" obstruction between the mold and the vise jaws. With the power off and the starting and stopping lever out, turn the machine forward by hand. The clutch rod 17 should draw the friction buffers away from the driving pulley when the mold contacts the obstruction. The adjusting screw 13, should not be adjusted too close to lever 10. If there is less than 1/32" clearance between the parts at casting position, the friction buffers 19 and 19' will be moved away from the driving pulley 20 and the machine will stall.

New Style Mold Disk Slide Safety Attachment. The new style attachment operates the clutch mechanism through the upper stopping lever 1, Fig. 53. Extending to the right and forming part of the lever casting is a bracket, in the outer end of which is machined a square slot. The mold slide safety stop 2 is placed in the slot and is held in position by a cover 3. An extension 4 is fastened to stop 2. Threaded through the extension is an adjusting screw 5, which banks against plate 6 fastened to the end of the mold disk slide 7. Spring 8, fastened to extension 4 at the rear and to a pin at the front, constantly urges stop 2 and extension 4 towards the front of the machine. Screw 5 is thereby held in contact with the banking plate 6 on the mold disk slide 7. As the slide moves forward and backward, therefore, the safety stop 2 will move a corresponding distance. The safety stop dog 9, fastened to the delivery and elevator transfer cam 10, operates the mold disk slide safety device when the mold disk is prevented from making its normal forward movement at casting position.

In the normal operation of the machine, the mold cam roll 11 moves the mold disk slide 7 forward at casting position through the mold cam lever roll 12. If the slide moves forward all the way, safety stop 2 will move forward far enough to clear dog 9 on cam 10. If the normal forward movement of the mold disk is obstructed, however, the mold disk slide is held back a corresponding distance. This leaves stop 2 directly in line with dog 9. As cam 10 turns, dog 9 banks on the top of stop 2 and depresses the stop. Since the stop is mounted in the upper stopping lever casting, the lever 1 is depressed and the machine is stopped in the regular way. When the machine is backed up, the obstructing condition can be corrected and at the same time, stop 2 will assume its proper position. The

mold cam safety lever spring 14 serves the same function on the new style attachment as it did on the old style device. The spring permits the overmotion necessary for the movement of safety lever 13, which is pivoted in the same way on the mold cam lever.

Adjustment of New Style Mold Slide Safety Attachment. As in the case of the first style safety attachment, the mold cam roll eccentric stud setting and the clutch adjustments should be checked before attempting to adjust the new style attachment. When these settings have been verified, the mold slide safety stop 2, Fig. 53, can be adjusted by means of screw 5. Turn the machine forward by hand until the mold cam roll 6, Fig. 52, is on the high point of shoe 4. Adjust screw 5, Fig. 53, so that stop 2 just clears dog 9, then tighten the nut on the screw. The clearance between the stop and the dog should not exceed $1/64''$. It

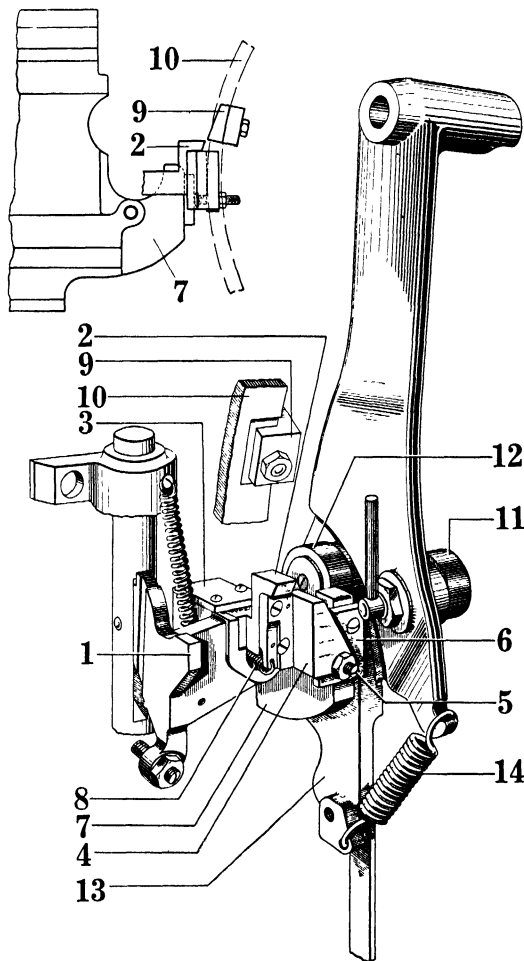


Fig. 53. The New Style Mold Slide Safety Device. This device stops the machine directly through the upper stopping lever. Like the first style device, it functions automatically when the forward movement of the mold disk and slide is obstructed.

is essential that the stop 2 move freely in its bearing at all times. The stop should be cleaned occasionally and lubricated with a light oil which will not gum.

Vise Closing and Justification Mechanism

Up to this point, the line of matrices and spacebands has been positioned between the vise jaws by the first elevator. The mold disk has turned one-quarter of a revolution, bringing the mold in use to a horizontal position in front of the matrix line. The mold disk slide has moved the mold disk forward to within .010" of the matrix line, the toes of the matrices entering the alignment grooves in the mold body. When the machine has reached this point in its revolution, the justification mechanism begins to justify (spread out) the matrix line in preparation for the cast. The length of the matrix line is usually shorter than the measure being set. The average line sent into the casting mechanism may be from one to three ems shorter than its ultimate length on the slug. This variation or slack in the length of matrix lines is taken up by the spacebands, which spread the lines out tightly between the vise jaws. As explained previously, the spaceband consists of a short sleeve and a long wedge. The short sleeves of the spacebands are held in position in the first-elevator jaw by their lugs so that only the long wedges can move during justification of the line. As the wedges of the spacebands are driven upward, the matrix line is spread out until the space between the vise jaws is filled. Every line of the measure being set is thus justified to the positive and uniform length provided between the vise jaws.

The upward movement of the spacebands which spreads the matrix line out tightly between the vise jaws is caused by the vise justification block 4, Fig. 54. The block is actuated on each side by a separate lever and cam assembly. The

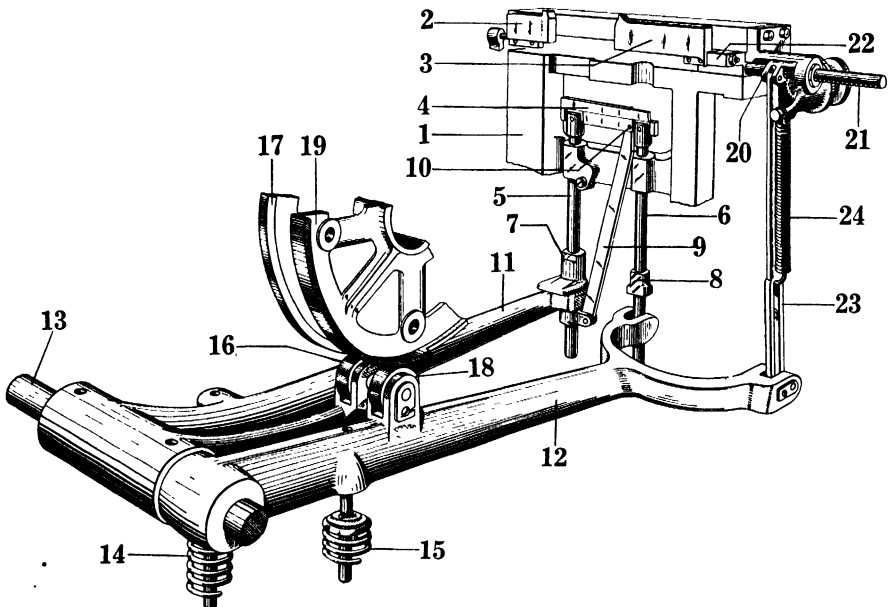


Fig. 54. Perspective View of the Justification and Vise Closing Mechanism in Assembly

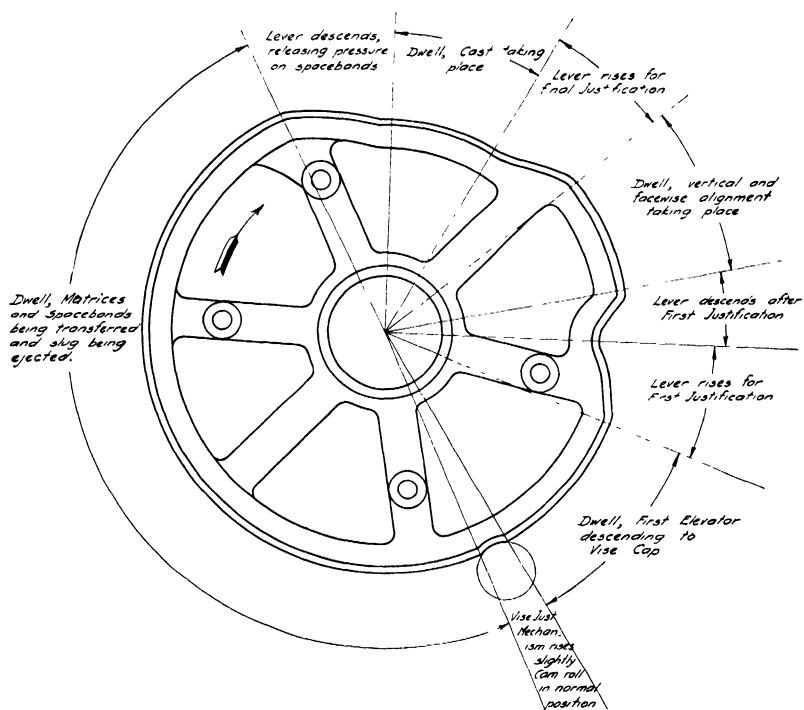


Fig. 54a. The Justification Cam, showing the surfaces of the cam which promote the main movements of the justification lever

justification lever 11, following the contour of the justification cam 17 through roll 16, operates the left side of the justification block 4.* The vise closing lever 12, following the contour of the vise closing cam 19 through roll 18, operates the right side of block 4. Both levers are pivoted on a shaft 13 at the rear of the machine. The cam rolls on the justification and vise closing levers are held in contact with their respective cams through action of two large compression springs. Spring 14 holds cam roll 16 in contact with cam 17 and spring 15 fulfils the same function with respect to cam roll 18 and cam 19.

The arrangement of the vise justification mechanism provides for an inclined position of the vise justification block 4, Fig. 54. The block is fastened to a bar which is pivoted at each end on two rods 5 and 6. These rods move vertically in bearings in the vise frame 1. Pinned to the lower end of the first vise justification rod 5, is a collar 7, which rests on the front end of the justification lever 11. A collar 8 is pinned also to the lower part of the second vise justification rod 6. As shown in the illustration, this collar is *not* in contact with the vise closing lever 12 when the machine is in normal position. Consequently, the normal position of the vise justification block 4 is inclined, the left-hand end of the block resting higher than the right-hand end. The vise justification bar brace 9 supports the

*All mechanisms referred to in Fig. 54 are being viewed from the rear of the machine, as shown in the illustration. The only exception is the left and right vise jaws, which are so designated.

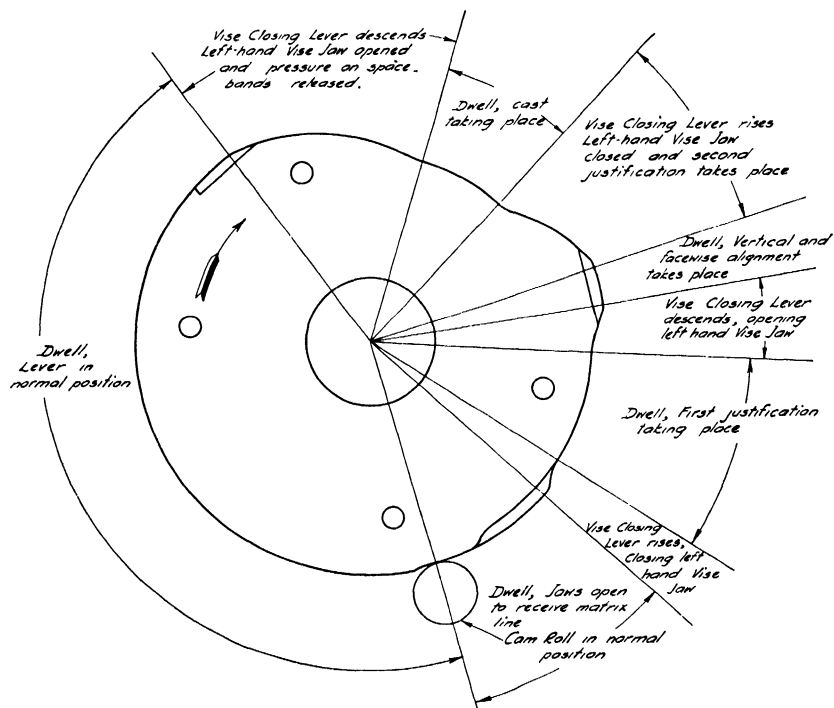


Fig. 54b. The Vise Closing Cam, showing the surfaces of the cam which promote the main movements of the vise closing lever

right-hand side of the justification block 4. There is a beveled notch in the upper end of brace 9 through which a shoulder screw 10 passes. The screw can move slightly in the notch, providing overmotion on the right side of block 4. This overmotion is necessary during second justification, when the right-hand end of the block is raised level with the left-hand end. The amount of movement provided for screw 10 is just enough to permit the justification block to assume a horizontal position.

In addition to operating part of the vise justification mechanism, the vise closing lever 12, Fig. 54, also operates the vise closing attachment. The purpose of the attachment is to close and to open the left-hand vise jaw 3 during justification and after the cast. The vise closing screw 20, operating in a threaded bearing, moves the left-hand vise jaw towards and away from the matrix line through rack 21 and block 22. The vise closing screw is connected to a rod 23, which is attached to the front end of the vise closing lever 12 by a hinge pin. The vise closing spring 24, attached to the connecting rod 23 and to the vise closing bracket at its upper end, pulls the connecting rod upward as permitted by lever 12. Whenever the vise closing lever rises, therefore, screw 20 closes the left-hand vise jaw 3 through rack 21 and block 22. Whenever the vise closing lever descends, screw 20 opens and the left-hand vise jaw is permitted to move away slightly from the matrix line. The right-hand vise jaw 2 has a slight idle movement but occupies a constant position during justification.

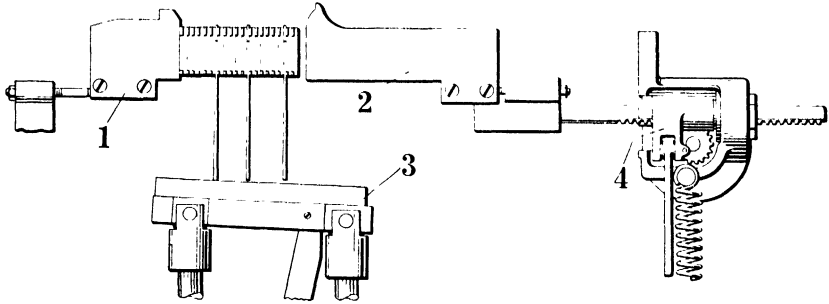


Fig. 55. Showing the vise justification mechanism just before first justification. The line of matrices and spacebands has been positioned between the vise jaws 1 and 2 by the first elevator. The inclined position of the vise justification block 3 is also shown. The vise closing screw 4 is open.

Justification Movements. The justification of the matrix line is accomplished by two upward movements of the vise justification block 4, Fig. 54. The first upward movement of the block is controlled by the justification lever 11, which operates the left side of the vise justification mechanism. The justification block 4, as shown in the illustration, rests normally in an inclined position, with its left-hand end higher than its right-hand end. When the justification lever rises for the first justification stroke, therefore, the justification block, operated only on the left-hand side, is moved upward at an angle corresponding to its original inclined position. The spacebands assume this angle at the end of the first justification stroke. As shown in Fig. 56, the spaceband at the left of the line is driven up further than those at the right. After first justification, the cams depress the justification and vise closing levers, lowering the vise justification block as shown in Fig. 57.

There is a definite reason for justifying the line in the manner just described. As stated previously, the length of the matrix line is usually shorter than the measure being set: the average line sent in to the casting mechanism may be from one to three ems shorter than its ultimate length on the slug. When the first

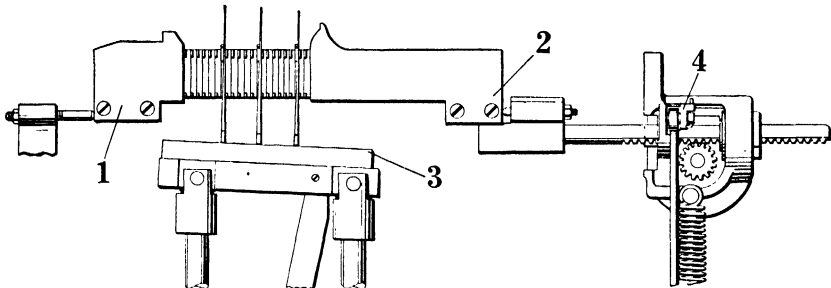


Fig. 56. Showing the matrix line at first justification. The vise closing screw 4 has closed, and the left vise jaw 2 has been moved in to the proper length. The justification block 3 has been raised on an inclined plane by the justification lever. The angular stroke of the block has driven the spacebands upward consecutively, those near the right-hand jaw 1 being driven up higher than those near the left-hand jaw 2.

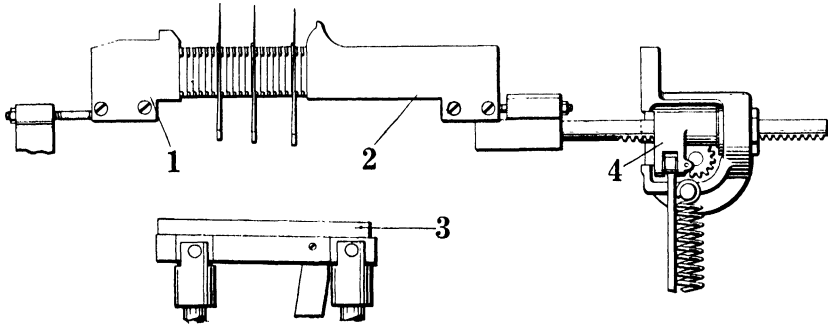


Fig. 57. Showing the vise justification mechanism after first justification. The justification block 3 has lowered, releasing the upward pressure on the spacebands. The vise closing lever has opened the vise closing screw 4, releasing the sidewise pressure of the left vise jaw 2 from the matrix line. These movements provide freedom in the matrix line for vertical and facewise alignment.

elevator descends and carries the line between the vise jaws, however, the right-hand end of the line is always presented in a positive position with respect to the right-hand vise jaw. If the casting stroke of the delivery slide is set properly, the last matrix on the right of the line will be positioned fairly close to the right-hand vise jaw. This relationship between the jaw 1 and the matrix line is shown in Fig. 55. If the line is shorter than the measure being set, therefore, the slack between the jaws and the line will occur at the left. This slack is represented in Fig. 55 by the space between the left-hand vise jaw 2 and the matrix line. Since the variation in the length of the matrix line always occurs at the left, the first upward stroke of the justification block must help the spacebands to move towards the left-hand vise jaw. The angular stroke of the block at first justification is designed to facilitate this movement. As shown in Fig. 56, the block 3 is tilted toward the left-hand vise jaw 2 at the end of the first justification stroke. The spacebands have been pushed up consecutively from the right vise jaw toward the left vise jaw, thereby moving the matrix line in the required direction.

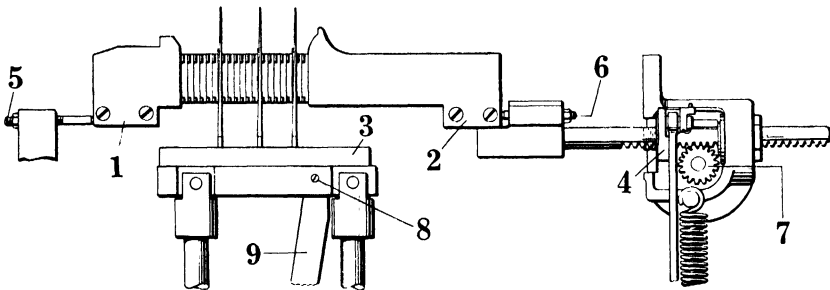


Fig. 58. Showing the matrix line at second justification. The vise closing screw 4 has closed again, and the left vise jaw 2 is moved forward to the exact length of line to be cast. The justification block 3 has been raised on a horizontal plane by the vise closing lever and the justification lever. The horizontal position of the block is determined by screw 8, which moves in a beveled notch in brace 9. In rising the second time, the block contacts the spaceband nearest the left-hand jaw 2 first and the rest in succession.

The second upward movement of the justification block is controlled by the justification lever and the vise closing lever, which lift the vise justification block on both sides. The position of the block during second justification, as stated previously, is regulated by screw 10, Fig. 54, which passes through a beveled notch in the upper end of brace 9. The screw permits the justification block to rise just high enough to assume a horizontal position. After the matrix line has been aligned vertically and facewise, the vise closing lever 12 rises, permitting screw 20 to close the left-hand vise jaw 3. The lever continues its upward movement and raises the right end of the justification block 4 until the block assumes a horizontal position, as permitted by screw 10. Then the justification lever 11 and the vise closing lever 12 rise together, raising the justification block on a horizontal plane as shown in Fig. 58.

The force of the second justification stroke is exerted against the spaceband at the extreme right of the line first and then successively against the others. If the matrix line has been left fairly loose after first justification, the spacebands will be driven up a uniform distance at the end of the second justification stroke. In some instances, however, the length of the matrix line is so close to the measure being set that the line is practically justified after the first justification stroke. The force of the second justification stroke in these cases will be exerted against only one or two of the spacebands at the right of the line. It is important to note, however, that the position of the justification block during its second upward movement is horizontal. The block does not begin to rise until the vise closing lever has raised the low end of the block level with the high end.

The purpose of the vise closing attachment, as stated previously, is to open and close the left-hand vise jaw during justification and after the cast. The movement of the jaw in relation to the matrix line is highly important. Between first and second justification, a slight amount of freedom between the vise jaws and the matrix line is necessary so that the matrices can be aligned vertically

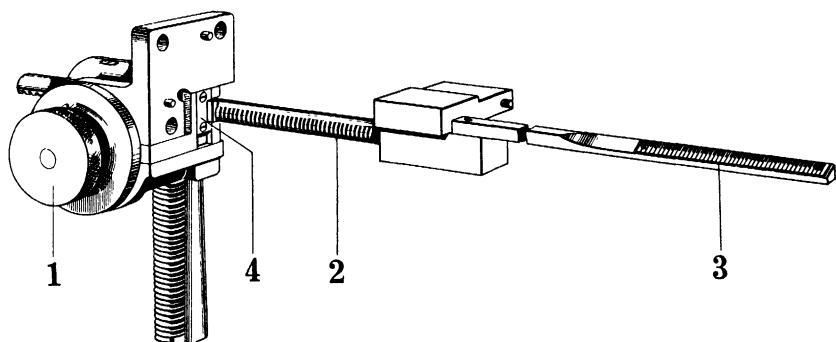


Fig. 59. The Vise Adjusting Mechanism. The distance between the vise jaws is set by pulling out the vise adjusting knob 1, and turning the knob in the desired direction. The knob is connected with a pinion 7, Fig. 58, which meshes with notches in rack 2 (this figure). As the knob is turned, the position of the left vise jaw is changed and the measure is indicated by scale 3, which registers with a banking plate at the right of the vise cap. When the knob is released, a compression spring causes detent 4 to enter the proper notches in rack 2, locking the setting of the left-hand jaw.

and facewise. Similarly, after the cast the sidewise pressure of the vise jaws against the matrix line must be released so that the first elevator can lift the line from between the jaws without friction. Besides performing these functions, the vise closing attachment also closes the left-hand vise jaw to the exact length of line to be cast. After the first elevator has positioned the matrix line between the vise jaws and the mold disk has moved forward to within .010" of the line, the vise closing lever rises, permitting the vise closing screw to close the left-hand vise jaw. The vise closing screw 4 is shown in this position in Fig. 56. Immediately following the closing of the jaw, the line is justified for the first time. The justification lever is then depressed by its cam and the vise justification block 3,

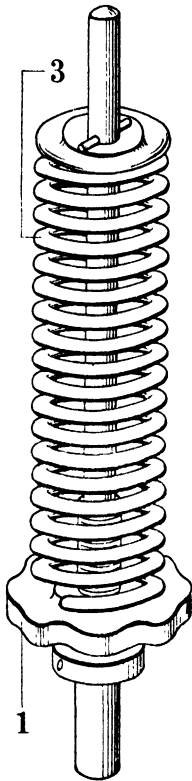
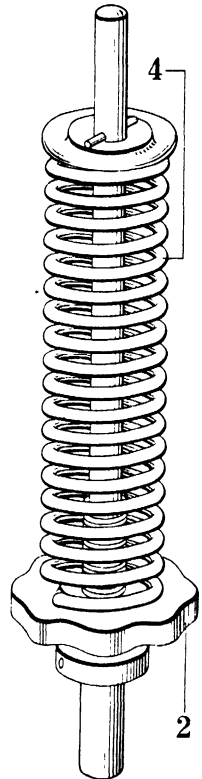


Fig. 57, is lowered. At this time the vise closing screw 4 is opened by the vise closing lever and rod, permitting the left-hand vise jaw 2 to withdraw slightly from the matrix line. This provides sufficient freedom so that the matrices can be aligned vertically and facewise in relation to the mold. Directly following facewise alignment, the vise closing lever rises, permitting the vise closing screw 4, Fig. 58, to close the left-hand vise jaw 2. Second justification then takes place, the justification block 3 rising on a horizontal plane. After the slug has been cast and just before the first elevator begins to raise the matrix line from between the vise jaws, the vise closing lever descends, permitting the left-hand vise jaw to move away slightly from the matrix line. This movement enables the first elevator to lift line freely from between the vise jaws.

Fig. 60. The Justification and Vise Closing Lever Springs, showing the collars 1 and 2 which can be turned by hand to adjust the tension of the springs. The justification lever spring, which is the heavier of the two springs, is shown at 3. The vise closing lever spring is shown at 4.



Adjustment of Vise Jaws. The vise jaws should be adjusted so that the type line will be flush at each end with the body of the slug. Each jaw is separately adjustable. The right-hand jaw 1, Fig. 58, is adjusted by means of screw 5 and the left-hand jaw 2 by means of screw 6. To adjust the jaws, place a 30-cm mold in operating position and set the vise jaw cm scale and the assembler slide scale on 30 cms. Lock the spaceband lever pawl latch, assemble a line of matrices and spacebands and send the line over to the casting mechanism. Cast a slug after each adjustment of the jaws to observe the position of the type line in relation to the ends of the slug. The right-hand or constant jaw should be adjusted first.

Justification Springs. The justification springs can be adjusted for tension by means of adjusting collars 1 and 2, Fig. 60. The collars can be turned by hand to secure more or less tension on the springs. When the springs have been adjusted to suit the average range of work done on the machine, readjustment will rarely be necessary. In general, a long matrix line containing seven or eight spacebands should be spread out fully between the vise jaws at the end of the first justification stroke. Stop the machine at this point, grasp a spaceband at each end of the line and try to pull them upward. If they cannot be moved easily, the spring tension may be regarded as correct.

To remove the justification or the vise closing spring, insert a rod in the hole in the bottom of the sleeve and through the spring rod. It may be necessary to turn the collars on the springs and to depress the levers in order to align the holes in the sleeves with the holes in the rods. Turn the machine forward until the cam rolls on the levers are directly under the deepest depressions in the cams. The levers can then be raised and the assembled springs and rods can be lifted from the machine. Be careful not to transpose the springs when replacing them, because matrix lines will not be justified properly. The heavier spring belongs under the justification lever 11, Fig. 54. The vise closing spring is made from the lighter wire.

Maintenance. The parts of the justification and vise closing mechanism should be cleaned and lubricated regularly in order to keep them working freely. The face of the vise jaws should be cleaned each day to remove any small metal or oxide adhesions. The vise justification rods 5 and 6, Fig. 54, should be cleaned with gasoline when dirt and gum begin to accumulate. A light film of oil on the rods is beneficial. There are four oil holes in the justification and vise closing levers which should be oiled weekly. Two of the holes provide oil for the justification and vise closing lever shaft 13, Fig. 54, and the other two lubricate the top of the rods in springs 14 and 15. Oil holes are provided for the cam rolls 16 and 18 and for the vise closing screw 20. These parts should be oiled weekly. The surfaces of the justification cam 17 and the vise closing cam 19 should be kept clean at all times. Spacebands should be polished with dry graphite every eight hour run. It is essential that the wedges of the spacebands operate freely in the spaceband sleeves in order to obtain smooth and uniform justification.

The Pump Stop

The purpose of the pump stop is to prevent the pot pump plunger from making its casting stroke when the matrix line is too short to justify or when the space between the vise jaws is not completely filled. The pump stop consists mainly of the pump stop lever 1, Fig. 61, which is moved under a block 2 fastened to the pot pump lever 3. The pump stop lever 1 is pivoted on a stud 4. The beveled end of the lever rests directly above a collar 5 fastened to the operating rod 6. The lower end of the operating rod is inserted in a slot in the justification lever 8. In the normal operation of the machine, the justification lever raises the justification block 9 until the matrix line is spread out tightly between the vise jaws by the spacebands. The friction of the spacebands then stops the upward movement of the justification block 9 and the justification lever 8. Since the jus-

tification lever does not make a full upstroke when the line is properly justified, the lever does not contact the collar 7 on rod 6. Under these circumstances, lever 1 is not operated and the pot pump lever 3 is permitted to depress the plunger for the cast.

When the matrix line does not contain enough spacebands to justify it completely, however, the justification lever 8 makes a full upstroke. The lever contacts collar 7 on rod 6, raising the upper collar 5 against the beveled end of lever 1. The opposite end of the lever moves under block 2 and prevents the pot pump lever 3 from descending while the depression in the pot pump cam is passing under roll 10. When the justification lever 8 descends, collar 5 lowers out of engagement with lever 1 and spring 11 returns the lever to normal position. At the

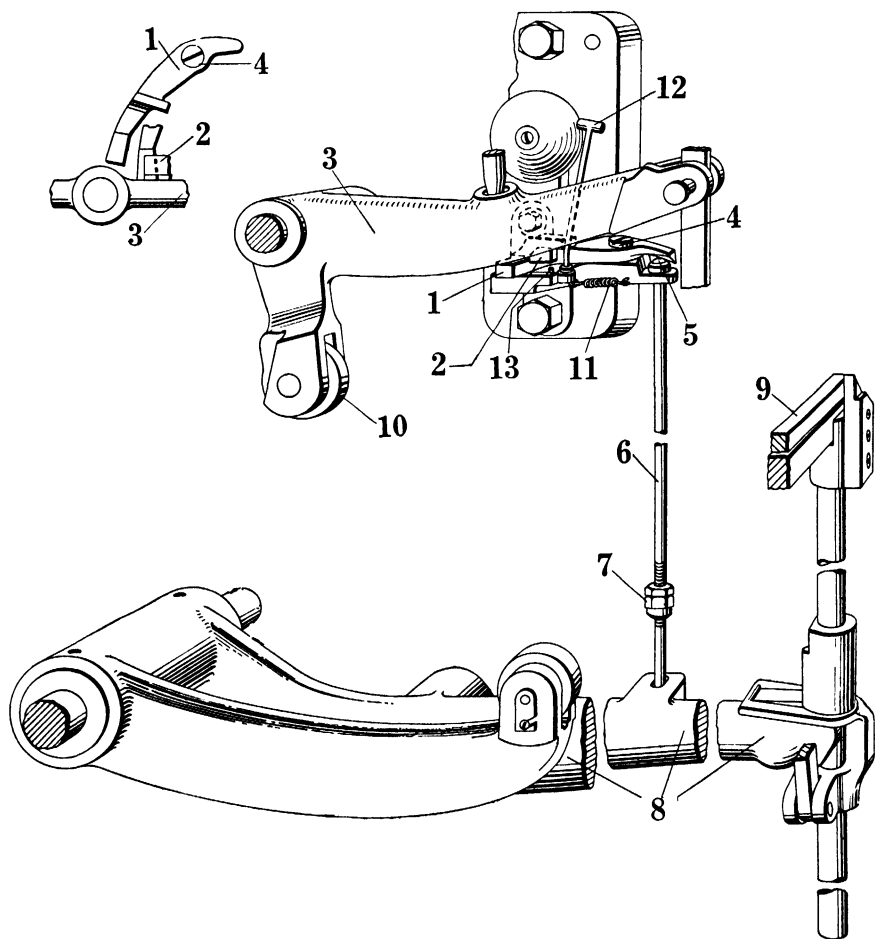


Fig. 61. Perspective View of the Intertype Pump Stop. This device prevents the pot pump lever 3 from making a casting stroke when the matrix line is too short to justify or when the space between the vise jaws is not completely filled. The operation of the device is controlled by the upstroke of the justification lever 8. The height to which the lever rises determines whether lever 1 will be moved under block 2.

same time, hammer 12 strikes the bell, informing the operator that the machine has not cast.

Adjustment of Pump Stop. To check the adjustment of the pump stop, disconnect the pot pump plunger, open the vise jaws and turn the machine forward until the justification lever 8, Fig. 61, makes its second upward stroke. Stop the machine and observe the position of stop lever 1. The lever should be positioned under block 2 within $1/32''$ of the stop pin 13. The lever should not touch the pin. Turn collar 7 until this adjustment is obtained, then tighten the check nut against the collar.

Blank Line Justification Wedge

The purpose of the blank line justification wedge is to render the pump stop inoperative so that blank slugs can be cast in the mold. The wedge 1, Fig. 62, is fastened to a collar on the first vise justification rod 4. In the left-hand vise jaw

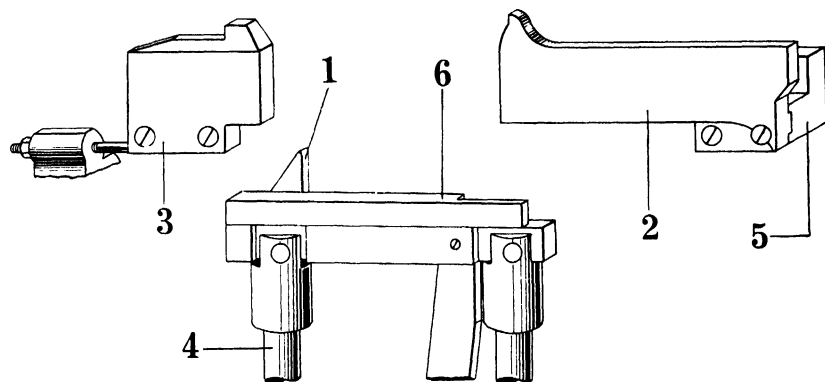


Fig. 62. The Blank Line Justification Wedge, which locks the vise jaws tightly together when blank slugs are being cast. The wedge also obstructs the upstroke of the justification lever sufficiently to render the pump stop inoperative.

block 5 there is a square opening (not shown) which has a beveled edge corresponding to the angle of the wedge. The opening registers with the wedge during justification if the left-hand vise jaw 2 is in contact with the right-hand jaw 3. When the justification block 6 rises, the wedge enters the opening in the left-hand vise jaw block, holding the vise jaws tightly together. At the same time, the wedge restricts the upstroke of the justification lever sufficiently to render the pump stop inoperative. Any desired number of blank slugs can be cast, therefore, simply by sliding the left-hand vise jaw against the right-hand jaw and holding out the starting and stopping lever.

Vise Jaw Manual Closing Attachment

The latest right-hand vise jaws are equipped with a manual closing attachment, which makes it possible to cast lines of matrices without spacebands or lines of matrices and spacebands which ordinarily would be too loose to cast. The attachment consists principally of a slide 3, Fig. 63, which operates in a slot

in the right-hand vise jaw block 2. Knob 4 is pinned to slide 3 and projects at the right side of the vise cap. When the knob is pushed in as far as it will go, spring 5 compresses and holds the right-hand vise jaw 1 firmly against the matrix line. At the same time, slide 3 is moved in far enough to engage the justification wedge 6 when it rises during first and second justification. The pump stop, as described previously, is operated when the justification lever makes a complete upstroke. Since slide 3 engages wedge 6, however, the vise justification mechanism and the

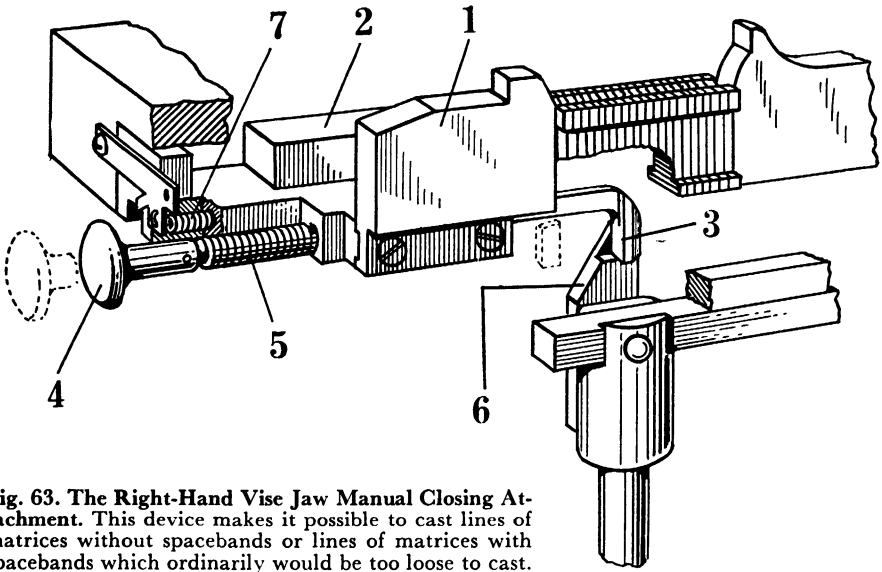


Fig. 63. The Right-Hand Vise Jaw Manual Closing Attachment. This device makes it possible to cast lines of matrices without spacebands or lines of matrices with spacebands which ordinarily would be too loose to cast.

justification lever are prevented from rising all the way. Consequently, the pump stop is not operated and the line is cast. When the pressure on knob 4 is released, spring 5 retracts slide 3 and spring 7 returns the right-hand vise jaw 1 to normal position.

The movement of the right-hand vise jaw 1 is limited by the vise locking screw, which passes through the slot in the vise jaw block 2. The maximum inward movement of the jaw is $1\frac{1}{2}$ ems. *When casting lines of matrices without spacebands, therefore, the assembled lines must be set within one em of the measure indicated on the assembler slide scale.* If this provision is observed, the lines will be of the proper length to cast. When casting lines of matrices with spacebands, the assembled lines should likewise be set within one em of the measure indicated on the assembler slide scale. Also, when using the attachment, knob 4 should not be pushed in until the first elevator has descended to the vise cap. There are no adjustments to be made on the device.

The Metal Pot

The metal pot consists basically of three parts: the pot jacket, the pot crucible and the pot jacket cover. The pot jacket 1, Fig. 64, is a square-shaped casting

which is open at the top and the bottom until fully assembled. Extending downward and forming part of the jacket casting are two legs, which support and pivot the assembled pot on the vise frame shaft. At the base of each leg there are four adjusting screws, by means of which the pot mouthpiece is aligned accurately with the mold. The pot crucible 2 is supported within the pot jacket by three lugs. The crucible contains the molten type metal from which the slugs are cast. The space between the pot jacket and the crucible is filled with asbestos packing, which is paste-like in composition when it is first applied but which later becomes hard. The purpose of the packing is to keep the heat concentrated around the crucible. The pot jacket cover 3 is fastened to the top of the jacket with four screws. The cover is equipped with a small lid through which pigs of type metal can be fed into the crucible. The pot lever 4 is pivoted at its upper end on a shaft which passes through lugs on the pot jacket casting. The lever is connected to the jacket at its lower end by an adjustable eyebolt and a compression spring 5. The spring provides pressure when the pot is moved forward against the back of the mold. The pot cam roll 6 follows the contour of the pot cam 7, which promotes the forward movements of the pot.

In the pot crucible there is a circular well leading to an opening in the throat

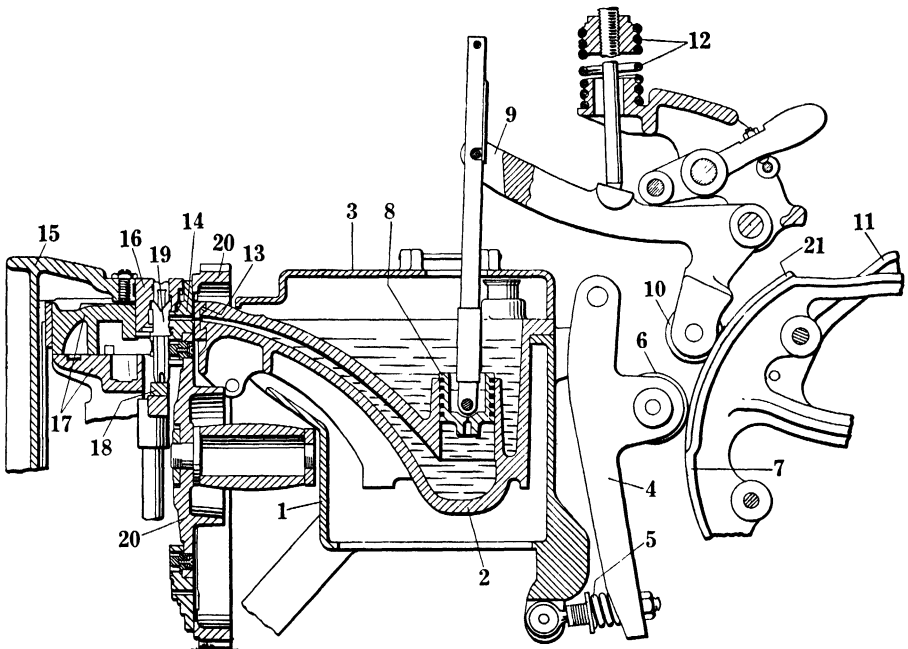


Fig. 64. Sectional View of the Main Parts of the Casting Mechanism in position preparatory to the casting of the slug. 14 Mold; 15 First elevator; 16 First-elevator jaw; 17 Vise cap; 18 Vise Justification block; 19 Line of matrices and spacebands; 20 Mold disk. The line of matrices and spacebands 19 has been justified and aligned in relation to the mold 14. The metal pot has been moved forward by the long pot cam shoe 21, locking the mouthpiece 13 tightly against the back of the mold 14. As the cams continue to revolve, roll 10 will drop into a depression in the pot pump cam 11. Plunger 8 will then descend and force molten metal into the mold against the line of matrices, thereby forming the slug.

of the crucible casting. The pot pump plunger 8 is inserted in the well and is fastened by a pin to the pot pump lever 9. At the proper time in the revolution of the machine, the pot pump cam roll 10 drops into a depression in the pot pump cam 11, permitting spring 12 to depress lever 9 and plunger 8. The plunger then forces molten metal upward in the throat of the crucible through openings in the mouthpiece 13 into the mold 14.

Detail views of the pot crucible, the mouthpiece and the plunger are shown in Fig. 65. The crucible 1 and the plunger at the right of the illustration are shown partly in cross-section. The lower part of the plunger 2 has been broken away to show one of the intake holes 3 in the crucible well. There are two of these holes in the well, each hole directly opposite the other. The purpose of the intake holes is to permit a fresh supply of type metal to flow into the well and

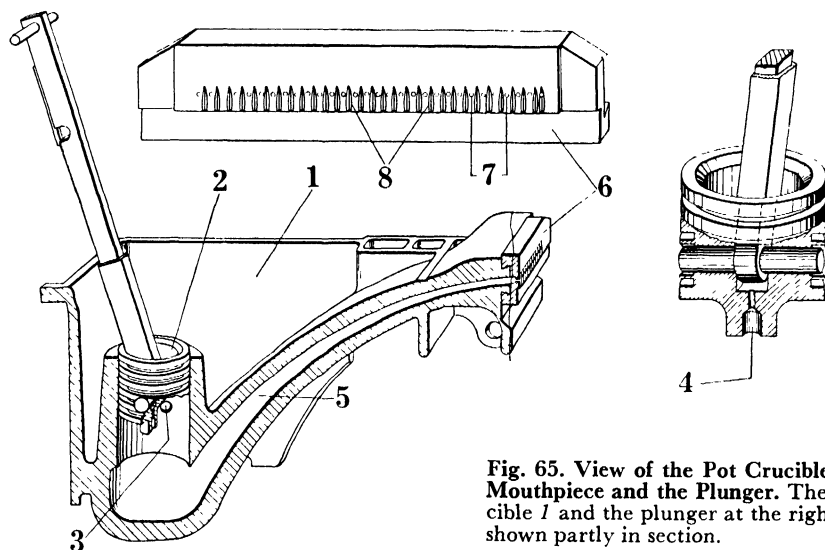


Fig. 65. View of the Pot Crucible, the Mouthpiece and the Plunger. The crucible 1 and the plunger at the right are shown partly in section.

under the plunger after each cast. The bottom of the plunger rests just above the holes when the machine is in normal position. When the pot moves forward in preparation for the cast the plunger covers the intake holes, thus preventing the metal from escaping when the plunger descends in the well. A small hole 4 is drilled in the base of the plunger to permit a slight amount of type metal to escape when the plunger makes its downstroke. This hole relieves the pressure under the plunger after the mold has been filled and permits the plunger to make an overstroke. The purpose of this action is to prevent the formation of incrustations in the crucible well when short slugs are being cast for an extended length of time. The throat of the crucible is shown at 5. The molten metal is driven upwards through the throat and out of the mouthpiece 6. The mouthpiece is fastened at the front of the crucible casting. Small holes or jets 7 are drilled through the mouthpiece for the passage of the type metal. The vents 8 are milled in the mouthpiece between the jets. The purpose of the vents is to

allow the air to escape when the molten metal is forced into the mold. While a certain amount of the air escapes between the matrices, some of it is forced back toward the base of the slug. The vents allow the air to escape and a small amount of type metal with it. The metal forms sprues on the base of the slug, which are trimmed off by the back knife.

The Metal Pot and Related Mechanisms

The metal pot 1, Fig. 66, is supported and pivoted at the front on the pot legs 2, which form part of the jacket casting. Adjusting screws 3, passing through the bottom of the legs, bank against the pot leg bushings 4, which are mounted on

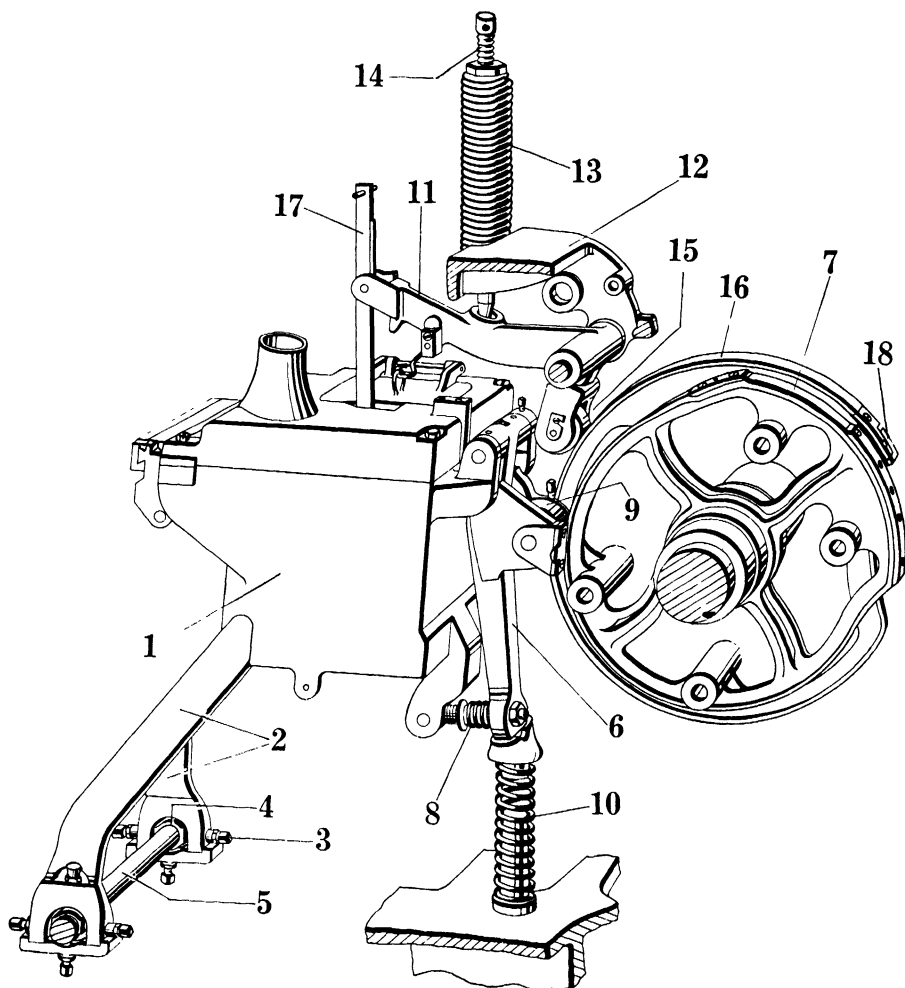


Fig. 66. Perspective View of the Metal Pot, the Pot Pump Mechanism and Related Parts in Assembly

the vise frame shaft 5. This shaft is inserted in bearings in the machine base and serves also as a support for the vise frame. The pot lever 6 is interposed between the metal pot and the pot cam 7. The lever is pivoted at its upper end on a shaft passing through lugs on the pot jacket casting. The lever is connected to the jacket at its lower end by an eyebolt and a compression spring 8. When cam 7 moves the pot mouthpiece forward against the back of the mold through roll 9 on the pot lever, the forward pressure exerted on the pot is applied through spring 8. The spring imparts a yielding pressure during the lock-up and also permits sufficient overmotion in case the full forward movement of the pot is obstructed. The pot balancing spring 10 relieves the pot cam of part of the weight of the pot.

The pot pump mechanism controls the movements of the pot pump plunger. The pot pump lever 11, Fig. 66, is pivoted on a shaft in the pot pump bracket 12. The pot pump spring 13, mounted on the bracket, continually exerts a downward pressure on lever 11 through spring rod 14. The pot pump cam roll 15, which rides on the pot pump cam 16, controls the upward and downward movements of lever 11. The pot pump plunger rod 17 is fastened to lever 11 by a pin and follows the upward and downward movements of the lever. The plunger, as previously described, rests in the crucible well and forces the molten metal into the mold when the pot pump lever 11 descends.

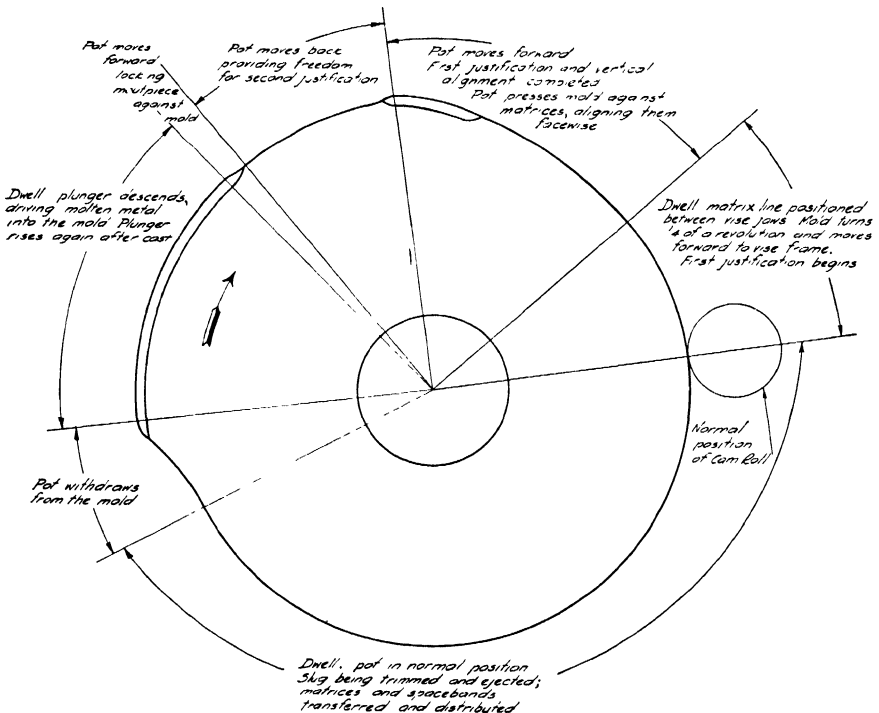


Fig. 66a. The Pot Cam, showing the surfaces of the cam which promote the main movements of the metal pot

Movements of Metal Pot and Pot Pump Plunger

The metal pot, through its connection with the pot cam, makes four movements during one revolution of the cams. After first justification has taken place and the matrix line has been aligned vertically, the metal pot advances and pushes the mold against the matrix line, aligning the matrices facewise in relation to the mold. The pot and the mold disk then recede, providing freedom for second justification of the matrix line. The mold advances against the aligned and justified matrix line and then the pot locks against the back of the mold. The pot pump cam roll drops into a depression in the pot pump cam, causing the plunger to descend in the crucible well. Molten metal is thereby forced into the mold against the line of matrices and spacebands. The plunger rises and the pot withdraws from the back of the mold to normal position. A quick-drop latch 18, Fig. 66, is applied to the pot pump cam 16 just in front of the casting depression in the cam. The latch can be unhooked from its pawl in order to provide a sudden drop for the pot pump lever. The plunger makes its casting stroke quickly when the latch is in use, forcing the molten metal into the mold with greater pressure. The quick-drop latch is used chiefly to cast large display type, when it is desirable to obtain a quick flow of type metal into mold under more pressure.

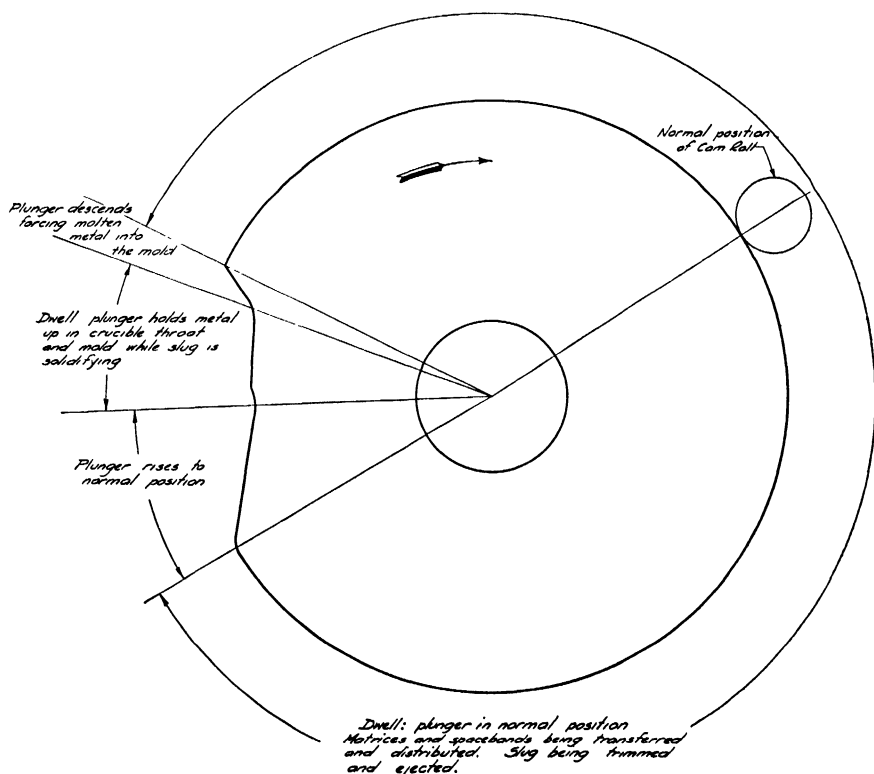


Fig. 66b. The Pot Pump Cam, showing the surfaces of the cam which promote the main movements of the pot pump mechanism

The Lock-Up

The relationship between the pot crucible mouthpiece and the mold is one of the most important settings on the machine. Proper operation of the machine depends, to a great extent, upon the condition of the lock-up. Each time the mouthpiece locks against the back of the mold, it should meet the mold squarely and in the correct relationship for height. The parts of the casting mechanism which are involved in the lock-up are accurately manufactured and are set correctly when the machine is assembled. The first-elevator jaw, the mold and the mouthpiece are in the proper positions, but improper use or faulty maintenance of these parts may disturb their relationship. The vise cap supports these mechanisms at casting position and provides a positive bearing surface for the lock-up. As a general rule, the vise cap, the first-elevator jaw and the mold may be regarded as positive factors in the lock-up. Usually, it is necessary only to adjust the metal pot so that the mouthpiece will be square in relation to the mold or to stone the mouthpiece in order to restore it to its original true surface.

Adjusting the Lock-Up. The relationship between the pot crucible mouthpiece and the mold is controlled by four adjusting screws at the bottom of each pot leg 5, Fig. 67. The screws pass through the legs and bank against the pot leg bushings 6, which are mounted on the vise frame shaft 7. The mouthpiece can be adjusted in two directions by means of these screws. The upper screw 1 in each pot leg raises or lowers the mouthpiece with respect to the mold. The front and back screws 2 and 3 in each leg, position either end of the mouthpiece closer to or further away from the mold and are used to obtain a square relationship between the parts.

The mouthpiece is adjusted for height by means of the upper screw 1 in each pot leg. Disconnect the pot pump plunger and turn the machine forward until the first elevator descends to the vise cap and before the mold disk moves forward. Remove the mold cap and liners from the mold in casting position and close the vise frame. Pull the mold disk forward until the mold disk locking studs enter the stud block bushings on the vise frame, then push the disk back. Be careful not to turn the disk while pushing it back—the object in pulling it forward is to place the mold in the position it would assume when the pot locks up against it. Next, pull the pot forward by hand until the mouthpiece is almost in contact with the mold body and place a block of suitable size between the pot jacket casting and the pot pump cam roll to hold the pot forward.

Open the vise frame and observe the relationship between the mold body and the jets or holes in the mouthpiece. The lower edge of all the jets should be slightly above the mold body. Loosen the lock nuts on screws 1 and 4, Fig. 67. Turning screw 1 in will raise the mouthpiece and backing the screw off will have the opposite effect. If the pot is to be raised, screw 4 must be backed off first. After the adjustment is obtained, turn in screw 4 until it banks against bushing 6 and tighten the lock nuts. Replace the liners and the mold cap and cast a few slugs. The position of the mouthpiece jets can be verified by the circular marks on the base of the slug. The jet marks should show full on the slug with about .005" space between the edge of the marks and the smooth side of the slug. *The*

adjusting screws should not be jammed against the bushings—they need only be turned until the play between the parts is taken up.

To determine whether the mouthpiece is square with respect to the mold, disconnect the pot pump plunger and run the machine ahead until the first elevator seats on the vise cap. Open the vise frame to second position, depress the mold cam lever handle, disconnect and remove the ejector lever link and pull the mold disk and slide forward until the disk is out of engagement with the mold disk pinion. Clean the back of the mold and the mouthpiece thoroughly. If there are any metal adhesions on the parts, scrape them off with a brass rule

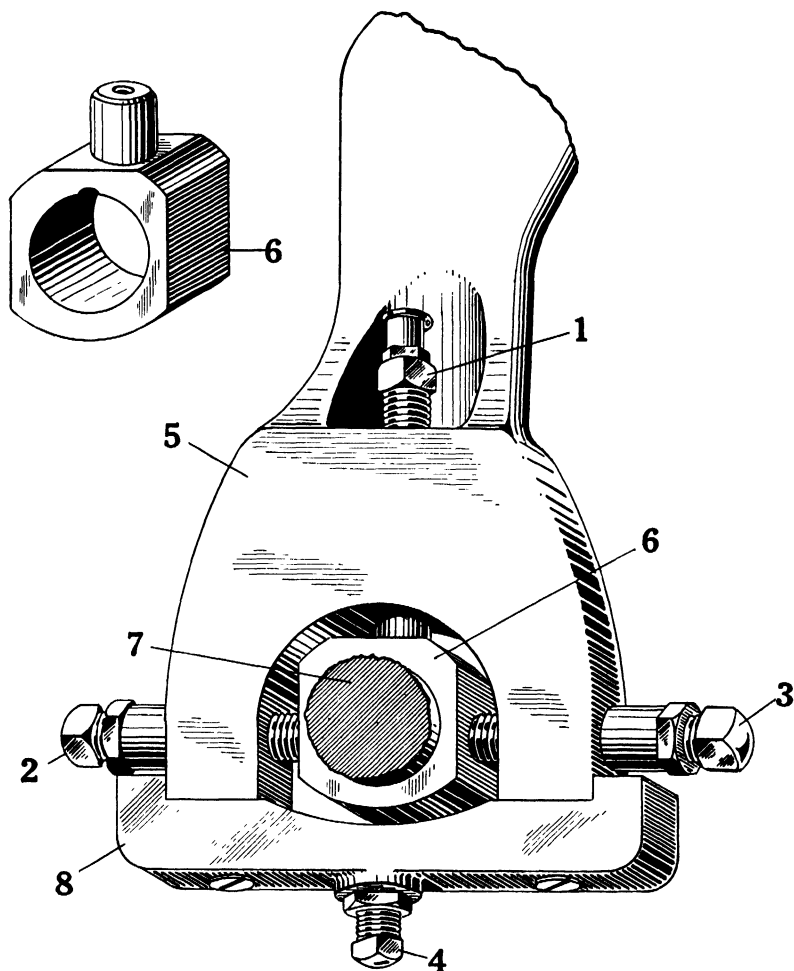


Fig. 67. Showing the Pot Leg Adjusting Screws, by means of which the mouthpiece is aligned with the mold. This view also shows the oil cup applied to the upper adjusting screw 1. A hole drilled through the screw conducts the oil to a hole in the shank of bushing 6. A groove is machined in the bushing to distribute the oil, thereby insuring lubrication for the entire bearing surface of the bushing.

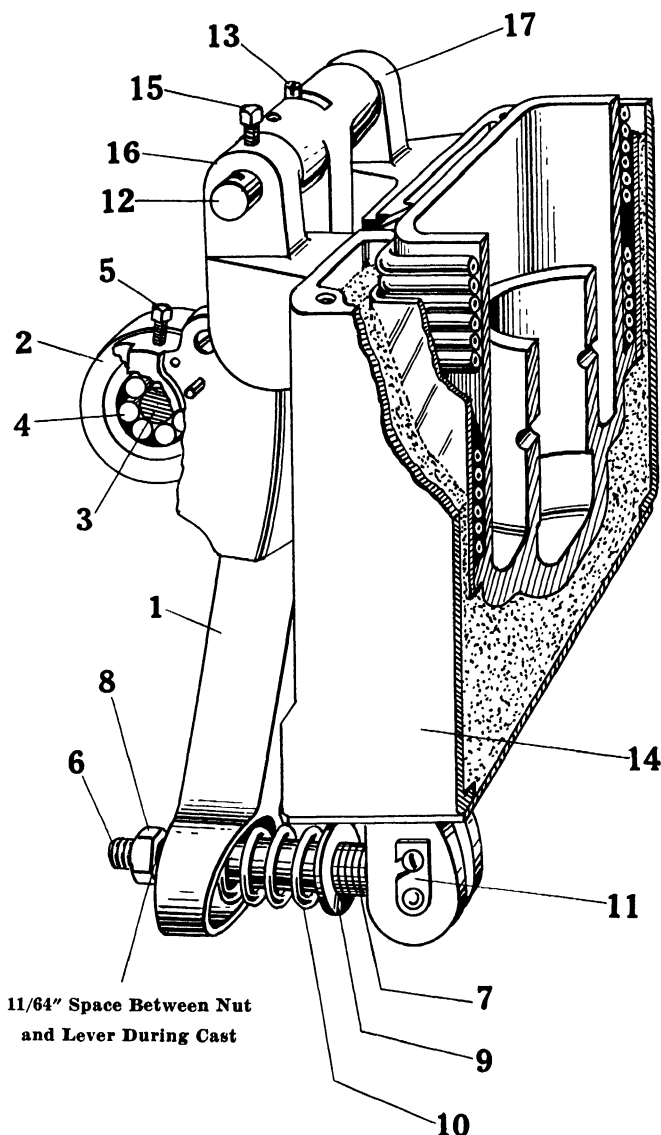


Fig. 68. View of the Pot Lever, showing its relation to the pot jacket. The lever 1 is pivoted at the top on a shaft 12 passing through lugs 16 and 17 on the pot jacket casting 14. The lever is connected to the pot jacket at its lower end by an eyebolt 6 and a compression spring 10. When the pot cam moves the pot forward and locks the mouthpiece against the mold, a yielding pressure is applied through spring 10.

and go over the surfaces with a clean cloth. Apply a thin coat of red lead or Prussian blue to the back of the mold with a small wad of cloth. Push the mold disk back into engagement with the pinion, making sure that they are properly timed. Lock the vise frame, then pull the mold disk forward until the mold disk locking studs enter the stud block bushings. Turn the machine forward by hand until the pot cam roll is on the short pot cam shoe. Turn the machine forward and back it a few times so that the cam roll will pass back and forth over the shoe, then back the machine until the pot leaves the mold. Open the vise frame, pull the mold disk and slide forward and observe the impression on the mouthpiece and on the back of the mold. If the red lead is distributed in spots along the entire length of the mouthpiece, it is an indication that the mouthpiece needs to be trued with an Arkansas stone. A film of light machine oil should be applied to the stone before using it. If the mouthpiece shows an impression at one end only, the front and back pot leg adjusting screws probably require adjustment.

Either end of the mouthpiece can be moved closer to or further away from the mold by means of screws 2 and 3, Fig. 67, in each pot leg. If the left side of the mouthpiece is to be moved closer to the mold, the left pot leg should be moved forward by backing off the rear screw 3 and turning in the front screw 2 an equal amount. The screws should be adjusted by not more than half a turn each time. Tighten the lock nuts after each adjustment to prevent the screws from working loose. The effect of each adjustment can be observed by taking a red lead impression of the lock-up as previously described. If the lock-up produces a red lead impression along the entire length of the mouthpiece at the top or the bottom only, it is an indication that the mouthpiece and the mold are parallel but that the full front surface of the mouthpiece is not perfectly flush with the mold during the lock-up. The mouthpiece can be brought flush with the mold by turning both front or back pot leg adjusting screws an equal amount. Turning in the front screws will bring the bottom of the mouthpiece closer to the mold. Turning in the back screws will bring the top of the mouthpiece closer to the mold. Before turning in either pair of screws, the opposite pair must be backed off first and at the end of the adjustment, all of the screws must be banking *lightly* against the bushings so that there is no play between the parts. When the adjustment is completed, the mouthpiece should show a full impression along the entire length of its raised surface. If this result cannot be obtained completely by means of the adjusting screws, it is an indication that the surface of the mouthpiece is not true. This condition can be corrected by stoning the mouthpiece as previously described.

Pot Lever Eyebolt Adjustment. When the pot cam moves the metal pot forward to lock the mouthpiece against the back of the mold, the pressure is applied through the pot lever spring 10, Fig. 68. The spring is strong enough to lock the mouthpiece tightly against the back of the mold and at the same time, it permits sufficient overmotion in case the full forward movement of the pot is obstructed. The spring is mounted on an eyebolt 6 between a large banking washer 9 and the pot lever 1. When the pot moves forward for the second time and locks tightly against the back of the mold, there should be approximately 11/64" space between nut 8 and lever 1 for spring 10 to exert the proper pres-

sure. This adjustment is obtained with spacing washers 7, by means of which the compression of spring 10 can be varied. Adding washers to the eyebolt will provide more pressure during the lock-up and will increase the space between lever 1 and nut 8. Approximately six washers are used with molds of American height (.875"). It may be necessary, however, to add or to remove one washer to obtain the 11/64" dimension during the lock-up. A sleeve is interposed between nut 8 and banking washer 9 to insure a constant distance between the two parts. The nut should always be turned up tightly against the sleeve.

Removal of Parts and Maintenance

Cleaning the Plunger and Well. The production of good slugs is dependent, to a great extent, upon the faithful performance of a few simple duties. Cleaning the plunger and the crucible well is one of them. The importance of cleaning these parts once a day cannot be emphasized too much. The plunger must fit the crucible well snugly, but at the same time, it must be perfectly free to move. After several hours of operation, a dross coating forms in the well and, to some extent, on the plunger. If this film is not removed, the casting stroke of the plunger will be shortened and will therefore be less forceful. For this reason, the plunger should be removed from the well every morning and cleaned thoroughly with the wire brush provided for the purpose. Various types of brushes and scrapers are supplied for cleaning the crucible well. If a wire brush is used, it should always be turned clockwise to prevent the wires from breaking off in the well. After scraping the well, the two intake holes 3, Fig. 65, should be opened with the pointed end of the pot mouthpiece wiper or similar tool. When the parts have been cleaned in this manner, the dross which has been loosened floats to the top of the molten type metal and should be removed with a dross spoon or a small skimmer.

Before the plunger is replaced in the well, it should be immersed in the type metal for a few minutes to permit it to reach the temperature of the type metal. If the plunger is inserted immediately in position, it may expand rapidly and stick in the well. When this happens, it is necessary to remove the molten type metal from the pot with a ladle until the plunger and well are exposed. A small amount of oil or tallow should then be placed around the plunger. Close the pot cover lid, fasten a wrench to the plunger rod and turn the plunger back and forth, working the plunger upward at the same time. It may be necessary to tap the plunger rod a few times with a light hammer to start it moving.

Pot Lever Removal and Lubrication. The pot lever 1, Fig. 68, should be removed from the machine once every four or five months so that the pot cam roll 2 can be cleaned and lubricated. To remove the lever, pull the pot forward by hand and place a block of suitable size between the pot jacket casting and the pot pump cam roll. Remove the pot balancing spring 10, Fig. 66. Remove screw 13, Fig. 68, loosen set screw 15 and remove the pot lever shaft 12. Loosen the screw in the hinge pin 11. While supporting the pot lever at its lower end, withdraw the hinge pin and lower the lever out of the machine. Loosen set screw 5 and remove pin 3. This will release the cam roll 2, the nine anti-friction rolls 4 and two washers. All of the parts of the cam roll should be cleaned thoroughly

in gasoline and dried. Two cam wipers are attached to the pot lever to keep the surfaces of the pot cam and the pot pump cam clean. If the wiping surface of the felt is hardened or worn, the felts should be renewed. Run a wire through the two oil holes and the slot at the top of the pot lever, then clean the finished surfaces of the lever with a stiff brush soaked in gasoline.

To reassemble the pot cam roll, place it on a flat surface, insert one of the washers and stand pin 3 upright in position. Coat each of the anti-friction rolls with a mixture of graphite and grease and place them in position around the pin. Fill up any remaining space inside the cam roll with the graphite grease. Replace the other washer, press it in position and remove the excess grease from the roll. Withdraw the cam roll pin 3, place the assembled cam roll in position and run the pin through the lever and roll. The grease will hold the anti-friction rolls in position while this is being done. Tighten the set screw 5 securely. In returning the lever to the pot, reverse the order of removal. When the lever is in position, make sure that it has equal clearance between the mold cam and driving gear and the pot pump cam. The assembled lever can be adjusted sidewise after set screw 15 is loosened. A convenient oil cup has recently been applied to the pot lever to facilitate the oiling of the pot cam roll. The cup is fully accessible and can be filled with oil without removing the pot lever. This new oiling arrangement insures constant lubrication for the cam roll and anti-friction rolls.

Removing the Wedge Mouthpiece and Cleaning the Crucible Throat. After a metal pot has been in use for an extended period of time, it may be necessary to remove the mouthpiece and to clean the throat of the pot crucible. Accumulation of dross and oxide can generally be attributed to one of three conditions in the type metal: poor composition, excessively high temperature or consistently low level of metal in the crucible. The presence of foreign substances in the crucible throat is objectionable, of course, because they obstruct the free passage of type metal into the mold. These accumulations can be loosened with a throat cleaner and removed after the mouthpiece is taken off the crucible. The basic cause of the dross or oxide accumulation, however, should be ascertained and corrected to prevent a recurrence of the condition. A special pot crucible mouthpiece remover (U-1370, assembled) is made to facilitate the removal of the mouthpiece. The remover forces the mouthpiece off the crucible by screw pressure, thereby preventing the damage sometimes occasioned by the more commonly used drift (U-1018) and hammer. Proper use of the drift and hammer requires considerable skill and should be attempted only by those who have had experience in removing mouthpieces by this method. In the absence of such experience, it is advisable to use the special remover, which will force the mouthpiece off the crucible without danger of burring the mouthpiece or causing damage to the crucible.

The mouthpiece is removed while the metal pot is heated and the type metal is molten. To remove the mouthpiece, run the machine ahead until the first elevator seats on the vise cap and stop the machine before the mold disk moves forward. Open the vise frame and lower it to second position. Disconnect the pot pump plunger, depress the mold cam lever handle and remove the ejector lever link. Pull the mold disk slide forward until the ejector slide can be reached, then pull the ejector slide forward until an ejector blade passes through the

mold. The object in doing this is to prevent the mold disk from turning while handling it. Grasp the mold disk slide firmly, pull it forward slowly and lift the assembled mechanism out of the machine. Remove the left-hand vise locking stud from the mold gear arm to provide space for the use of the pot mouthpiece drift. Place a wedge-shaped block of wood of suitable size between the pot jacket and the machine column to absorb the shock when the mouthpiece is being driven off. Draw a straight score or scratch line across the top of the mouthpiece and the crucible so that the mouthpiece will be accurately located when it is replaced. The line should be drawn directly above the jet at the extreme right of the mouthpiece. When the mouthpiece is placed in position so that the score lines coincide, the two end jets will be wholly inside the mold cavity formed for

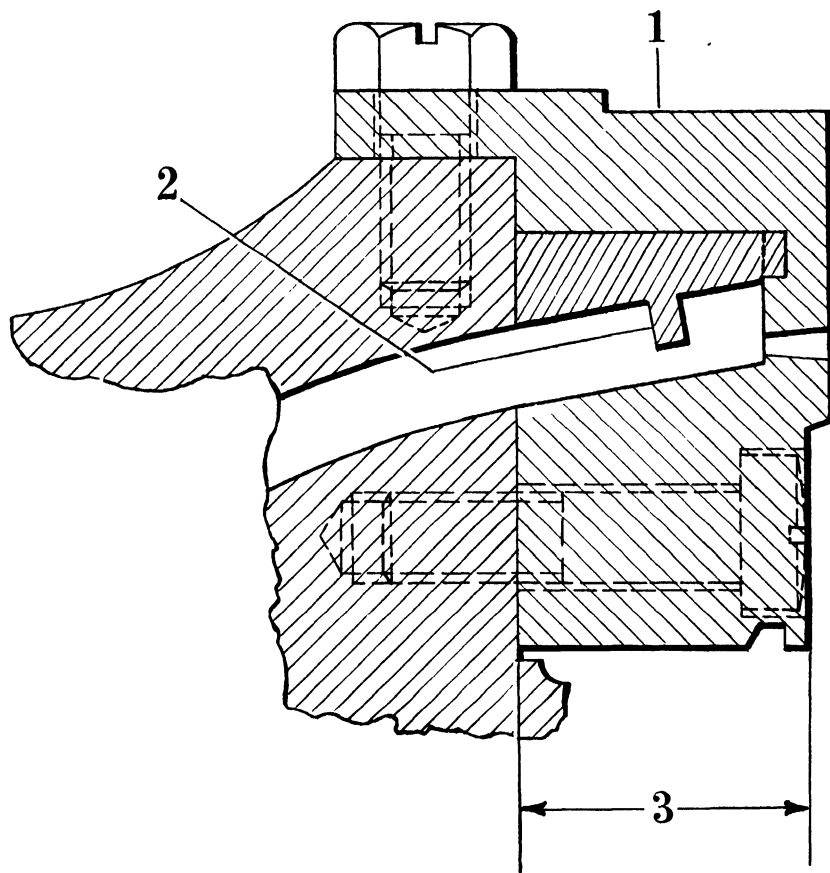


Fig. 69. The Baffle Mouthpiece. This new type of mouthpiece is designed to mix the type metal before it enters the mold and to facilitate the escape of air from the mold as the cast occurs. A baffle 2 is accurately located at the back of the mouthpiece to achieve these results. As the type metal is forced upward through the crucible throat into the mouthpiece, it meets the baffle and is agitated and deflected under pressure to the mouthpiece jets. The agitation mixes the metal thoroughly and breaks up any hard particles or dross. The baffle mouthpiece is fastened to the crucible with screws, making it easier to adjust the mouthpiece sidewise and to remove it.

a 30-em slug. If a new mouthpiece is to be applied, the score line can be transferred from the old mouthpiece to the new one.

Insert a file between the angular end of the mouthpiece gib and the pot crucible to prevent the gib from moving. Place the drift against the left end of the mouthpiece and strike the drift smartly with a three-pound hammer. One or two heavy blows should start the mouthpiece, then a few light blows will loosen it. When the mouthpiece has been moved sufficiently to the right, the gib can be withdrawn and the mouthpiece can be slid to the left off the crucible. The dross and oxide in the crucible throat can now be loosened with the crucible cleaner, which consists of a long blade with a row of teeth on each edge. The blade is curved to fit the shape of the crucible throat. After using the cleaner, place a metal pan or an ingot mold under the crucible mouth and work the plunger *slowly* by hand. The dross and oxide which has been freed by the throat cleaner will then flow out of the crucible with the type metal into the pan. After this operation, clean the surfaces of the crucible against which the mouthpiece bears with a wire brush. If the old mouthpiece and gib are to be used again, scrape all metal and oxide adhesions off the parts until they are bright and smooth.

Before replacing the old mouthpiece or a new one, it is advisable to grind in the mouthpiece and the crucible to insure a metal tight union of the parts. A small wooden block should be prepared for the purpose. Drive two headless nails about .060" in diameter into the block about 24 cms apart. Place the mouthpiece centrally on the block with the nails projecting through two of the mouthpiece jets. Coat the inside bearing surfaces of the mouthpiece with No. 120 emery powder mixed with machine oil or use valve-grinding compound. Slide the mouthpiece on the crucible and move it back and forth in short strokes across the crucible lips. Be sure to hold the mouthpiece square with the crucible during this operation. Remove the mouthpiece and wipe the ground surfaces thoroughly, making sure that all of the abrasive is removed. Apply a very thin coat of white lead to the face of the crucible lips. Keep the lead away from the crucible opening, because the lead will eventually harden and might interfere with the passage of the type metal. Slide the mouthpiece on the crucible without disturbing the lead. Insert the mouthpiece gib and drive it to position, being careful that the mouthpiece does not move past the score lines made previously as a guide. The gib should not be driven in too tightly, since it is possible to spring the parts and cause a leakage of type metal. If a leak is not too serious, it can be remedied by applying a mixture of litharge and glycerin to the crucible lips and the mouthpiece and permitting the mixture to harden. A lock-up impression can now be taken with red lead or Prussian blue to determine the parallelism of the mouthpiece with respect to the mold. The pot leg adjusting screws should be adjusted until the mouthpiece is properly located for height and parallelism, as previously described.

Occasionally, it is necessary to open the mouthpiece jets and vents to remove small particles of dross and other accumulations. The jets can be opened with a No. 52 drill or a small broach, *but under no circumstances should the jet holes be enlarged*. The drill should be immersed in oil after each third or fourth jet and care should be taken that the drill does not break off. The mouthpiece vents can be cleaned with a small penknife or scriber. The vents should permit enough

metal to escape during the cast so that the sprues will be about half an inch long. The length of the sprues can be observed by stopping the machine just before the slug is trimmed by the back knife. If the sprues are not long enough, insert a knife blade or a fine chisel in the lower end of the vents and tap the blade lightly with a small hammer. Care should be exercised, however, that the vents are not opened too much, because this will result in leakage of type metal.

The Baffle Mouthpiece

The baffle mouthpiece recently developed by Intertype Corporation differs in several respects from the wedge mouthpiece. The chief differences are in its construction and in the method of fastening it to the pot crucible. The new mouthpiece incorporates the principle of a baffle, which is designed to mix the type metal and to facilitate the escape of air as the cast occurs. The baffle 2, Fig. 69, is inserted in slots formed at the back of the mouthpiece 1. The baffle projects partly into the opening of the mouthpiece through which the type metal passes. As the metal is driven up through the crucible throat into the mouthpiece, it meets the baffle and is agitated and deflected under pressure before it reaches the jets or holes at the front of the mouthpiece. The effect of agitating the metal is to prevent any hard particles or dross from being projected against the matrix characters. The deflection and agitation of the type metal result in a clear type face with sharply defined characters.

In addition to agitating the type metal, the baffle is designed also to pocket air in the crucible throat and to retard momentarily the flow of type metal so that any air driven into the mold can escape more readily. The projecting baffle creates an open pocket or a formed cavity behind the mouthpiece jets. When the type metal is driven into the mouthpiece, it is forced with continuous pressure against the baffle. The baffle agitates and skims the metal before it passes through the mouthpiece jets. These combined factors result in slugs of closer microstructure and uniformity.

The baffle mouthpiece is fastened to the crucible with screws instead of a gib. A number of screws at the front and top of the mouthpiece hold it firmly against the face of the crucible. The holes through which the fastening screws pass are enlarged slightly to permit sidewise adjustment of the mouthpiece. The baffle mouthpiece has a thicker body than the wedge type, as shown at 3. This increased amount of steel in the baffle mouthpiece makes it possible to control its temperature accurately and uniformly.

Removal. To remove the baffle mouthpiece, it is necessary only to remove the screws which fasten it to the crucible. Since the screws are usually tightened securely, it is important to use a screwdriver of the right size. If any of the screws are too tight to be turned, they can usually be started by inserting a screwdriver with a solid shank in the screw slots and striking the tool with a hammer. When the mouthpiece is replaced, the screws should be coated with a paste made of linseed oil and graphite to facilitate their removal the next time. In replacing the mouthpiece, turn in the front screws until the mouthpiece bears lightly against the face of the crucible. Turn down the top screws so that the mouthpiece will seat on the ledge of the crucible, then tighten the front screws securely.

Removing and Packing the Gas Metal Pot

The metal pot should be removed from the machine at long intervals for purposes of cleaning and repacking. Although it is possible to repack the pot while it is in the machine, a cleaner and more thorough job can be done with the pot fully accessible. In removing the pot, the following procedure should be used:

Remove the plunger and ladle as much type metal as possible from the crucible. Turn off the gas and disconnect and remove the governor and burners. Run the machine ahead until the first elevator seats on the vise cap and before the mold disk moves forward. Push in the starting and stopping lever and turn off the motor. Lower the vise frame to second position, depress the mold cam lever handle, remove the ejector lever link and remove the assembled mold disk slide. Remove the mold disk shield, which is fastened to the face plate directly above the mold disk. Remove the pump stop bracket. Remove the two caps at the base of the pot legs and loosen the two front pot leg adjusting screws. Remove the pot lever, replace the pot lever shaft and tighten the set screw so that the shaft will not slip. Place a belt around the pot lever shaft.

One person should lift and support the pot at the back while another lifts the pot legs off the bushings. As soon as the legs are free, the pot should be lowered at the back while the legs are raised in the front. When the pot is in this position, it can be lifted and removed from the machine over the vise frame. The pot should be held high during removal so that it will not bump against any part of the vise mechanism. Take out the four pot cover screws and remove the cover. Any remaining metal in the crucible can be removed by tilting the pot over a metal pan. Loosen the asbestos packing between the jacket and crucible with a long screwdriver, invert the pot and tap the crucible loose with a lead hammer or a pig of type metal. Place the pot jacket on a box in an upright position with the pot legs resting on the floor.

Break up the asbestos in a pan and moisten it with water. The water should be added in small quantities in order to obtain as thick a mixture as possible. Apply about a half inch coat of the asbestos paste to the inside of the pot jacket. Place the crucible in the jacket and make sure that it seats firmly in position. *Asbestos must be kept out of the crucible well.* The well should be stopped up with some waste or cloth to prevent the entrance of asbestos. Fill any remaining space between the crucible and jacket with the asbestos and press it tightly in position with a stick of wood of suitable size. Clean all of the parts of the pot thoroughly and reassemble them by reversing the order of removal. Before the assembled pot is returned to the machine, turn the pot leg bushings until the lugs are straight up. The upper pot leg adjusting screws rest on these lugs when the pot is in position.

Pot Gas Burner and Governor

The burner and governor system applied to Intertype gas pots is designed to provide means for controlling separately the temperature of the type metal in the crucible and the heat of the mouthpiece. The pot gas burner 1, Fig. 70, is supported under the crucible by a bracket rod 2 passing through holes in the pot jacket. This burner supplies heat to the crucible and keeps the type metal in a molten state. The pot gas mouth burner 3 is inserted in holes at the front of the

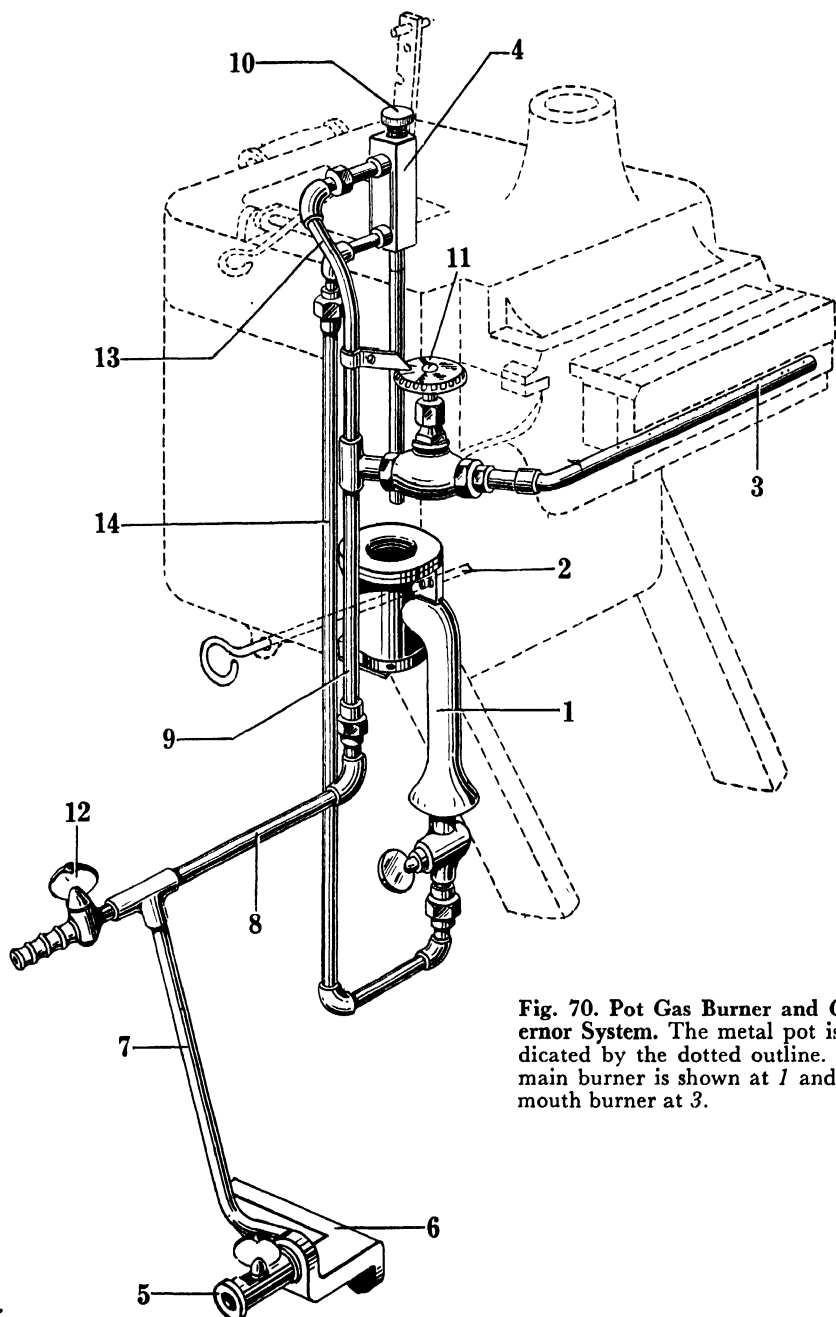


Fig. 70. Pot Gas Burner and Governor System. The metal pot is indicated by the dotted outline. The main burner is shown at 1 and the mouth burner at 3.

pot crucible and rests directly beneath the mouthpiece. This burner controls the heat of the mouthpiece and can be regulated to suit variable casting conditions. Gas is fed to the two burners by a series of pipes leading to the pot gas governor 4, which controls automatically the volume of gas supplied to the main burner 1.

The pipe system which supplies gas to the burners has been simplified greatly, as shown in Fig. 70. The gas enters through valve 5, which is used to shut off the gas supply from the burners when desired. The valve is threaded in a bracket 6 and is connected to pipe 7 by a nipple and elbow. This arrangement provides a swivel joint which permits pipe 7 and the rest of the gas burner system to move forward and backward with the metal pot. The gas passes through pipes 8, 9 and 13 to the gas governor 4, in which the supply of gas to the burner 1 is controlled by a regulating screw 10 and an automatic valve mechanism. The gas flows from the governor to the main burner through pipe 14. The flow of gas to the pot mouth burner 3 is controlled directly by the valve 11. The mixers used on the burners are of the Bunsen type and are designed to provide a properly proportioned mixture of oxygen and gas. It is essential that the mixture be correct in order to obtain the maximum heating effect from the gas. A faulty combination of air and gas will produce a yellowish instead of a blue flame and lamp black will accumulate around the surfaces touched by the flame. The sooty deposits act as insulation and more gas will be required to heat the mouthpiece and the type metal. The auxiliary valve 12 is provided for use with a hand torch. The torch is inserted in the free end of a rubber hose, the other end of which is fastened to the valve.

Pot Gas Governor. The Intertype gas governor is simple in construction and highly efficient from the standpoint of uniform temperature control. Its operation is controlled by the difference in the rate of expansion and contraction of aluminum and steel. The governor consists mainly of a governor tube 1, Fig. 71, a valve rod 2, a valve 3 and a valve spring 4. The aluminum tube 1 is inserted in a guard 5, which is surrounded by the molten type metal in the crucible. The aluminum tube lengthens by expansion as the temperature of the type metal approaches the maximum degree of heat for which the governor has been set. The tube shortens by contraction as the temperature of the type metal approaches its minimum degree. When the aluminum tube lengthens, valve rod 2 falls away from valve 3, permitting spring 4 to move the valve closer to the gas outlet and against screw 6. This action decreases the volume of gas supplied to the main burner, screw 6 permitting just enough gas to flow through the outlet to keep the burner flame from being extinguished. The diminished volume of gas will continue to flow until the type metal begins to cool, at which point the aluminum tube 1 will start to shorten by contraction. The contraction of the tube raises rod 2 against valve 3, moving the lower end of the valve away from the gas outlet. This action increases the volume of gas flowing to the main burner and automatically increases the temperature of the type metal until it reaches its maximum degree of heat. The average casting temperature of the type metal is from 525 degrees F. to 550 degrees. Variations in slug sizes require modification of the mouthpiece temperature. When casting 5 point slugs for an extended period of time, for example, the mold does not receive as much heat from the type metal as would be received when casting large display slugs. Since the

THE INTERTYPE

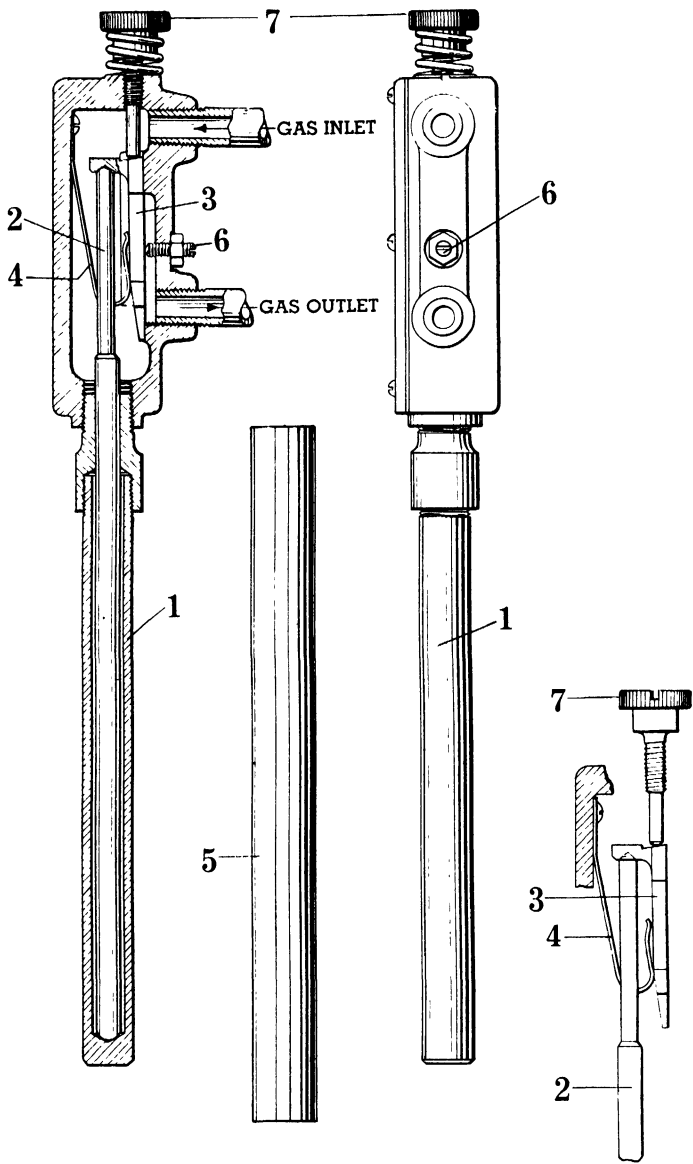


Fig. 71. The Intertype Gas Governor is simple in construction and highly efficient in maintaining uniform temperature control. The governor operates on the principle of the sensitivity of an aluminum tube to variations in heat. The governor at the left of the illustration is shown partly in section.

mold is cooler when casting the smaller sizes of slugs, it tends to draw some of the heat from the mouthpiece each time a lock-up occurs. The mouthpiece requires a greater heat input for this reason when small slugs are being cast. When casting large display slugs, the heat input into the mouthpiece should be decreased somewhat to compensate for the greater heat in the mold.

Adjusting the Governor. The volume of gas supplied to the main gas burner is controlled by the regulating screw 7, Fig. 71. Turning the screw clockwise (down) will increase the flame and raise the temperature of the type metal. Turning the screw counter-clockwise will have the opposite effect. The full result of the adjustment will not appear immediately. A number of minutes should be allowed between each adjustment to insure completion of the changes.

The valve adjusting screw 6, as stated previously, permits just enough gas to flow to the main burner to prevent the flame from being extinguished when the type metal has reached its maximum temperature. The screw should be set for this condition and the lock nut tightened securely. The valve adjusting screw should not be used to adjust the temperature of the type metal. This adjustment, as described previously, is made with the regulating screw 7.

Maintenance. The pot gas burner 1, Fig. 70, and the mouth burner 3 should be removed from the machine once every five or six months for cleaning. Soot and dirt tend to accumulate on the burners and affect the heating power of the flames. If these foreign substances are not removed, the heating efficiency of the burner system will be impaired and regulation of the type metal temperature will be difficult. The burners are attached to the pipes with small unions which make removal easy and convenient. The main burner and the mouth burner should be cleaned thoroughly with a wire brush. The holes in the mouth burner can be cleaned with a small drill or wire. The opening in the main burner can be scoured thoroughly with a wire brush by removing the regulating nut and spring from the burner cap and taking the cap out of the burner body. When the burner is replaced, it may be necessary to raise or to lower the burner cap by means of the regulating nut to secure a flame of the proper intensity. The detent spring under the regulating nut prevents the nut from moving after it has been set. The burners should produce a steady blue or greenish-blue flame at all times. A yellow flame indicates that the regulators on the air mixers are not adjusted sufficiently to produce the proper mixture of oxygen and gas. Occasionally, it is necessary to remove the gas governor in order to clean the chamber in the valve case. The case is fitted with a steel cover held in place with several screws. When screws are replaced, coat them with graphite grease to facilitate removal the next time.

The Intertype Electric Metal Pot

The construction of the electric pot proper is similar in all basic respects to that of the gas pot. The electric pot, like the gas pot, consists principally of the pot jacket, the pot crucible and the pot jacket cover. These parts have been described already in the general section dealing with the metal pot and need not be repeated here. The chief difference between the two types of metal pots is that the openings provided in the gas pot for the burners are covered in the electric pot with plates and are filled with asbestos.

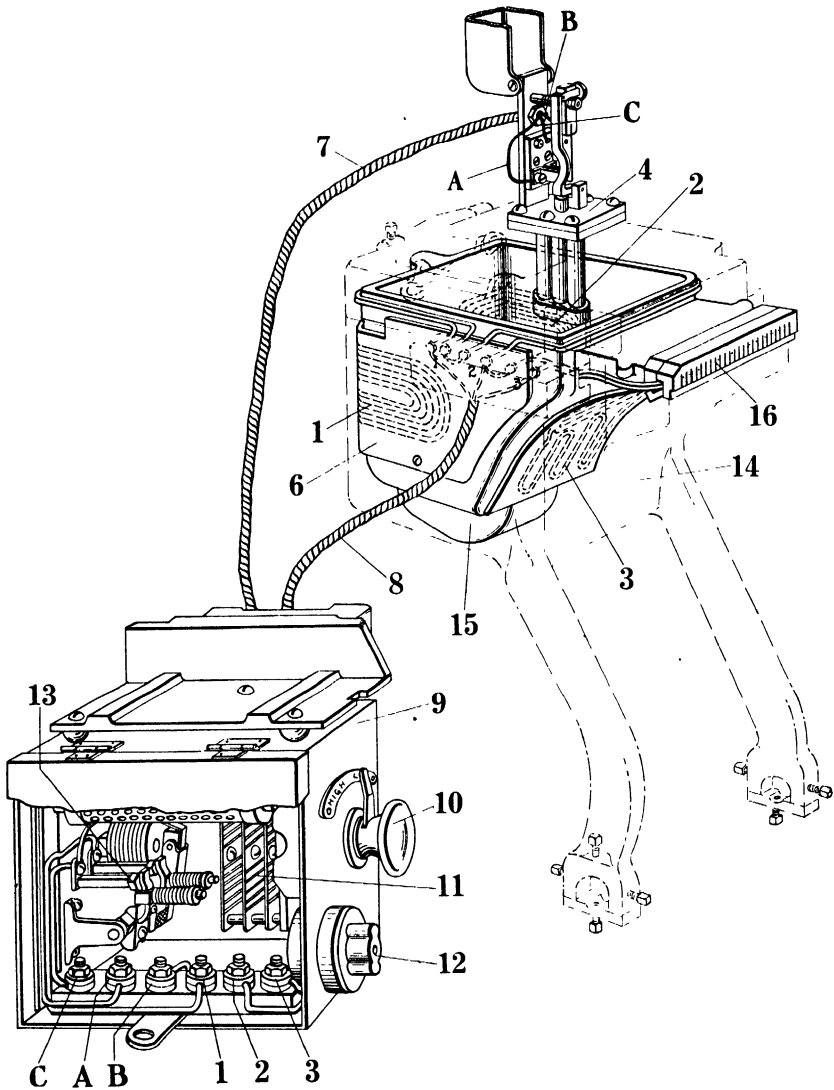


Fig. 72. Perspective View of the Electric Pot and Heating Equipment. The heaters are shown at 1, 2 and 3. The thermostat 4 is fastened on top of the pot cover and the control box 9 is mounted on the left side of the machine base. The thermostat regulates the temperature of the type metal automatically by controlling the current passing through the side heaters 1 and 2. The rheostat knob 10 controls the temperature of the crucible throat and of the mouthpiece 16 by regulating the current passing through the throat heater 3.

A perspective view of the electric pot with its heating equipment is shown in Fig. 72. The heating system may be regarded as composed of three main groups:

1. **The Heaters**, which supply heat to the crucible and the mouthpiece;
2. **The Thermostat**, which automatically controls the temperature of the type metal by regulating the current passing through the heaters;
3. **The Control Box**, which contains mechanism suitable for closing and opening the electrical circuit automatically and for regulating the heat of the mouthpiece and crucible throat.

The Heaters

The three heaters applied to the electric pot are shown in dotted outline at 1, 2 and 3, Fig. 72. The heaters are placed around the crucible and are held in contact with the crucible casting by covers, one of which is shown at 6. These covers also separate the heaters from the asbestos and prevent the formation of hot areas, which occur only when asbestos comes into contact with a heater and makes it impossible for the heat to be dissipated at that point. The two side heaters 1 and 2 surround the body of the crucible 15 and keep the type metal at the proper temperature. The throat heater 3 keeps the crucible throat and the mouthpiece 16 at a temperature corresponding to that of the molten type metal so that the metal will not be chilled or overheated as it is delivered to the mold. The heaters are made of sheath wire surrounded with a layer of magnesium oxide and encased in a steel tube. The tube is made of a special alloy so that it will withstand the continuous heat. A sectional view of the heaters showing this construction may be seen in Fig. 68. The ends of the heaters are located in a terminal box at the left side of the pot 14, Fig. 72, where they are clamped in position and connected with wires leading from the control box. The terminal box cover, which protects the connections, should always be kept in position.

The same side heaters are used for low voltage (100-125) as for high voltage (200-250). The heaters are connected in *parallel* or *multiple* for low voltage installations and in *series* for high voltage installations. The part numbers of the side heaters are as follows:

U-1143 (right-hand heater), for currents ranging from 100 to 125 volts or 200 to 250 volts.

U-1146 (left-hand heater), for currents ranging from 100 to 125 volts or 200 to 250 volts.

The throat heater is *not* universal and can be used only on the current specified. The part numbers of the throat heaters are as follows:

U-2813, for currents ranging from 100 to 125 volts.

U-2814, for currents ranging from 200 to 250 volts.

All three of the pot heaters can be used for both direct and alternating current installations.

Other parts for the electric pot are illustrated and listed with specifications in the Intertype Parts and Supplies catalogue.

The Lever Type Thermostat

The thermostat, as stated previously, controls the temperature of the type metal automatically by regulating the current passing through the two side heaters. The thermostat is shown in assembly with the rest of the pot electrical

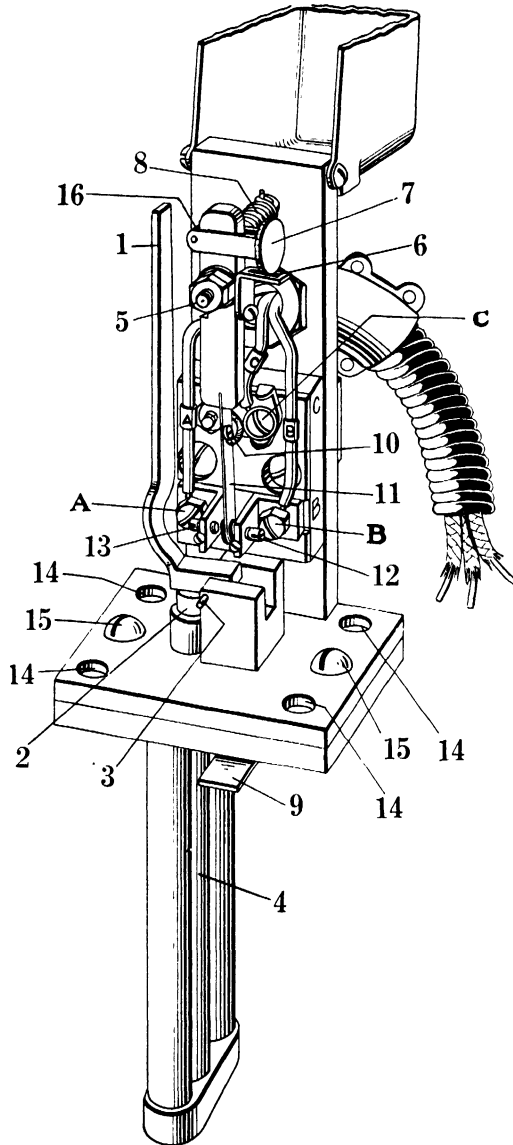


Fig. 73. The Lever Type Electric Pot Thermostat controls the temperature of the type metal automatically through the expansion and contraction of expanding rod 4, which is immersed in the molten type metal. As the type metal approaches its maximum temperature, rod 4 lengthens by expansion, causing end 2 to bear against the lower end of lever 1 pivoted on pin 3. Lever 1 bears against roller 16 on contact arm 11, causing the lower end of the arm to contact screw 13 in the A terminal. This action opens the relay in the control box and the current ceases to flow through the side heaters. As the type metal approaches its minimum temperature, expanding rod 4 shortens by contraction and releases the pressure of end 2 from lever 1. This leaves the arm free to follow spring 8, which moves the arm until it contacts screw 12 in the B terminal. The relay in the control box is thereby closed and current flows again through the two side heaters, raising the temperature of the type metal until it reaches its maximum degree of heat.

equipment in Fig. 72. The thermostat 4 is fastened on top of the pot cover and the control box 9 is mounted on the left side of the machine base. Three wires inside cable 7 are fastened at each end to *A*, *B* and *C* contact screws in the control box 9 and the thermostat 4. Three wires inside cable 8 are connected to the ends of the heaters in the terminal box and lead to terminals 1, 2 and 3 in the control box 9. This wiring system connects the thermostat with the relay mechanism, which closes and opens the electric circuit and causes current to flow or to cease flowing through the side heaters. The closing and opening of the circuit is controlled by an operating lever in the thermostat, which is operated by an expanding rod immersed in the type metal. The knob 10 controls the amount of current passing through the throat heater 3 by cutting resistance in or out of the rheostat units 11. *The throat heater circuit is entirely independent of the side heater circuit* and the operation of either circuit in no way affects that of the other. Adjustment of the type metal temperature is made by means of a regulating screw in the thermostat 4 and adjustment of the throat and mouthpiece temperature is made by means of the rheostat knob 10. This double method of heat control provides an exceedingly flexible system which is adaptable to all conditions under which slugs are cast. The snap switch button 12 is used to turn the current on and off when desired.

The closing and opening of the circuit, as stated previously, is controlled by an operating lever and a contact arm in the thermostat, which are operated by an expanding rod immersed in the type metal. The contact arm 11, Fig. 73, is pivoted on post 5 and is connected by wire 10 to the *C* terminal. The arm is moved between contact screw 13 in the *A* terminal and contact screw 12 in the *B* terminal by operating lever 1, which bears against and withdraws from a roller 16 on the arm as the temperature of the type metal rises and falls. These movements are caused by the aluminum rod 4, which is more sensitive to heat changes than the two steel rods. As the type metal approaches the maximum temperature for which the adjusting screw has been set, the expanding rod 4 lengthens by expansion and the end 2 of the rod bears against lever 1 pivoted on pin 3. The operating lever 1 presses against roller 16, causing the lower end of arm 11 to contact screw 13 in the *A* terminal. This action opens the relay in the control box and current ceases to flow through the two side heaters. As the temperature of the type metal decreases and approaches its minimum degree of heat, expanding rod 4 shortens by contraction and releases the pressure of end 2 from lever 1. Arm 11 is then left free to follow the movement of spring 8, which moves the arm until its lower end contacts screw 12 in the *B* terminal. This action energizes the relay coil in the control box, causing the relay to close and current to flow through the side heaters. These actions are entirely automatic and it is necessary only to set the thermostat for the temperature desired.

Adjustments. The temperature of the type metal is regulated by screw 7, Fig. 73. Turning the screw clockwise will lower the heat of the type metal and turning the screw counter-clockwise will raise the temperature. Friction clamp 6 prevents the adjusting screw from moving after it has been set. The average casting temperature of the type metal is from 525 degrees Fahrenheit to 550 degrees. The difference between the on and off position of the thermostat contact arm should *not* exceed 25 degrees. Accuracy in setting the type metal tempera-

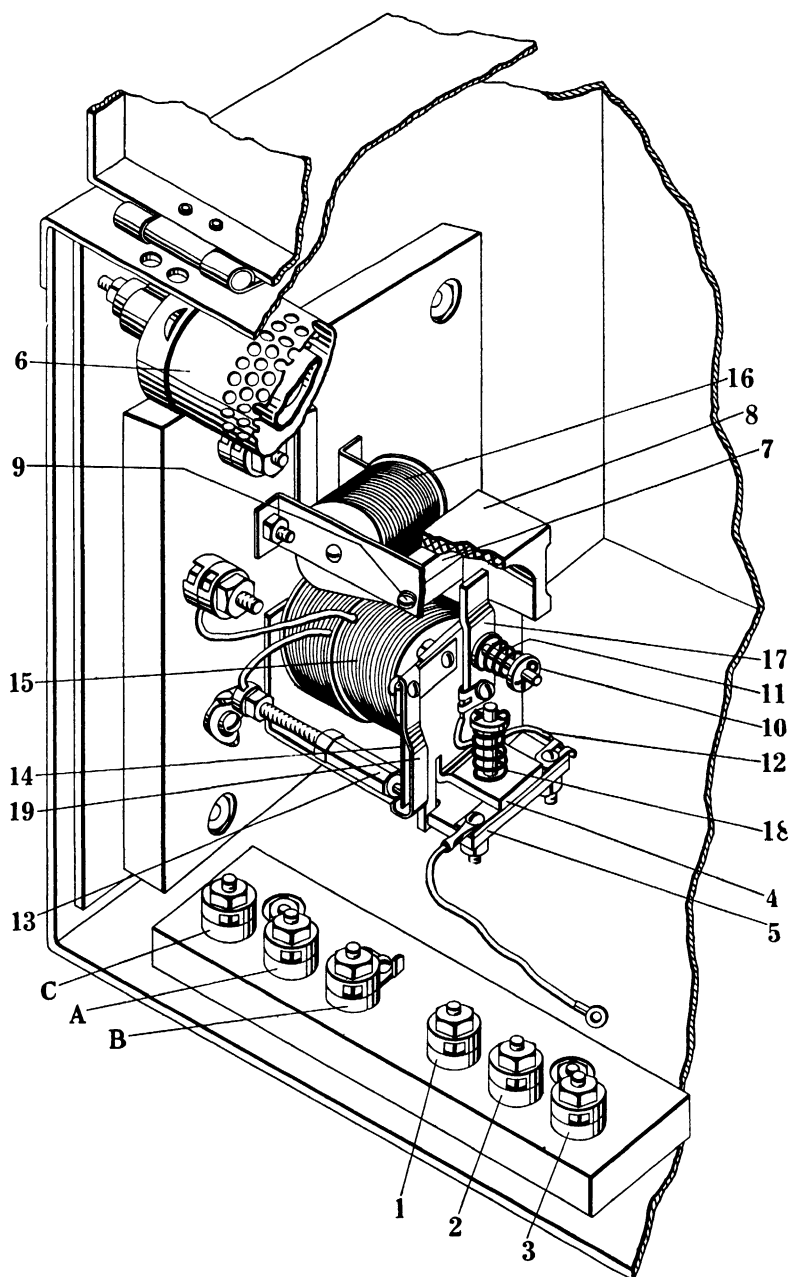


Fig. 74. The Direct Current Relay, which closes and opens the electrical circuit as the thermostat contact arm moves from the A to the B terminal.

ture requires the use of a reliable thermometer. Intertype Corporation carries in stock a thermometer (W-88) intended specifically for this purpose.

The contact screws 12 and 13 should be adjusted so that there is approximately $1/32''$ space between the lower end of arm 11 and one contact screw when the arm is touching the other screw. The small locking screws should be tightened after the contact screws are set.

Removal of Thermostat. To remove the thermostat when the type metal is frozen, simply remove the four holding screws 14 and the two frame screws 15. This will release the thermostat frame from the base and the assembled upper section of the thermostat can be moved aside. If the pot cover is to be removed, take out the two flathead screws which hold the thermostat base to the stem and lift off the base. This will leave the thermostat stem in the metal and the pot cover can be removed from the jacket. Spring 9 provides a yielding contact between the thermostat and the pot cover and prevents loss of adjustment when the type metal freezes around the thermostat stem.

Maintenance. The contact studs at the lower end of arm 11, Fig. 73, and the inside ends of contact screws 12 and 13 should be kept clean and smooth so that the parts can establish full contact. These parts should be cleaned occasionally with a piece of fine-grained emery cloth. It is essential that the contact arm 11 move freely on the post 5. If the arm is removed, make sure that the two fastening nuts do not bind it in position when it is replaced. The three thermostat wires *A*, *B* and *C* should be kept away from the arm so that they will not interfere with its movements. While the parts of the thermostat are made as durable as possible, they can be damaged if they are not handled properly. Bent or scored parts should be replaced with new ones to insure efficient operation of the device.

The Control Box

The control box, mentioned previously as the third division of the electric pot equipment, contains the mechanism necessary for controlling the current passing through the three pot heaters. This mechanism consists of two major groups:

1. **The Relay and Resistor**, which close and open the electrical circuit as the thermostat contact arm is moved between the *A* and *B* terminals by the expanding rod in the type metal;
2. **The Rheostat**, which is used to raise or to lower the heat of the crucible throat and the mouthpiece. Incidentally, of course, the throat heater has an effect upon the heat of the type metal in the crucible.

The Relay Mechanism

The D.C. Relay. Although the direct and alternating current relays vary in mechanical construction, they perform similar functions and operate on the same principle. The direct current relay is shown in Fig. 74. The relay is connected in series with the resistor unit, which is enclosed in a cage 6 in the control box. The relay mechanism consists chiefly of the relay coil 15, the relay contact tip 17, the contact post 13 and the contact spring 14. When the contact arm in the thermostat touches the screw in the *B* terminal, the relay coil 15 is energized

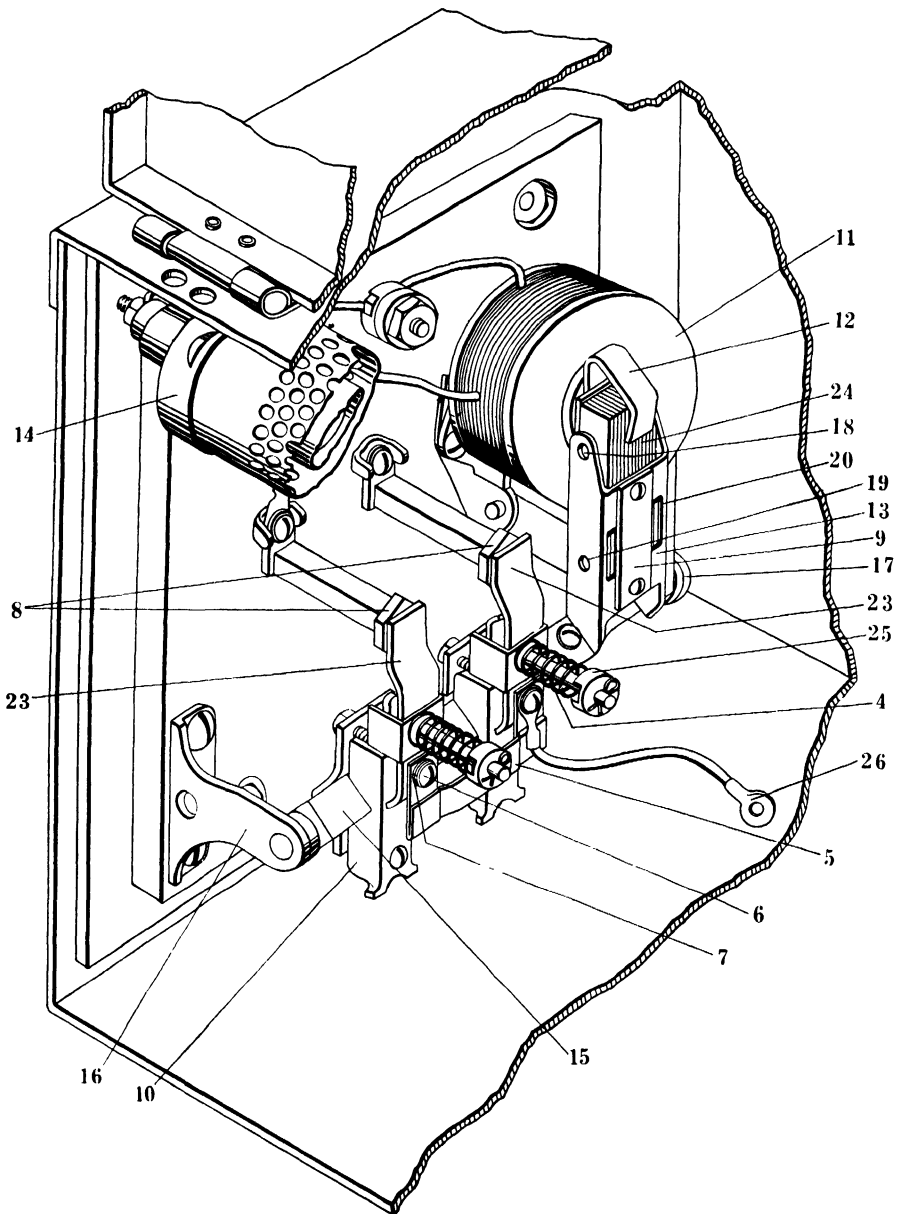


Fig. 75. The Alternating Current Relay fulfils the same function as the direct current relay. The alternating current relay closes and opens the circuit and causes current to flow and to cease flowing through the two side heaters.

and contact tip 17 closes against contact piece 7. At the same time, contact spring 14 is moved forward until it establishes contact with post 13. As soon as the relay closes, the circuit is formed through the *relay, the resistor and the thermostat*, causing current to flow through the two side heaters. As the temperature of the type metal rises, the thermostat contact arm is moved from the *B* terminal to the *A* terminal. While the arm is moving toward the *A* terminal, the relay is held in contact with its coil by contact spring 14 on finger 19. This causes the current to continue to flow through the two side heaters, even though the thermostat contact arm is no longer in contact with the *B* terminal. This type of circuit is known as a maintaining circuit. As soon as the arm touches the *A* terminal in the thermostat, however, a by-pass circuit is established, causing contact tip 17 to fall away from contact piece 7 and contact spring 14 to fall away from post 13. The blowout coil 16 prevents an arc or flame from being given off when tip 17 is drawn away from piece 7 through action of spring 18. These parts will remain inoperative until the contact arm in the thermostat touches terminal *B* again, energizing the relay and causing current to flow through the two side heaters.

Adjustment. The contact post 13, Fig. 74, should be adjusted so that spring 14 contacts the post slightly before tip 17 contacts piece 7. The post can be turned closer to or further away from the spring after the lock nut is loosened. The contact post and the spring establish a maintaining circuit which holds tip 17 against piece 7 while the thermostat contact arm is moving toward the *A* terminal.

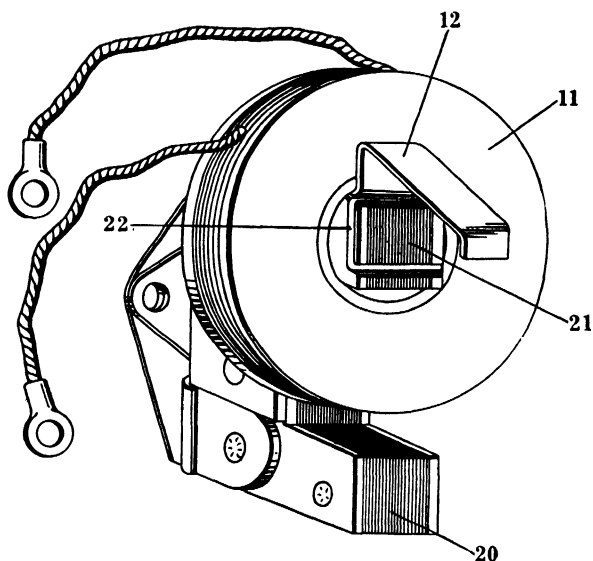


Fig. 75a. Showing a detail view of the pot relay coil used on alternating current installations. The relay laminated field is drawn against pole faces 20 and 21 when the coil is energized. It is essential that these surfaces be kept clean and smooth. A copper band or pole shaver 22 is fastened around the upper face 21. The shaver should always be seated firmly in its grooves in the pole face.

Removal of Parts and Maintenance. The maintenance of the control box consists chiefly in keeping the connections tight and the contact surfaces clean. From time to time inspect the nuts which hold the connecting wires to their posts and make sure that they are tight. With the current off, work the relay by hand occasionally to see whether the armature 4, Fig. 74, is free in the frame 5. To remove contacts 17 and 7, first remove arc chute 8 by pulling it out horizontally to the right. The contact tip 17 can then be removed by pulling out the cotter pin 10 and unfastening the shunt 12. The contact piece 7 can be removed by turning out screw 9. When these parts are replaced, clean their contact surfaces with a piece of fine emery cloth. Occasionally, it is necessary to renew the contact spring 11 if it becomes weakened. The spring should exert about two pounds pressure against piece 7 when armature 4 is closed as far as it will go.

The A. C. Relay. The alternating current relay differs mechanically from the direct current relay but operates on the same principle. The alternating current control switch is of the magnetic type. The relay mechanism is mounted on a shaft 15, Fig. 75, which is supported on each side by a bracket 16 and 17. The laminated field 24 and the two contact tips 23 are fastened on the shaft 15. When the magnet is energized, current passes through resistor tube 14 into the relay coil 11; the current then passes through contacts 8 and 23 to the shunt 26 and then out into the line wire. The laminated field 24 is thereby drawn against two poles on coil 11, causing contact tips 23 to close against contact screws 8. Pins 18 and 19 hold the field loosely in its bearing and limit the movement of the field. When the field closes against the poles, current flows through the two side heaters and the temperature of the type metal rises. When the type metal reaches its maximum temperature, the thermostat contact arm touches the A terminal. This by-passes the current passing through the relay coil and causes tips 23 to fall away from screws 8. Armature stop 12 limits the open position of laminated field 24 and tips 23.

Maintenance. The contact surfaces of tips 23 and screws 8, Fig. 75, should be cleaned regularly with a piece of fine-grained emery cloth. The laminated field 24 closes against two pole faces, which are shown at 20 and 21, Fig. 75a. The contacting areas of the field and the faces should be kept clean and smooth to prevent excessive humming of the parts when they are closed. Occasionally, inspect the copper pole shader 22 around the upper face 21. If the shader becomes disconnected or broken, the laminated field and the pole faces will become hot during operation. To remove the contact tips 23, Fig. 75, pull out the cotter pins holding the cup washers 25 and the springs 4 and remove shunt 26. Springs 4 should have enough tension to exert about one-half pound pressure against the screws 8 when armature 9 is closed all the way. If the springs are weak, they should be replaced with new ones. When the contact tips are replaced, make sure that screw 6 and lock washer 7 are turned up tight and that the contact tips are free in the supports 10.

The Rheostat

The rheostat is used to raise or to lower the heat of the crucible throat and the mouthpiece. Manipulation of the rheostat, as stated previously, has no effect upon the operation of the side heaters — the two control systems are entirely

independent of each other. The rheostat mechanism is shown in Fig. 76. The rheostat units 2 are mounted on studs and are held apart by spacers. The assembled units are fastened to a base which is held in position by four holding screws 1. The rheostat knob 10 is mounted outside the control box. When the knob is turned, a lever attached to the knob inside the control box moves contact shunt 4 from one contact button 3 to another. If the rheostat knob is moved toward the "High" position, resistance is cut out and more current will flow through the throat heater and the temperature of the crucible throat and of the mouthpiece will rise. Turning the knob toward the "Low" position will have the opposite effect.

Removal and Maintenance. If it is necessary to replace a rheostat unit, the

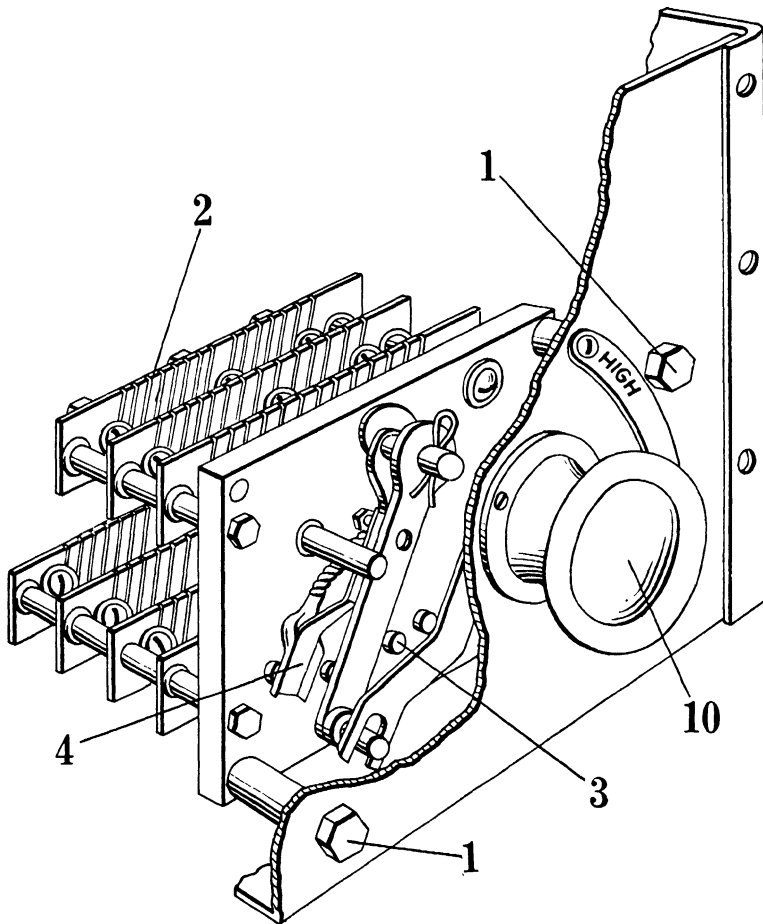


Fig. 76. The Pot Rheostat controls the current passing through the throat heater and regulates the temperature of the crucible throat and of the mouthpiece. Knob 10 moves shunt 4 across a number of buttons 3, causing more or less current to flow through the heater. This is accomplished by cutting resistance into the resistor units to lower the temperature, and by cutting resistance out of the units to raise the temperature.

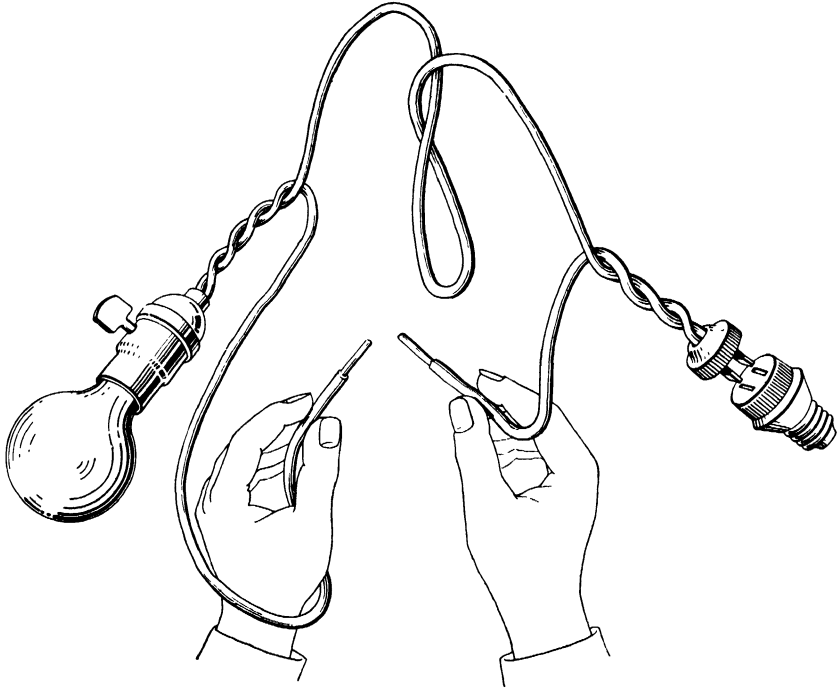


Fig. 77. Showing the lamp in series, which is used for testing open circuits and short circuits

assembled rheostat should be removed from the control box. Disconnect the main insulated wires attached to the rheostat, remove the four holding screws 1, Fig. 76, and lift out the rheostat. See that all the tap nuts are tight. Examine the wire connectors to make sure that they do not touch one another. Inspect the flat resistor ribbon carefully for breaks. If a rheostat unit is defective, it can be replaced easily with a new one. It is necessary only to remove the unit studs, nuts and spacers which hold the unit in position. It is essential that the new unit bear the same part number as the old one. When reassembling the parts, make sure that the connecting wires are separated and that the tap nuts and screws are tight.

Testing the Rheostat. The rheostat can be tested with a lamp in series before it is returned to the control box. The test lamp and its connections are shown in Fig. 77. Connect the lamp in series with the rheostat and move contact shunt 4, Fig. 76, back and forth across the contact buttons 3. The lamp should remain lighted on each button. If the lamp goes out on any of the buttons, it indicates that the resistor unit or the connecting wire for the button is defective or that a connecting screw or nut is loose. When the lamp remains lighted on all buttons and the connections have been restored to their original positions, return the assembled rheostat to the control box.

General Maintenance

With a reasonable amount of care and maintenance, the electric pot will operate without interruption. Due to the widely varying conditions under which electrical equipment is used, however, a few difficulties may arise which can be located and corrected by some simple tests.

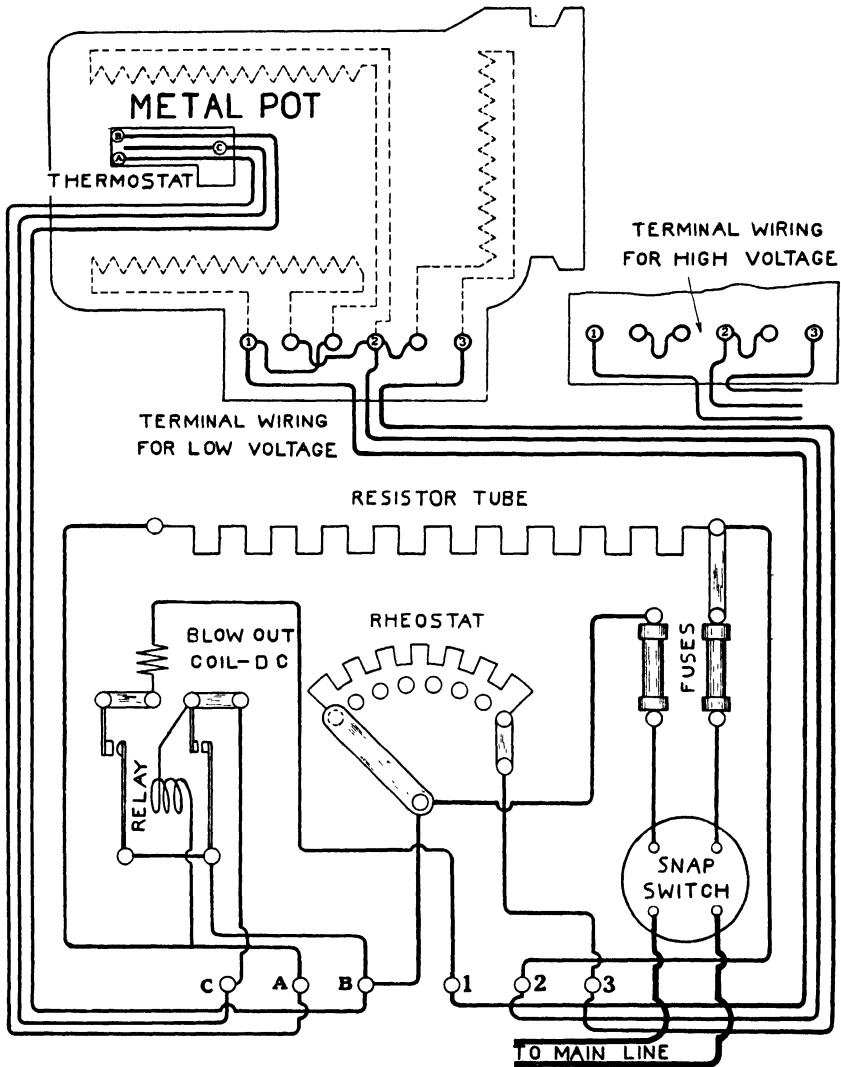


Fig. 78. Direct Current Pot Wiring Diagram, showing the terminal wiring for high and low voltage installations. The heaters are connected in series for high voltage and in parallel or multiple for low voltage. The same side heaters are used for high voltage as for high voltage, the only difference being in the method of connecting them. A different throat heater is required for high and low voltage installations.

The Fuses. To examine the fuses, remove them from the control box and test them with a lamp. If the fuses keep blowing, some part of the electric circuit is probably grounded or short circuited. The electrical connections will have to be tested under these conditions in order to locate and remedy the defect. In the case of fuses with removable links, make sure that the links are not shriveled and that the link caps are tight.

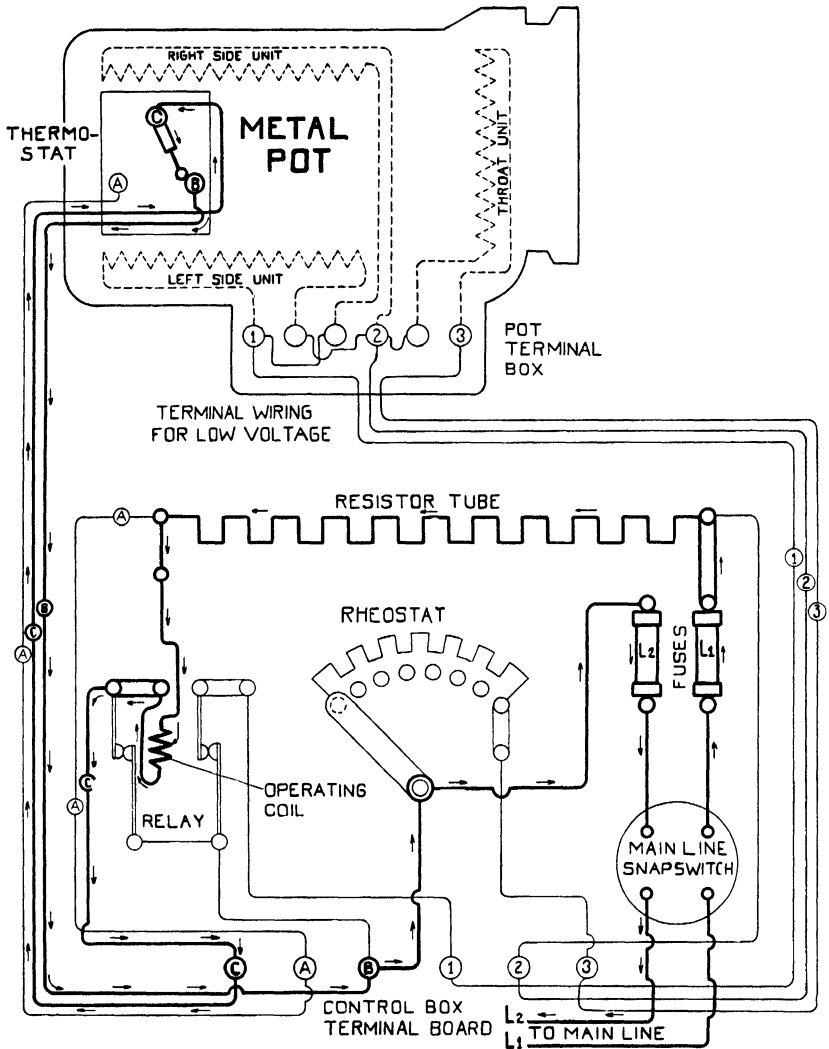


Fig. 79. Alternating Current Pot Wiring Diagram, showing the position of the thermostat contact arm and the relay when the circuit is closed. As the type metal approaches its minimum temperature, the thermostat contact arm touches the *B* terminal in the thermostat. This action energizes the relay operating coil, causing the relay to close and to complete the circuit indicated in heavy outline. The current then flows through the two side heaters and raises the temperature of the type metal. The direction of the current is shown by the arrows.

Testing the Heaters. If a heater is removed from the pot and is not replaced properly, it may burn out in the course of operation. When any of the three heaters is defective, there is generally sufficient indication to show which one is at fault. If the throat heater is burned out, the mouthpiece and crucible throat will be cold and it will be impossible for the type metal to pass through the mouthpiece. If either of the two side heaters is defective, the type metal nearest the defective heater will remain frozen long after the metal on the other side has melted. In an emergency, it is possible to operate a pot with one good side heater on 100 to 125 volt circuits, but the defective heater should be replaced as soon as possible to insure proper casting conditions. A defective heater must be replaced immediately on 200 to 250 volt circuits.

An *open* heater is one in which a wire has been broken, making it impossible for the current to flow through and to complete the circuit. If a heater burns out or becomes open and it is difficult to determine which one is defective, turn off the main line snap switch and remove the terminal box cover at the left side of the pot. Disconnect terminal No. 1 (numbered 1 to 6 from left to right). Turn on the main line switch, make sure that the relay is closed, then tap the terminal with the disconnected wire. If the wire produces a spark, the left side heater is not *open*. Connect terminal No. 1 and repeat the same operation with terminal No. 3 to determine whether the right side heater is all right. The same test on terminal No. 5 will indicate whether or not the throat heater is *open*. The heaters can also be tested for open circuits with a lamp in series. The equipment consists simply of an ordinary incandescent lamp, a lamp socket, an attachment plug and a convenient length of cord, as shown in Fig. 77. Disconnect the inter-connecting wires on the heaters under test and connect the two bare lamp cord wires to two different terminals of the heaters. If the lamp lights, it indicates that the heaters are not *open*.

A *grounded* heater is one in which the insulation is loosened from a wire, causing contact with a metallic cable covering. The heaters must be removed from the pot in order to test them for grounds. Place the heaters on a board or any other non-conductive material. Place one wire of the test lamp against the outside sheath of the heater and the other wire on one of the terminals. If the lamp lights, the heater is grounded. If the lamp does not light, the heater is all right. Note that in the test for *open* circuits the lamp *should* light on a good heater, and in the test for *grounds* the lamp *should not* light on a good heater. Sometimes the mica washer at the terminals of the heater are loosened or broken by improper handling, causing a ground in the heater.

The frame of the machine should be grounded for efficient operation. This can be done easily by making a wire connection from the machine to a gas or water pipe.

Removal and Replacement of Heaters. The three pot heaters, as mentioned previously, are placed around the crucible and are held in contact with the crucible casting by a number of covers. The heaters can be removed and replaced easily because they are located in very accessible positions. To remove the throat heater, remove the terminal box cover on the left side of the pot and remove the clamp over the two terminals of the heater. Loosen the two square head screws under the throat of the pot and remove the shield directly under the mouthpiece.

The throat heater can now be removed with a pair of pliers and a new one placed in position. Before replacing the heater cover, make sure that the two set screws under the throat of the pot are turned in sufficiently to hold the throat heater up close to the crucible throat and the mouthpiece. Replace the heater shield and fill the space between the heater cover and the shield with asbestos, being careful that none of the asbestos is left in contact with the heater.

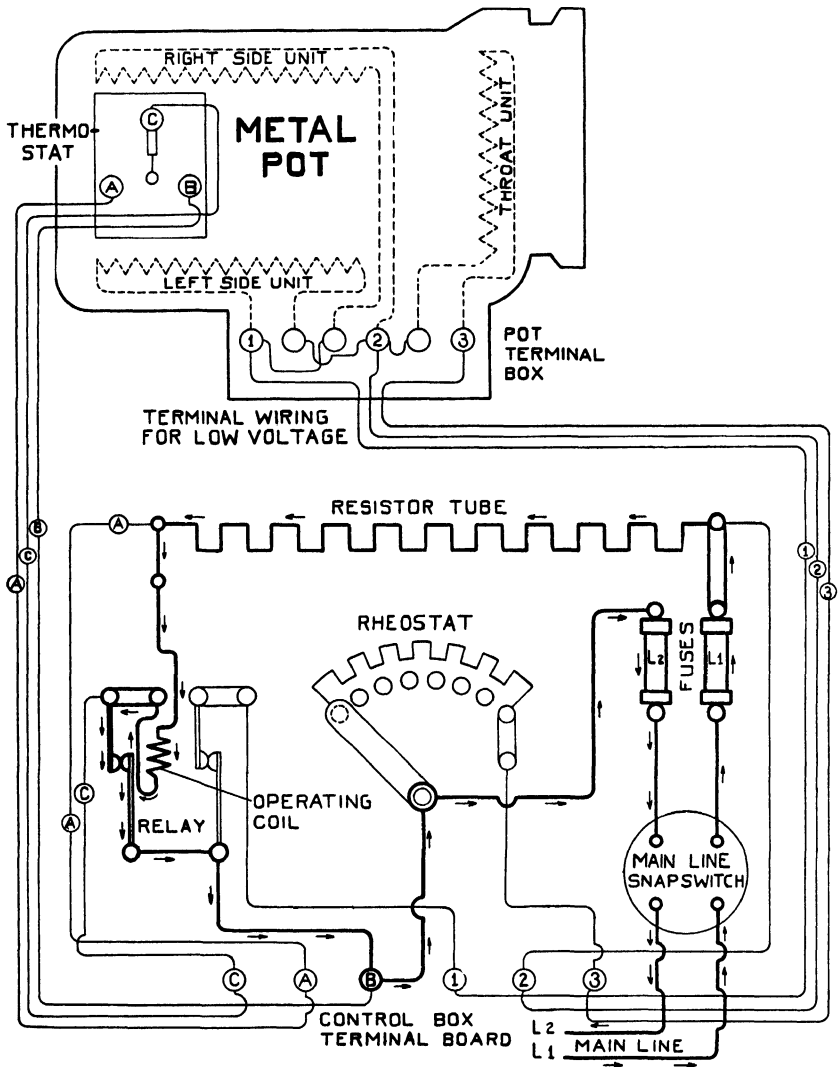


Fig. 79a. Alternating Current Maintaining Circuit. As the temperature of the type metal rises, the contact arm in the thermostat is moved away from the *B* terminal by an expanding rod in the type metal. The original closing circuit shown in Fig. 79 is thereby broken. The relay is still held in a closed position, however, because the relay operating coil is energized by the current. The path of the current is shown by the arrows.

To remove either of the side units, it is necessary first to remove the pot cover, which is fastened to the pot jacket with four screws. If the metal is frozen, the thermostat frame can be separated from the base by removing the four holding screws and the two frame screws, then the base can be separated from the thermostat stem by taking out the two flathead screws. This will permit the pot cover to be raised and the heaters can be removed freely after the terminal clamps are taken off.

Removing and Packing the Electric Pot

To remove the electric pot from the machine, take out the plunger and ladle as much type metal as possible from the crucible. Shut off the pot current by turning the main line snap switch and disconnect and remove the thermostat. Remove the terminal box cover, disconnect the three wires leading through the cable from the control box, unscrew the cable connector nut and lower the cable. Run the machine ahead until the first elevator seats on the vise cap and before the mold disk moves forward. Push in the starting and stopping lever and turn off the motor. Lower the vise frame to second position, depress the mold cam lever handle, remove the ejector lever link and remove the mold disk slide from the machine. Remove the mold disk shield, which is fastened to the face plate frame directly above the mold disk, and remove the pump stop bracket. Remove the two caps at the base of the pot legs and loosen the two front pot leg adjusting screws. Remove the pot lever, replace the pot lever shaft and tighten the set screw so that the shaft will not slip. Place a belt around the pot lever shaft. One person should lift and support the pot at the back while another lifts the pot legs off the bushings. When the legs are free, the pot should be lowered at the back while the legs are raised in the front and then the pot can be lifted out over the vise frame. The pot should be held high enough during removal so that it will not bump against any part of the vise mechanism.

Packing the Electric Pot. The space between the pot jacket and the crucible heater covers must be packed as solidly as possible with asbestos to insure proper heat insulation for the crucible. Voids in the packing cause loss of heat and impair the efficiency of the pot. The asbestos can be ordered in any quantity desired from Intertype Corporation. The asbestos is always used dry in the case of the electric pot. Remove the pot cover, turn the pot upside down and fill the space around the sides, back and throat of the crucible with the asbestos. Fill the space at the bottom of the crucible and replace the pot jacket bottom plate. Turn the pot right side up and stuff a cloth or piece of waste in the crucible well to prevent the entrance of asbestos. Fill up any remaining space between the jacket and the crucible heater covers and press the asbestos tightly in position with a stick of wood. Moisten a small quantity of asbestos and pack it in the openings around the mouthpiece. *Asbestos must be kept away from actual contact with the heaters.* If the asbestos touches a heater, the heat cannot be dissipated and the heater is likely to burn out. To return the assembled pot to the machine, reverse the procedure of removal. A lock-up impression should be taken after the pot is in the machine to make certain that the mouthpiece is parallel with respect to the mold.

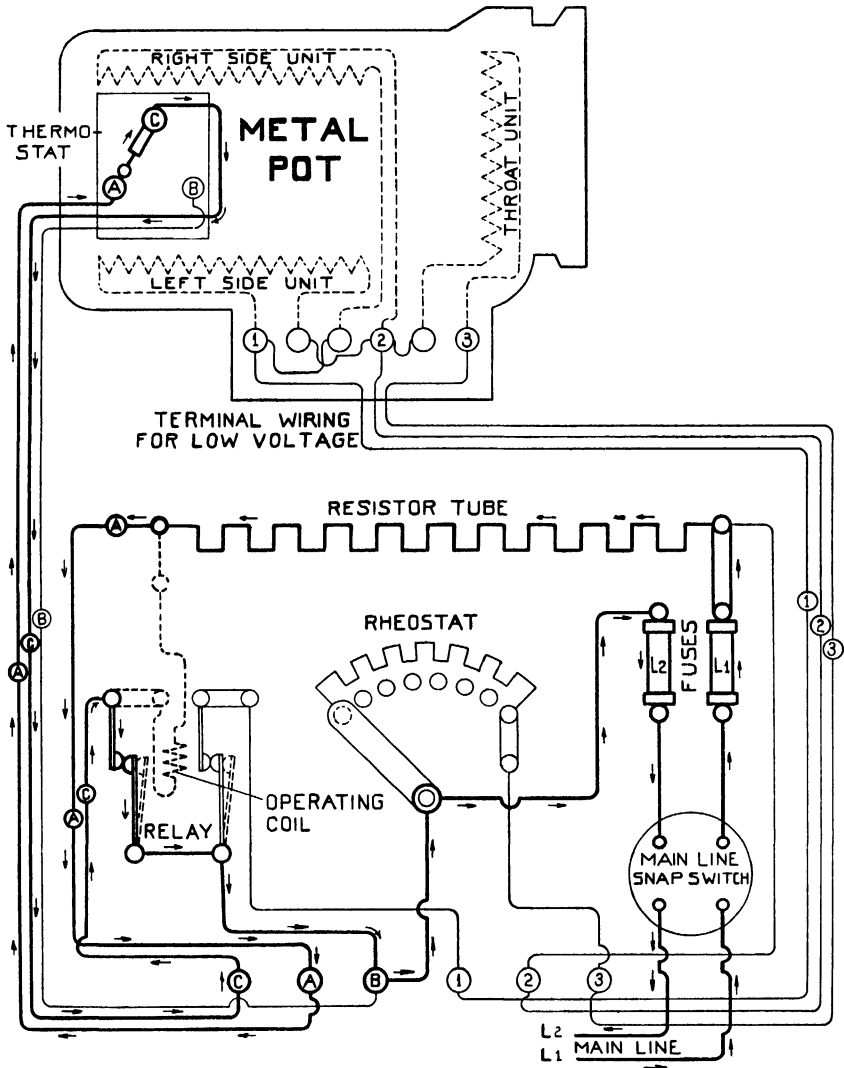


Fig. 79b. Alternating Current Opening Circuit. The maintaining circuit shown in Fig. 79a has kept the relay closed and the side heaters have raised the type metal to its proper temperature. As soon as the type metal reaches the maximum temperature for which the thermostat is set, the thermostat contact arm touches the *A* terminal. This action by-passes the current passing through the relay operating coil and the relay is thereby permitted to open. When the relay contact tips separate from the contact screws (as shown in dotted lines), the circuit is broken and the current will not flow through the *A*, *B* or *C* wires until the thermostat contact arm touches the *B* terminal again.

New Style Bulb-Type Thermostat

Intertype Corporation has adopted a new thermostat, known as the bulb-type thermostat, for the control of the side heaters on the electric pot. The bulb-type thermostat offers a new and exceedingly sensitive method of controlling the temperature of the type metal. The chief change is the use of a bulb and bellows assembly, which is filled with an operating liquid responsive to fluctuations in heat. The expansion and contraction of the liquid produces corresponding changes in the bellows, which operates a contact in the thermostat and causes current to flow or to cease flowing through the two side heaters. The most important feature of the thermostat is its quick and positive movements in closing and opening the circuit. The bulb-type thermostat and its control box, due to the direct line connection of the thermostat, have been simplified to a remarkable degree. The wiring system and the control box mechanism especially reflect this change. The bulb-type thermostat is supplied for either direct or alternating current and can be applied with the necessary parts to any outstanding electric pot.

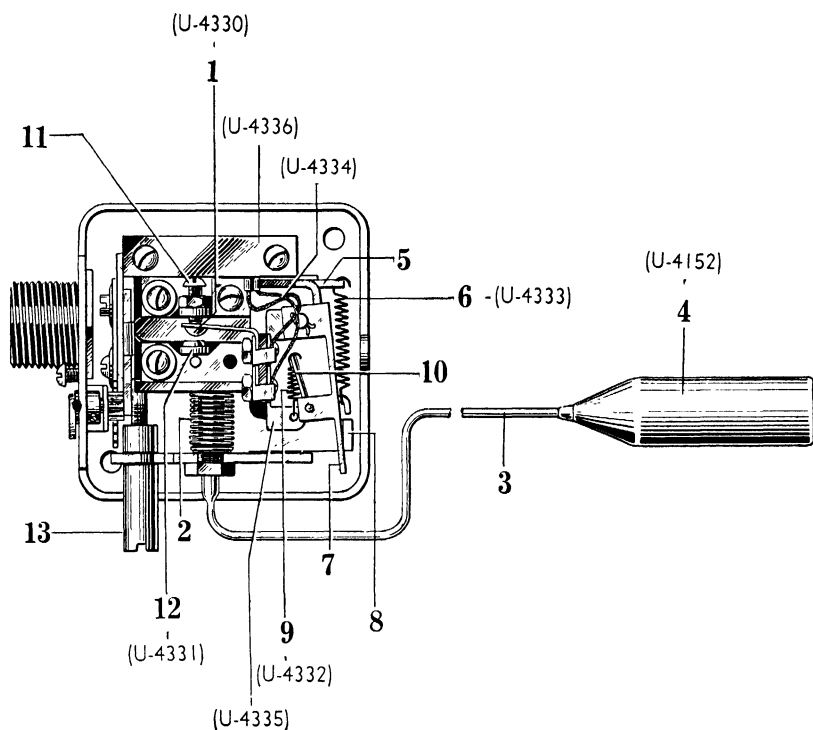


Fig. 80. The New Style Bulb Type Thermostat is operated by a bellows 2, which lengthens and shortens as the temperature of the type metal rises and falls. The lengthening and shortening of the bellows is caused by an operating liquid in the bulb 4 and tube 3. The expansion and contraction of the liquid and bellows moves the contact 1 between points 11 and 12 by the series of arms and springs shown. The contact thereby closes and opens the circuit, causing current to flow or to cease flowing through the two pot side heaters.

THE INTERTYPE

The bulb-type thermostat is shown in Fig. 80. The closing and opening of the circuit is controlled by contact 1, which is operated by the expansion and contraction of bellows 2. The bellows is attached to a capillary tube 3, on the other end of which is a bulb 4, which is immersed in the type metal. As stated previously, the bulb, tube and bellows assembly is filled with an operating liquid sensitive to changes in temperature. As the temperature of the type metal rises, the liquid in the bulb expands and causes the bellows 2 to increase in length. As the type metal cools, the operating liquid contracts and permits the bellows to undergo a similar contraction in length. The expansion and contraction of bellows 2 operates the contact 1 in the thermostat. With a rise in temperature, the bellows lengthens and raises lever 5. The lever causes spring 6 to pull arm 7 toward stop 8. This movement causes the fulcrum of yoke 10 to move past the

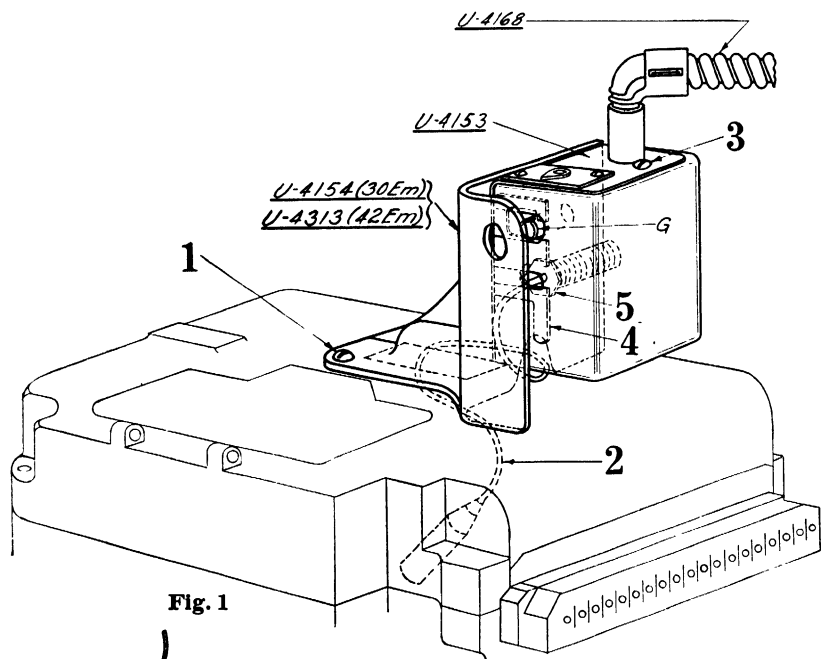


Fig. 1

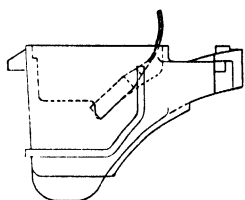


Fig. 2

Pot (G. E.) Thermostat (Bulb Construction)

U-4150 for A. C., 30 Em
U-4323 for A. C., 42 Em

U-4151 for 220 V. D. C., 30 Em
U-4324 for 220 V. D. C., 42 Em
U-4326 for 110 V. D. C., 30 Em
U-4327 for 110 V. D. C., 42 Em

Fig. 81. Showing how the bulb-type thermostat is mounted on the pot cover and how the bulb is located in the pot crucible. The thermostat is attached to a bracket which is fastened to the top of the pot cover. The bulb passes through the hole in the pot cover occupied formerly by the lever type thermostat stem. The capillary tube is bent so that the bulb is immersed as deeply as possible in the crucible, as shown in the detail drawing. The thermostat can be removed when the type metal is molten or frozen, as described in the text.

center of spring 9 and causes contact 1 to snap open against the adjustable screw 11. The circuit is thereby broken and current ceases to flow through the two side heaters. With a decrease in the temperature of the type metal, bellows 2 shortens and permits lever 5 to move arm 7 to the left. This causes the fulcrum of yoke 10 to move to the left past the center of spring 9 and contact 1 snaps closed against the stationary contact 12, completing the circuit and causing the current to flow through the two side heaters. Note that both movements of the thermostat contact are caused by spring action, which operates the parts in a quick and positive manner.

Adjustments. The temperature of the type metal is set by means of adjusting screw 13, Fig. 80. Turning the screw clockwise will lower the temperature of the type metal; turning the screw counter-clockwise will raise the temperature. The adjusting screw should be turned by small degrees and should never be forced. There is a small scale and indicator on top of the thermostat which moves as the adjusting screw is turned. The adjusting screw has a certain amount of lost motion and no change will occur in the temperature of the type metal unless the indicator actually moves. Each number on the indicator scale represents a difference of approximately 8 to 10 degrees in temperature. The total range of the thermostat is from 475 degrees Fahrenheit to 575 degrees. With the indicator set between 4 and 6 on the scale, the temperature of the type metal should be about right. When thermostats are applied to machines at the factory, they are adjusted approximately for 540 degrees and require no further adjustment. However, if a different temperature is required, a reliable thermometer should be used to determine the exactness of the setting.

Screw 11, Fig. 80, should be set so that there is approximately $1/32''$ clearance between the movable contact 1 and screw 11 when contact 1 is touching contact 12. This setting is made when the thermostat is assembled and need not be changed unless the contact points wear.

Maintenance. As in the case of the lever type thermostat, the contact points on the bulb-type thermostat should be clean and smooth to insure the proper flow of current. The contacts are made of coin silver and will rarely require cleaning. If it is necessary to dress the contacts, use a piece of fine-grained emery cloth which will not remove too much metal or score the points. Proper operation of the thermostat depends largely on the relative strength of springs 6 and 9. If these springs become weak for any reason, they should be replaced with new ones.

Removal of Thermostat. The new style thermostat, like the lever type, can be removed while the metal is molten or frozen. If the metal is molten, it is necessary simply to remove the two screws 1, Fig. 81, and lift the assembled thermostat and bracket off the pot cover. If the metal is frozen, the bulb and bellows assembly 2 must be freed first from the thermostat. Loosen screw 3 and remove the thermostat cover. This uncovers the bellows, which is held in a slot in flange 4 by nut 5. Loosen the nut and remove the two screws 1. The assembled thermostat and bracket can now be freed from the bellows and lifted out of the way. Once these parts are removed, the pot cover can be taken off without disturbing the position of the bulb in the type metal. The detail drawing shows how the bulb is positioned in the pot crucible.

The Control Box

The control box apparatus for the bulb-type thermostat has been simplified greatly. Many of the parts previously used with the lever type thermostat have been eliminated, resulting in an extremely compact assembly and a clearly defined wiring system. The chief parts which have been removed from the control box are the resistor and relay mechanism. These parts are no longer necessary, because the thermostat is connected directly with the line wires carrying the current. The only parts used in the new control box are a rheostat, a snap switch,

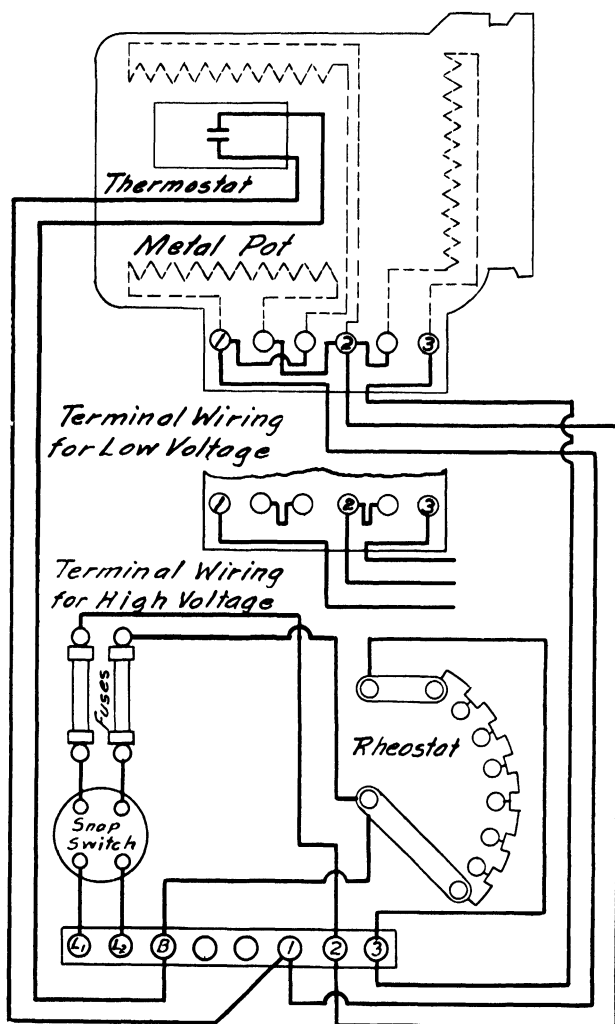


Fig. 82. Pot Wiring Diagram for Bulb-Type Thermostat. The wiring system is identical for both A.C. and D.C. installations. Terminal wiring for high and low voltages is also shown.

a fuse block and a terminal board, as indicated in the wiring diagram, Fig. 82. These parts fulfil the same functions they had formerly in the lever type assembly. The rheostat is used to raise or to lower the heat of the crucible throat and mouthpiece by turning the rheostat knob outside the control box. As in the case of the lever type control box, manipulation of the rheostat has no effect upon the operation of the side heaters — the rheostat is entirely independent of the thermostat. The snap switch is used to turn the current on and off. The fuse block contains clips suitable for holding the fuses and terminals for making the necessary connections. Intertype Corporation recommends the use of the non-renewable fuses in the control box, because link fuses may cause unintentional resistance. The terminal board consists of the usual insulating plates, screws and nuts for making the main connections between the thermostat and the other parts of the assembly. For direct current installations, an Alnico magnet is provided in the thermostat to deflect the arc and prevent welding of contacts. (The capacitor formerly used on D. C. installations is not needed.) *When the D. C. thermostat is in operation, the arc formed by the separation of the thermostat contacts must move away from the terminal screws.* If the arc moves toward the terminal screws, *reverse the thermostat connections B and 1, Fig. 82.* This condition is highly important and should be checked carefully.

Replacement Parts

Some of the part numbers for the bulb-type thermostat are illustrated in Fig. 80. The names of these parts are as follows:

- U-4152 Pot (G. E.) thermostat pot bulb and bellows, assembled.
- U-4330 Pot (G. E.) thermostat movable contact tip, assembled, bulb construction.
- U-4331 Pot (G. E.) thermostat stationary contact tip, assembled, bulb construction.
- U-4332 Pot (G. E.) thermostat spring, short, bulb construction.
- U-4333 Pot (G. E.) thermostat spring, long, bulb construction.
- U-4334 Pot (G. E.) thermostat shunt, assembled, bulb construction.
- U-4335 Pot (G. E.) thermostat movable contact bracket, assembled, bulb construction.
- U-4336 Pot (G. E.) thermostat stationary block, bulb construction.

When ordering these parts, the above parts numbers and names should be specified.

Pot Gasoline Burner

For those localities where neither gas nor electricity is available, Intertype Corporation supplies gasoline burner equipment for the metal pot. The gasoline burner (U-2000, assembled) is easily installed and operates satisfactorily from the standpoint of uniform temperature control. The parts of the gasoline burner are illustrated and listed with specifications in the Intertype Parts and Supplies Catalogue. Detailed instructions concerning the installation and operation of the equipment are included with orders.

The Type Metal

The quality of slug produced by the Intertype machine is dependent, to a great extent, upon the condition of the type metal used in the metal pot. A properly balanced and clean grade of type metal can be maintained by the con-

scientious performance of a few simple duties. If a reasonable amount of care is exercised in the use and remelting of the metal, the slugs will be more close-grained and the face will improve in sharpness of character. Troubles with slugs and faulty operation of the casting mechanism can be traced, in most instances, to the use of an inferior grade of type metal or to improper methods of remelting and purifying the metal.

Composition of the Type Metal. Type metal is composed of three metals—lead, antimony and tin—each of which serves a definite purpose in the formation of slugs. The approximate proportion of the metals is 85 per cent lead, 11 per cent antimony and 4 per cent tin. Lead constitutes the largest part of the type metal because it has a low melting point. Lead alone is too soft, however, so antimony and tin are added to compensate for this deficiency. Antimony lends hardness to the lead and has the added advantage of making the lead more fluid when it is in a molten state. The antimony expands just as the slug solidifies and reproduces the face with more exactness and clarity. Tin provides both strength and fluidity to the type metal and by helping the lead and antimony to combine more closely, the body of the slug is improved. The tin also is responsible for the smoothness and evenness of the characters on the face of the slug. Deficiencies in the proportion of the three metals will affect the slug considerably. If the amount of antimony is decreased, the slug will be too soft for extended press use and if the amount of tin is insufficient, the slug will be hollow and the face less sharp. A sample of type metal should be sent every three months to the metal manufacturers for analysis. The sample should be made up of small vent and jet trimmings gathered every day for a week so that the specimen will be representative of the metal stock. The metal manufacturers will furnish a report which will be of use in toning the metal and restoring it to its proper composition. No attempt should be made to tone the metal without such a report.

Melting the Metal. The metal should be melted as slowly as possible to avoid overheating any portion of the stock. As the metal begins to melt, the heat should be increased gradually until the temperature reaches approximately 600 degrees Fahrenheit. A reliable thermometer should be used to determine the temperature. If a thermometer is not available, a piece of newspaper can be used for a rough test. The end of the paper should be held in the type metal for about five seconds and should be light brown in color when it is withdrawn. *The molten metal should be stirred thoroughly* in order to mix the lead, antimony and tin and to prevent the last two metals from rising to the surface with the dross. Much of the antimony and tin are skimmed off with the dross precisely because the molten metal is not agitated sufficiently. It is essential that a quantity of Fluxor be mixed with the type metal when the stirring is begun. Fluxor is a special chemical preparation designed to clean and to purify the type metal. It separates the dross from the metal, breaks up oxide accumulations and mixes the ingredients of the type metal to closer uniformity. By combining the lead, antimony and tin more closely, Fluxor prevents much of these valuable ingredients from being removed with the dross. Fluxor can be obtained from Intertype Corporation or any of its agencies. When the dross on the surface of the type metal has been reduced as nearly as possible to powder form, skim it off

and deposit it in a drum or any other convenient receptacle. The skimming operation should be continued until the surface of the molten metal is clear and mirror-like. When dross has been removed, the molten metal should be poured into the molds as rapidly as possible to prevent its ingredients from separating before the job is completed.

Contamination of the Metal. Next to dirt and improper methods of melting the metal, the most frequent cause of contamination is the introduction of copper, brass and zinc into the type metal. Copper hardens the type metal and clogs the mouthpiece jets. Trimmings from stereotype and electrotype material are frequently mixed with slug trimmings and are a common source of trouble. Zinc is probably the worst metal that can be introduced into line-casting stock and should be kept isolated in a separate container. Foundry type, brass rules and etchings must never be used in the type metal. When one considers that these contaminating metals have a bad effect not only upon the quality of the slug but also upon the operation of the machine, it is logical to assume that a reasonable amount of care in the use and maintenance of the type metal will be amply repaid in time and effort later on.

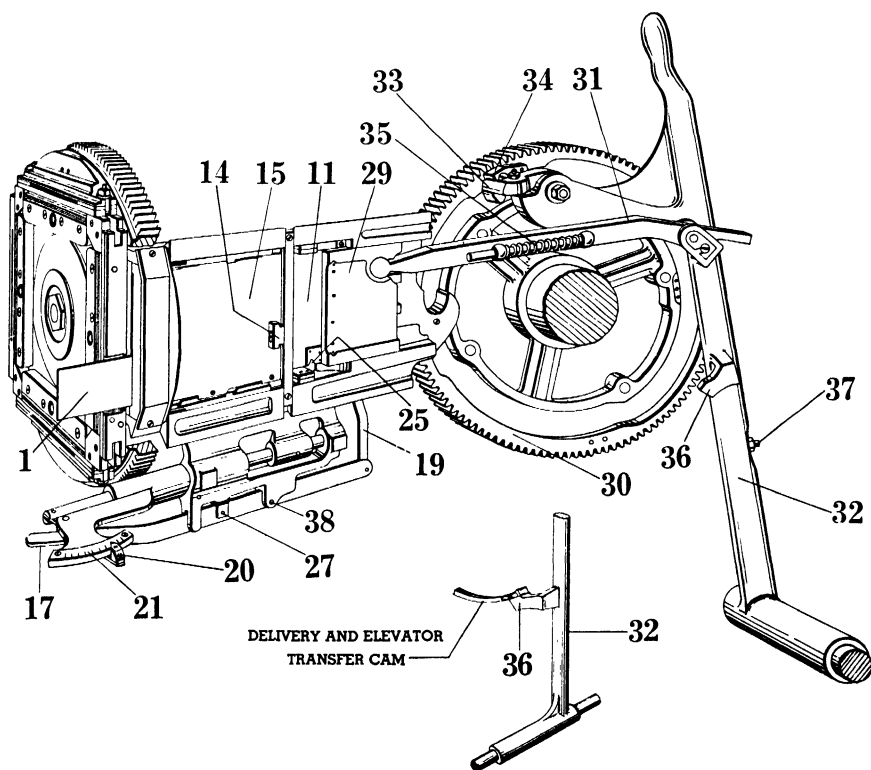


Fig. 83. Perspective View of the Universal Ejector and Related Parts in Assembly. The small detail drawing shows the part of the delivery and elevator transfer cam which returns the ejector lever and other mechanisms to normal position.

The Intertype Universal Ejector

Up to this point, we have followed the movements of the machine leading to the casting of the slug. Directly after the cast, the pot backs away from the mold and the mold withdraws the slug from the matrix line. The mold disk is then turned three-quarters of a revolution, carrying the slug in the mold past the back knife to ejecting position. These actions have been described in the sections dealing with the movements of the mold disk, mold disk slide and metal pot. During the three-quarter turn of the mold disk, the base of the slug is trimmed to type height by the back knife. When the mold disk completes its three-quarter revolution, the mold turning cam shoe stops the disk in position so that the mold disk locking studs are directly in line with the stud block bushings on the vise frame. The mold cam lever, as described previously, is then caused by the contour of the mold cam to move the mold disk forward through its connection with the mold disk slide. The mold disk locking studs enter the bushings on the vise frame and it is this action which locates the slug in the mold accurately with respect to the ejecting mechanism and the knife block. The mold is supported at ejecting position by two stationary banking blocks and one adjustable block. The stationary blocks furnish a support for the assembled mold and the adjustable one supports the mold cap.

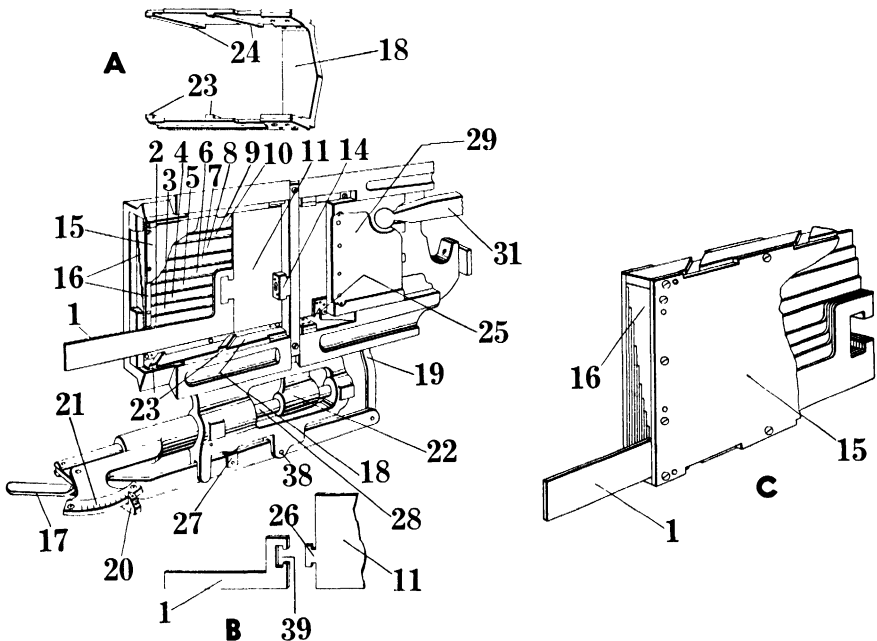


Fig. 84. Detail Views of the Ejecting Mechanism, showing how the parts are related and the means provided for their engagement and movement. The ejector blade magazine accommodates any selection of twelve blades. The operator can change instantly from one blade to another simply by depressing lever 17 and moving lever 20 to the number on em scale 21 corresponding to the size of the ejector blade desired.

Ejector Blade Operating Mechanism. The main parts of the ejecting mechanism are mounted in a recess on the right side of the mold disk slide casting. The mechanism consists principally of the ejector blades, which are contained within a movable magazine, the ejector blade holder and slide, the ejector lever and link and mechanism suitable for locating, shifting and selecting the blades. The chief parts of the ejector operating mechanism are shown in Fig. 83. The ejector blades *1* are contained within the ejector blade magazine *15*. The magazine contains an assortment of twelve blades, each blade being of a different height to correspond with the various lengths of slugs cast on the machine. The ejector blade holder *11*, fastened to the ejector slide *29*, moves the ejector blade forward to eject the slug and withdraws the blade after ejection through cam action. The ejector slide is connected to the ejector lever *32* through link *31*. The forward movement of the ejector lever and consequently, the forward motions of the ejector slide and blade, are promoted by the ejector cam *34*, which is fastened on one side of the mold cam and driving gear *30*. The ejector cam engages the ejector lever pawl *33* at the proper time in the operation of the machine and pulls the lever forward, causing the ejector blade *1* to push the slug out of the mold between the trimming knives and into the galley. As the ejector blade approaches the end of its forward stroke, a buffer rod *35* on link *31* banks against the machine column and cushions the movement of the parts through the compression spring. This prevents the ejecting mechanism from overthrowing beyond the movement imparted by cam *34* and pawl *33*. After the slug has been ejected, the ejector blade and the mechanisms connected with it are returned to normal position by part of the delivery and elevator transfer cam. The cam engages a lug *36* on the ejector lever *32* and moves the mechanisms back to normal position. This action is illustrated in the small detail drawing, Fig. 83.

Ejector Blade Shifting and Selecting Mechanism. In addition to operating mechanism described previously, additional mechanism is provided to locate, shift and select the ejector blades to correspond with changes in the length of slugs being cast. The purpose of the ejector locating lever *17*, Fig. 84, is to fix the position of the ejector blade holder *11* when the ejector blade is being changed. The engagement of the holder with each of the twelve blades is accomplished by the use of a T-shaped projection on the holder, which registers with T-slots in the ejector blades. The projection *26* on the holder and the T-slot *39* in one of the blades is shown in the detail drawing *B*. In order that the holder will engage freely with the blades, it is essential, of course, that the T-shaped projection on the holder be accurately aligned with the T-slots in the blades before the ejector blade magazine is moved. The locating lever *17* serves this purpose. The lever is pivoted on a fulcrum screw *38* and a locating plunger *19* is attached to the rear end of the lever. When the lever is depressed, the plunger is raised and its upper end enters a lock *25* in the holder *11*. This action fixes the holder accurately in position for the shifting of the ejector blade magazine.

The movement of the ejector blade magazine is controlled by a series of levers and links operated by shifter lever *20*, Fig. 84. After the locating lever is depressed, the shifter lever is swung through a small arc until the pointer on the lever registers with the number on the em scale *21* corresponding with the size of the blade desired. The movement of the shifter lever is transferred to rod *28*,

on which is pinned the ejector shifter fork 22. The fork operates the slide bars 18 in which the ejector blade magazine 15 is mounted. The slide bars are provided with diagonal guides 23 and 24 (detail drawing A), which fit into grooves in the top and bottom bars of the magazine. As the fork 22 moves the slide bars 18 forward and backward, therefore, the ejector blade magazine 15 is moved at right angles to the mold disk slide. When the pointer on the shifter lever 20 registers with the size of ejector blade desired, the T-shaped projection 26 on the holder 11 will be in engagement with the T-slot 39 of the particular blade selected. No other blade will be engaged by the holder at this time because the distance between the ejector blade keeper 14 and another keeper below (not shown) is just sufficient to accommodate the thickness of one blade at a time. The keepers also serve to keep the T-slots of the ejector blades in uniform alignment. The arrangement of the ejector blades in the magazine is indicated in the detail drawing C and in the main drawing by the numbers beginning with 1. A locking plunger 27 attached to the locating lever 17 locks the setting of the ejector blade after the change has been made. The plunger engages with notches in the shifter rod 28 and prevents the ejector blade magazine from moving inadvertently. After changing an ejector blade, always move the shifter lever 20 slightly to make sure that the plunger is locked in position. No change in the size of the ejector blade can be made unless the locking plunger is withdrawn by depressing locating lever 17. *No attempt should be made to change the ejector blade when the machine is in motion.* A stepped guide 16 is inserted at the front of the ejector blade magazine to guide each blade when it is moved out of the magazine to eject the slug. If any change is made in the original combination of ejector blades in the magazine, a new guide must be inserted with the necessary changes in the height of the steps.

Adjustments. When the machine is in normal position, the holder lock 25, Fig. 83, should rest directly above the plunger 19 so that the plunger will enter the lock easily and without friction. The position of the lock is determined by screw 37 in the ejector lever 32. The screw banks against a sleeve on the justification and vise closing lever shaft and fixes the normal position of the ejector lever. Since the ejector blade holder 11 is connected with the ejector lever through link 31, adjustment of screw 37 will naturally affect the normal position of holder lock 25. When the plunger 19 enters the lock smoothly at normal position, tighten the lock nut on the adjusting screw. In making this adjustment, it is necessary to back the machine and to push the ejector lever forward in order to reach the adjusting screw more easily.

The forward stroke of the ejector blade is controlled by an adjusting screw in pawl 33, Fig. 83. Raising the pawl with respect to the ejector cam 34 will shorten the stroke of the blade and lowering the pawl will cause the blade to move further forward. The adjustment of the pawl depends upon the type of galley with which the machine is equipped. In the case of the inside galley, set the pawl so that the ejector blade advances $1/32''$ beyond the inside edge of the galley. In the case of the outside galley, the front edge of the ejector blade should clear the knife block casting at the top of the slug chute by $1/32''$. The position of the ejector blade at precisely this moment can be observed by stopping the machine when the ejector blade has made its full forward stroke and looking

through the galley chute at the blade. An extension light is needed to see the position of the blade clearly.

Removing the Ejector Mechanism. It is necessary or desirable at times to remove the ejecting mechanism from the mold disk slide to insert new blades or to clean and lubricate the moving parts. Place the smallest ejector blade in operating position. Run the machine ahead until the first elevator seats on the vise cap and before the mold disk moves forward, push in the starting and stopping lever and shut off the power. Lower the vise frame to second position, depress the mold cam lever and remove the ejector lever link. Pull the mold disk slide forward sufficiently so that the rear mold disk stud nut can be removed. This nut has a left-hand screw thread. *The front mold disk stud nut should never be removed.* This nut is accurately aligned at the factory and it is difficult to replace the nut in its proper running condition if it is removed. Remove the mold disk guide and lift the disk carefully off the mold disk slide arm. Wrap a cloth around the back knife to avoid injury, lift the mold disk slide out of the machine and place it on a bench. Remove the ejector slide shield, the mold disk scraper, the front guide and cap, the holder guide and the ejector blade right and left-hand keepers. The left-hand keeper is fastened with a screw passing through the mold disk slide casting from the left. The ejector blade magazine can now be removed from the slide bars. Clean the ejector blades and the magazine with high test gasoline. Wipe the moving parts of the ejector shifting mechanism thoroughly, making sure that all gummy substances are removed. Lubricate the moving parts with a light film of oil and reverse the procedure of removal to assemble the parts.

Removing the Ejector Lever Pawl. Back the machine by hand until the ejector lever can be moved forward. Remove the pawl screw nut and disconnect the spring from the pawl. Push the ejector lever forward until the pawl screw is opposite the groove in the mold cam and driving gear and turn the screw out of its bearing. The plate on the pawl which the ejector cam contacts should be renewed if its lower edge has been rounded so much that the pawl cannot be adjusted. The replacement of the pawl spring can be simplified by inserting a piece of string through the loop of the spring to hold it in position until the fastening screw is returned.

Removing the Ejector Lever. With the machine in normal position, remove the ejector lever link and loosen the first-elevator auxiliary lever set screw. Drive the shaft on which the ejector lever is pivoted toward the metal pot side of the machine until the shaft is clear of the ejector lever. The lever can then be lifted upward and out of the machine. It is necessary to maneuver the lever while raising it so that the long bearing at the lower end of the lever will clear the machine parts. If the cam shaft is turned so that the long gap in the delivery and elevator transfer cam is placed properly in position, the removal of the lever will be facilitated.

The ejector lever is provided with a handle which is sometimes used to force a slug out of the mold. While this procedure may be justified under certain conditions, it is usually advisable to raise the ejector lever pawl off the cam and to permit the machine to come to normal position, when the slug can be removed by taking off the mold cap. When the machine fails to eject the slug, it is usually due to an abnormal cause, which is only aggravated by trying to pound the slug

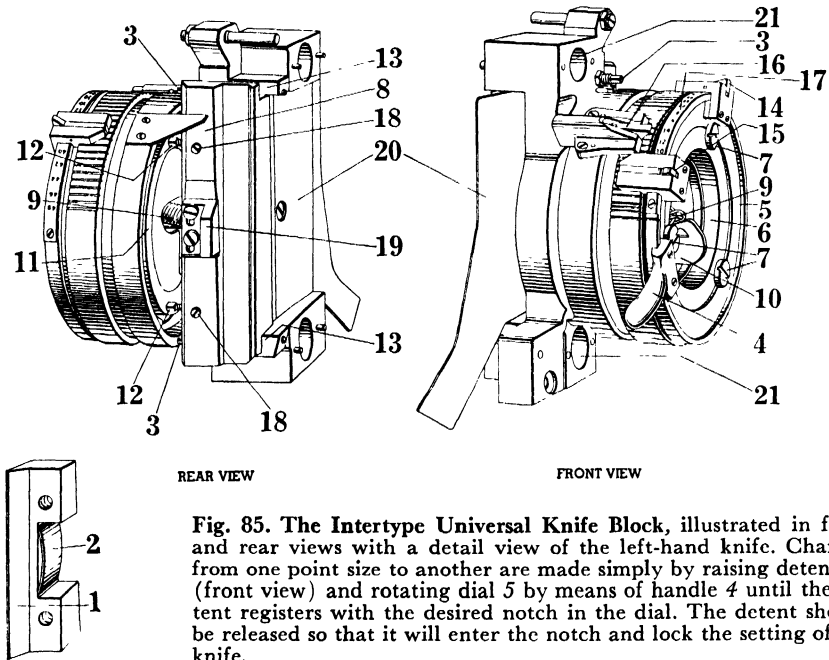


Fig. 85. The Intertype Universal Knife Block, illustrated in front and rear views with a detail view of the left-hand knife. Changes from one point size to another are made simply by raising detent 16 (front view) and rotating dial 5 by means of handle 4 until the detent registers with the desired notch in the dial. The detent should be released so that it will enter the notch and lock the setting of the knife.

out of the mold. The ejector blade placed in position may be of the improper size for the mold cavity, in which case the left-hand liner will be damaged by forcing the ejector lever forward. Also, if the setting of the knife block has been neglected, an undue strain will be put on the knives by forcing the slug between them. Since no more time or effort is required to follow the correct procedure, the operator should permit the machine to return to normal position without ejecting the slug. The cause of the trouble can then be ascertained and corrected without any damage occurring to the machine.

The Intertype Universal Knife Block

As the slug is ejected from the mold it passes between two parallel knives, which trim the sides of the slug accurately to point size. The slug continues to move forward between a spring plate and a bracket and then slides down a chute. The slug finally comes to rest face upward in the outside galley at the front of the vise frame. In the case of the inside galley, the slugs are delivered on end.

The knife block consists, in general, of a left-hand knife, a right-hand knife and mechanism suitable for shifting the right-hand knife in a sidewise direction. The left-hand knife 1, Fig. 85, is fastened to the vise frame by two square head screws, which pass through the vise frame from the front and thread into the base of the knife. Since the left-hand knife trims the constant or smooth side of the slug, it occupies a stationary position once it is set properly. A small flat spring 2 is interposed between the left-hand knife and the mold disk locking stud

block to cause the knife to follow the movement of adjusting screws 3 after the two fastening screws are loosened. The left-hand knife is set so that it will remove the small shoulder of type metal at the top edge of the smooth side of the slug. This knife is not intended to shave metal off the body of the slug.

The position of the right-hand knife is controlled by the operating handle 4, which is fastened to the rim of the knife block dial 5. The dial is fastened to an operating screw 6 by three screws 7. The operating screw is threaded in the knife block casting and the face of the screw travels to the left or to the right as the operating handle 4 is moved up or down. The right-hand knife 8 is held in positive relationship to the operating screw by a powerful tension spring 9, which is attached at one end to a hook in the knife and at the other end, to a bracket 10 fastened to the knife block casting. A disk 11 is interposed between the knife and the operating screw. The disk is provided with three accurately finished bearing pads, which bear against the operating screw. The heads of the two right-hand knife adjusting screws 12 are provided with projections which enter holes in the disk and hold the disk in proper relationship to the knife so that the three bearing pads are in the proper relationship to the operating screw. The right-hand knife, as stated previously, is movable in a sidewise direction. The knife 8 is held under tension of spring 9 against two pads 13 and the operating screw, as previously described. When the knife is moved to the right to trim a larger size slug, the tension of the spring causes the knife to follow the movement of the operating screw. When the knife is moved to the left to trim a smaller size slug, it moves against the tension of the spring.

To change from one measure to another on the knife block dial scale 17, it is necessary simply to raise detent 16 and to turn the dial until the detent registers with the proper notch in the dial. The detent is then released so that it will drop into the notch and lock the setting. Two dial stops 14 and 15 are provided to facilitate advertising figure composition, in which large display characters are cast on a slug body of a smaller size. If the operator is setting 24 point advertising figures with 8 point text, for example, the detent 16 should be set on any measure *above* 24 points and the upper stop 14 should be set against the bracket in which detent 16 is pivoted. The detent 16 should then be set on 8 points and the other dial stop 15 should be brought up to the bracket. When the stops have been set in this manner, the operator can alternate rapidly between the two measures without having to look at the dial settings. The dial stops are useful also in any other type of composition requiring frequent changes from one point size to another on the same machine.

Setting the Knives. Each knife is separately adjustable with respect to the mold. The left-hand knife should be set so that it will remove the small shoulder of type metal at the top edge of the smooth side of the slug. This knife, as stated previously, is not intended to shave metal from the body of the slug. To adjust the left-hand knife, loosen the two square head collar screws at the front of the vise frame which hold the knife in position. Do not loosen the two inside collar screws—these screws hold the right mold disk locking stud block in position. The two adjusting screws 3 for the left-hand knife are threaded through the knife block casting above and below the right-hand knife. These screws bank against the left-hand knife and adjust it further away from or closer to the slug. Spring

2 causes the knife to follow the movement of the adjusting screws. After the screws have been turned in the desired direction, tighten the two square head collar screws at the front of the vise frame. Assemble a 30-em line of matrices and spacebands composed of capital letters and cast the line to observe the effect of the adjustment. After each successive adjustment has been made, recast the line until the desired result is obtained. When the left-hand knife has been adjusted sufficiently to remove the small shoulder of metal at the top of the smooth side of the slug, the lock nuts on the adjusting screws and the two fastening screws at the front of the vise frame should be tightened securely. The shoulder of metal, of course, must be trimmed flush with the slug body for its entire length. If part of the shoulder is left on the slug, it is an indication that the knife has not been set parallel with respect to the mold body. A full-length slug should be used when adjusting the knives.

The right-hand knife is adjusted by means of two screws 12, Fig. 85, which determine the relationship of the knife to the knife block operating screw. After the left-hand knife has been adjusted, the right-hand knife should be set parallel to it and far enough to the left or to the right to trim the slug to point size. Set the detent 16 on the point size of the slug being cast. Loosen set screws 18 and adjust screws 12. Cast a few slugs and measure them at each end with a micrometer to determine the accuracy of the trim. The usual practice is to measure the slug on the second rib from each end of the slug. The slug should be allowed to cool, of course, before the measurements are taken. When the measurements at both ends of the slug are exactly equal, and according to the body thickness, tighten the two set screws 18. A brass plug is inserted under each of the set screws to prevent them from damaging the threads of the adjusting screws.

Adjusting the Mold Banking Blocks. The mold banking block 19, Fig. 85, supports the mold cap when the slug is being ejected from the mold. There are two additional banking blocks for the assembled mold, one of which is fastened to the vise frame under the front mold wiper and the other, to the knife wiper bar guide. The fitting of these blocks is highly important because they not only affect the efficiency of slug ejection but also can affect the casting process if they are not set properly. When the blocks are applied at the factory, they are set so that the mold contacts all three blocks *only* at ejecting position but not at casting position. If a mold should touch the blocks when the disk moves forward to casting position, a metal-tight lock-up could not be obtained and metal would escape when the slug is cast. The mold must be perfectly free at casting position to lock against the matrix line, which is supported at this time by the first-elevator front jaw and vise cap. To test these conditions, apply a thin coat of red lead to the three banking blocks and turn the machine forward to casting position. Back the machine until the mold disk withdraws from the vise frame, open the frame and look at the mold body and cap. No part of the mold should show signs of red lead at this time. The same test should be followed with the mold disk at ejecting position, at which time the mold body should show two red lead marks from the two stationary blocks and the mold cap, one mark from the adjustable block. If a knife wiper bar guide or a mold banking block is replaced, the red lead tests described above should be followed to verify the relationship of the mold at both the casting and ejecting positions.

If the knives are treated with care and the casting mechanism is handled properly, the knives will require resharpening only at long intervals. After continuous use for a long period of time, the trimming edges of the knives may become dull to a certain extent. If the edges are not too dull, they can usually be sharpened by lapping the knives on a cast iron block and finishing the edge with an oil stone. Sprinkle some No. 120 emery or carborundum on the block, moisten it with gasoline and rub the knife steadily back and forth across the block. Shift the knife with each stroke until its trimming edge is completely polished. *It is essential that the lapping block and oil stone be perfectly flat and maintained solely for use on trimming knives, as otherwise a correct trimming edge cannot be obtained.* Where such equipment is unavailable, it is advisable to send the knives to the nearest Intertype agency for regrinding. Special equipment not ordinarily available elsewhere is required for this type of work. It is advantageous to have an extra pair of knives on hand so that the machine can be operated while the dull set is being repaired. When knives have been sharpened or ground, it is necessary to reset them when they are returned to the machine. The procedure outlined previously for setting knives should always be followed.

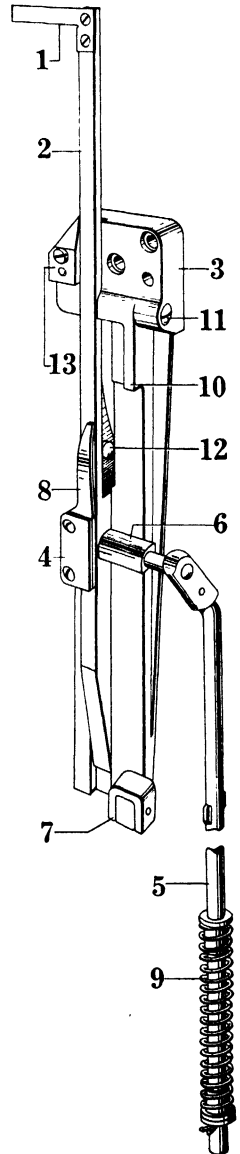


Fig. 86. The Intertype Knife Wiper is operated positively by a stop fastened to the bottom of the first-elevator slide. The wiper removes type metal shavings from the knives after the slug is ejected from the mold.

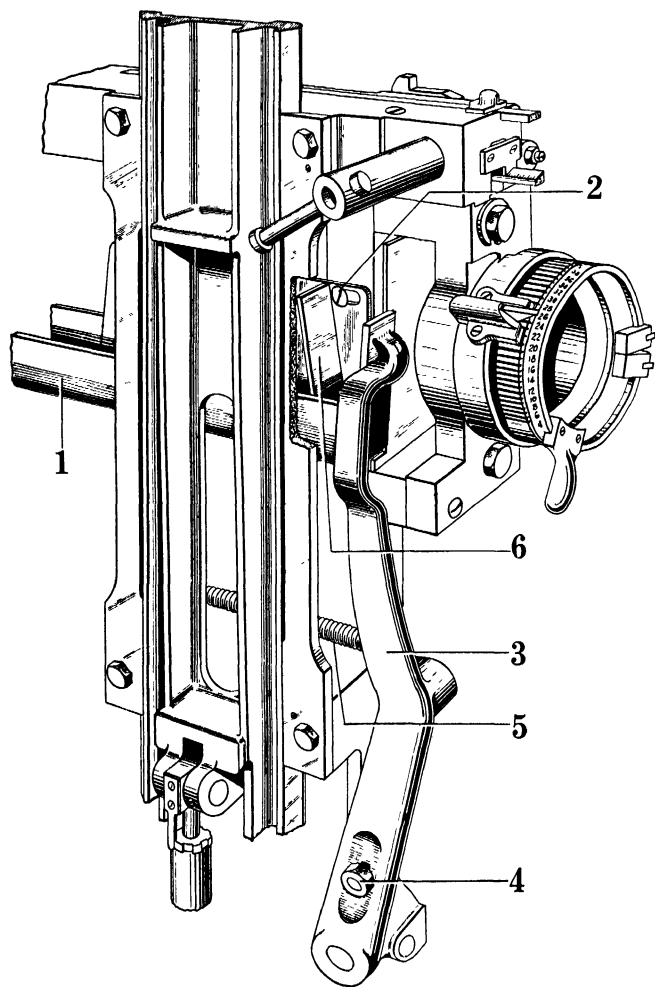


Fig. 87. The Inside Galley supports the slugs in a vertical position after they have been ejected from the mold. The slugs are moved to the left by slug lever 3, which receives a positive and uniform movement from a formed cam on the pot leg.

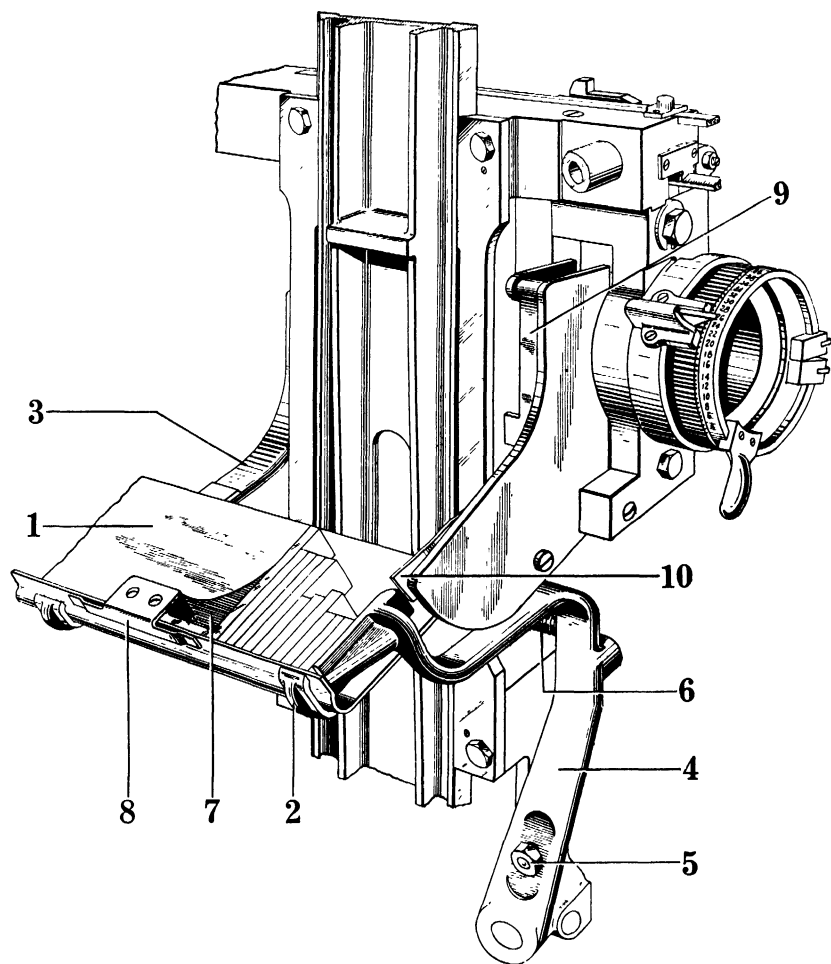


Fig. 88. The Outside Galley supports the slugs in an inclined position. The slug lever 4 moves the slugs and angle piece 7 to the left each time the pot moves forward. The movement of the slug lever is uniform and positive because it is controlled by a formed cam on the pot leg.

The Knife Wiper

The purpose of the knife wiper is to remove the small shavings of type metal which adhere to the knives as the slug is ejected from the mold. The parts of the knife wiper are shown in Fig. 86. The wiper 1 is fastened to a bar 2 which is inserted in a slot in guide 3. Gib 4 is fastened to guide 3 and holds bar 2 in the slot in the guide. The knife wiper bar is operated by rod 5, the lower end of which is inserted in a stop fastened to the bottom of the first-elevator slide (not shown). When the first elevator descends to the vise cap, the stop at the bottom of the slide banks on the cotter pin at the lower end of rod 5. This action pulls rod 5 and bar 2 down until stud 6 banks on buffer 7, which limits the downstroke of the assembled mechanism. Spring 8 exerts sufficient tension on bar 2 to prevent the wiping mechanism from dropping with a shock on buffer 7. The spring also

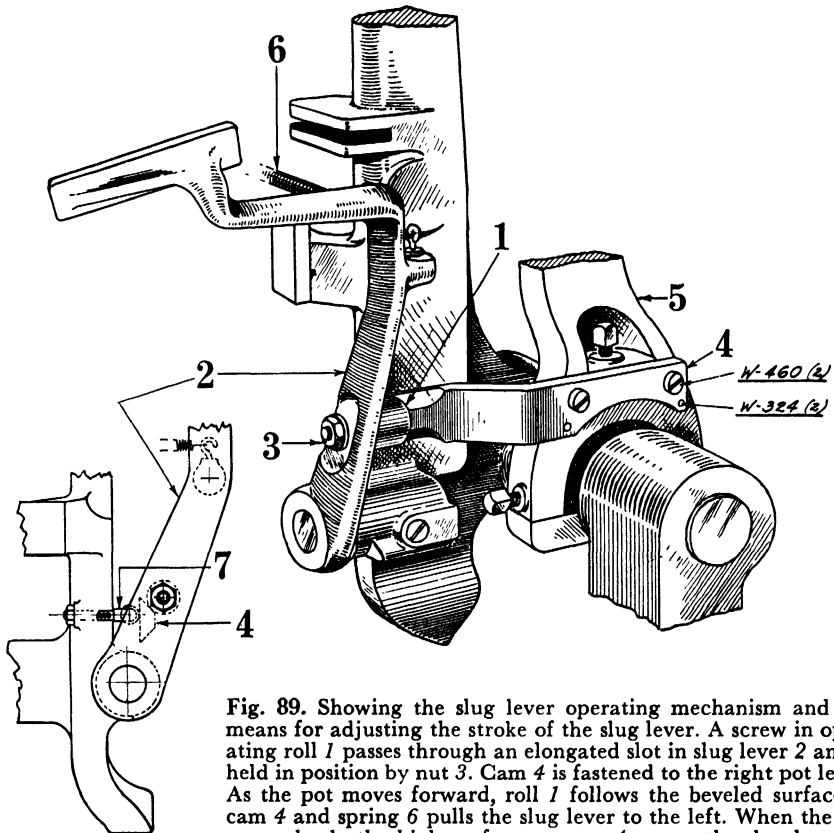


Fig. 89. Showing the slug lever operating mechanism and the means for adjusting the stroke of the slug lever. A screw in operating roll 1 passes through an elongated slot in slug lever 2 and is held in position by nut 3. Cam 4 is fastened to the right pot leg 5. As the pot moves forward, roll 1 follows the beveled surface of cam 4 and spring 6 pulls the slug lever to the left. When the pot moves back, the high surface on cam 4 moves the slug lever to the right, providing room for the next slug when it slides into the galley. The movement of the slug lever can be varied by loosening

nut 3 and setting roll 1 with respect to cam 4. The small detail drawing shows the support 7, which should be turned out until the roll on the support touches cam 4. The operating mechanism shown in this illustration is the same for the inside galley slug lever.

holds the wiper 1 against the trimming edges of the knives. When the first elevator rises to transfer position, the stop on the first-elevator slide raises spring 9 until the spring engages the lugs on bar 5, then the assembled mechanism is raised until wiper 1 reaches the top of the knives. Lug 10 limits the upstroke of the parts and spring 9 permits the first-elevator slide to complete its movement to transfer position. As the wiper bar 2 reaches its highest stroke, a compression spring under screw 11 causes a friction ball to engage stop 12 on the bar. The ball holds the assembled wiping mechanism in this raised position until the first elevator descends to the vise cap with the next line. The plate shown at 13 is one of the stationary banking points for the mold when it is in ejecting position.

The Galley and Slug Lever

The galley is made in two forms, either of which is suitable for use on the machine. The inside galley 1, Fig. 87, is suspended between the vise frame and the first-elevator slide on screws 2. The slug lever 3 is pivoted on a stud in the vise frame. At the lower end of the lever there is an operating roll fastened in position by nut 4. The roll engages the beveled surface of a cam attached to the right pot leg. When the pot moves forward, the roll follows the surface of the cam and permits spring 5 to pull the slug lever 3 to the left. The slugs, which are resting in the galley against angle piece 6, are thereby moved to the left to make room for the next slug. The angle piece slides frictionally in the bottom of the galley and is moved with the slugs. When the pot withdraws from the mold after the cast, the cam on the pot leg moves slug lever 3 sufficiently to the right to clear the slug when it slides into the galley. It is essential that the forward stroke of the ejector blade be adjusted properly when the machine is equipped with an inside galley. The ejector blade should advance positively $1/32''$ beyond the inside edge of the galley, the ejector lever buffer rod spring preventing any overthrow.

The outside galley is shown in Fig. 88. The galley 1 is supported by two brackets 2 and 3 fastened to the vise frame. The slug lever 4 is pivoted on a stud in the vise frame and is operated in the same manner as the slug lever for the inside galley. An operating roll fastened in position by nut 5 is adjustable with respect to the cam on the pot leg to govern the movement of slug lever 4. Spring 6 holds the slug lever operating roll in contact with the cam and pulls the lever to the left when the pot moves forward. This action moves the slugs to the left to provide space for the next slug. The slugs are supported by an angle piece 7, which slides frictionally along the galley through action of spring 8. The function of the slug buffer 9 is to direct the slugs to the bottom of the chute so that they will be delivered face upwards in the galley. The underside of the buffer is provided with a leather pad to avoid damage to the face of the slug. An adjustable chute guide 10 is provided to direct slugs of various lengths to position as they slide out of the chute. Adjustment of the slug lever is made by loosening nut 5 and moving the operating roll with respect to the cam on the pot leg. This adjustment is indicated clearly in Fig. 89. The spring plate at the bottom of the galley chute should be polished from time to time to remove lead accumulations from its surface.

SPECIAL ATTACHMENTS FOR THE CASTING MECHANISM

Adjustable Knife Block Detent

An adjustable knife block detent is available for application to the Intertype knife block. The detent enables the operator to set the right-hand knife instantly for an oversize or undersize trim on each body size without disturbing the adjusting screws for the knife. The detent has proved very useful in offices where both conventional and odd point measurements are required. The left and right-hand knives are set to trim slugs accurately to point size so that conventional measurements can be obtained when required. Odd point measurements are then secured simply by turning a detent dial, which moves the right-hand knife in graduations of .001". The range of the detent is plus or minus .001" to .007" inclusive. These measurements can be secured universally on any size slug from 5 to 48 points. When conventional point sizes are required, it is necessary only to turn the detent dial back to zero. The ease and rapidity with which even, half or quarter points can be obtained makes this device invaluable in offices where such variations are required. A close trim or a large leaded trim can be secured within precise limits merely by setting the detent.

The knife block detent is very simple in construction, as shown in Fig. 90. The mechanism is mounted in a bracket 1, which is fastened to the knife block casting 2. The detent dial 3 is pinned to a shaft 4, on the other end of which is fastened the detent 5. Shaft 4 is threaded in bracket 1 and advances or withdraws as dial 3 is turned. The movements of the shaft are transferred to the detent 5, which is held on the shaft between a shoulder and a nut. When the dial is turned to a number on the plus side of the scale, the right-hand knife is opened and the slug will be oversize by the amount indicated. A setting on the minus side of the scale will trim the slug undersize by the amount indicated.

The complete plus and minus range of the detent, as stated previously, can be obtained on any body size from 5 to 48 points. If the size of the slug being cast, for example, is 10 points, detent 5 is raised and the large knife block dial 6 is turned until the notch for 10 points is directly under the detent. The detent is then released so that it enters the notch. Odd point measurements are then secured by turning the detent dial 3. If the slug is required .005" undersize, the dial is turned until minus 5 registers with the index 7. If the slug is to be trimmed .003" oversize, the dial should be turned until plus 3 registers with the index. To obtain the conventional 10 point slug, turn the detent dial back to 0.

Setting the Knife Block. To set a knife block equipped with the adjustable detent, lift detent 5, Fig. 90, out of contact with dial 6. Adjust the right-hand knife to trim the slug accurately to point size. The procedure for adjusting the knife has been outlined already on page 130. When the right-hand knife has been set parallel to the left-hand knife and far enough to the left or to the right to trim the slug precisely to size, turn the detent dial 3 until the zero on dial registers with the index 7. Loosen screws 8 and turn dial 6 until detent 5 is centrally located above the notch corresponding with the point size for which the knife

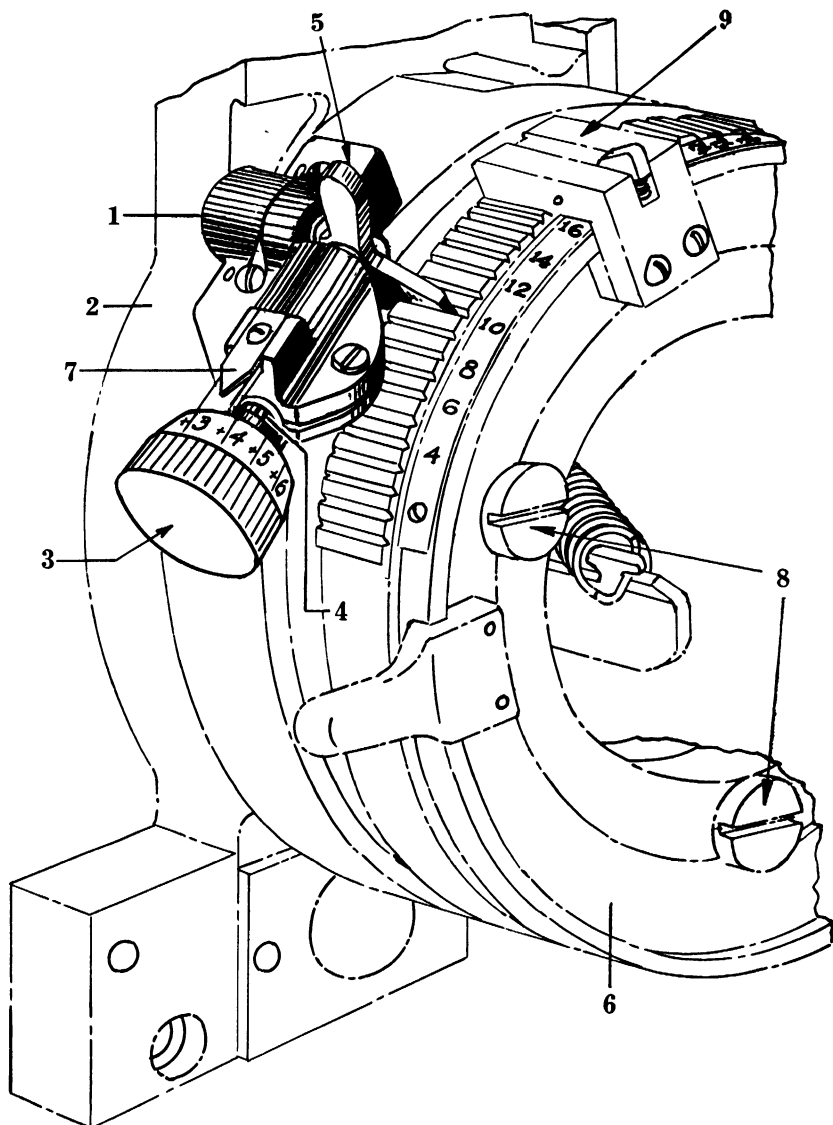


Fig. 90. The Adjustable Knife Block Detent makes it possible to set the knife block instantly to trim slugs plus or minus .001" to .007" inclusive. The knife block detent 5 is set on the point size of the slug being cast. Undersize or oversize trims are then secured simply by turning detent dial 3 to the desired setting on the scale. This attachment is especially useful in offices where frequent changes are made from conventional to odd point measurements.

has been set. For instance, if the knife has been set to trim a 10 point slug (.140"), loosen screws 8 and turn dial 6 until notch 10 is centrally located under detent 5. Tighten screws 8 when this condition has been obtained. The dial stops 9 are not used when the adjustable detent is being set for odd measures and should be moved out of range.

Galley Chute for Short Slugs

The galley chute for short slugs is shown in Fig. 91. This auxiliary galley is used for stacking short slugs from 4 to 6 ems in length and from 5 to 14 points in width. The chute 1 is located and held in position by a clamp screw 2 in bracket 3. The bracket fits over the right-hand galley bracket plate 4 and screw 2 locates the galley accurately in the sidewise direction. To apply the galley chute, place end 5 on bracket 6 and swing the entrance end of the galley down between spring plate 7 and the galley bracket until the end of rail 8 is slightly below the ledge of the knife block casting. Tighten clamp screw 2. When the galley chute is in this position, the slugs will slide down the chute against buffer 9.

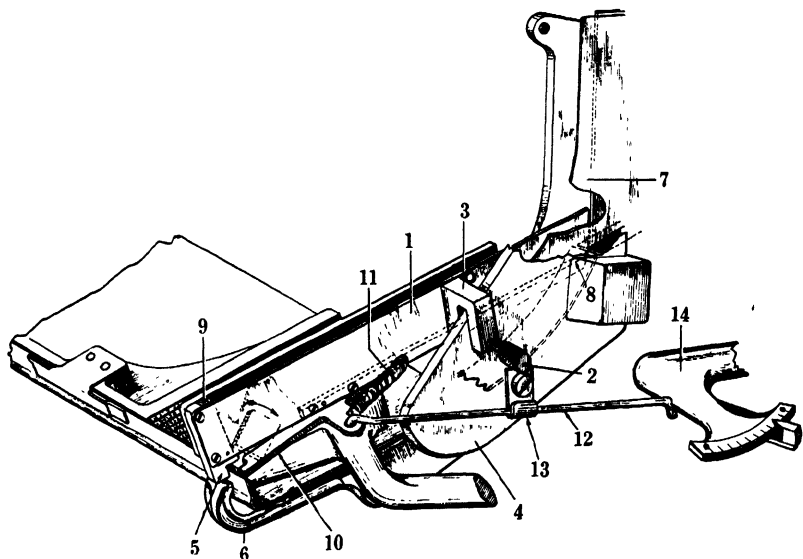
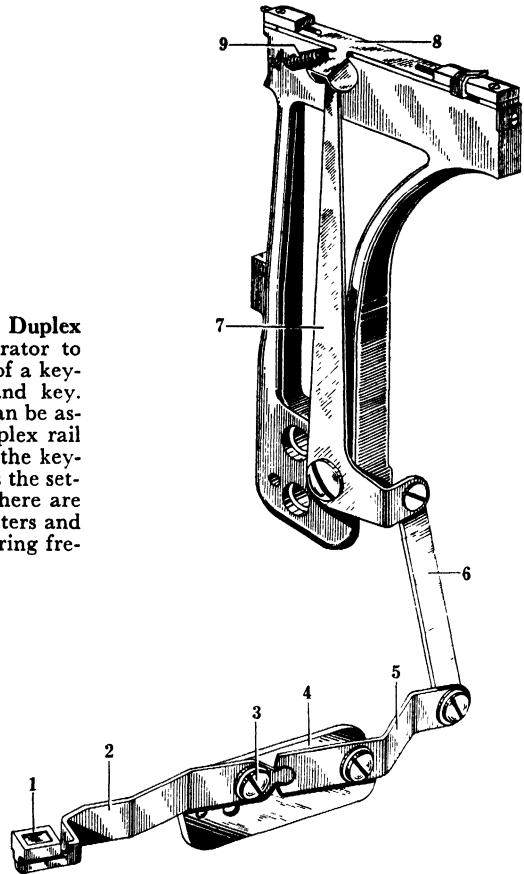


Fig. 91. The Galley Chute for Short Slugs is used for stacking slugs from 4 to 6 ems in length and from 5 to 14 points in width. The galley shutter, which permits the slugs to drop into the galley, is operated by the movement of the mold disk slide.

The galley chute shutter 10 is operated by the movement of the mold disk slide. The shutter is pivoted on a screw in the bottom of the chute and is held open by spring 11. Operating rod 12 rests on support 13 with its back end directly in front of ejector shifter lever bracket 14. When the mold disk slide moves forward to ejecting position, bracket 14 pushes rod 12 forward, causing shutter 10 to swing in and to close the opening in the bottom of the galley chute. The slug is ejected from the mold and comes to rest on top of the shutter. When the mold disk slide withdraws to normal position, spring 11 opens the shutter,

Fig. 92. The Assembling Elevator Duplex Rail Mechanism enables the operator to control the duplex rail by means of a key-button located near the spaceband key. Any desired number of matrices can be assembled on the normal or the duplex rail simply by depressing or releasing the key-button. This mechanism facilitates the setting of language work in which there are many accented and special characters and is useful also in composition requiring frequent use of the duplex rail.



permitting the slug to drop between the slug lever and the previous slug. Support 13 should be set to locate the end of rod 12 in front of the ejector shifter lever bracket, as shown in the illustration.

Assembling Elevator Duplex Rail Mechanism

The assembling elevator duplex rail mechanism is sometimes referred to as the "Greek attachment" because it was developed first for machines which set the Greek language. The attachment is useful in languages with a large number of special and accented characters punched in auxiliary position. It is useful also in other types of composition requiring frequent and extensive use of the assembling elevator duplex rail and can be applied to any machine on which such work is done.

The duplex rail attachment transfers the operation of the rail from the conventional operating lever on the assembling elevator to a keybutton located conveniently near the spaceband key. The mechanism is shown in Fig. 92. Keyboard lever 2 is pivoted on a screw 3 in plate 4. The plate is fastened to the assembling elevator lever. When keybutton 1 is depressed, the rear part of ex-

tension 5 is lowered. This movement is transferred to link 6, which causes the upper end of operating lever 7 to move to the right. The duplex rail 8 is thereby moved to the right against tension of spring 9. At the end of the rail is riveted an L-shaped detaining plate, which is moved far enough to the right to receive the matrices as they enter the assembling elevator. Any number of matrices, therefore, can be assembled on the duplex rail merely by holding keybutton 1 in the depressed position. When the keybutton is released, spring 9 pulls the duplex

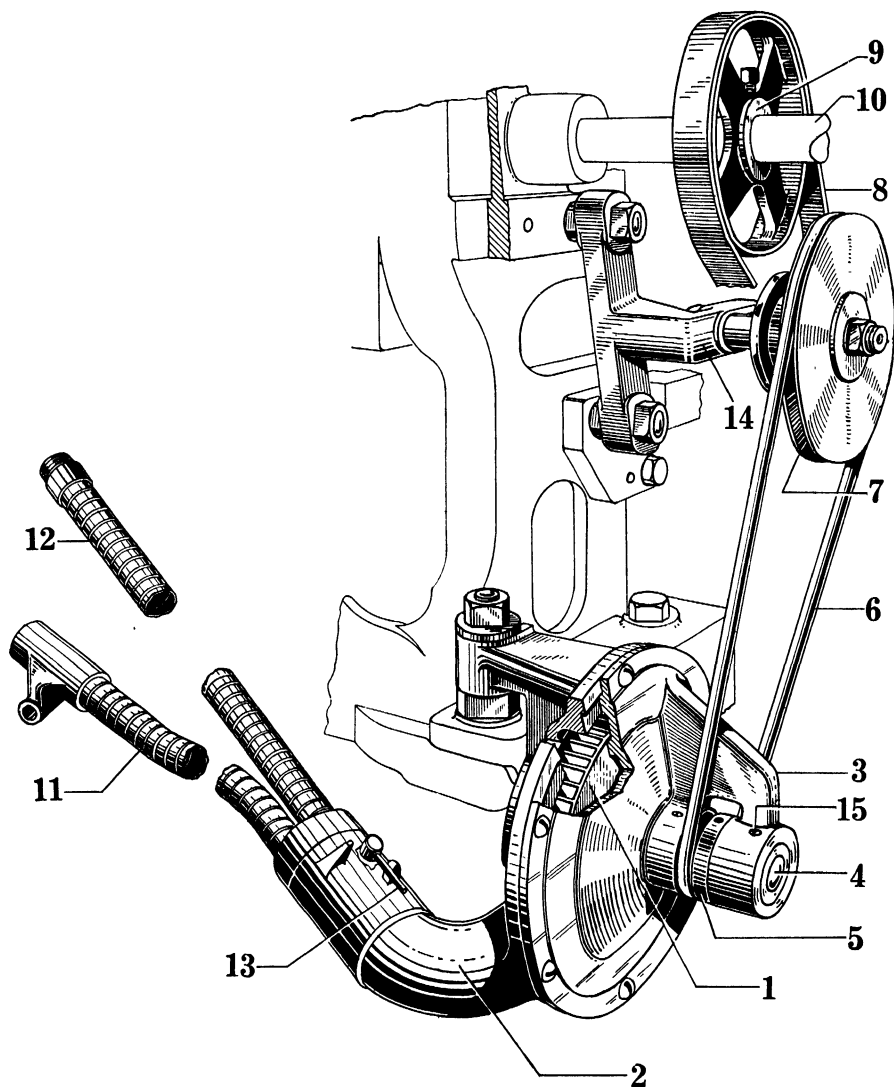


Fig. 93. The Mold Cooling Attachment blows a continuous stream of air across the face of the mold in operating position. The attachment is mounted on a screw passing through the machine column and is driven by a pulley on the intermediate shaft. This equipment is designed primarily for use on display machines casting large-bodied slugs.

rail sufficiently to the left to permit the following matrix to assemble on the lower or normal rail. All of the succeeding matrices will assemble in this position until the duplex rail is moved to the right again by depressing keybutton 1. A special delivery channel front rail is provided with the duplex rail mechanism. The delivery channel rail has a clearance cut at its right end to accommodate the extra length of the assembling elevator duplex rail. There are no adjustments to be made on this device.

Mold Cooling Attachment

A mold cooling attachment is manufactured for machines devoted principally to headletter and display work. The equipment consists chiefly of a blower assembly, a number of pulleys and belts for driving the impeller and tubes which direct the air to the mold. The blower assembly is mounted on the machine column at the rear of the keyboard, as shown in Fig. 93. The blower assembly comprises the blower housing 2, the impeller 1 and the housing cover 3. The impeller 1 is pinned to a shaft 4, which revolves in oilite bearings in the housing cover 3. The impeller shaft pulley 5 is pinned to shaft 4 and turns the impeller 1 when it is driven by belt 6. The movement of the impeller is promoted by driving pulley 9, which is held in position on the intermediate shaft 10 by a set screw. The driving pulley is connected by belt 8 to compound pulley 7, which drives the impeller 1 through pulley 5 and belt 6. As the impeller is turned, a number of formed blades on the impeller draw air through an opening in the housing 2. The air is then forced through an outlet in the housing into tubes 11 and 12, the ends of which are located opposite the mold in normal position. Tube 12 is connected with the right-hand vise locking stud, in which a hole is provided to direct the air downward across the face of the mold. The bracket at the front end of tube 11 is fastened to the starting and stopping lever bracket, locating the tube outlet opposite the lower part of the mold being used and directing the air upward across the face of the mold. The combined effect of the two streams of air keeps the mold effectively cooled, especially when casting headletter and display slugs in the larger sizes. The air passing through tubes 11 and 12 can be regulated by turning the valve stem handle 13. The handle moves a disk inside the tube connection and varies the opening through which the air passes.

The compound pulley 7 is mounted on an adjustable bracket 14. The bracket is provided with elongated holes and should be set so that belt 8 will exert enough friction on pulley 7 to drive pulley at uniform rate of speed. The compound pulley itself can be adjusted so that belt 6 has the proper tension. The hole in bracket 14 through which pulley shaft passes is elongated for this purpose.

The maintenance of the mold cooling attachment has been simplified greatly by the use of "oilite" bronze bearings. The bearings are porous in composition and retain oil over long intervals. The revolution of the shafts inside the bearings warms the oil and causes it to flow out to the shafts. "Oilite" bearings require little attention and keep the shafts lubricated over a period of five or six months. Mobiloil 10-10W is recommended for use in "oilite" bearings because it is sufficiently pure to flow through the pores of the metal. Two screws 15, Fig. 93, are threaded in the housing cover 3 to keep the oil ducts for the bearing closed in order to exclude dust. After filling the oil ducts, replace the two screws.

The Stick Attachment

The stick attachment provides mechanism suitable for casting hand-set lines in all sizes of type up to and including full-width 60 point caps. The attachment has a wide variety of uses, the most important of which is casting of one, two and three-column newspaper heads and other display lines on one-piece slugs. This system eliminates the time-wasting process of piecing and fitting separate slugs, besides making available display faces beyond the range of keyboard operation. The stick attachment is valuable also as a means of obtaining corrections quickly without shifting or replacing magazines. The corrected line is assembled by hand in a special composing stick and is inserted in the hinged first-elevator head. When the operating lever is pulled out, the first elevator descends for the cast in the regular way, then returns and stops immediately at normal position without rising to transfer position. The line of matrices and spacebands, therefore, can be removed from the first elevator almost immediately following the cast, without waiting for the machine to come to rest. This feature saves considerable time.

The special movements of the first-elevator slide occur only when the stick attachment operating lever is pulled out. When regular keyboard composition is being done, the first elevator and the other parts of the machine move through their usual cycle of operations. Automatic spaceband justification of all lines, whether set by keyboard or by hand, is provided with the attachment. Special spacebands of exclusive Intertype design are used with the large display faces.

The Composing Stick

The composing stick used with the stick attachment is shown in Fig. 94. The stick is shaped suitably for rapid hand assembling of Intertype matrices and spacebands and contains a sliding arrangement which facilitates the insertion of the line in the first-elevator jaw. The stick consists principally of the composing stick body 1, a matrix guide 2 and a gib 3. The line of matrices and spacebands is assembled in the conventional way from left to right. The first matrix in the line is placed on the body 1 against the keeper 4 and the succeeding characters are arranged in their natural reading order. The matrices are assembled face upwards with the triangular tooth recesses straddling the matrix guide 2. The lower edge of the gib 3 acts as an additional guide for the matrices.

The special spacebands used with the stick attachment are easily assembled and are held positively in the composing stick. A spaceband of this type is shown in the detail drawing, Fig. 94. The stick attachment spaceband consists principally of a sleeve 11 and a wedge 12. The sleeve on this type of spaceband differs from that used on other types in that it is provided with two lower lugs 13. These lugs hold the spaceband properly in position when the line is justified preparatory to the cast. The triangular recess 14 at the top of the spaceband sleeve fits over guide 2 on the composing stick and aligns the sleeve properly with respect to the matrices. The stick attachment spacebands have a wide expansive range to insure proper justification of the large display lines in which they are used. The minimum measurement of the spaceband is .070" and the maximum mea-

surement, .164". The complete expansive range of the spaceband, therefore, is .094", or slightly less than 7 points.

When the matrices and spacebands have been assembled in the stick, the length of the assembled line can be determined instantly by moving slide block 5 and detent block 6 against the line. The length will then be indicated by the scale on gib 3, which is divided in half-em increments. Detent 7 in block 6 registers with notches in the composing stick body and locks the setting of the line at the desired length. To insert the line in the first-elevator jaw, it is necessary simply to swing back the hinged head of the first-elevator slide and insert the end 8 of the composing stick in the spaceband grooves in the jaw. When the composing stick is in position, wedge 9 will move keeper 4 out of the way and the assembled line can then be moved into the first-elevator jaw by sliding block 5 to the left. Spring 10 guides the matrices and spacebands into the jaw. After the slug has been cast, the composing stick is placed in the same position with respect to the first-elevator jaw and the assembled line is moved out of the jaw and on the stick again. The matrices and spacebands can then be distributed back to the case.

Display Italic Matrices and Spaces

The special display italic matrices used with the Intertype composing stick are shown in Fig. 95. These matrices, as well as hair spaces, end quads and other equipment used with the stick attachment are exclusively of Intertype design. The display italic matrices are of a special oblique construction which makes it

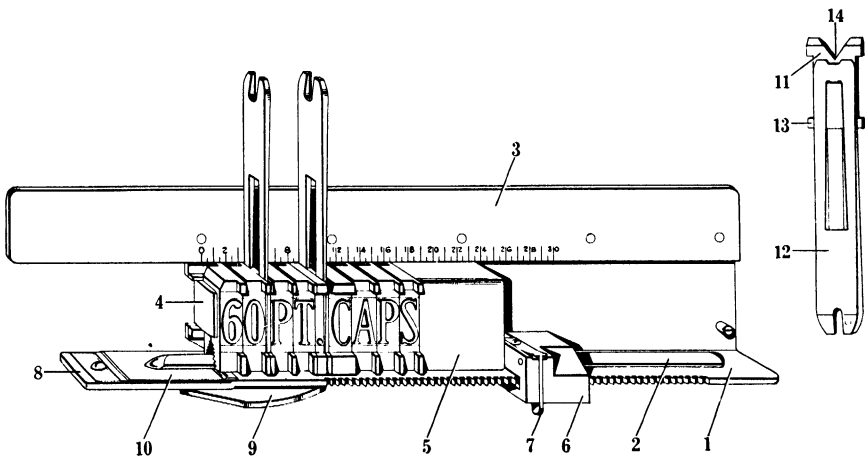


Fig. 94. The Intertype Composing Stick, developed for use with the stick attachment, is designed for easy hand assembling of matrices and spacebands. The stick is provided with an adjustable block arrangement for locking the setting at the various measures required. The scale on the composing stick is divided into half-em increments and indicates the length of the assembled line. The end of the composing stick gib fits into the regular spaceband grooves in the first-elevator jaw and locates the stick while the line of matrices and spacebands is being moved into the jaw.

The spaceband shown at the right of the illustration is especially designed for use with the stick attachment. It has an expansive range of .094", or nearly 7 points, insuring proper justification of the large display matrices with which this type of spaceband is used.

possible to fit the characters closely together. Due to this unique construction and to the resultant closeness of the characters, display italic faces are produced with the properly proportioned characters and precise spacing required in good typography.

The three matrices shown at the top of Fig. 95 illustrate the three types of angular construction provided for close fitting of characters. The regular construction consists of an angular cut on each side of the matrix. This construction suffices for most of the characters in a font and makes it possible to obtain the proper space relationship between the characters. In addition to matrices of the regular construction, caps T, V, W and Y are furnished with every font in style number 1 and caps A and L, in style number 2. Matrices in style number 1 have an angular cut only on the right side of the character, as shown in the illustration. This makes it possible, for example, to obtain a precise space relationship between a cap W and L, a cap W and A, etc. Style number 2 matrices have an angular cut only on the left, as illustrated. An accurate relationship between caps A and Y, L and W, etc., is thereby obtained.

Special opening and closing quads are provided to begin and to end the line. The quads are shown in position in the line of matrices at the bottom of illustration, Fig. 95. The purpose of the opening and closing quads, of course, is to fill the openings caused by the angular cuts on the two end matrices. This squares off the line at each end so that the vise jaws can lock tightly against the line. Ordinary spacebands can be used at either or both ends of the line if space permits.



ALWAYS BUY



Fig. 95. Intertype Display Italic Matrices are of a special angular-cut design which makes it possible to fit the characters closely together. When the matrices are assembled, the angular cuts dovetail and the matrix characters are located properly with respect to each other. The precise spacing and proportion of characters demanded for advertising composition and other classes of display work are thereby obtained. Special opening and closing quads and hair spaces are provided for use with display italic matrices.

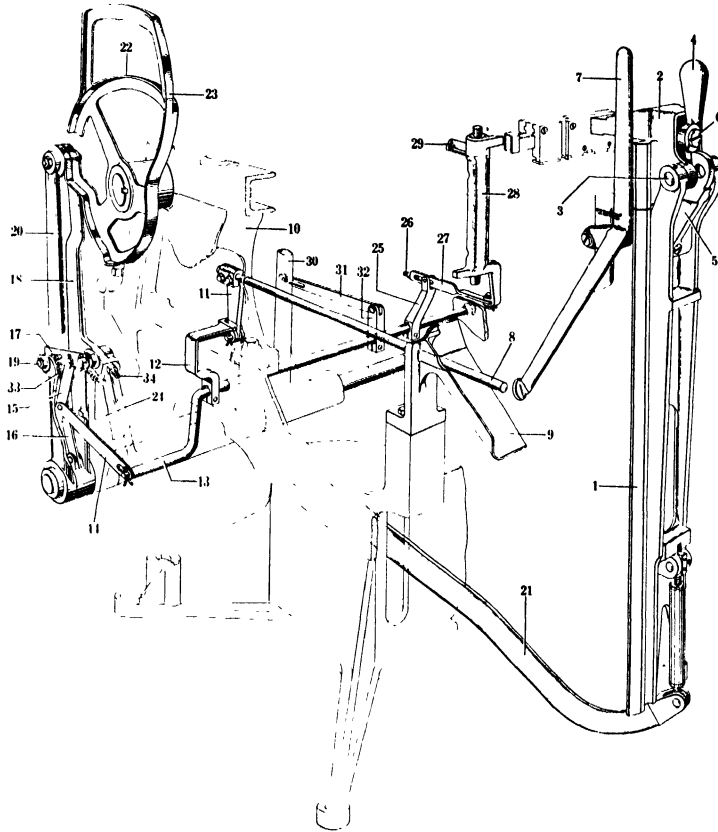


Fig. 96. Perspective View of the Stick Attachment, showing the operating parts of the mechanism in assembly. The complete cycle of operations provided for in the stick attachment is controlled by a single operating lever at the front of the machine.

Hair spaces (.014" and .028" wide) are made for use with display italic matrices in order to obtain correct spacing between words. Other spaces are available in 6, 8, 10, 12 and 14 point widths. The relationship of a hair space to one of the matrices is shown on the opposite page in Fig. 95. The lower back lug of the hair space fits into a formed recess in the matrix. This recess is provided in all matrices with angular cuts and serves to hold the space in position. The front part of the hair space follows the shape of the matrix and is locked tightly in position when the line is justified preparatory to the cast. The hair space is provided with a small projection or tab to facilitate handling when inserting it in the line or removing it. If justified composition is being set, the regular opening and closing quads are placed on each side of the spaceband.

Stick Attachment Operating Mechanism

The assembled operating mechanism for the stick attachment is shown in Fig. 96. The mechanism consists principally of parts for transferring the movement of the first-elevator slide from one cam surface to another and auxiliary

mechanism for starting the machine. Both of these movements are controlled by a single operating lever at the front of the vise frame. It is necessary only to pull out the lever to obtain the complete cycle of operations provided for in the stick attachment.

The first-elevator slide 1, Fig. 96, is supported in the conventional way on the vise frame. The slide is held in position by two gibs, which guide the slide in its upward and downward movements. The first-elevator slide used with the stick attachment differs from the regular slide in that it is provided with a hinged head 2. The head is pivoted on pins 3 in the first-elevator slide, making it possible to swing the head out to a horizontal position with respect to the slide after handle 4 is swung to the left. This facilitates the insertion of the line of matrices and spacebands in the first-elevator jaw. After the line has been inserted, the first-elevator head is moved back to position and is locked rigidly with respect to the first-elevator slide by the lower end of handle 4. The end of the handle is provided with a beveled surface which drops in front of a formed surface on lock 5. A coil spring around stud 6 causes the locking action of handle.

The main operating lever, as stated previously, transfers the movement of the first-elevator slide from one cam surface to another and starts the machine. The lever 7, Fig. 96, is pivoted on a stud in the vise frame. When the lever is pulled back, its lower end banks against rod 8, which is supported freely in the mold gear arm support 9 and the cam shaft bracket 10. At the rear end of rod 8 is fastened an extension 11. The extension is fastened pivotally to operating crank arm 12, which is keyed on crank 13. When extension 11 and arm 12 are moved back by rod 8, therefore, crank 13 is turned in its bearing in the machine base. The crank is connected with a toggle operating link 14, on the end of which are pivoted two latch links 15 and 16. The upper link is fastened pivotally to latch 17 and the lower link 16 is pivoted on a pin in the inside first-elevator auxiliary lever 18. When toggle link 14 is pulled forward by crank 13, therefore, links 15 and 16 are drawn forward past the center of their pivot, raising latch 17 off stud 19. This action disengages the first-elevator auxiliary lever 20 from connection with the first-elevator lever 21. As the cams revolve, therefore, the first elevator will receive movement only from the inside auxiliary lever 18, which is always connected with the first-elevator lever 21. The cam surface on which the inside auxiliary lever 18 rides is the same as the cam surface provided for the outside auxiliary lever 20 up to the point where the first elevator begins to rise from the vise cap after the cast. From this point on, the low contour of cam surface 22 raises the first elevator to normal position, where it stops with the first-elevator jaw opposite and in alignment with the delivery channel. The outside auxiliary lever 20 is held in contact with the high cam surface 23 by spring 24. This lever, however, has no effect upon the movement of the first-elevator slide at this time because it is disengaged from the first-elevator lever when latch 17 is raised, as previously described.

In addition to transferring the movement of the first-elevator slide from the regular cam surface 23 to the low surface 22, Fig. 96, the main operating lever 7 also starts the machine. Operating crank 13, as stated previously, is turned by rod 8, extension 11 and arm 12 when the main operating lever is pulled out. Starting lever 25 is fastened on crank 13. When the crank is turned, the pin in

the upper end of the starting lever banks against screw 26 in link 27. The link is attached by a pin to the lower end of the vertical starting lever 28. Backward movement of the link swings the vertical starting lever on its shaft. This causes the lug 29 on the lever to move the automatic stopping pawl in the delivery and elevator transfer cam off the upper stopping lever, permitting the clutch to operate and the cams to revolve. When the ejector lever 30 moves forward, the parts of the stick attachment are returned to normal position. The ejector lever is connected with reset lever 32 through link 31. The reset lever is fastened on crank 13. When the ejector lever moves forward, therefore, crank 13 is turned in a clockwise direction by link 31 and lever 32. This movement causes the end of the operating crank to move toggle link 14 toward the back of the machine. The upper and lower latch links 15 and 16 are thereby moved back past the center of their pivot, permitting spring 33 to pull latch 17 back to position over stud 19. This reconnects the outside auxiliary lever 20 with the first-elevator lever. Therefore, the first elevator will rise to transfer position if the machine is operated in the conventional way, because its movements will be imparted by the outside lever 20 and cam surface 23. In other words, a machine equipped with the stick attachment is instantly available for special display composition or for regular keyboard composition simply by transferring operations from the keyboard to the casting mechanism.

Adjustments. The alignment of the first-elevator jaw with the delivery channel is controlled, as on the regular machine, by an adjusting screw 34, Fig. 96, in the first-elevator auxiliary lever 18. Loosen the first-elevator auxiliary lever connecting screw, adjust screw 34, then tighten the connecting screw. Turning the adjusting screw in will raise the first-elevator slide and jaw; backing the screw off will have the opposite effect. The $\frac{5}{8}$ " and $\frac{7}{8}$ " settings of the first-elevator lever link eyebolts should be checked before setting the first-elevator auxiliary lever adjusting screw. The procedure for setting the eyebolts is described on page 49.

Screw 26, Fig. 96, in the starting link 27 controls the stroke of lug 29 with respect to the automatic stopping pawl in the delivery and elevator transfer cam. When the stick attachment operating lever is pulled all the way out, the stopping pawl should be moved approximately $1/64$ " clear of the upper stopping lever. Adjusting screw 26 will increase or decrease the stroke of lug 29 on the vertical starting lever and will have a corresponding effect upon the movement of the stopping pawl with respect to the upper stopping lever. Tighten the lock nut on the adjusting screw when the setting is correct.

Vise Jaw Odd Measure Device

Intertype Corporation has developed an odd measure device for newspapers which have changed from the conventional 6 point column rule to a 4 point rule. The vise jaw odd measure device makes it possible to set the measure, automatically, for casting double-column slugs 24 ems plus 4 points in length. Slugs of this length are required, of course, because the width of the double column is reduced 2 points by the use of 4 point column rules.

The device automatically reduces the vise jaw setting 2 points on double-column work when the vise jaw indicator rod em scale is set on $24\frac{1}{2}$ ems. When

changing from the single-column measure of 12 ems to double-column measure of 24 ems plus 4 points, the operator has merely to turn the vise adjusting knob in the usual way.

If desired, a cam block can be provided for setting both 18 ems plus 4 points for three-column work and 24 ems plus 4 points for double-column work. The vise jaw odd measure device is applied only to non-quadding machines. The device is not required on quadding machines, because the quadding vise closing attachment is provided with an adjustable knob for obtaining odd vise jaw settings.

The mechanism of the odd measure device, as shown in Fig. 97, is extremely simple in construction and operation. It consists chiefly of a cam *U-4431* on the vise frame and a stop plate *U-4432*. The plate is pivoted on the left vise jaw block and is interposed between the jaw and screw *W-1073*. The plate *U-4432* has two different thicknesses, *A* and *B*, *B* being 2 points thicker than *A*.

When lines of even and half-em lengths are being set, the stop plate *U-4432* rests on pin *W-338*. This positions thickness *A* of the plate between the jaw and screw *W-1073*, as shown in illustration. The thickness of the plate at this point locates the left vise jaw in its regular positions for even and half-em lengths.

When 24 ems plus 4 point lines are to be set, the vise jaw indicator rod em scale is set on 24½ ems. This advances plate *U-4432* and the left vise jaw until the plate rides up on the high point of cam *U-4431*. As the plate is raised by the cam, thickness *B* moves up between screw *W-1073* and the vise jaw, moving the jaw forward an additional 2 points. This reduces the space between the vise jaws to 24 ems plus 4 points. The operation of the device is the same when setting 18 ems plus 4 point lines, in which case the indicator rod em scale is set on 18½ ems. Intertype Corporation, of course, will supply liners for casting slugs of 18 ems plus 4 points and 24 ems plus 4 points in length.

The vise jaw odd measure device can be made inoperative simply by pulling cam *U-4431* out slightly and turning it a quarter turn to the right. Plate *U-4432* will then rest on its stop pin *W-338* with thickness *A* always in position, providing all of the regular measures in even and half-em increments.

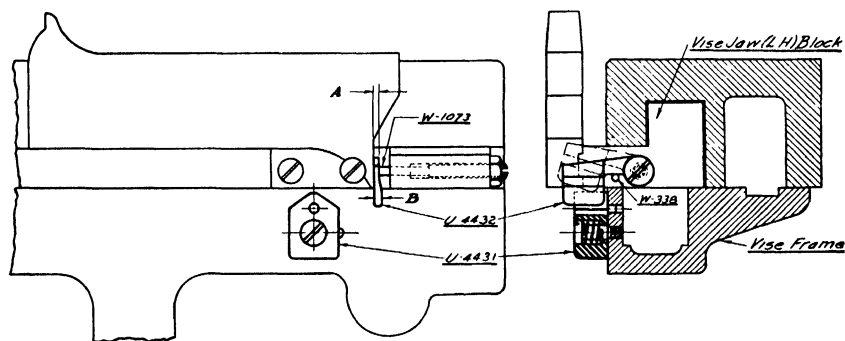


Fig. 97. The Intertype Vise Jaw Odd Measure Device provides the special double and the three-column measures required by newspapers which have reduced the width of their column rules. The device automatically reduces the vise jaw measure at the proper settings and can be made inoperative simply by reversing a cam block.

Double-Acting Mold Attachment

A double-acting mold attachment is available for casting slugs alternately in two opposite molds. This attachment is of great advantage in work requiring extensive recasting, such as blank slugs for leading, rules, borders, titles, dates, etc. The double-acting mold attachment consists simply of a special mold turning segment (S-256), which is fastened to the mold turning cam in place of the regular long segment. The special segment, like the regular short segment, turns the mold disk only one-quarter of a revolution.

In equipping the machine, it is necessary only to set two opposite molds for the same size slug and to apply the special segment. As the machine revolves, the slugs are cast in one mold and then in the other by intervals. Since two molds are being used, neither mold overheats excessively and the quality of the slug is thereby improved. In some cases, all four of the molds on the disk are set for the same size slug and by revolving the mold disk one-quarter of a revolution from time to time, the opposite pair of molds is brought into operation. This arrangement provides ideal conditions for work which is to be recast extensively.

Automatic Repeat Casting Attachment

A repeat casting attachment (U-2900, assembled) can be supplied for casting automatically any required number of duplicate slugs up to a maximum of 6 from the same line of matrices. The device is operated whenever a line is carried into the first-elevator jaw by the delivery slide. The slide operates linkage connected with the starting and stopping lever connecting rod, causing the rod to be held out in the starting position. After the first slug has been cast, the first elevator rises to transfer position as usual but is prevented from rising to the full height by a stop on the operating lever. The line is therefore retained in the first-elevator jaw and the machine continues to operate because the starting and stopping mechanism is held out in the starting position.

If the repeat casting attachment is equipped to produce only two duplicate slugs, the first elevator will disengage the starting and stopping lever as it descends the second time to casting position. At the same time, the stop which prevented the full ascent of the first elevator to transfer position will be moved out of position. When the elevator rises to transfer the second time, therefore, it ascends all the way and the line is transferred in the usual way. As the machine returns to normal position, it stops automatically because the starting and stopping connecting rod has been left in its regular position.

The repeat casting attachment can be furnished with parts necessary for casting any desired number of duplicate slugs up to a maximum of 6. Variations in the number of slugs to be cast entails only the application of a ratchet wheel with a suitable number of actuating surfaces.

Pot Crucible Mouthpiece Wiper

An automatic pot crucible mouthpiece wiper is available for machines equipped principally for headletter and display work. The wiper is mounted at the front of the pot jacket and is actuated by a lever pivoted on a special driving

shaft bearing. The lever is provided with a cam roll, which is held in contact with the pot pump cam by a compression spring. After the slug has been cast and while the mold disk is forward at ejecting position, the wiper is moved across the mouthpiece to the right and then to the left, effectively removing any metal accumulations from the mouthpiece. The constant cleanliness of the mouthpiece insures an accurate lock-up and fewer interruptions while the machine is in operation. The wiper is easily adjusted. Its maintenance and removal have been simplified by locating all renewable parts in accessible positions.

Intertype Automatic Quadding and Centering Device

In the history of the line composing machine, probably no single development has facilitated composition, speeded up production and reduced the costs of printing as much as the Intertype universal automatic quadding and centering device, commonly known as the autospacer. Prior to the introduction of this device, the composition of white space constituted one of the most intricate and time-consuming processes in line composition. To center a line, for example, quads had to be assembled, counted and distributed on each side of the line; spacebands had to be inserted in the proper positions; in cases where there was an insufficient number of quads of a kind, the duplex rail had to be manipulated and very often, the width of a particular face necessitated the location and insertion of quads and spacebands of special thickness. The process of quadding to the left or to the right was equally inefficient and lengthy before the advent of the quadding and centering device. In addition to assembling the necessary quads and spacebands, the line had to be transposed whenever quadding to the right was desired. The variable lengths of quadded lines, moreover, entailed additional operations and, in some cases, even held up the composition of succeeding lines until the quadded line had been cast and distributed.

These were only a few of the considerations leading to the development of the automatic quadding and centering device. In modern typography, the increasing proportion of white space has made the automatic quadding and centering device indispensable to all types of printing establishments. Users of the device, depending upon the class of work done, report seemingly incredible savings in time and expense. The composition of title pages, menus, listings, stationery, tickets, headings, programs, display, catalogs, classified and many other kinds of printing done by line composition has shown a saving of from 10 to 75 per cent in time. It is not too much to say that the Intertype automatic quadding and centering device has revolutionized line composition and made profitable a phase of printing which for years was responsible for the greatest loss of money, time and effort in the production of printed matter.

Two Basic Characteristics of Quadding Machines

In its most fundamental aspect, a quadding machine differs from a non-quadding machine in two broad respects:

1. The quadding machine is provided with automatically movable vise jaws.
2. Its justification mechanism is designed not only to produce fully justified

composition, but also to operate auxiliary mechanism related to the quadding of lines.

In addition to these factors, several parts of the machine require alteration to suit the various operations of quadding and centering. The chief parts which require changing are those related to the assembling and the delivery of the line. The assembling elevator, delivery slide, first-elevator jaw and other parts come under this category. Before describing the vise jaw and justification mechanism, therefore, it is necessary to indicate some of the most important changes in the smaller parts of the machine.

The Assembler Slide. The assembler slide applied to quadding machines is provided with a red pointer, which registers with a stationary scale. The pointer and scale arrangement is shown in Fig. 98. The purpose of the stationary scale is to show the operator at a glance how much a line of any particular measure lacks of being full. When setting fully justified lines on a quadding machine, it is essential, of course, to know how much shorter the lines are than the measure

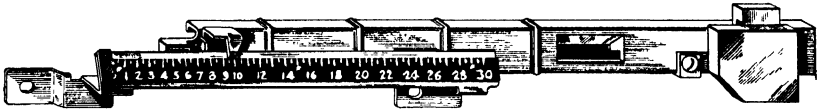


Fig. 98. The Quadder Assembler Slide is provided with a pointer and a stationary scale which enable the operator to determine instantly the length of the assembled line. In setting justified composition, the length of the line is an important factor, because justified lines must be assembled to within the limit of expansion for which the line spread device is set.

to which they are to be justified. By this means, the operator determines whether a line contains a sufficient number of spacebands to justify it to the measure or whether the line requires additional filling out with spaces to decrease the amount of justification required. As on a non-quadding machine, fully justified lines on a quadding machine must contain a sufficient number of spacebands to expand the line to the measure being set. Depending upon the measure, therefore, the assembled lines should be filled to within 1 to 3 ems of the full measure, exactly as is done on a regular machine. The assembler slide pointer and scale provide a positive means of determining the amount of slack in the line, provided that the setting of the assembler slide finger is accurate. The adjustment of the finger should be checked periodically and reset as the star wheel wears.

A line spread device is provided on the quadding and centering device to regulate the amount of justification required in lines of various lengths and also to control the quadding function of the machine. The operation of this device is described in connection with the justification and quadding mechanism on pages 167, 168, 171, 173 and 175.

The Assembling Elevator. The assembling elevator gate and back rail are provided with friction rails *A* and *B*, Fig. 99. These rails are urged forward by coil springs and are located properly to contact matrices as they are assembled in the elevator. The purpose of the friction rails is to hold the matrices upright in the assembling elevator while the line is being raised to the delivery slide and carried into the delivery channel. On a quadding machine, the delivery slide

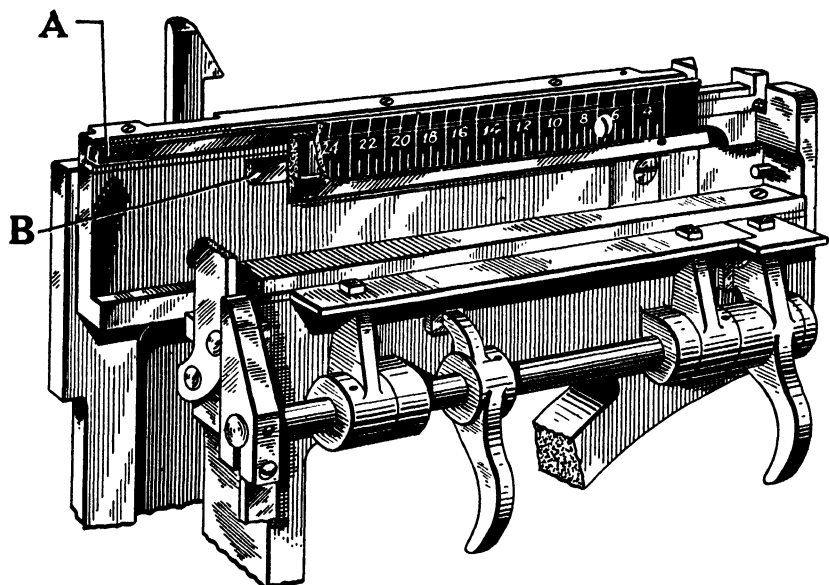


Fig. 99. The Assembling Elevator is provided with friction rails *A* and *B* to hold the matrices upright while the line is being raised to the delivery slide.

long finger always remains at the longest measure (30 or 42 ems) in normal position. This change was made because the length of lines on quadded and centered work always varies. Unlike a non-quadding machine, it is necessary on a quadding machine to send in only the type to be cast. With this wide variation in length of lines, therefore, it is desirable to locate the long finger in a constant position where it does not require setting. Since the long finger is not in position to support the left end of the line on measures shorter than 30 ems, therefore, another means was developed to fulfill the same function. The friction rails in the assembling elevator serve this purpose. The rails contact matrices assembled both in normal and auxiliary position and hold them upright as they are raised to the delivery slide. The rails are set to hold the matrix line more tightly on the left end than on the right in the assembling elevator.

The Delivery Slide. The delivery slide for quadding machines is shown in Fig. 100. As stated previously, the delivery slide long finger always remains at the longest measure in normal position. This is achieved by a detent release arrangement, which not only locates the long finger in its constant position but also permits the finger to adjust itself to lines of all lengths as they are received by the delivery slide. Detent 1 is pivoted on a screw in the long finger block 2. A ball and spring arrangement above detent 1 urges the detent down with respect to detent rod 3. When the delivery slide is in normal position, the detent is held up out of engagement with rod 3 by release 6, which is fastened to the transfer channel. When the matrix line is raised in the assembling elevator to the delivery slide, the slide is released and the short finger 4 carries the line forward until the line comes into contact with the long finger 5. As the delivery slide be-

gins to enter the delivery channel with the line, detent 1 drops off release 6 and engages the proper notch in rod 3, locking the matrix line positively between the delivery slide long and short fingers. This insures positive delivery of the line of matrices and spacebands to the casting mechanism, no matter what the length of the line is. As the delivery slide returns to normal position, detent 1 rides up on the inclined surface of release 6, holding the long finger 5 at the full measure setting (30 or 42 ems) and at the same time, permitting rod 3 to move back to position with the short finger 4.

A spring 7 is riveted to the delivery slide long finger to hold matrices upright when "waiting" lines are carried into the delivery channel. The long finger has

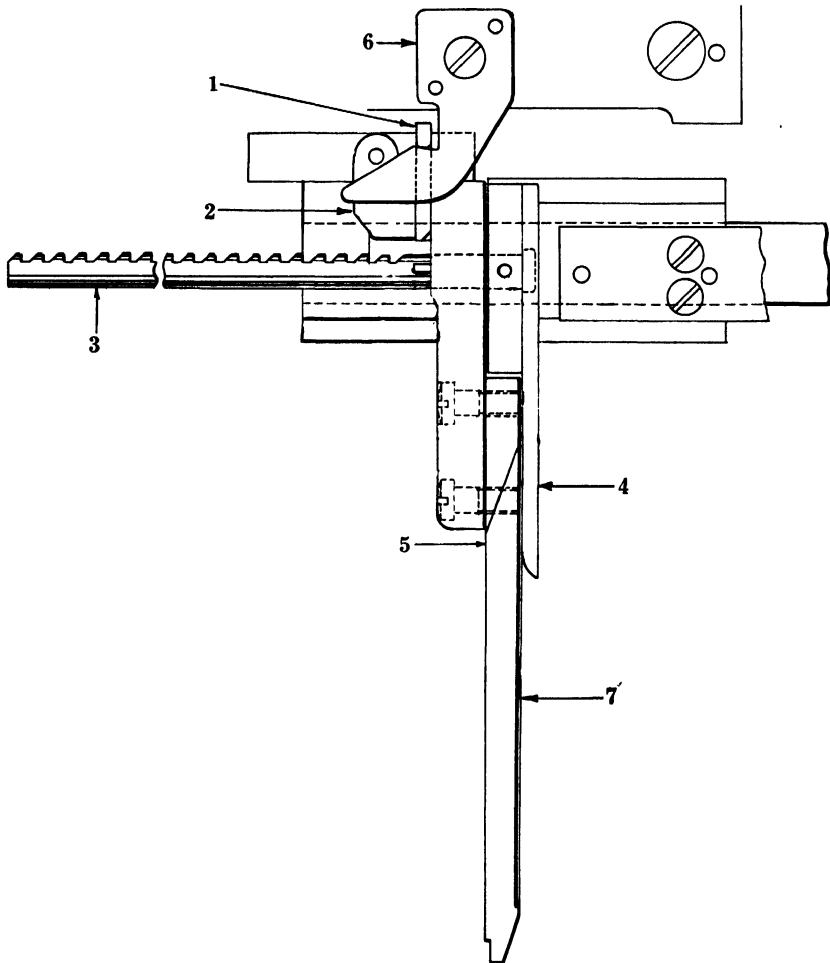


Fig. 100. The Delivery Slide designed for the quadding and centering device adjusts itself automatically to any length of line sent in to the casting mechanism. The long finger always remains at the full measure setting in normal position, making it unnecessary to adjust the finger when the measure is changed. In this illustration, the short finger 4 has moved to the left against the long finger 5.

a slight amount of overmotion when this occurs and the spring is required to hold the matrices upright, especially when the line is very short. It is important that the spring be so formed that when compressed by the matrices it will lie flat against the long finger. If the spring becomes buckled or extends too far to the right, the matrix at the right end of the line might be pushed out of the first-elevator jaw as the first elevator descends to the vise cap. The quadding delivery slide long finger block is designed to permit the long and short fingers to move together more closely, thereby insuring positive control of short lines or even of a single matrix.

The First-Elevator Jaw. A friction rail *C*, Fig. 101, is provided in the first-elevator back jaw to hold the matrices squarely in the jaw while the line is being carried between the vise jaws. The rail is urged forward by coil springs and is set to exert more pressure on the right of the line than on the left. The reason for this is that the line stop provides positive support at the left of the line. The only attention required by the friction rails in the first-elevator jaw and the assembling elevator is an occasional inspection to make sure that they are straight and working freely. Friction rail *C* was formerly applied to the first-elevator front jaw.

The improved first-elevator jaw line stop is also shown in Fig. 101. This line stop is operated automatically and does not require setting when the measure is changed. As lines of various lengths are carried into the first-elevator jaw, the line stop is moved to the left by the line until the last matrix is inside the first-elevator jaw detents. A formed lug on the line stop registers with a recess in the left-hand vise jaw and prevents the stop from overthrowing to the left. When the line is transferred from the first elevator to the second elevator, a pawl fastened to the elevator transfer slide engages the projecting lug on the line stop and draws the stop and the matrix line to the right. As the elevator transfer lever reaches the end of its stroke, friction plunger *A* drops in front of projection *B* on the line stop, preventing the stop from overthrowing to the right. The line stop, therefore, is always returned to the extreme right position in the first-elevator jaw and is adjusted automatically to any length of line sent in to the casting mechanism.

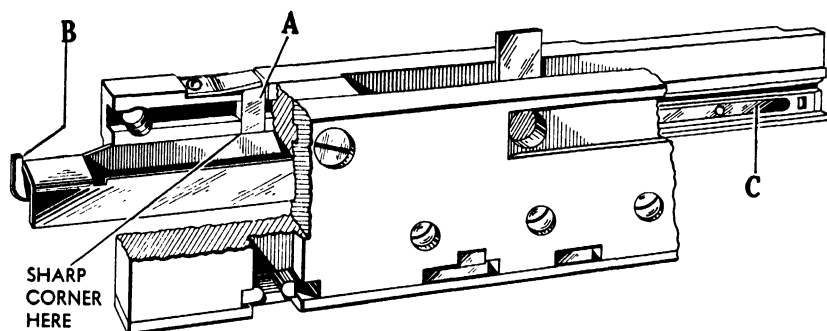


Fig. 101. The First-Elevator Jaw is provided with a friction rail *C*, which holds the line of matrices squarely in the jaw while the line is being delivered to the casting mechanism. This illustration also shows the automatic line stop used with the quadding and centering device. The stop is automatically adjusted to any length of line and does not require any attention on the part of the operator.

It is essential that the line stop be handled with care and lubricated with dry graphite from time to time to keep it working freely. The friction plunger *A* is provided with one square corner, as indicated in the illustration. If the plunger is removed at any time in order to remove the line stop from the first-elevator jaw, it is important to replace the plunger with the square corner facing projection *B* on the line stop.

Movement of the Vise Jaws

One of the basic requirements for automatic quadding and centering, as stated previously, is that the vise jaws move automatically with respect to the matrix line when it is delivered to the casting mechanism. On a non-quadding machine, the vise jaws occupy stationary positions once they are set for the desired measure. Most of the quadding and centering done on such machines, therefore, necessitates the assembling of quads or blank matrices, which provide the blank space or quadding at the required positions on the slug and also fill out the line so that it will justify to the full measure and cast. On a quadding machine, however, the automatic movement of the vise jaws eliminates the necessity of assembling quads for lines which are to be centered or quadded to the left or to the right. Depending upon the setting of a simple operating lever, the vise jaws close automatically against the line of matrices and spacebands, moving the matrix line to the required position with respect to the mold and at the same time, closing the front of the mold at the positions where the quadding or blank space is to appear. Needless to say, each vise jaw is long enough to close the mold opening completely, whether the vise jaws are operating separately, as they do when quadding to the left and to the right, or whether the vise jaws are operating together, as they do when centering. This basic feature of the quadding and centering device—automatic movement of the vise jaws—has done more to revolutionize the process of line composition than any other single device applied to slug casting machines since their inception.

Vise Jaw Mechanism

The complete vise jaw operating mechanism is shown in Fig. 102. This mechanism may be regarded from the standpoint of two major assemblies:

1. **The Vise Jaw Assembly**, consisting of parts suitable for engaging the vise jaws separately or together with the right-hand vise jaw rack.
2. **The Operating Assembly**, which imparts movement to the right-hand vise jaw rack and cushions the stroke of the vise jaws as they close against the matrix line.

Engagement of Vise Jaws with Rack

The quadding and centering device provides three completely automatic features of composition to the operator. In addition to making it possible to set fully justified composition, the device provides for automatic quadding on the left or right and equal quadding on both sides with the line of type in the center. These three automatic features of quadding, as stated previously, are obtained by engaging the vise jaws with the right-hand vise jaw rack, which forms a con-

necting link between the vise jaws and the operating mechanism. Depending upon the setting of a control operating lever, the vise jaws are engaged separately or together with the rack. As lines are assembled and delivered to the casting mechanism, they are justified to the full measure, quadded to the left or to the right or centered, according to the relative engagement of the vise jaws with the rack.

The engagement of the vise jaws 2 and 3, Fig. 102, with the right-hand vise jaw rack 1 is accomplished by a bolt 5 for the right vise jaw and a gear 6 for the left vise jaw. Both the bolt and the gear are operated by lever 4, which is located at the right end of the vise cap within easy reach of the operator. The bolt 5 is

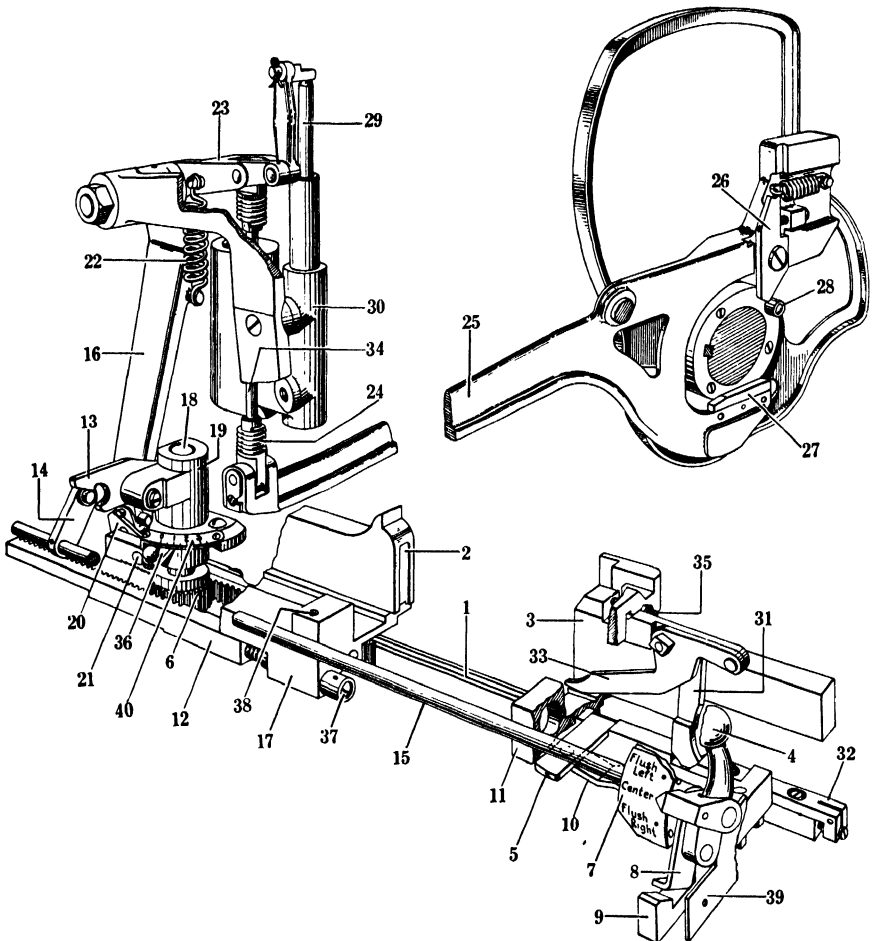


Fig. 102. Perspective View of the Complete Vise Jaw Operating Mechanism provided in the Intertype quadding and centering device. This illustration shows the means provided for the engagement of the vise jaws with the right-hand vise jaw rack and the mechanism which imparts movement to the vise jaws through their connection with the rack.

connected with lever 10, which is fastened pivotally to the base of the right-hand vise jaw block 11. As lever 4 is moved to the various positions on indicator plate 7, shoe 8 moves slide 9 forward and backward. These movements swing lever 10 through a small arc, causing bolt 5 to enter or to withdraw from a slot in rack 1. The engagement and disengagement of the left vise jaw 2 with respect to rack 1 is controlled by the same movements of lever 4. As the lever is moved to the various positions on indicator plate 7, gear 6 is raised or lowered with respect to the main rack 1 and the left vise jaw rack 12 by lever 13, arm 14 and rod 15. Depending upon the setting of the operating lever, therefore, the vise jaws are engaged separately or together with the right-hand vise jaw rack. The engagement of the vise jaws at the various settings is described below.

Flush Left. When operating lever 4, Fig. 102, is at the flush left position, bolt 5 is moved into engagement with rack 1 and gear 6 is lifted out of engagement with the main rack 1 by lever 13 and related parts. In this position, therefore, only the right vise jaw 3 is engaged with the right-hand vise jaw rack 1. Consequently, when the vise jaw lever 16 pulls rack 1 to the left to make its operating stroke, the left vise jaw 2 remains in normal position and the right vise jaw 3 is moved to the left with the matrix line until the line is tight between the two jaws. If the line is short enough to be quadded, the right vise jaw remains in position and is locked for casting; if the line is long enough to be justified, the upward movement of the spacebands spreads out the matrix line and moves the right vise jaw back to normal position against its stop screw 35.

Center. When the operating lever 4 is placed at center position, bolt 5 remains in engagement with rack 1 and, in addition, gear 6 is pushed down between the main rack 1 and the left vise jaw rack 12. Rack 12 is fastened to the left vise jaw block 17 and gear 6 is fastened to a shaft 18 which is free to revolve in bearing 19. The engagement of bolt 5 with rack 1, and gear 6 with racks 1 and 12, therefore, connects both vise jaws with the main rack 1. When the rack makes its operating stroke to the left, therefore, the right vise jaw 3 will move to the left because it is positively engaged with the rack through bolt 5. In addition, the teeth in rack 1, meshing with the teeth of gear 6, turn the gear in a counter-clockwise direction. This movement is transmitted to the left vise jaw rack 12 on the opposite side of gear 6, causing the rack and the jaw 2 to move toward the right. Consequently, both vise jaws move an equal distance, centering the matrix line exactly on the measure being set and quadding the remainder of the slug on each side of the line. When the main rack 1 makes its return stroke, the vise jaws are returned to normal position by movements in the reverse directions to those described.

Flush Right. When the operating lever 4 is placed at flush right position, bolt 5 is withdrawn from the slot in rack 1 and gear 6 remains in engagement with the main rack 1 and the left vise jaw rack 12. In this setting, therefore, only the left vise jaw 2 is engaged with rack 1. Consequently, when the rack makes its operating stroke to the left, the right vise jaw 3 remains in normal position and the left vise jaw 2 is moved to the right by gear 6 and rack 12 until the matrix line is clamped between the vise jaws. The line, therefore, casts flush at the right end of the column and quads at the left.

Vise Jaw Operating Mechanism

The automatic movements of the vise jaws, as previously described, are promoted by the right-hand vise jaw rack. Depending upon their relative engagement with the rack, the vise jaws close against the matrix line when the rack makes its operating stroke to the left, and move back to normal position when the rack makes its return stroke to the right. The operating and return movements of the right-hand vise jaw rack are controlled by a series of operating levers on the left side of the machine. The operating mechanism is actuated by a roll on the first-elevator cam and imparts movement to the rack through a vise jaw lever fastened to the face plate and the left-hand vise locking stud.

The right vise jaw rack 1, Fig. 102, is connected with the vise jaw lever 16 through a link 20. The link is provided with a hole into which a pointed stud 21 on the rack fits. This method of connection is provided, of course, to facilitate the opening and closing of the vise frame. Whenever the frame is opened, make sure that the stud 21 is connected with the link 20 when the frame is returned to position. If the vise frame is opened with the machine at casting position, there will be tension on lever 16 and it will be necessary to hold the lever to the right while closing the vise frame to connect the link and the stud. In any event, *always make sure that the parts are connected when the vise frame is closed.*

The vise jaw lever 16 is connected with safety lever 23 by spring 22, which provides overmotion in case the return of the vise jaw lever is obstructed. The safety lever 23 is connected with operating lever 25 by spring 24. The operating lever is pivoted on a stud which fits into a bearing on the mold gear arm. At the back end of the operating lever are fastened two shoes 26 and 27, against which roll 28 bears during the revolution of the cams.

As the first elevator is descending to the vise cap with the matrix line, roll 28, Fig. 102, on the first-elevator cam contacts the upper shoe 26 on operating lever 25. This depresses the front end of the operating lever, causing spring 24 to stretch and to exert downward tension on the safety lever 23 and the vise jaw lever 16. The two levers, however, are held in position against the tension of the spring at this time by latch 31, which rests normally in front of a stop 32 fastened to the rack 1. As soon as the first elevator seats on the vise cap, however, the first-elevator jaw banks on lever 33, causing latch 31 to rise out of engagement with stop 32, thereby freeing the rack 1. The tension of spring 24 then causes lever 16 to swing to the left, pulling the vise jaw rack 1 to the left to make its operating stroke. As the rack and the vise jaws reach the end of their operating stroke, the movement of the parts is cushioned by a plunger 29 and an oil cylinder 30. The plunger works in a close-fitting sleeve and cushions the vise jaws as they close together by compression set up within the oil cylinder. A detail view of the plunger and oil cylinder arrangement is shown in Fig. 105.

As the first elevator rises to transfer position, the rack and the vise jaws are returned to normal position. Roll 28, Fig. 102, banks against shoe 27 on operating lever 25. This action raises the front end of the operating lever, causing a rod 34 inside spring 24 to raise safety lever 23. The vise jaw lever 16 is thereby swung to the right, causing the rack 1 and the vise jaws to return to position. The rack is returned far enough to the right to permit latch 31 to engage stop 32.

Vise Jaw Operating Mechanism Adjustments

Several of the parts of the vise jaw operating mechanism shown in Fig. 102 are adjustable to obtain the settings required for efficient quadding and centering. These adjustments are made correctly when the machines are assembled at the factory, but the variable amount of wear to which the parts are subject over a period of years may necessitate occasional readjustment in order to bring the parts back to their original positions. All of the adjustments to be made in connection with the vise jaws and operating mechanism are described in the following sections under their respective headings.

Right-hand Vise Jaw Adjustment. As on a non-quadding machine, the quadding vise jaws 2 and 3, Fig. 102, should be adjusted so that the first and last characters in type lines of fully justified composition are flush at each end with the body of the slug. In addition, the centering feature of the quadding device requires that the left vise jaw 2 be adjusted with respect to its rack 12 to center the type on the slug. Once these basic adjustments are made, of course, the operation of the vise jaws is completely automatic and no further change will have to be made in the adjustment except when the parts wear after long periods of use.

The position of the type with respect to each end of the slug is separately adjustable. The right-hand vise jaw 3, Fig. 102, is adjusted by means of screw 35. The jaw rests against this screw in normal position and is moved back against the screw when setting fully justified composition. To adjust the jaw, place a 30-em mold in operating position, set the vise jaw em scale and the assembler slide scale on 30 ems, make sure that operating lever 4 is at flush left position and place the line spread indicator arm 36 on $3\frac{1}{2}$. Lock the spaceband lever pawl latch, assemble a line of matrices and spacebands long enough to justify to 30 ems and send the line over to the casting mechanism. After each adjustment of screw 35, recast the line to observe the position of the last character at the right end of the slug. Tighten the lock nut on the screw securely when the adjustment is correct.

Left-hand Vise Jaw Adjustment. The position of the character at the extreme left of the slug is governed by the normal position of the left vise jaw 2, Fig. 102. The left vise jaw is adjusted by means of the large knurled knob on the vise closing attachment, Fig. 103. Turning the knob causes the vise closing block to advance or to retract the left vise jaw with respect to the matrix line. Turning the knob clockwise moves the jaw further to the left. Screw *A* must first be loosened before the large knurled knob can be turned. When the knob has been turned sufficiently to line up the character at the extreme left of the slug, tighten screw *A*. Next, loosen set screw *B* and turn collar *C* until the zero on the collar coincides with the zero on the vise closing bracket, then tighten set screw *B*. Once these proper settings have been established, uneven measures from minus 2 to plus 3 points can then be obtained by loosening screw *A* and turning the large knurled knob. This device is particularly advantageous in newspaper offices, which require odd linear measurements other than the even and half-em measures provided on the conventional vise closing attachment.

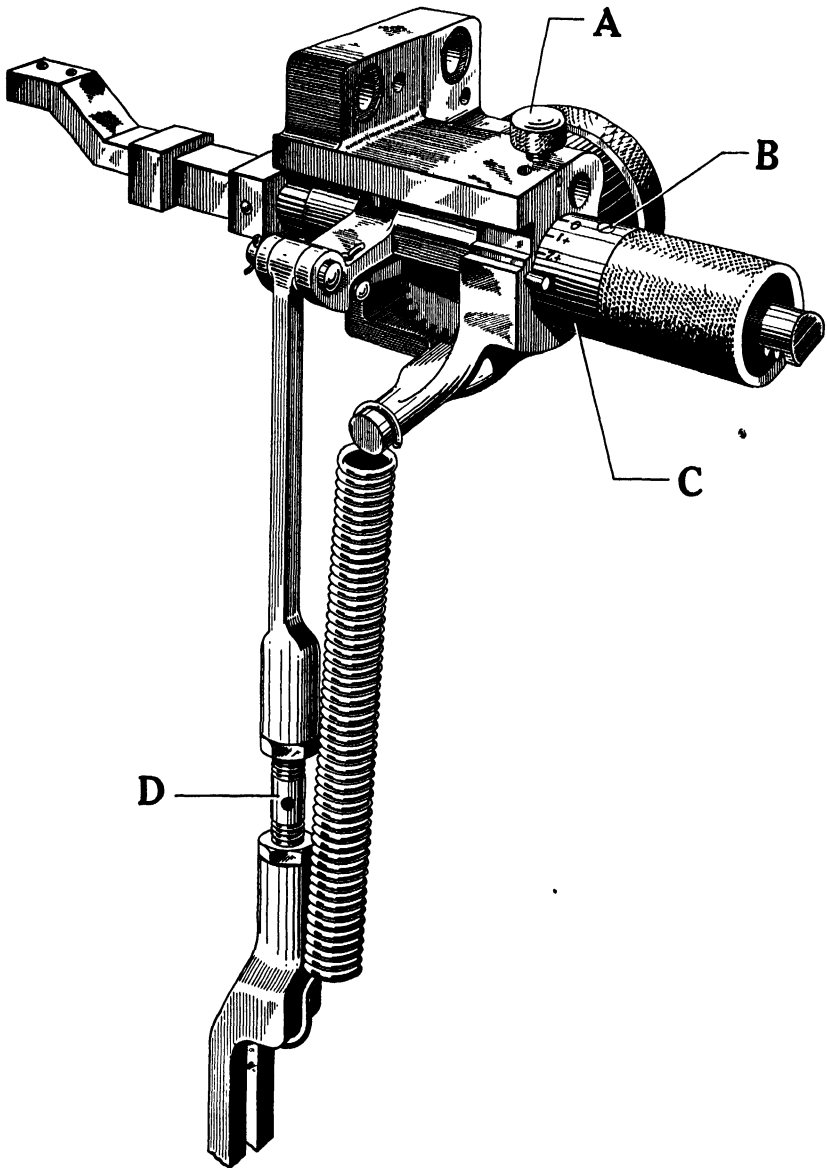


Fig. 103. The Vise Closing Attachment used with the quadding and centering device not only closes and opens the left-hand vise jaw but also operates auxiliary mechanism inside the vise frame. The position of the type with respect to the extreme left end of the slug body is adjusted by means of the large knurled knob. The knob also provides odd vise jaw settings from minus 2 to plus 3 points.

Centering Adjustment. The adjustment for centering, as mentioned previously, is made by adjusting the left vise jaw rack 12, Fig. 102, with respect to the left vise jaw 2. The adjusting screw 37 is held in the left vise jaw block by two collars. When the screw is turned, the threaded end of the screw causes rack 12 to move to the left or to the right. In adjusting the screw for centering, place a 30-em mold in operating position, set the vise jaw em scale on 30 ems, set lever 4 at center position and place the line spread indicator 36 on 0. Lock the space-band lever pawl latch, assemble one vertical rule matrix and send it in to the casting mechanism. If two slugs are cast and placed back to back, the position of the two rules with respect to each other will indicate the error from center. If the centering adjustment is made properly, the two rules will coincide exactly. To readjust the centering adjusting screw, place lever 4 on flush left position and move the left vise jaw 2 against the right vise jaw 3. When the left vise jaw is in this position, set screw 38 is directly under a hole drilled in the top of the vise cap to the right of the first-elevator vise automatic stop. The set screw can be loosened with a small screwdriver. The adjusting screw 37 can be reached with a screwdriver inserted under the slot in the vise cap cover plate 39 fastened to the right end of the vise cap. If a light is held on the inside of the vise frame directly in front of the two jaws and the left vise jaw is moved back until the head of the centering adjusting screw is under the hole in the top of the vise cap, it will be easier to see whether the screwdriver is in the slot of the screw. Turning the adjusting screw clockwise moves the center line further to the left. Tighten set screw 38 after each adjustment, push the left vise jaw all the way back to the left against its stop, set lever 4 on center and cast two slugs to observe the position of the rules, as previously described. When the rules coincide, the centering adjustment is correct and the set screw should be tightened securely.

Vise Jaw Automatic Adjustable Release Latch. When the first elevator is descending to the vise cap with the matrix line, the operating lever 25, Fig. 102, pulls downward on spring 24. This action builds up tension on lever 16 and rack 1, but the parts do not move at this time because latch 31 is resting in front of stop 32 on rack 1. Just before the first elevator seats on the vise cap, however, the first-elevator jaw banks on lever 33, raising latch 31 from in front of stop 32 and permitting lever 16 to pull rack 1 to the left through action of spring 24.

The arrangement of the release device is shown clearly in Fig. 104. To set the device, place the first-elevator alignment stop bar in *normal* position and turn the machine forward by hand until the first elevator seats on the vise cap and before the mold disk moves forward. Lift the first elevator and place a .093" feeler gauge on the stop bar where the adjustable screw in the first-elevator head banks. With the elevator resting on the gauge, loosen fulcrum block screw B, Fig. 104, move block A slowly to the left or to the right until the latch just releases the right vise jaw rack, then tighten screw B. The purpose in releasing the rack before the first elevator has made its complete downstroke is to produce a wiping action between the vise jaws and the two end matrices in the line. The downward movement of the matrices against the vise jaws prevents metal from building up on the jaws. No further adjustments are necessary on the device. When the alignment stop bar is moved to the *headletter* (H. L.) and *high* align-

ment positions, a pivot block, working in a slot in the fulcrum block, automatically raises the release lever to the proper height, as shown.

Vise Jaw Rack Release Stop. The latest rack release stops *C*, Fig. 104, have been changed to facilitate adjustment. After the right-hand vise jaw has been set so that the type line is flush with the end of the slug body, the stop *C* should be adjusted so that the release latch disengages freely. Before placing the vise jaw rack in the machine, tighten the release stop screws just enough to hold the stop firmly on the rack but with sufficient freedom to permit the stop to move lengthwise when the adjusting screw *D* is turned. The adjusting screw can be reached through the right end of the vise cap after the rack is replaced. When the release latch is in normal position in front of stop *C*, there should be from .005" to .010" clearance between the right-hand vise jaw and its stop screw. When the adjustment is completed, remove the vise jaw rack from the machine and tighten the release stop screws securely. If there is excessive clearance between the right-hand

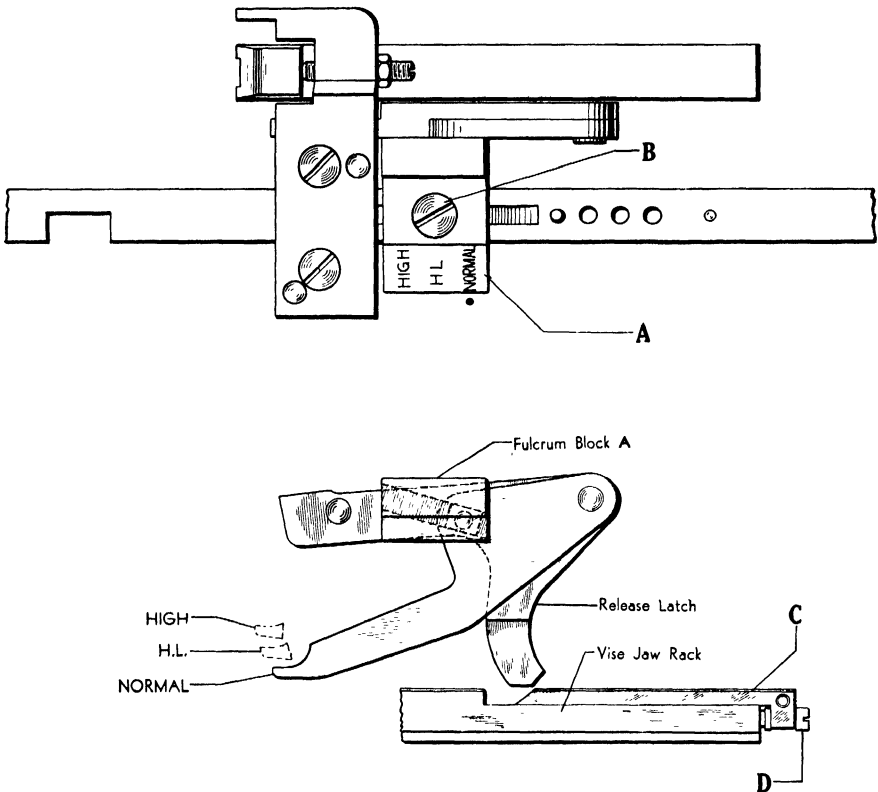


Fig. 104. The Vise Jaw Automatic Adjustable Release is operated when the first elevators descend to the vise cap. The release determines the precise moment when the right-hand vise jaw rack makes its operating stroke and closes the vise jaws against the matrix line. The release is adjusted by means of the fulcrum block *A*, which automatically sets the release to the various positions of the first-elevator alignment stop bar for headletter and high alignment work.

vise jaw and its stop screw, it may be difficult to move the operating lever to *center* position.

Vise Jaw Cushion Cylinder Needle Valve Adjustment. When the right vise jaw rack is released and the vise jaws close against the matrix line, the movement of the vise jaws, as previously described, is cushioned by an oil cylinder and plunger arrangement. This device is illustrated in Fig. 105. The force with which the vise jaws close against the matrix line can be varied by means of the needle valve *D*. Turning the valve in will produce a greater cushioning effect. After the valve is adjusted, disconnect the pot pump plunger and permit the machine to operate in order to observe the movement of the vise jaws. This should be done with the operating lever in flush left, center and flush right positions successively

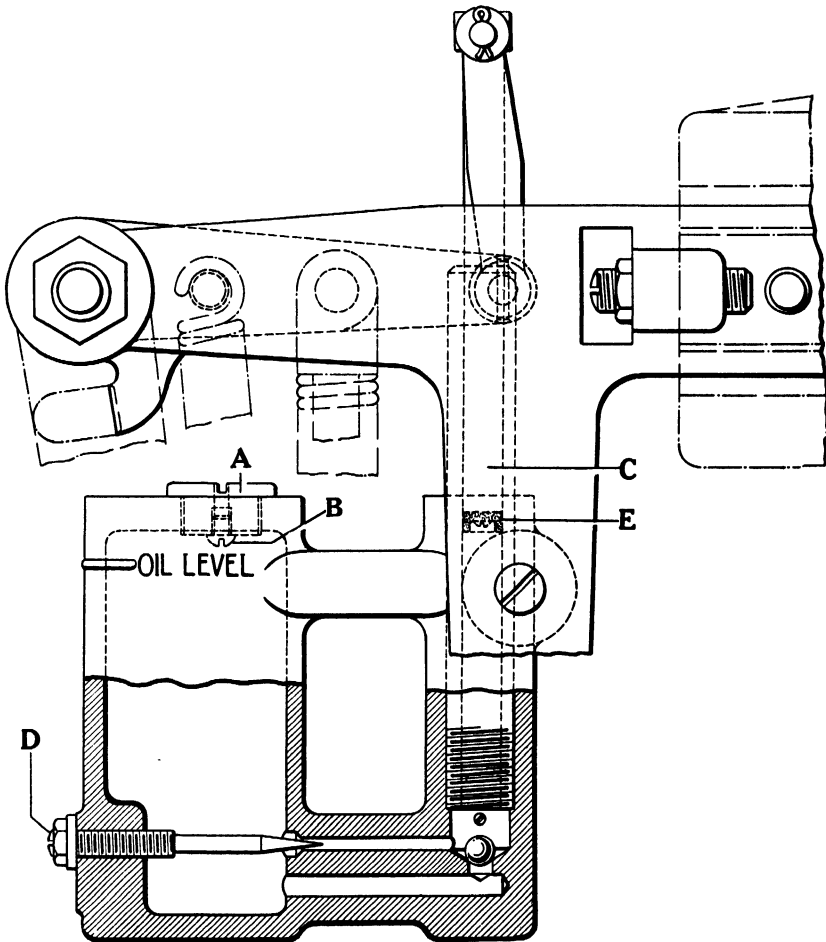


Fig. 105. The Vise Jaw Cushion Device governs the force with which the vise jaws close against the matrix line. The stroke of the vise jaws can be cushioned by adjusting the needle valve *D*.

to observe the effect of the adjustment under all three conditions. Care should be exercised that the needle valve is not adjusted to such an extent that the vise jaws are prevented from closing all the way in time.

When new machines are shipped from the factory, a screw *B* is inserted in cover *A* to prevent leakage of oil. This screw must be removed when the machine is put in operation and the vent must be kept open in service. The oil chamber should be kept filled to the oil level mark when plunger *C* is depressed all the way. Medium heavy D. T. E. oil (Socony Vacuum Oil Co.) or a similar light motor oil are most suitable for use in the cushion cylinder device. A cup washer *E* is fastened to the bottom of the plunger to provide an oil-tight seal between the plunger and the cylinder sleeve.

Vise Jaw Operating Lever Shoe Adjustment. The operating stroke of the right vise jaw rack *1*, Fig. 102, as previously outlined, is promoted by tension of spring *24*, which causes lever *16* to pull rack *1* to the left as soon as the rack is released. The tension of spring *24* is controlled by shoe *26* on operating lever *25*. When roll *28* contacts the shoe, the front end of the operating lever lowers and stretches spring *24*, placing the spring under the tension required for the movement of the rack and the vise jaws. Once the vise jaws are in position against the matrix line, it is essential, of course, that no further tension be exerted on rack *1*. The reason for this is that the rack and the right-hand vise jaw must be free to move when the matrix line is justified by the upward movement of the spacebands. If lever *16* should continue to hold rack *1* and the right vise jaw *3* to the left as the line is justified, the jaw would resist the spreading of the matrix line and justification would be accomplished only by overcoming this undue strain. When first justification takes place, the tension must be released from spring *24* so that the right vise jaw will be perfectly free to move back against its stop screw. Releasing the tension of the spring is accomplished by adjusting shoe *26* with respect to the operating lever roll *28*.

The arrangement of the shoe and roll is shown clearly in Fig. 106. Adjusting screw *C* is threaded in the operating lever and furnishes a banking point for shoe *A* against tension of spring *B*. Adjusting the screw will change the relationship of shoe *A* to roll *D*. To set the screw, assemble a 30-em line of matrices and spacebands, set lever *4*, Fig. 102, on flush left and indicator *36* on $3\frac{1}{2}$. Send the line in to the casting mechanism and stop the machine when the vise justification block just touches the bottom of the spacebands in preparation for first justification. The position of the justification block can be observed by looking through the front of the vise frame. When the parts are in this position, shoe *A*, Fig. 106, should be ready to drop off roll *D*, as illustrated. Adjust screw *C* until this result is obtained, then tighten the lock nut securely. *Proper adjustment of this screw is extremely important because it affects not only the smoothness of justification but the durability of the spacebands.* If the screw is set properly, the upward drive of the spacebands will be lively without undue strain. A sluggish drive of the spacebands indicates that shoe *A* is dropping off roll *D* too soon.

Operating Changes

The foregoing details of the vise jaw operating mechanism and especially of the section dealing with the engagement of the vise jaws with the main

operating rack should make apparent several facts regarding the method of making vise jaw and other changes on the quadding and centering device. For convenience of reference, the most important facts for the operator to bear in mind are described below.

Changing Vise Jaw Measure. When a change is to be made in the vise jaw setting, the main operating lever 4, Fig. 102, must be placed at *flush left* position. The reason for this is that in any position other than flush left, the vise jaw rack gear 6 is engaged with the main rack 1 and the left vise jaw rack 12. When the operating lever is placed at flush left position, however, gear 6 is raised out of engagement with the rack 1, leaving the left vise jaw free to follow the movements of the vise adjusting mechanism as the measure is changed. When the vise jaw measure is set, make sure that the left vise jaw is all the way to the left against its stop. The main operating lever can then be set on center or flush right position if desired, or it can be left at the flush left position. *It is important to remember, however, that the operating lever must always be set at flush left position when the vise jaw measure is to be changed.*

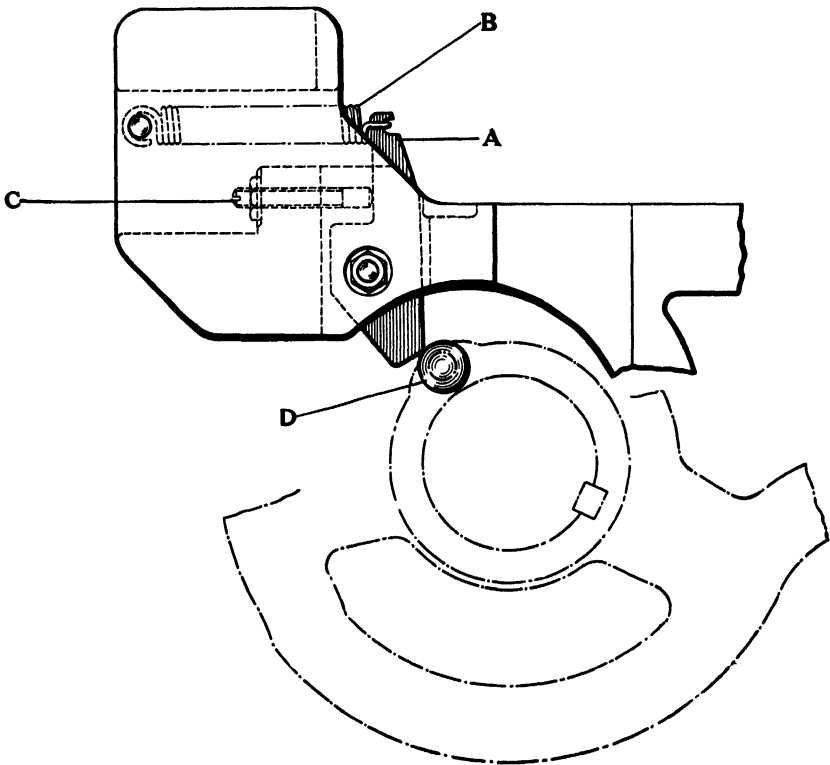


Fig. 106. Detail view of the vise jaw operating lever and the roll *D* on the first-elevator cam which imparts movement to the lever and the right-hand vise jaw rack. The means for adjusting the operating shoe *A* is also shown.

While it is possible to change the setting of the operating lever after the transfer of the line has occurred or before the first elevator has descended to the vise cap, *it is best to change the operating lever setting when the machine is in normal position.* In this position, rack 1, Fig. 102, bolt 5, gear 6, the vise jaws and the rest of the vise jaw operating mechanism are in the proper relationship for engaging and disengaging as the operating lever is moved to flush left, center or flush right.

On machines equipped with the Mohr Intertype Saw, it should be borne in mind that changing the setting of the saw also changes the setting of the left vise jaw. For the same reason outlined previously, therefore, the operating lever should be set at *flush left* when setting the saw. After the setting has been made, the left vise jaw should be moved all the way to the left against its stop before changing to center or flush right position. The vise closing attachments applied

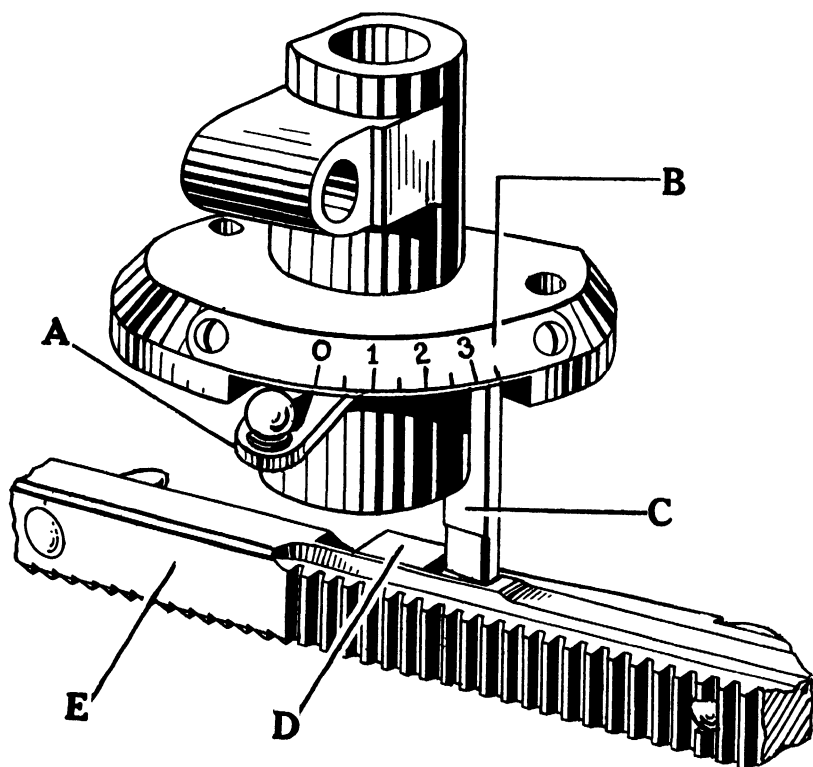


Fig. 107. The Line Spread Device provided with the quadding and centering device determines whether lines will justify or quad. As lever *A* is set with respect to scale *B*, the position of arm *C* in relation to the line spread pawl *D* on the right vise jaw rack *E* is changed. *The position of the arm with respect to the pawl after the line has been delivered to the vise jaws determines whether the line will justify or quad.* The various settings of the line spread device are explained in the text.

to the latest Intertype quadding and centering machines are provided with a spring detent which holds the left vise jaw in positive relationship to the vise adjusting mechanism. On such machines, the left vise jaw automatically follows the movements of the vise adjusting mechanism.

The Line Spread Device. In addition to setting the main operating lever 4, Fig. 102, at the flush left, center and flush right positions as required, the operator will have occasion to set the line spread indicator lever 36 with respect to the line spread scale 40. The line spread device is simple in operation but is extremely important in function, because it controls the justification and quadding operations of the machine. The mechanical operation of the line spread device is described briefly in the succeeding material and in more detail in the section dealing with the Justification and Quadding Mechanism, pages 169 to 175. For purposes of making operating changes, however, the various settings of the line spread device are described below under their respective headings.

A detail drawing of the line spread device is shown in Fig. 107. The line spread indicator lever *A* is provided with a small indicator which registers with scale *B*. On the other end of lever *A* there is a projecting arm *C* which is located inside the vise cap above the line spread pawl *D* fastened to the right vise jaw rack *E*. As indicator lever *A* is moved to the various settings on scale *B*, arm *C* is moved with respect to the line spread pawl *D*. *The position of the arm with respect to the pawl after the line has been positioned between the vise jaws determines whether the line will justify or quad.* The settings of the line spread indicator lever *A* as outlined in the following description, therefore, should be understood thoroughly by the operator.

Fully Justified Composition. When setting fully justified composition, the main operating lever is placed at the flush left position. The line spread scale *B*, Fig. 107, is indexed from 0 to $3\frac{1}{2}$ ems. *These figures represent the amount of slack or looseness permissible in the assembled lines when setting fully justified composition.* If indicator lever *A* is set at 2 on scale *B*, for example, all lines must be assembled to within at least 2 ems of the full measure to justify. Similarly, if the lever were set at 3, all lines would have to be assembled to within at least 3 ems of full to justify. Since wear of the assembler star wheel affects the accuracy of the assembler scale reading, *it is best to allow at least $\frac{1}{2}$ em leeway to be sure that the lines will justify.* Thus, if the line spread lever is set at 2, assemble all justified lines to within $1\frac{1}{2}$ ems of full; if a setting of 3 is being used, assemble all justified lines to within $2\frac{1}{2}$ ems of full, etc. As on a non-quadding machine, all justified lines must contain a sufficient number of spacebands for the amount of expansion required. Three or four bands for each em expansion is a good rule. If a line is set to within the amount indicated on the line spread scale but does not contain a sufficient number of spacebands for the required expansion, it will not cast, exactly as in the case of a loose line on a non-quadding machine. *All lines shorter than the amount indicated on the line spread scale will quad automatically.* This makes it possible, therefore, for the operator simply to send in the quadded line without having to change the line spread scale setting.

The usual settings of the line spread device for fully justified composition are from 2 to $3\frac{1}{2}$ ems on the indicator scale, depending upon the length of line being

set. The common setting for justified composition up to 12 ems is 2 on the indicator scale; for longer measures, a 3 or $3\frac{1}{2}$ setting is generally used. Many operators prefer to use a constant setting of 3 for justified composition, assembling all lines to within $\frac{1}{2}$ to $2\frac{1}{2}$ ems of full, according to the length of line being set. This setting insures justification, because all lines are being assembled well within the limit of looseness with a sufficient number of spacebands for the required expansion. The constant setting of the line spread indicator achieved by this method, of course, relieves the operator of an added operation.

Quadded and Centered Composition. When all of the composition is quadded to the left or to the right or centered, the line spread lever should be set at 0 on the scale. At this setting, all lines will cast, whether they contain spacebands or not. Thus, a line of matrices without spacebands or even a single matrix will be quadded left or right, or will be centered automatically without any attention on the part of the operator. Quadded lines with spacebands are handled in the same manner, quadding or centering according to the setting of the operating lever and casting automatically, regardless of the length of the line, size of type or any other factor which would have to be taken into account on a non-quadding machine.

Newspaper Headlines in Pyramidal Style. Many newspapers prefer to use the conventional inverted pyramid style for setting headlines, illustrated below:

Committee Says Any Revival Must Fit Several Different Aims and Conditions

In this style of composition, the first line is justified to the full column measure and the second and third lines are centered. While fully justified composition is regularly set with the operating lever on flush left position, as previously described, it is possible on the Intertype quadding and centering device to set both the justified and the centered lines of the subhead with the operating lever constantly at center position. In setting the justified line, the operator sets the line spread indicator lever at 3 on the line spread scale. With the operating lever at center position, the line will justify to the full measure if it is of the proper length and contains a sufficient number of spacebands for the amount of expansion required. In setting the two succeeding lines, which are simply to be centered on the measure, the line spread lever is set at 0 on the scale, exactly as is done for quadded composition. This method of setting subheads is very convenient for the operator, because it eliminates the necessity of changing frequently from flush left (for the justified line) to center position and also minimizes the possibility of incorrectly set lines due to failure to set the operating lever properly.

While justified composition, particularly on short newspaper measures, can be obtained with the operating lever set at center position, *it should be remembered that when the largest part of the composition is to be justified, the lever should be placed at flush left position.* The quadding and centering device is designed to justify lines principally in this position.

Justification and Quadding Mechanism

In describing the two fundamental characteristics of the quadding machine, it was pointed out previously that the justification mechanism on such machines is designed not only to produce fully justified composition, but also to operate auxiliary mechanism related to the quadding of lines. The operation of the justification and quadding mechanism is completely automatic once the operator sets the main operating lever and the line spread lever for the type of composition desired. For purposes of clarifying the quadding and centering device and to assist in the adjustment and maintenance of the parts, however, the basic operation of the justification and quadding mechanism is presented in following material.

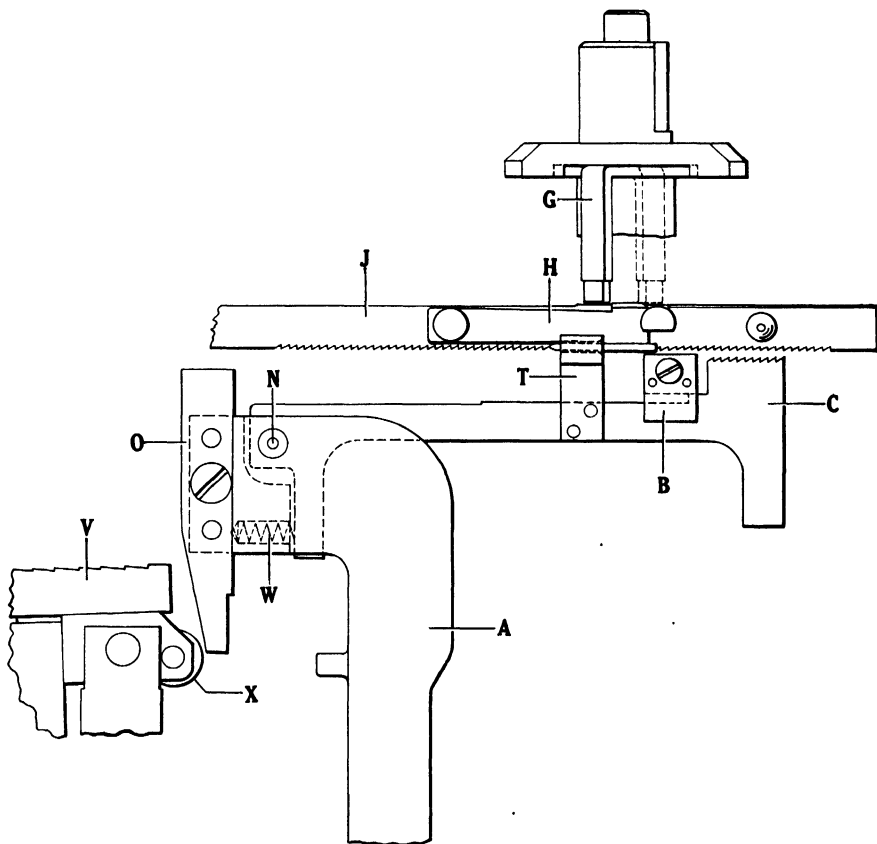


Fig. 108. Detail view of the parts which control the justification and quadding functions of the machine. *The justification or the quadding of the line depends upon the relationship between the line spread arm G and the line spread pawl H when first justification is about to occur.* The position of these parts at this time determines whether pawl C will engage or will be held down out of engagement with rack J. If the pawl engages the rack, the line is quadded; if the pawl is held down out of engagement with the rack, the line will justify, provided it is of the proper length and contains a sufficient number of spacebands for the required expansion.

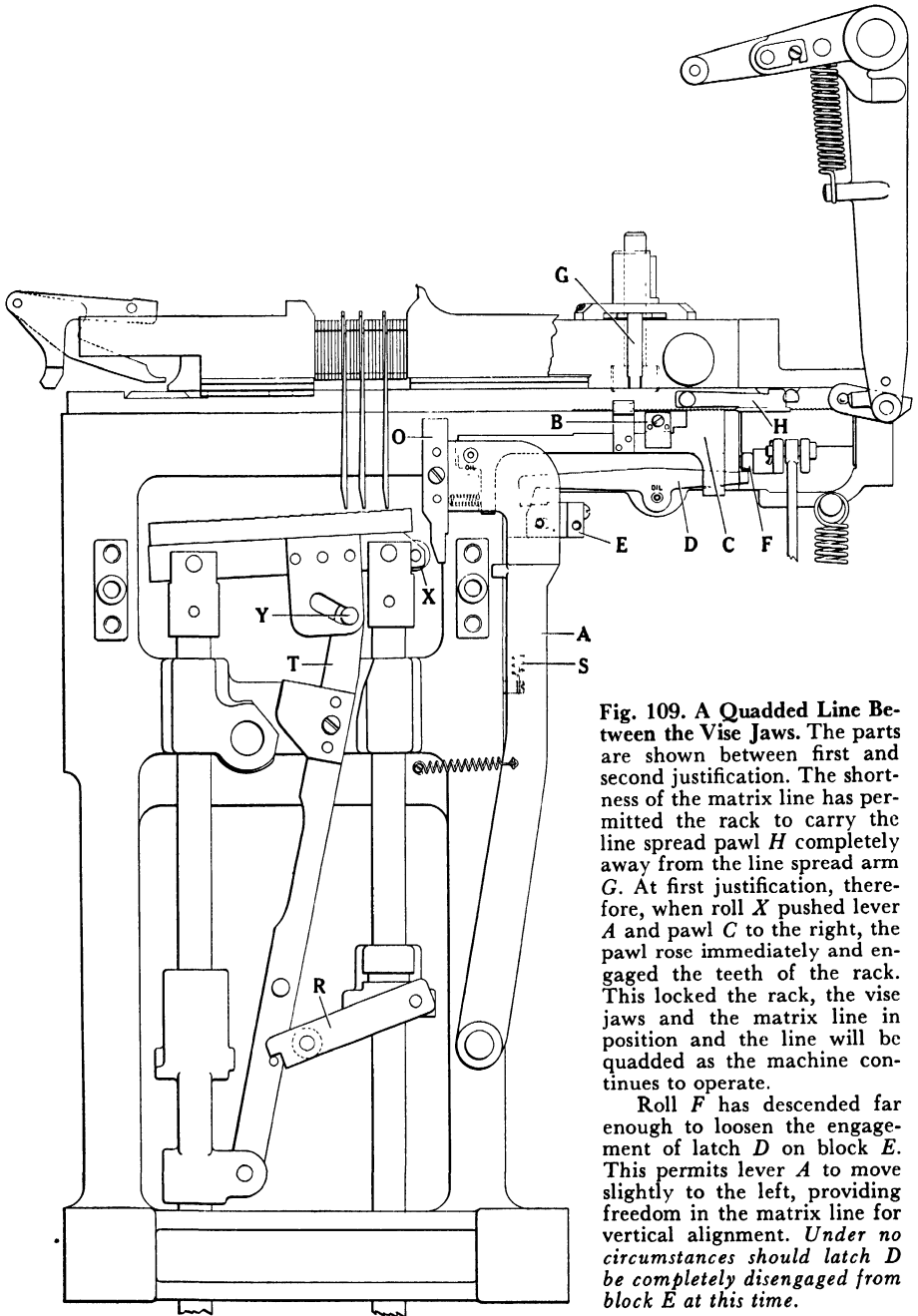


Fig. 109. A Quadded Line Between the Vise Jaws. The parts are shown between first and second justification. The shortness of the matrix line has permitted the rack to carry the line spread pawl *H* completely away from the line spread arm *G*. At first justification, therefore, when roll *X* pushed lever *A* and pawl *C* to the right, the pawl rose immediately and engaged the teeth of the rack. This locked the rack, the vise jaws and the matrix line in position and the line will be quadded as the machine continues to operate.

Roll *F* has descended far enough to loosen the engagement of latch *D* on block *E*. This permits lever *A* to move slightly to the left, providing freedom in the matrix line for vertical alignment. *Under no circumstances should latch D be completely disengaged from block E at this time.*

The principal parts of the justification and quadding mechanism are shown in detail in Fig. 108. *The justification or the quadding of the line depends entirely upon the relationship between the line spread arm G and the line spread pawl H when first justification is about to occur.* The line spread arm and the line spread pawl control the engagement of the vise jaw rack pawl C with the vise jaw rack J. The vise jaw rack pawl C is pivoted on a hinge pin N at the upper end of lever A. A compression spring W, interposed between a solid banking point and pawl C, continually urges the toothed end of the pawl upwards toward the teeth of rack J. The right end of pawl C engages normally under a step cut in the back of rest B, which holds the pawl down out of engagement with the rack until first justification takes place. After the pawl C is released from rest B, its engagement with the rack depends upon the position of the line spread arm G with respect to the line spread pawl H. If the projection at the top of pawl H is underneath arm G, the vise jaw rack pawl C will be held down out of engagement with rack J through rest T. *The rack, vise jaws and matrices will be free to move under these conditions and the line will justify.* If pawl H is not underneath arm G just before first justification, there will be nothing to prevent the vise jaw rack pawl C from rising immediately and engaging the teeth of rack J. *The rack and the vise jaws are held tightly under these conditions and the line is quadded.* In reading the following description, therefore, it should be borne in mind, as previously stated, that *the quadding or the justification of the line depends entirely upon the position of arm G with respect to pawl H when first justification is about to occur.* This statement has reference, of course, only to the mechanism of the quadding and centering device. The length of the line and the number of spacebands also have a bearing on the justification and quadding process.

The Quadding of the Line. When all of the composition is to be quadded to the left or to the right or centered, the line spread lever is set at 0 on the indicator scale. At this setting, the line spread arm G, Fig. 108, occupies the position shown by the solid lines. The lower end of the arm is moved completely to the left of the projection at the top of pawl H, as shown. When the first elevator descends and positions the matrix line between the vise jaws, the vise jaw latch is released, permitting rack J to be moved to the right by the vise jaw lever. The vise jaw or jaws which are engaged with the rack are then moved to position until they close tightly against the matrix line. When rack J moves to the right, of course, the line spread pawl H is carried with it. This leaves the vise jaw rack pawl C free to rise and to engage rack J immediately as soon as it is released from rest B. When the vise justification block V rises for first justification, therefore, roll X contacts cam O, moving lever A to the right. Pawl C is moved by the same action from under rest B, and spring W causes the toothed end of the pawl to rise and to engage the teeth of rack J. This action locks the rack, the vise jaws and the matrix line tightly in position. Just before the parts are locked in position, the justification block V is permitted to rise just high enough to drive the spacebands very slightly. At the same time, roll X exerts increasing pressure against cam O, pressing lever A, pawl C and rack J further to the right and locking the line tightly for the cast. The slight upward drive of the spacebands and the locking pressure of the parts just described produces a metal-tight seal for the cast.

A quadded line is shown in position between the vise jaws in Fig. 109. The vise jaws have closed against the line, the vise justification block has made its first upward stroke and pawl *C* has engaged the teeth of the right vise jaw rack. The vise closing lever has descended, permitting the left vise jaw to withdraw slightly from the matrix line. The vise closing link has also descended far enough to carry roll *F* down on latch *D*. This raises the left end of the latch and relaxes its grip on block *E*, permitting lever *A*, pawl *C*, the right vise jaw and the vise jaw rack to move *slightly* to the left. *This action is extremely important because it provides the freedom necessary in the matrix line for vertical alignment.* It should be borne in mind, however, that latch *D* should under no circumstances be completely disengaged from block *E* at this time.

After vertical alignment has occurred, the vise closing link rises, permitting spring *S* to pull latch *D* tightly over block *E* again. The vise justification block

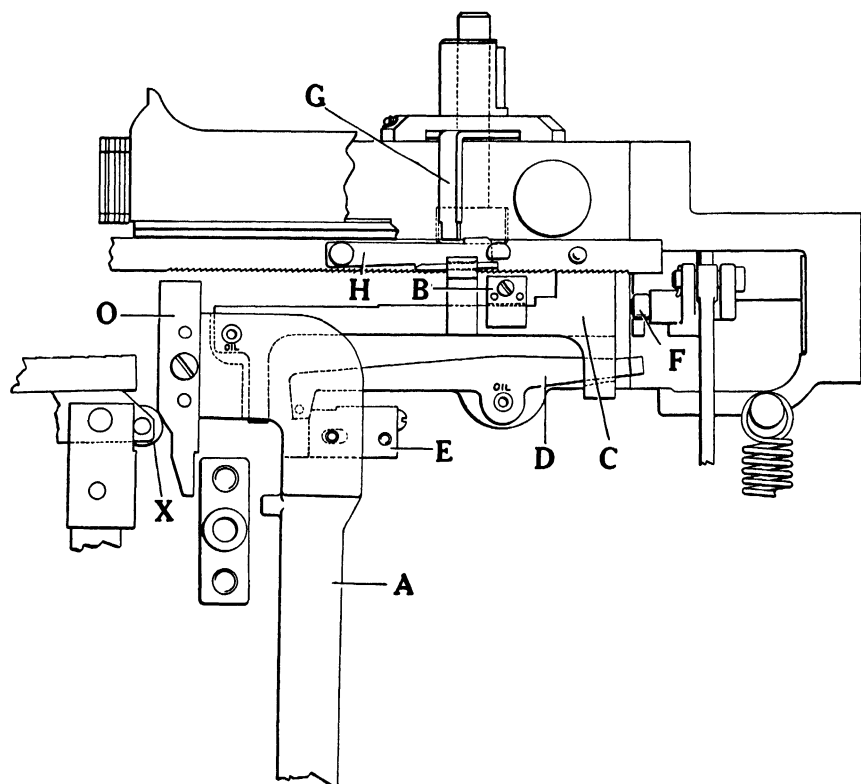


Fig. 110. Detail view, showing the position of the vise jaw rack pawl *C* and related parts with respect to a quadded line just before the cast. Since the line spread lever has been set on 0, arm *G* has no engagement with the line spread pawl *H*. Pawl *C*, therefore, engaged the rack as soon as first justification began and locked the rack, vise jaws and the matrix line in the quadded position. The line is now being held tightly between the vise jaws by the pressure of roll *X* against cam *O* and by the wedging action of latch *D* over block *E*. After the cast, the vise justification block will descend and release the pressure of roll *X* from cam *O*, but the matrix line will be held tightly until after the breakaway by latch *D* and block *E*.

then rises for second justification, causing roll *X* to contact cam *O* and to press lever *A* to the right again. Pawl *C* follows the same movement and locks the rack, the vise jaws and the matrix line tightly for the cast, as previously described. The parts are shown in this position in Fig. 110. Directly following the cast the vise justification block descends, carrying roll *X* away from cam *O*. While the mold is withdrawing the slug from the matrix line, however, the matrix line is held in position by the wedging action of latch *D* over block *E*. *This wedging action of latch D is of great importance*, because it prevents the matrices from moving during the withdrawal of the slug. Any movement of the matrices at this time will result in slurring of the characters on the slug. An improved wedge lock has been developed for the quadding and centering device and the justified quadding attachment to hold the matrix line more firmly between the vise jaws during the breakaway. This new device is described on pages 177 and 186. After the breakaway, roll *F* depresses latch *D* and pawl *C* sufficiently to disengage the pawl teeth from the rack teeth. This frees the matrix line and while the first elevator is rising to transfer position, the vise jaws and related parts are returned to their normal position.

Justification of the Line. Justified composition, as outlined briefly in the preceding material, is obtained by preventing the vise jaw rack pawl from engaging the teeth of the right vise jaw rack. When the pawl is held down out of engagement with the rack, the right vise jaw and the matrices are free to move and the vise justification block pushes the spacebands upward until line is fully justified.

When setting fully justified composition, the main operating lever is set on flush left position and the line spread lever is set for the required amount of expansion. This moves the line spread arm *G* to approximately the dotted position shown in Fig. 108. In flush left position, as previously described, only the right vise jaw is engaged with the rack. Consequently, when the first elevator positions the line of matrices and spacebands between the vise jaws and trips the vise jaw latch, the right vise jaw and the matrix line are pulled by the rack toward the left vise jaw until the line is clamped between the two jaws. If the assembled line has been set to within the limit of slack or looseness indicated on the line spread scale, the line spread pawl *H* is carried by the rack until it comes to position under line spread arm *G* (dotted outline). When pawl *C* is moved from under rest *B* during first justification, therefore, the line spread pawl *H*, banking under arm *G*, holds pawl *C* down out of engagement with rack *J* through rest *T*. This leaves rack *J* and the right vise jaw perfectly free to move. *The justification of the line, therefore, may be said to consist simply in preventing pawl C from engaging the teeth of rack J.*

An illustration of a justified line is shown in Fig. 111. The line of matrices and spacebands has been positioned between the vise jaws and the rack has moved the right vise jaw and the line against the left vise jaw. The line spread pawl *H* has been carried with the rack to position under arm *G*. The exact position of the pawl with respect to the arm is determined in this case, as in all cases, by the length of the line which has been sent in to the casting mechanism. Arm *G* is in position corresponding to the amount of expansion for which the line spread lever was set. Since the line was assembled to within the limit of looseness indicated on the line spread scale, pawl *H* came to position under arm *G* when the

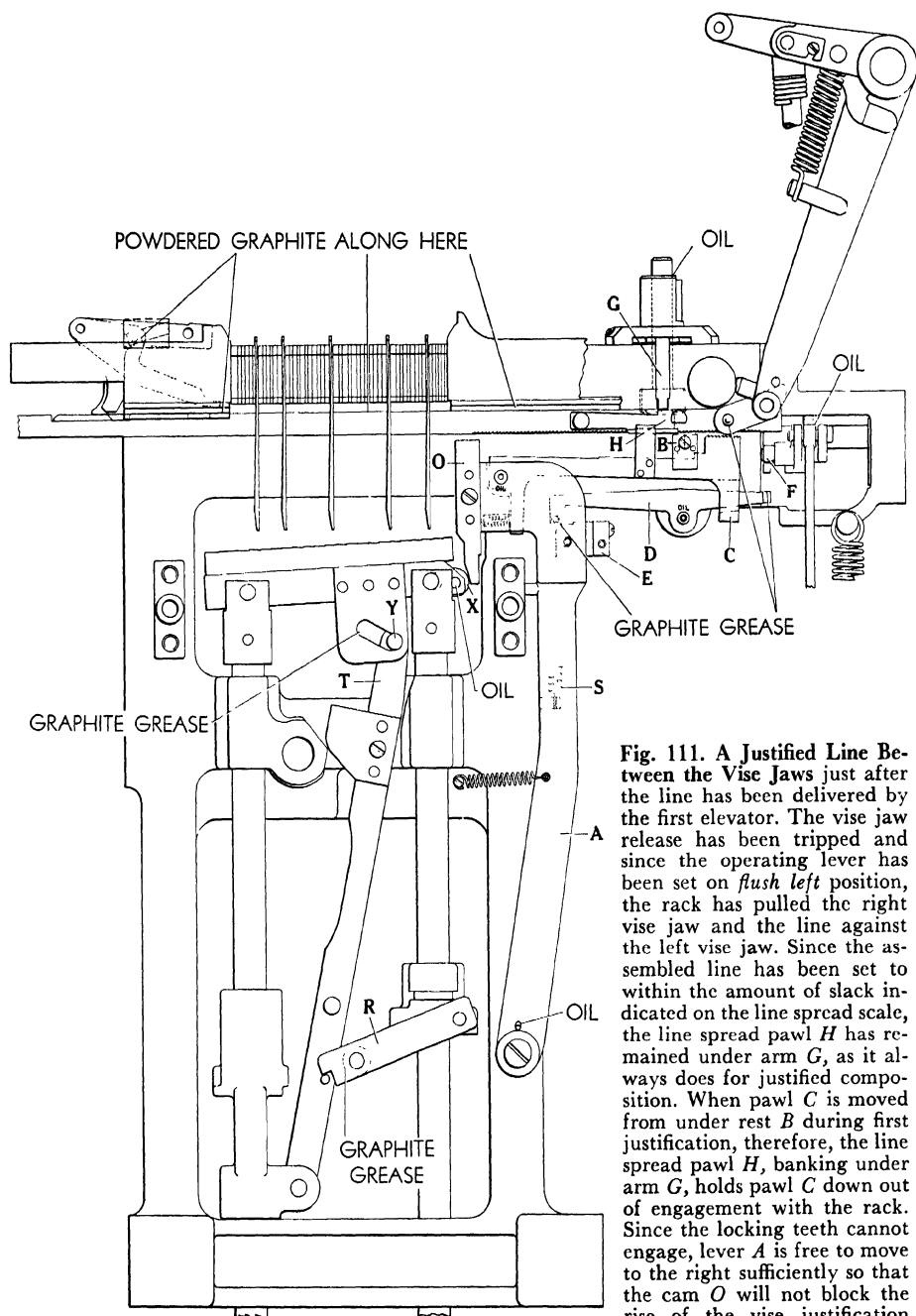


Fig. 111. A Justified Line Between the Vise Jaws just after the line has been delivered by the first elevator. The vise jaw release has been tripped and since the operating lever has been set on *flush left* position, the rack has pulled the right vise jaw and the line against the left vise jaw. Since the assembled line has been set to within the amount of slack indicated on the line spread scale, the line spread pawl *H* has remained under arm *G*, as it always does for justified composition. When pawl *C* is moved from under rest *B* during first justification, therefore, the line spread pawl *H*, banking under arm *G*, holds pawl *C* down out of engagement with the rack. Since the locking teeth cannot engage, lever *A* is free to move to the right sufficiently so that the cam *O* will not block the rise of the vise justification block. The block will rise high

enough, therefore, to push the spacebands upward until the right vise jaw is moved back against its stop screw, thereby justifying the line to the full vise jaw measure.

line was moved against the left vise jaw by the rack and the right jaw. It should be noted that pawl *H* is always under arm *G* when justified lines are being set. The movement previously mentioned in connection with the rack and pawl is very slight, because justified lines are usually only 1 to 3 ems shorter than the distance between the vise jaws. The range of engagement provided for pawl *H* and arm *G* is sufficient to cover all justified work.

When the justification block rises for first justification, pawl *C* is tripped but is held out of engagement with the rack by arm *G* and pawl *H*. Since there is no obstruction to the upward movement of the vise justification block, therefore, the spacebands are pushed upward consecutively from left to right, causing the matrix line to justify to the full length until the right vise jaw is pushed back against its stop screw. It should be noted that the angular stroke of the vise justification block is opposite to that of the non-quadding block. This change was made because the slack in the line occurs at the right, due to the movement of the right vise jaw after the delivery of the line.

During second justification, the vise justification parts rise with the justification block straight, pushing the spacebands upward from right to left. This is accomplished by an actuating finger *R*, a brace *T* and a cam arrangement shown at *Y*. Finger *R* forces brace *T* to the left, straightening the justification block through the cam and pin device shown at *Y*.

When setting fully justified composition, it is possible, as stated previously, to send in a quadded line without changing the setting of the line spread lever. The quadding of the line, as always, is controlled by the position of pawl *H* with respect to arm *G*. If the line is short by more than the amount indicated on the line spread scale, pawl *H* is carried past arm *G* when the line is delivered. During first justification, therefore, when pawl *C* is released from rest *B*, the pawl rises immediately and engages the teeth of the rack. The line, therefore, is quadded automatically because it was shorter by more than the amount indicated on the line spread scale.

Justification and Quadding Adjustments

Most of the parts of the justification and quadding mechanism are fixed in position and require no adjustment. The following parts mentioned below are the only ones which may require setting from time to time. Proper adjustment of these parts is very essential to the efficient operation of the machine.

Vise Closing Connecting Rod Adjusting Screw. Directly after the cast, roll *F*, Fig. 111, depresses pawl *C* through latch *D* so that the pawl can return to normal position under rest *B*. The pawl, of course, must lock under the rest so that it will not interfere with the movement of the rack while the line is being delivered to the vise jaws. The latching of the pawl under the rest is controlled by an adjusting screw *D*, Fig. 103, on the vise closing connecting rod. With the machine at transfer position, the screw should be turned until the pawl slips under the rest with about 1/64" clearance. Tighten the lock nuts securely when the setting is obtained.

Vise Jaw Rack Pawl Lever Latch Block. Block *E*, Fig. 111, is adjustable with respect to latch *D*. The block must be set so that latch *D* locks over it at the same

time that pawl *C* disengages from block *B*. In addition, latch *D* must have sufficient bite on block *E* to prevent movement in the line of matrices while the slug is being withdrawn. The amount of this bite will vary with the length of the lines, but under no conditions should the engagement be less than $1/16''$. To set the block, send in a short line composed of ETAOIN and observe the bite of latch *D* on block *E*. Next, send in the same line plus a thin space and observe the bite again. Continue this until the original line plus six thin spaces has been tried. The setting of the block will be correct when the smallest amount of bite is $1/16''$. The latch spring *S* must have sufficient tension to hold latch *D* tightly on block *E* during the breakaway. A load of 15 to 17 pounds should stretch the spring to $4\frac{1}{2}''$ between the loops. The result of a weak spring will be similar to a poor adjustment of block *E* in that the characters on the slug may be slurred during the breakaway.

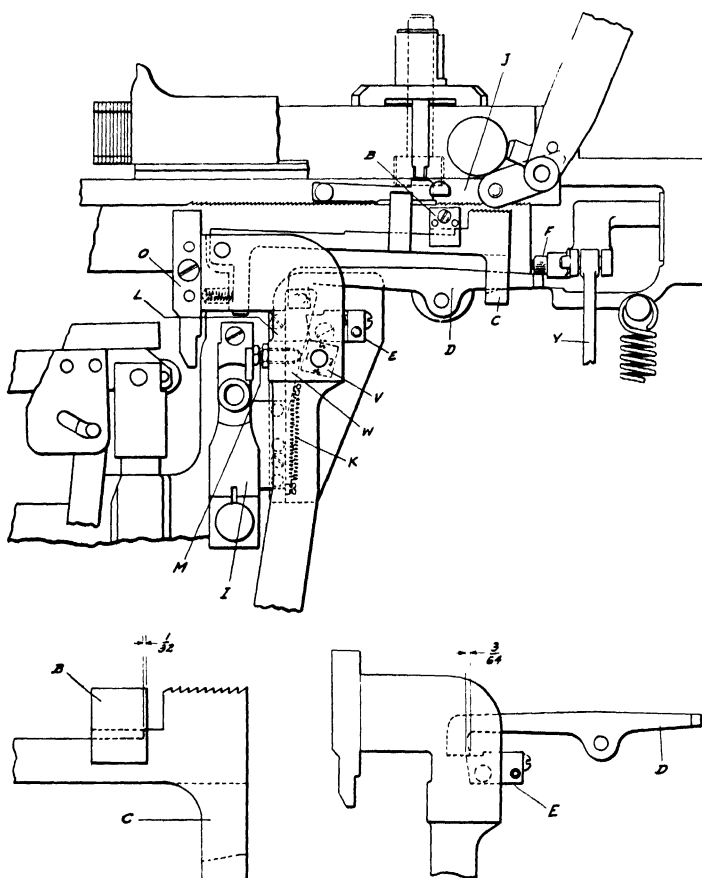


Fig. 112. The Improved Wedge Locking Device applied to the quadding and centering device. The wedge lock consists principally of a wedge *W* and a block *V*, which hold the matrix line more firmly between the vise jaws when the slug is being withdrawn from the matrix line. This prevents slurring of the type characters on the slug.

The functions of the latch arrangement described above have been incorporated in an improved wedge lock device on the latest quadding machines. This new device is described below.

Improved Wedge Locking Device

The improved wedge lock was developed to hold the matrix line more firmly between the vise jaws when the slug is being withdrawn from the matrices. The device is shown in Fig. 112. The wedge lock consists chiefly of a wedge *W* and a block *V*. During the breakaway, pawl *C* is engaged with rack *J* and wedge *W* is held tightly between extension *L* and block *V* by spring *K*. This wedging action holds the rack and related parts firmly in position, preventing movement of the vise jaws or the matrices when the mold is withdrawing the slug.

Block *V* is provided with four surfaces, which are at increasing distances from the pivot of the block. Surface 1 is nearest the pivot and surface 4 is furthest away. The surfaces of the block increase in increments of .005". In applying the block, it may be necessary to try each of the four surfaces. The surface which should be left facing wedge *W* is the one which will insure a positive wedging action when pawl *C* is engaged with rack *J* and various lengths of lines are held between the vise jaws. The best way to test the setting is to send over a short line, such as ETAOIN, and observe the position of wedge *W* with respect to block *V*. Then send over the same line plus a thin space and observe again. Continue this until the original line plus six thin spaces has been tried. The correct surface of block *V* will be in position if the wedging action is present in all tests. *Latch D must not touch block E*, otherwise the holding action of wedge *W* will be defeated.

Adjustments. With the machine in normal position, disconnect the vise closing connecting rod *Y* from the vise closing lever. Be careful not to lose the small roller in the link. The object of disconnecting the link is to raise roll *F* so that latch *D* will rest on block *E* and pawl *C* will engage block *B*, as illustrated. Adjust screw *M* until pawl *C* engages block *B* by $1/32"$, as illustrated. Also, block *E* should be set to provide $3/64"$ rest for latch *D*, as indicated in the detail drawing. The purpose of these adjustments is to insure engagement of pawl *C* with rack *J* before latch *D* drops off block *E*.

A cam shoe (S-386) is added to the justification cam to permit pawl *C* to engage rack *J* before the spacebands are driven upward at first justification.

The wedge locking device is applied to the justified quadding attachment and the two settings outlined above are made in the same way. All other adjustments of the quadding and centering device and the justified quadding attachment are made as described.

Removal of Parts and Maintenance

The vise mechanism for the quadding and centering device can be removed with speed and convenience because all of the parts are either doweled in position or located positively by other means. There is no need to disturb any of the adjustments in the process of removal due to the accessibility of the parts. Many of the mechanisms are assemblies in themselves and can be removed from the machine as units.

Right-hand Vise Jaw Rack. The removal of right vise jaw rack 1, Fig. 102, consists simply in following a definite procedure for disengaging the vise jaws from the rack. Open the vise frame. Place the operating lever 4 on *flush left* position, set the vise indicator scale on 30 ems, make sure that the left vise jaw is against its stop, then place the operating lever on *flush right* position. Depress the vise jaw release lever 33 and pull rack 1 to the left until the left vise jaw meets the right jaw. Change the operating lever to *flush left* position. This releases the right vise jaw from the rack and the rack can now be removed by sliding it out to the left. The inside of the vise cap and the rack can be cleaned and lubricated with powdered graphite when the rack has been removed. To replace the rack, reverse the procedure of removal.

The Vise Mechanism. To remove the complete mechanism from the vise cap, first remove the rack as outlined above. Remove the left vise jaw support overlapping the top of lever A. Remove the assembled vise jaw rack gear and line spread device and the left vise locking handle. Take out the wing pin at the bottom of the vise closing link, being careful not to lose the small roller in the slotted track of the link. After the three screws holding the vise closing bracket are removed, the assembled vise closing attachment, vise jaws and other parts can be removed from the vise cap. Reverse the procedure of removal to assemble the parts.

Maintenance. The Intertype quadding and centering device, as indicated in the foregoing description, is designed on the simplest and most rugged principles of construction. Complicated constructions have been avoided to insure trouble-free operation of parts. Like all fine mechanisms, however, the efficiency with which the quadding and centering device operates will depend to a great extent upon the care and maintenance which the parts receive in service. Some of the maintenance procedure has been indicated already. In addition, the vise frame parts requiring lubrication are indicated in Fig. 111 with the type of lubricant to be used. If the quadding and centering device is cleaned periodically and lubricated as directed, it will operate with maximum efficiency in service.

The Justified Quadding Attachment

The universal Intertype autospacer (quadding and centering device) can be equipped with a device known as the justified quadding attachment. This attachment increases the range of work possible with the autospacer without affecting its original features. With the justified quadding attachment, it is possible to set fully justified lines automatically with uniform indentions up to 15 ems on the right of the line. Indentions of any length on the left of the line are obtained as usual by means of the vise adjusting knob. The original features of the autospacer are still present. Lines can be justified to full measure, quadded to the left or to the right and centered by means of the operating lever.

From the operator's viewpoint, the chief differences between the ordinary autospacer and the new type with the justified quadding attachment are the operating lever A, Fig. 113, the knob B and the two scales D and E. Lever A controls the engagement and disengagement of the justified quadding device. When the lever is moved to the left, the justified quadding attachment is placed in oper-

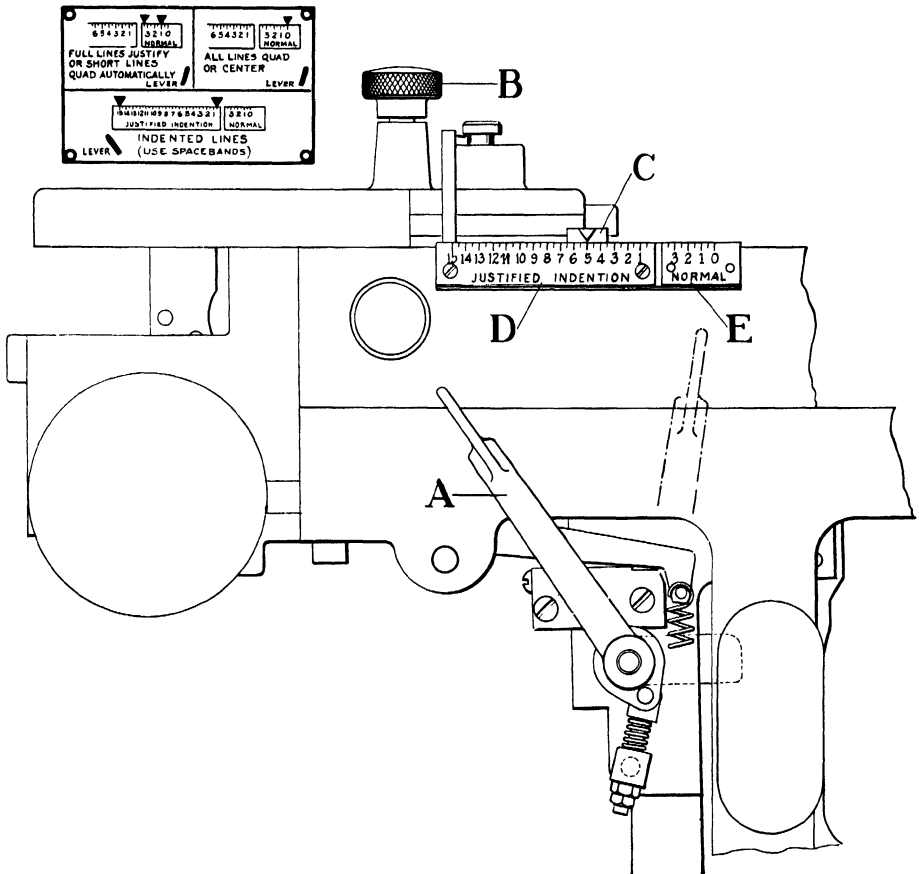


Fig. 113. Front View of the Justified Quadding Attachment, showing the simple operating mechanism. The instruction plate shown in the illustration is mounted on top of the device. The plate shows in picture form the position of the pointer *C* with respect to the two scales *D* and *E* and the positions of the lever *A* for different kinds of composition.

ation. When the lever is moved to the right, the attachment is disengaged from operation and the quadding and centering device is ready to be used for ordinary quadding and centering of lines of various lengths and also for setting fully justified composition. The knob *B* controls the movement of pointer *C* along the justified indentation scale *D* and the normal scale *E*. The pointer is moved by lifting knob *B* slightly and turning it in the desired direction. When the knob is dropped, the pointer is locked in position.

The Normal Scale corresponds exactly in function to the line spread scale used on the ordinary quadding and centering device. When the pointer *C* is on the normal scale *E* and operating lever *A* is to the right, the autospacer functions in every respect as described on the preceding pages. In setting ordinary composition having full justified lines, pointer *C* is moved to the normal scale and set for the desired amount of expansion. Operating lever *A*, of course, is swung to

the right under the normal scale. As on the ordinary autospacer, full lines with spacebands will justify and short lines will quad automatically. To quad or center all lines, simply set the pointer on zero and move the operating lever to the right the same as for full lines.

Use of the Justified Quadding Attachment. As stated previously, the justified quadding attachment makes it possible to set fully justified lines with indentions in half-em increments up to 15 ems on the right and indentions of any length on the left. The indentions on each side of the line are controlled separately. Indentions on the right of the line are set by lifting knob *B*, Fig. 113, and turning the knob until pointer *C* registers with the desired setting on the justified indention scale. Indentions on the left of the line are obtained as usual by moving in the left vise jaw by means of the vise adjusting knob. Since the left and right indentions are controlled separately, it is possible to locate the type line in any desired position on the face of the slug. For example, suppose that a 20-em line is to be set on a 30-em slug with a 7-em indention on the right and a 3-em indention on the left. In this case, pointer *C* should be set on 7, operating lever *A* should be moved to the left and the left vise jaw should be moved in until the vise indicator rod em scale is set on 27 ems. The assembler slide, as usual, is set for the length of the line, which in this case is 20 ems.

After the length of the line has been determined and the indention settings have been made, matrix lines are assembled in the same manner as on a regular machine. Since the lines are expected to justify to a predetermined length, provision must be made for the expansion of the spacebands. *The assembled lines should be slightly shorter than the measure being set.* Lines which are three picas short of the measure will justify if there is a sufficient number of spacebands for the required expansion. Lines short by more than three picas will quad out automatically if there are at least three spacebands in the line. As a general rule, all lines must contain at least two spacebands of ordinary thickness in order for the machine to cast.

Correct Adjustment of the Assembler Slide Finger is highly important on a machine equipped with the justified quadding attachment. When setting lines with indentions on the right, the distance between the vise jaws is greater than the length of the line being set. Since the right vise jaw does not move until the line of matrices has been positioned between the vise jaws, it is possible to send overset lines in to the casting mechanism without stalling the machine. Consequently, an overset line will cast and since the line is already longer than the desired measure, the indention on the right of the overset line will be less than that on the other slugs. The adjustment of the assembler slide finger should therefore be checked periodically to insure accuracy at all times. The finger should be set slightly short to offset the wearing of the assembler star wheel.

Mechanism of the Justified Quadding Attachment

The basic operating mechanism of the justified quadding attachment consists of the vise jaw rack pawl lever cam *R*, Fig. 114, the vise jaw rack pawl rest *PQ*, the line spread pawl *H* and the line spread and indention pawl gage *G*. Cam *R* is pinned to a shaft on the front end of which is fastened the operating lever *A*,

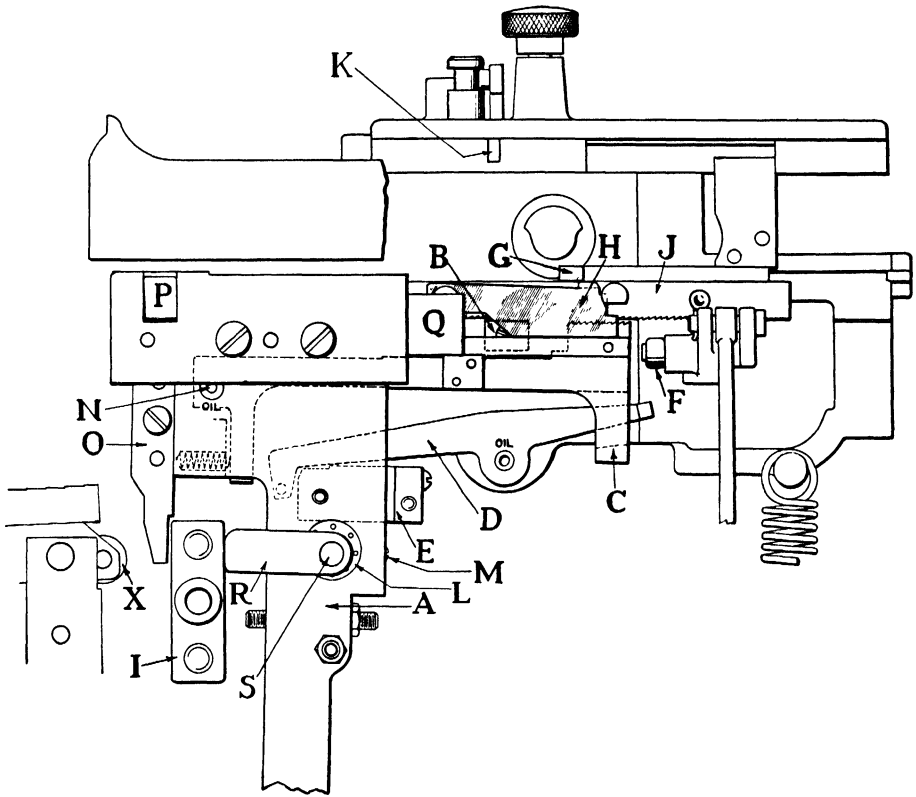


Fig. 114. Rear View of the Justified Quadding Attachment. The first elevator has descended to the vise cap and the right vise jaw rack *J* has moved the line of matrices and spacebands against the left vise jaw. The projection on pawl *H* has been carried under gage *G* by the movement of rack *J*. The vise closing lever has risen preparatory to first justification.

Fig. 113. The cam controls the position of vise jaw rack pawl lever *A*, Fig. 114, and consequently fixes the position of the vise jaw rack pawl *C*. The pawl rest *PQ* is provided to take the place of rest *B* when the justified quadding attachment is being used. The line spread pawl *H* and the indention pawl gage *G* control the engagement of pawl *C* with the right vise jaw rack *J*.

When Using the Regular Autospace Feature without justified quadding, operating lever *A*, Fig. 113, is moved to the right. This withdraws the high point of cam *R*, Fig. 114, away from the mold disk locking stud block *I*. Lever *A*, cam *O* and pawl *C* then move to the left and assume the positions they normally occupy on the regular autospace. Cam *O* moves into line with roll *X* on the vise justification bar and pawl *C* is engaged under rest *B*. The actions of the machine, under these conditions, are exactly as outlined in the description of the ordinary quadding and centering device.

When Using the Justified Quadding Attachment, the operating lever is moved to the left. This causes the high point of cam *R* to bear against block *I*, as shown in Fig. 114. Lever *A* is thereby moved to the right until cam *O* is out of

line with roll *X* on the vise justification bar. Consequently, the justification block will be permitted to make a full upstroke during first and second justification, because roll *X* will not contact cam *O*. This explains how the lines are justified when using the justified quadding attachment. The movement of lever *A* to the right, of course, disengages pawl *C* from rest *B*. The pawl rest *PQ* takes the place of rest *B* when the justified quadding attachment is in use. The rest *Q* engages an auxiliary lug on pawl *C* and holds the pawl down until it is to be released. *The main operating lever or control knob is always placed on flush left position when setting justified composition with indentions.* As explained in the description of the quadding and centering device, flush left is the normal position of the control knob for composition which is to be justified.

As explained previously, knob *B*, Fig. 113, controls the movement of pointer *C* along the justified indention scale and the normal scale. As the knob is turned to shift the pointer from one measure to another, indention gage *G*, Fig. 114, is also moved a corresponding distance to the right or to the left. When the knob is dropped, both the pointer and the indention gage are locked in position. The indention gage *G* is a banking point for pawl *H*, which controls the engagement of pawl *C* with rack *J*.

In Fig. 114, the parts of the justified quadding attachment are shown just after the first elevator has descended to the vise cap. The vise jaw release latch has been tripped, permitting the vise jaw lever to pull rack *J* to the right. The right vise jaw and the line of matrices and spacebands have been moved against

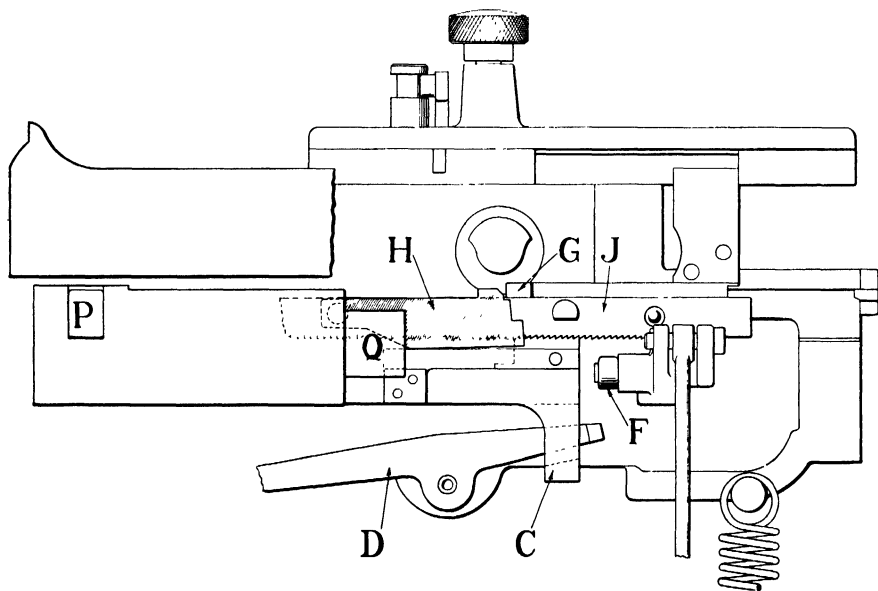


Fig. 115. View of the Justified Quadding Attachment just after first justification. The spreading of the line between the vise jaws has carried rack *J* and pawl *H* to the left. The projection on pawl *H* has cleared gage *G*, permitting the teeth in pawl *C* to engage the teeth in rack *J*. This locks the right vise jaw in the position corresponding to the indention setting on the Justified Indention Scale.

the left vise jaw. Since the assembled line has been set to within 3 ems of the full measure, rack *J* has moved just far enough to the right to carry the projection on pawl *H* under gage *G*. *This basic relationship between pawl H and indentation gage G is positive, no matter what indentation is being set on the right of the line.* If the assembled lines are of the proper length, the projection on pawl *H* will always be carried under gage *G* by the vise jaw rack *J*.

When the mold disk advances, it contacts block *P*, which releases rest *Q* from engagement with the lug on pawl *C*. The teeth in pawl *C*, however, do not engage the teeth of rack *J* at this time. The line spread pawl *H*, banking at its upper end under gage *G*, holds pawl *C* down out of engagement with rack *J*. As the spacebands are driven up during first justification, however, the right vise jaw and rack *J* are moved to the left by the spreading of the line. The projection on pawl *H* then moves up in front of gage *G*, as shown in Fig. 115, permitting pawl *C* to engage the teeth on rack *J*. As soon as the pawl engages the rack, the movement of the right vise jaw toward the left is halted and the jaw is locked in the position required for the desired indentation on the right of the line. *No matter what indentation is being set on the right, this basic sequence of actions is always the same.* The line is spread out towards the left, pawl *H* is moved past gage *G* and pawl *C* engages the teeth of rack *J*, locking the right vise jaw in the position required for the desired indentation. The parts of the justified quadding attachment are shown in these positions in Fig. 115.

If a line is more than $3\frac{1}{2}$ ems short of the length indicated on the assembler slide scale, the projection on pawl *H* is carried past indentation gage *G* when rack *J* makes its operating stroke. When the mold disk advances and contacts block *P*, therefore, pawl *C* rises immediately and engages the teeth of rack *J*. This locks the right vise jaw in position and quads out the matrix line, which is held tightly between the vise jaws during first and second justification. If there are at least two spacebands of ordinary thickness in the line, the machine will cast. It should be noted that in the case of a justified line the projection on pawl *H* rises to the left of gage *G*, as shown in Fig. 115. In the case of a quadded line, the projection rises to the right of gage *G*. If there is an insufficient number of spacebands in the line for the amount of expansion required, pawl *H* will not pass gage *G* at the left and the result will be a loose line which will not cast.

Between first and second justification, the matrix line is loosened for vertical alignment. As the vise closing link descends, the left vise jaw is permitted to open slightly. The link continues its downward movement until roll *F*, Fig. 115, carries latch *D* down on pawl *C*. Pawl *C* is then depressed slightly to permit approximately .020" freedom between the teeth of the pawl and rack *J*. After the matrices have been aligned vertically and facewise the vise closing link rises, closing the left vise jaw. The teeth of pawl *C* engage the teeth of rack *J* tightly and second justification takes place. The matrix line is spread out fully between the vise jaws, then the pot locks against the back of the mold and the slug is cast. The line is held tightly between the vise jaws during the withdrawal of the slug by the wedging action of the spacebands and the inward pressure of the vise closing screw. After the slug has been ejected from the mold, the vise closing link descends sufficiently to latch pawl *C* under rest *Q*. The rack *J* and the right vise jaw are returned to normal position by the vise jaw lever.

Adjustment of Shifting Cam Bushing. The shifting cam bushing *L*, Fig. 114, is the only part of the first style justified quadding attachment which requires adjustment. *The setting of the bushing, however, is highly important* because it determines within very positive limits the accuracy of the right-hand indentation. The hole in the bushing through which shaft *S* passes is eccentric. Turning the bushing will move lever *A* slightly to the right or to the left when the high point of cam *R* is banking against block *I*, as illustrated. Since pawl *C* is pivoted on a hinge pin *N* in lever *A*, the pawl will also move a corresponding distance to the right or to the left. The relationship of pawl *C* to rack *J* and consequently the accuracy of the indentions made by the right vise jaw are thus controlled by the bushing *L*.

If there is an error in the right-hand indentation, it can be eliminated very easily by adjusting the bushing. Before adjusting the bushing, however, the setting of the right vise jaw stop screw should be checked. This screw determines the position of the character at the extreme right of the slug with respect to the right end of the slug body. When fully justified lines are being cast with lever *A*, Fig. 113, to the right, the screw should be adjusted so that the extreme right character will be flush with the slug body. This setting is basic and should always be checked before attempting to adjust the bushing.

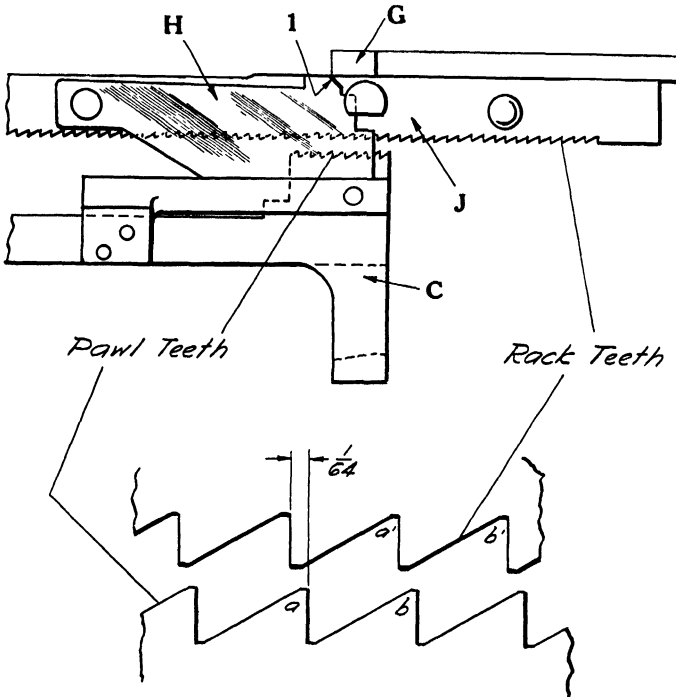


Fig. 116. Detail view, showing the position of the justified quadding parts when the line spread and indentation rack gear lock is doweled in position.

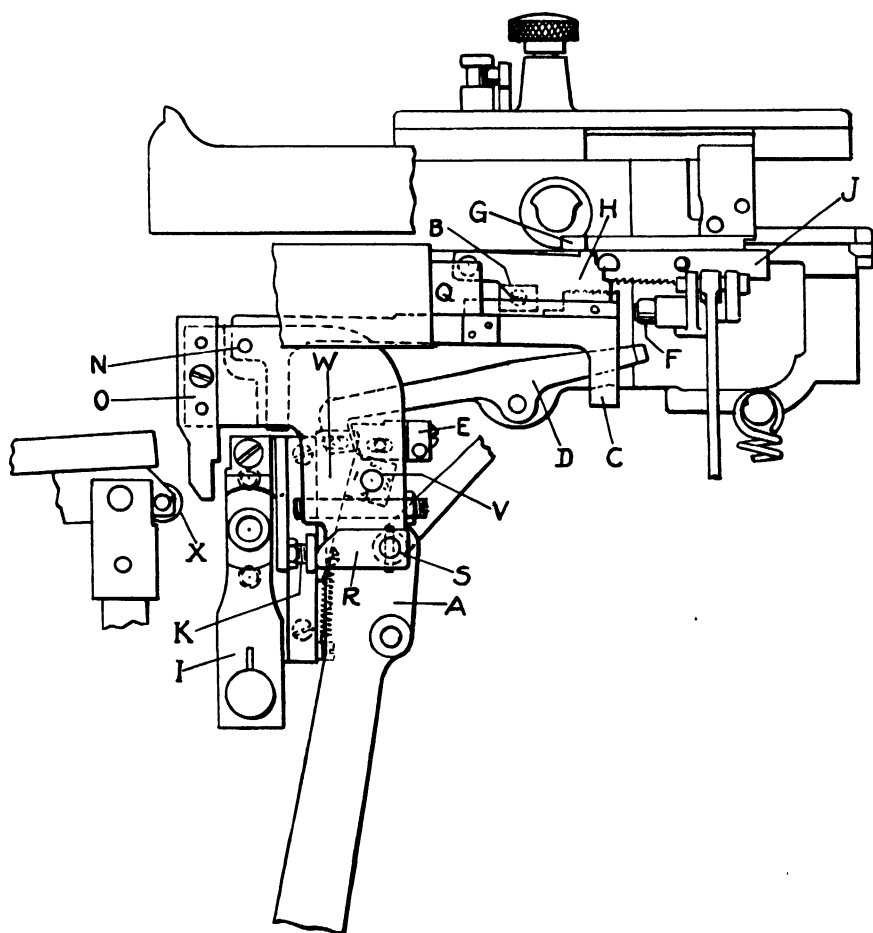


Fig. 117. The Justified Quadding Attachment with the Improved Wedge Locking Device. Wedge *W* and block *V*, as described in connection with the quadding and centering device, hold the matrix line more firmly between the vise jaws during the breakaway and prevent slurring of type characters on the slug.

After the stop screw setting has been verified, move the operating lever *A*, Fig. 113, to the right and turn knob *B* until pointer *C* registers with zero on normal scale *E*. Place a strip of thin paper measuring approximately .002" between the right vise jaw and its stop screw and make sure that the jaw is pushed all the way over to the right against the paper. Trip block *P*, Fig. 114, so that pawl *C* will rise and engage the teeth of rack *J*. Loosen set screw *M* and turn bushing *L* until the paper binds slightly as it is pulled up from between the jaw and the stop screw, then tighten screw *M*. After this basic relationship has been established, a slightly finer adjustment may have to be made. Cast two slugs with an indention of 1 em on the right and 1 em on the left. Place the slugs back to back to see

whether the extreme characters on each end of the slugs coincide in position. The shifting cam bushing adjustment will be correct when the characters coincide exactly.

An improved wedge lock, described previously on page 177 in connection with the quadding and centering device, has been developed to hold the matrix line more firmly between the vise jaws while the slug is being withdrawn from the matrices. The wedge lock device is applied also to the justified quadding attachment. The device requires a number of changes in the justified quadding parts, the most important of which is the replacement of the shifting cam bushing *L*, Fig. 114, with a slightly different means of adjustment.

The justified quadding attachment with the improved wedge lock is shown in Fig. 117. Instead of the shifting cam bushing formerly used, an adjusting screw *K* is provided to set the right-hand indention accurately. The procedure for making the adjustment is exactly as outlined in the description of the shifting cam bushing. The effect of adjusting the screw is the same as was obtained by turning the bushing.

Line Spread and the Indention Rack Gear Lock. The indention gage *G*, Fig. 114, and the line spread pawl *H*, as outlined before, control the engagement of the vise jaw rack pawl *C* with the vise jaw rack *J*. The relationship of the pawl to the rack is highly important. If the teeth of the pawl do not engage the proper teeth of the rack, there will be an error of one-half em in the right-hand indention. The meshing of the pawl teeth with the rack teeth can be delayed or advanced slightly by shifting gage *G* to the right or to the left with respect to the projection on pawl *H*. The position of gage *G* is controlled by the line spread and indention rack gear lock *K*, Fig. 114, which locks the gage and pointer *C*, Fig. 113, in position when knob *B* is dropped. The rack gear lock is set at the factory and is doweled in position.

In setting the rack gear lock, operating lever *A*, Fig. 113, is moved to the left and pointer *C* is moved to the justified indention scale. The pointer can be set on any desired measure while making this adjustment. Next, the vise jaw release latch is tripped and rack *J*, Fig. 114, is pulled to the right until the projection on pawl *H* is carried under gage *G*. Then block *P* is pushed in to raise rest *Q* off the auxiliary lug on pawl *C*. When the parts are moved in this way by hand, they are placed in the positions that they would assume just before first justification. The vise jaw rack *J* is then moved slowly to the left until the projection on pawl *H* is just about to drop off gage *G*, as shown in Fig. 116. This precise relationship is indicated by the arrow *I*. When the parts are in this position, the rack teeth which are *not* to engage with the pawl teeth should be $1/64''$ in advance of the pawl teeth as shown in the detail drawing. Thus, when pawl *H* drops off gage *G* and permits pawl *C* to rise toward the rack *J*, tooth *a* will engage tooth *a'*, tooth *b* will engage tooth *b'*, etc. To obtain this $1/64''$ relationship, gage *G* is moved slightly to the right or to the left in relation to pawl *H*. The gage is moved by shifting the rack gear lock *K*, Fig. 114, toward the front or the back of the machine. Moving gage *G*, Fig. 116, to the right will advance the engagement of pawl *C* with rack *J*. After the $1/64''$ relationship of the pawl teeth to the rack teeth has been obtained and pawl *H* is just ready to drop off gage *G*, the rack gear lock is

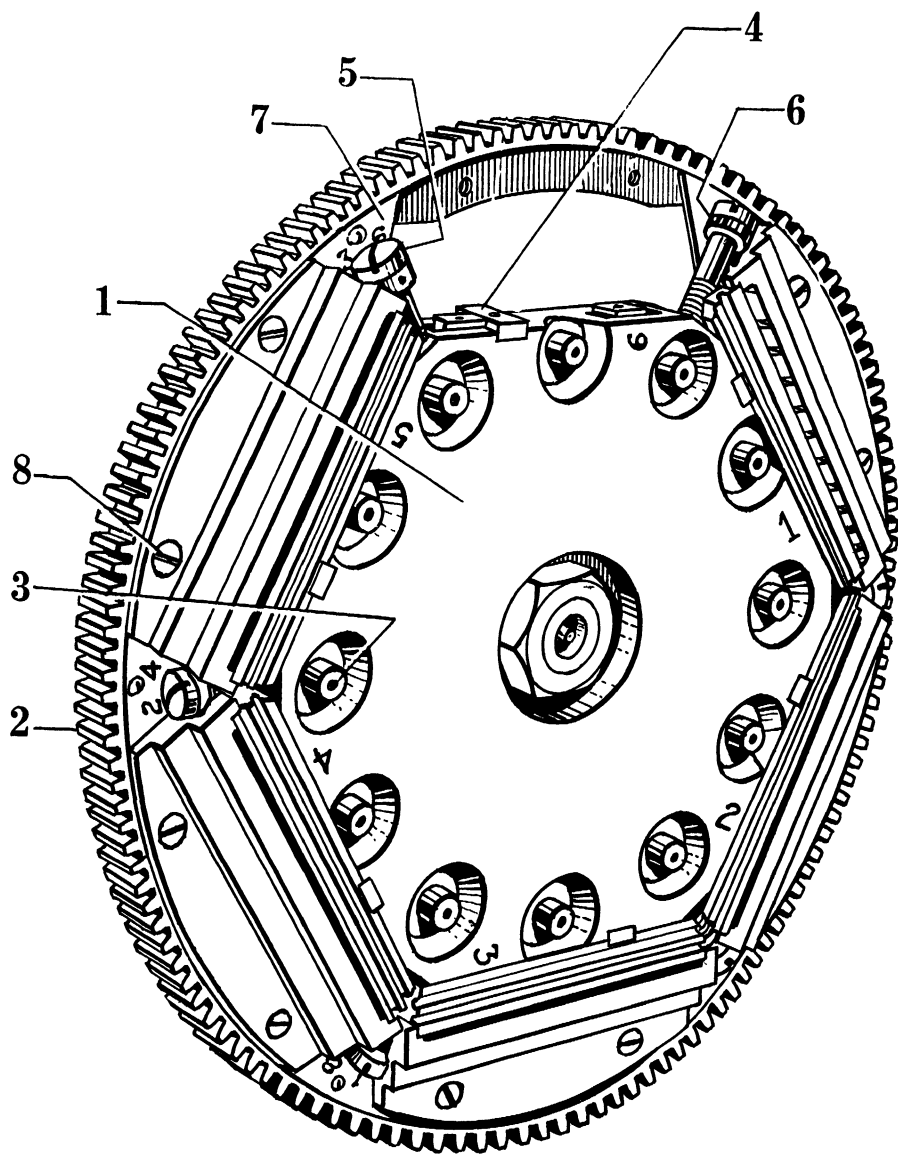


Fig. 118. Perspective View of the Six-Mold Disk. One of the molds has been removed to show the means provided for locating and fastening the molds in position.

doweled in position. One setting of the lock is all that is required. When the lock is positive for an indentation of one length on the right, it is positive for indentions of all other lengths.

The Six-Mold Disk and Automatic Ejector Blade Selecting Mechanism

The Intertype Six-Mold Disk combines the strength and reliability of the four-mold disk with the added advantages of increased mold capacity and centralized control of the mold and ejector selecting mechanism. The new disk is of the *same size* as the four-mold disk and it can accommodate *six full-length 30-em* molds or any in between assortment desired. The parts of the disk are manufactured under rigid standards of precision which insure accuracy in construction and dependability in performance.

From the operator's viewpoint, the outstanding advantages of the six-mold disk are (1) increased mold capacity, (2) centralized control of the mold and ejector selecting mechanism, (3) automatic ejector blade selecting mechanism and (4) safety devices designed to prevent damage to the molds and disk. From the machinist's viewpoint, the main advantages are (1) precise alignment of parts, (2) simplicity of design, (3) complete accessibility of operating mechanisms and (4) fewer mold and liner changes.

Construction of the Mold Disk

The basic construction of the six-mold disk provides strength and rigidity at the points of greatest stress. The disk consists of a hexagon-shaped mold disk 1, Fig. 118, upon which the molds are mounted, and a mold disk gear 2, which is fastened to the mold caps. The mold disk is mounted in the regular way on the mold disk stud. A left-hand nut on each end of the stud holds the disk securely to its bearing in the mold disk slide arm. There are twelve mold disk locking studs 3 on the disk, one pair for the casting and one pair for the ejecting position of each mold. These studs are of new design, insuring a positive location of the molds at casting and ejecting position.

The molds are mounted on the six flats of the mold disk. The flats of the disk are carefully ground and finished, providing straight and accurate surfaces for the seating of the mold bodies. The accuracy of the disk and its parts is due to the separation of the mold disk gear from the mold disk core, which makes it possible to adhere to manufacturing limits heretofore unobtainable. Every mold body is held rigidly and accurately in position by three keys in each flat of the disk, one mold locating key 4 and two mold aligning keys. These keys engage keyways in the base of each mold body and fix the position of the molds on the disk with precision. The mold locating key aligns the mold endwise on the flat, and the two mold aligning keys align the mold in relation to the front and back of the disk. In this respect, the mold bodies are self-aligning because they can assume only the one definite position provided for by the keys.

The mold cap, Fig. 121, is aligned accurately with the mold body by a lug on each end of the body. These lugs serve as projecting keys which fit slots in each end of the mold cap. The cap is held down firmly on the mold body by a mold

screw 5, Fig. 118, on each side of the cap. These screws are threaded into the mold disk and each screw serves to hold the ends of two adjoining molds in position. Washers 6 under each screw bear on seats formed on the ends of the mold caps. When the mold screws are turned down firmly on the mold cap, a rigid and precisely aligned mold assembly is formed on the mold disk.

Six triangular mold disk cover plates 7 are fastened to the mold disk gear between the molds. These plates indicate the thickness and length of slug for which each mold is made. When the machine is in normal position, the plate corresponding with the mold in operating position is uppermost and indicates which mold is "up." Two holes are provided in each mold cap for the mold cap screws 8, which fasten the mold disk gear in position. These holes are accurately drilled and bored to insure a correct alignment of the mold disk gear with other parts of the assembly.

The Mold and Liner Insert

The molds are made of special mold steel, which is carefully heat-treated and hardened to insure durability and accuracy in continuous use. The parts of the mold are ground within very close limits, resulting in a high degree of accu-

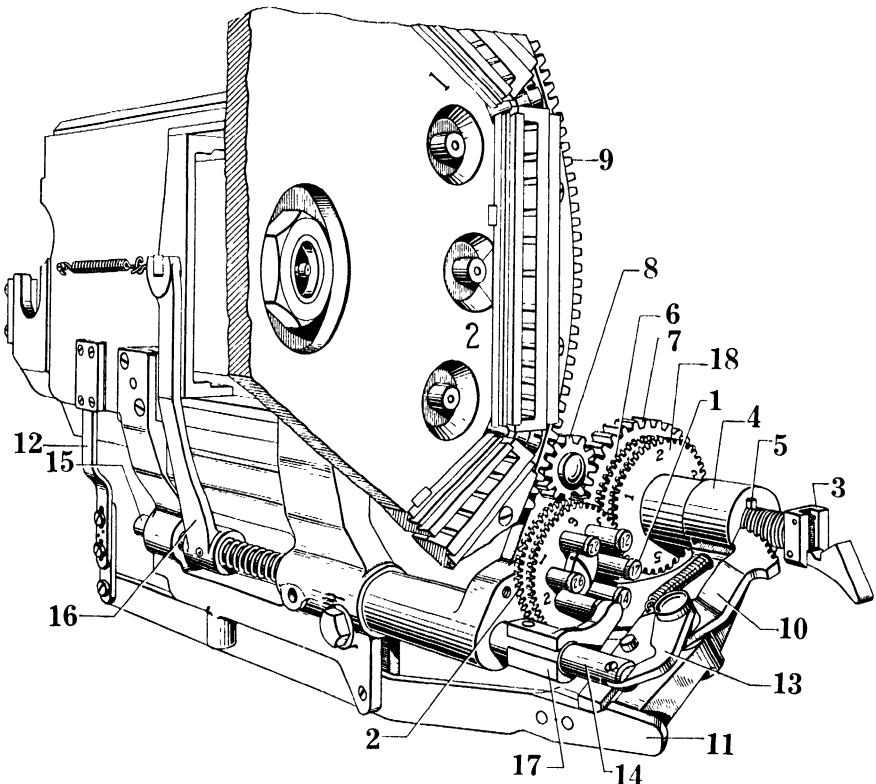


Fig. 119. View of the Automatic Ejector Shifting and Selecting Mechanism and related parts in assembly.

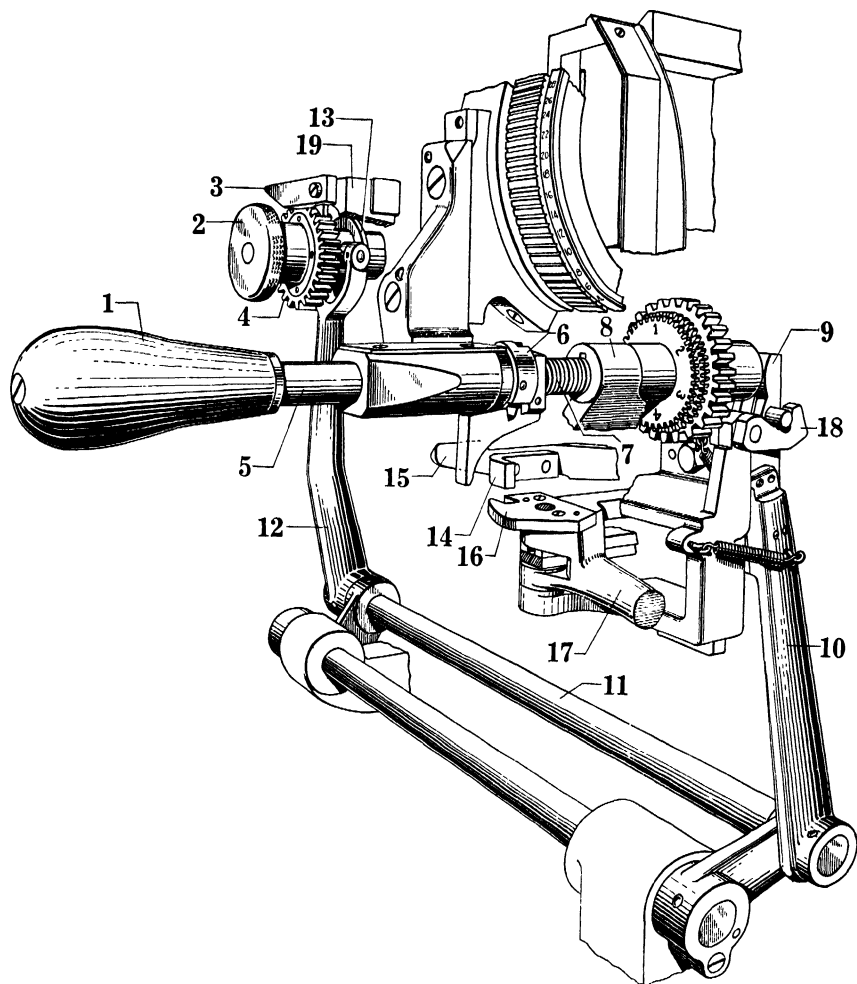


Fig. 120. Perspective View of the Mold Disk Pinion Operating Mechanism and the Mold Turning Mechanism.

racy in the alignment and dimensions of the parts. The finished molds are put through a special process which produces a beautiful ebony finish on the steel. This finish penetrates the metal and protects it from moisture, preventing the formation of rust and minimizing the accumulation of type metal on the mold.

The molds applied to the six-mold disk are of an entirely new type. They are short and compact and therefore less subject to distortion. Triangular shelf molds are made for slugs from 18 to 48 points in body thickness. The length and thickness of solid slugs from 5 to 14 points and recessed slugs from 10 to 14 points can be varied by means of special liner inserts *U-4077*, *U-4079*. Triangular shelf mold caps in sizes 18 to 48 points are made to suit the measures desired and re-

quire no liners. Different triangular shelf molds or mold caps can be applied to the disk whenever necessary to secure slugs of different lengths and thicknesses.

Liner inserts, as stated previously, are used to vary the length and thickness of slugs. Liner inserts *U-4077* are made for solid slugs from 5 to 14 points and for any length from 4 to 30 cms. Liner inserts *U-4079* are made for recessed slugs from 10 to 14 points. The inserts are aligned positively with the mold body and cap by aligning lugs, as shown in Fig. 121. The mold cap is machined accurately for the insert and holds it rigidly in position. To place an insert in the mold or to remove one, it is necessary only to loosen the two mold cap screws *8* and the two mold screws *5*, Fig. 118. The trim ribs in all mold caps are similar in design to those used in the advertising figure caps. The lip *X*, Fig. 121, on the liner inserts and mold caps is of maximum width. These two features make it possible to cast advertising figure work on any of the six-pocket molds. There is no limit to the variety of work obtainable by means of the molds on the six-pocket disk.

Mold Changes

Changing from one mold on the disk to another is controlled by a single handle *1*, Fig. 120, placed within easy reach of the operator. When the handle is pushed in, the mold disk pinion is disengaged from the mold disk gear and the ejector blade magazine is shifted to position in preparation for the selection of the ejector blade. When the handle is turned to bring the desired mold to operating position, the proper ejector blade selecting stop is also moved into position. When the handle is pulled out, the mold disk pinion meshes again with the mold

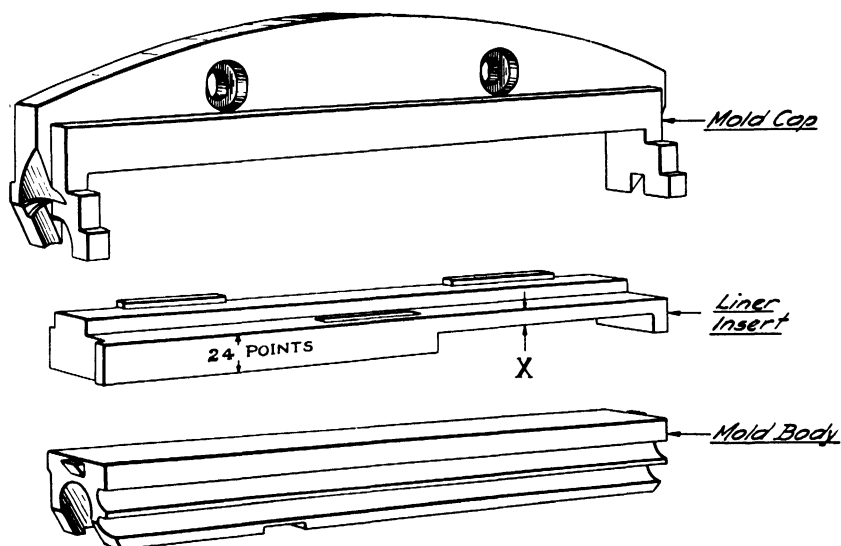


Fig. 121. Liner Insert Mold for Six-Mold Disk. Inserts are made for casting solid slugs from 5 to 14 points and recessed slugs from 10 to 14 points in any length up to 30 cms. The liner inserts are interchangeable and are removed simply by loosening the mold screws sufficiently to raise the mold cap about $1/16''$. The lip *X* on the insert is sufficiently thick for casting overhanging characters up to 24 points in height.

disk gear and the ejector blade magazine moves until the proper ejector blade for the selected mold comes to position. The operation of the mold disk pinion and the selection of the ejector blade are wholly automatic. All the operator has to do is to place the desired mold in operating position. The starting and stopping lever must be pushed in before the mold change can be made. The machine cannot be started until the mold change is fully completed.

Whenever a change is made in the length of slug cast from a particular mold, a corresponding change must be made in the ejector blade selecting stop for that mold. The stops 1, Fig. 119, are held by friction on short posts on the ejector blade selecting gear 2. They can be pulled off the posts and replaced easily whenever necessary. The size of the ejector blade which each stop will bring into operating position is stamped on the head of the stop. After the necessary change has been made, of course, the operation of the ejector blade selecting mechanism is completely automatic.

The mold disk can be turned in the conventional way by means of a knob 2, Fig. 120, fastened to the mold disk pinion. When the disk is turned by means of this knob, however, the ejector blade selecting gear is not operated. Consequently, the ejector blade originally in use is still left in operating position, and the size of this blade might not correspond with the mold placed in position. A safety latch 3 is therefore attached to the mold disk guide to remind the operator to check the ejector blade setting with that of the mold whenever he turns the disk by means of the mold disk pinion knob. The latch rests normally in front of the mold disk pinion and must be raised before the pinion can be disengaged from the driving shaft.

Mechanism of the Six-Mold Disk

The mechanism of the six-mold disk is so arranged that four separate operations are controlled centrally by one main operating handle. The mold disk pinion is disengaged from the mold disk gear, the ejector blade magazine is shifted preparatory to the selection of the ejector blade, the desired mold is placed in operating position and the proper ejector blade is selected. All of these operations are performed automatically as the desired mold is placed in operating position.

Fig. 120 shows the mold disk pinion operating mechanism and the mold

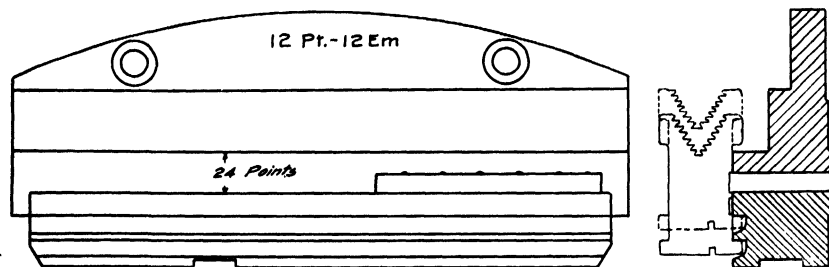


Fig. 122. Mold for Solid Slugs. Molds of this type are made to suit the measures desired and require no liners. These molds are designed for casting solid slugs from 5 to 14 points in any length up to 30 ems. Only one point size and length can be cast with a mold cap.

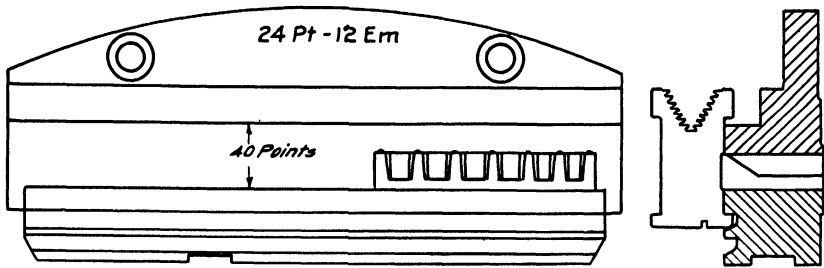


Fig. 123. Headletter Recessed Mold. Molds of this type are made to suit the measures desired and require no liners. These molds are designed for casting recessed slugs in 16, 18, 24, 30 or 36 point sizes. Molds similar to that shown but with a high alignment mold body are made for casting 42 or 48 point slugs. Any length up to 30 ems can be provided. Only one point size and length can be cast with a mold cap.

turning mechanism. The mold disk pinion 4 is disengaged from the mold disk gear when the main operating handle 1 is pushed in. On the end of shaft 5 is a coupling 6 which bears against the mold selecting pinion shaft 7 in bracket 8. When the mold selecting pinion shaft is moved in by the operating handle, the end of the shaft bears against a shoe 9 on lever 10, moving the lever towards the back of the machine. This movement is transferred through shaft 11 to lever 12, the upper end of which engages the mold disk pinion sleeve 13. The pinion is thereby moved back and out of engagement with the mold disk gear.

The mold turning mechanism is engaged by the same inward movement of the main operating handle. The mold selecting pinion shaft 3, Fig. 119, is keyed in its supporting bracket 4. The key 5 in the shaft aligns with keyways in gears 6 and 7. When the shaft is moved in by the main operating handle, the key in the shaft enters the keyways in the gears, engaging the gears with the shaft. The gear 7 meshes with idler gear 8, which in turn meshes with the mold disk gear 9. When the main operating handle is turned, therefore, the mold disk is turned by the series of gears outlined above. One complete turn of the main operating handle will bring an adjacent mold into position.

Fig. 119 shows the ejector shifting and selecting mechanism. The ejector blade magazine is shifted to position in preparation for the selection of the ejector blade by the same inward movement of shaft 3. There is a small toothed segment at the upper end of lever 10 which meshes with a circular rack on the mold selecting pinion shaft 3. When the shaft is moved in, the segment follows the rack and moves lever 10 through a small arc. The lower end of the lever depresses locating lever 11, causing plunger 12 to enter the ejector holder lock. At the same time, the pin in the lower end of lever 10 bears against lever 13, causing link 14 and rod 15 to move forward. This movement shifts fork 16, which moves the ejector blade magazine until the smallest blade is in position. This action is only preparatory to the selection of the proper ejector blade.

The selection of the ejector blade is controlled by the length of the ejector blade selecting stop 1 which is brought to position. The stops are mounted on gear 2, which is timed in relation to the mold disk. As the desired mold is turned to operating position, gear 6 turns gear 2, which positions the correct ejector

blade selecting stop in front of the ejector shifter rod stop 17. When the main operating handle is pulled out at the end of the mold change, stop 17 banks against the ejector blade selecting stop 1, which halts the movement of the ejector blade magazine when the proper ejector blade comes to position.

Six numbers are stamped on gear 18, which correspond with the numbers of the ejector blade selecting stops and the mold numbers. The numbers on the gear register with a small window in the gear guard. As a mold is placed in operating position, the number of the ejector blade selecting stop which is brought into position is indicated by the corresponding number on the indicator gear through the window in the gear guard. This makes it unnecessary to remove the guard in order to check the number of the ejector blade selecting stop with the number of the mold.

Two safety devices are applied to the six-mold disk. The first of these devices, as previously described, prevents the operation of the machine while a mold change is in progress. The device consists simply of a safety hook 14 on lever 15, Fig. 120, which aligns with a slot in block 16 only when lever 17 is pushed in. The hook enters the slot in the block as a mold change is begun and remains in the slot until the change is completed.

The second safety device prevents the mold disk pinion 4 from being disengaged inadvertently from the mold disk gear. The device consists of a hook 18, which engages a pin on shoe 9. The hook is disengaged from the pin in the course of a mold change, but it engages the pin as soon as the change is completed. This prevents the mold disk pinion from being moved back out of engagement with the mold disk gear.

Removal of Mold Disk

In order to remove the mold disk from the mold disk slide at casting position, it is necessary to remove the ejector blade selecting gear 2, Fig. 119, and the mold disk guide 19, Fig. 120. In replacing the parts, the following procedure should be used:

Place the mold disk on the mold disk slide with any mold approximately in

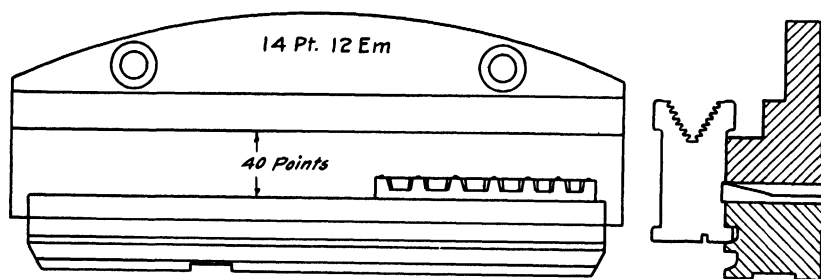


Fig. 124. Headletter Advertising Figure Mold. Molds of this type are made to suit the measures desired and require no liners. The mold shown in the illustration is designed for use with type faces punched in the headletter or auxiliary position only, casting 5 to 14 point solid slugs in any length up to 30 ems. Only one point size and length can be cast with the mold cap. The mold illustrated is suitable for casting overhanging characters up to 40 points in height punched in headletter position. Mold assemblies similar to this type are made for casting other ranges of advertising figure work.

normal and ejecting position. Do not fasten the nut on the mold disk stud at first because the mold must be positioned accurately in relation to the ejector blade. Push shaft 3, Fig. 119, in all the way until the lug on the shaft banks against bracket 4. While holding the shaft in, push the mold disk back into engagement with gear 8. Make sure that the mold in ejecting position is in proper relationship to the ejector blade by holding a light in front of the mold and looking through the mold at the blade. *The mold body must be perfectly straight in relation to the ejector blade.* When the mold is in this position, place the nut on the back of the mold disk stud and tighten it. Next, turn gear 18 by hand until the number 1 is directly in line with the keyway in bracket 4. While holding shaft 3 in, place gear 2 in position with ejector blade selecting stop number 1 directly in front of stop 17. In meshing gear 2 with gear 18, make sure that the timing marks on both gears are matched. Replace the guide 19, Fig. 120. Next, turn mold number 1 to the horizontal casting position by revolving the mold disk directly: do *not* turn the disk by means of the mold selecting pinion shaft. Push the mold disk gear back into engagement with the mold disk pinion, and time the gear with the pinion by matching the timing mark in position on the gear with the timing mark on the pinion. When the parts are replaced in this manner, they will be properly timed.

Ejector Blade Selecting Stops

In the description of the six-mold disk mechanism, it was pointed out previously that the selection of the ejector blade is controlled by the length of the ejector blade selecting stop which is brought to position. The relationship between the ejector blades and the selecting stops is shown in diagrammatic form, Fig. 125. The standard series or combination of ejector blades is represented in the illustration. Beginning with the longest blade (30 ems) at the left, the blades decrease successively in length toward the right. For convenience of reference, the twelve blade positions of the ejector blade magazine have been designated by letters from *A* to *L* inclusive. In the diagram, therefore, a 30-em blade is in position *A*, a 22-em blade in position *E*, a 6-em blade in position *L*, etc.

The selection of the ejector blade, as stated above, is controlled by the length of the ejector blade selecting stop which is brought to position. Since the ejector blade magazine contains twelve blades, twelve selecting stops of different lengths are provided for their selection—one stop for each blade position of the magazine. In Fig. 125, therefore, the blade in position *A* is selected by stop *A*, which is .468" long; the blade in position *B* is selected by stop *B*, which is .543" long, etc. If the blade in position *L* is to be used, stop *L* (1.293") would be required to bring the blade into operating position.

The examples just cited indicate, therefore, that the ejector blade selecting stops control the twelve blade positions of the ejector blade magazine. If a 20-em blade is in position *F*, as in the standard layout, selecting stop *F* (.843") will bring that blade into position. If a special layout has been specified, however, with a 21-em blade in position *F*, the same selecting stop *F* (.843") will bring the 21-em blade into position. To cite another example, a 17-em blade is inserted in position *G* in the standard ejector blade magazine layout. To select this blade,

stop G (.918") is required. If a 16-em blade is inserted in position G in a special layout, however, the same selecting stop G (.918") will bring the 16-em blade into position. *The ejector blade selecting stops, therefore, select the ejector blades according to the positions they occupy in the ejector blade magazine. This rule holds true for all ejector blade layouts, no matter what combination of blades is provided in the ejector blade magazine.* The ejector blade selecting stops are of standard lengths because, as previously stated, they select only the twelve positions of the ejector blade magazine. Each position of the magazine, of course, is constant, thereby making it possible to standardize the lengths of selecting stops.

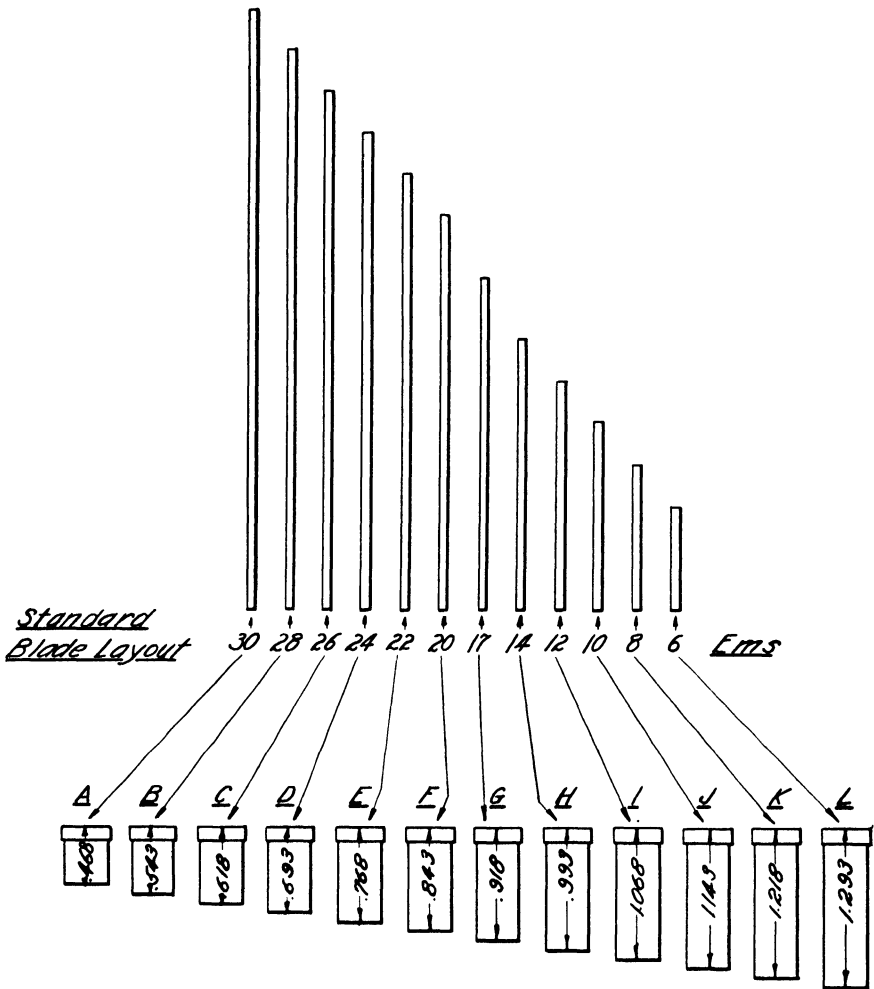


Fig. 125. Six-Mold Disk Ejector Blade and Selecting Stop Layout. The illustration shows in diagrammatic form the relationship between the ejector blade positions and the corresponding ejector blade selecting stops. Complete information for ordering selecting stops is contained in the text.

Since the ejector blade selecting stops select the blades by *positions*, it is possible in instances where slug lengths are duplicated to provide two ejector blades of the same length for alternate use in order to minimize the wearing of any one blade. Suppose, for example, that a six-mold disk installation specifies the following six slug lengths: 30 ems, 30 ems, 24½ ems, 24½ ems, 12 ems and 12 ems. In this instance, it would be possible to supply duplicate blades as follows:

<i>Ejector Blade</i>	<i>Position</i>	<i>Ejector Blade</i>	<i>Position</i>
30 ems.	A	24½ ems.	E
30 ems.	B	12 ems.	I
24½ ems.	D	12 ems.	J

If the 30-em blade in position *A* was originally in use, therefore, the 30-em blade in position *B* will be utilized when the second 30-em mold is used. The same selection of duplicate blades will occur, of course, in the case of the 24½ and 12-em molds. Through this arrangement, each mold has its own individual ejector blade and the wearing of each blade is minimized by the fact that six blades are being used instead of three.

Ordering Ejector Blade Selecting Stops. When ordering ejector blade selecting stops, the following information should accompany the order:

(1) *Ejector Blade Position and Length.* The twelve ejector blade positions, as shown in Fig. 125, are designated by letters from *A* to *L* inclusive. If a selecting stop is required for the 24-em blade (standard layout), the ejector blade *position* would be regarded as position *D*. The letters designating the blade positions are constant, no matter what series of blades is contained in the magazine. If a special blade layout has been provided, therefore, the letter positions shown in Fig. 125 still hold true.

The em length of the ejector blade for which the selecting stop is being ordered should be specified. This information is necessary in order that the em length can be stamped on the selecting stop for the convenience of the customer. This is advantageous to the user, of course, because it indicates immediately which blade the stop will select.

(2) *Ejector Blade Selecting Stop.* The ejector blade selecting stop should be designated by position letter, as indicated in Fig. 125.

When ordering a mold or a liner insert for a length of slug not previously cast, it is necessary, of course, to order an ejector blade selecting stop to select the required ejector blade.

If an ejector blade requires replacement, it is necessary only to specify the em length of the blade, as heretofore.

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