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# ATHLETICS



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*by*

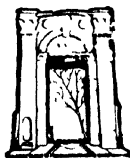
JOHN HANSEN

*Translated by*

NORAH HOLTZE

WITH 100 ILLUSTRATIONS

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## FOREWORD

WITH the present great and growing interest in physical education, it is natural that Athletics should take a prominent place amongst the many effective activities of to-day, more attention being accorded to it than has been the case since the time of ancient Greece.

Athletics as a means of uniform physical development forms a valuable asset to the physical educational programme, theory holding that—to a certain extent—the vital organs are hereby stimulated to normal growth and efficient action, thus affording conditions favourable for the delicate development of the central nervous system and consequent mental power.

It has been said that the high standard of art attained by the Greeks was probably inspired by the beautifully developed athletes of that period, and that their great culture was likewise influenced by the intensive training to which their athletes were subjected.

The performance of modern athletes is undoubtedly far superior to that of the Greeks : if records could be compared, the former would be found to run faster, jump higher and throw farther than could their ancient brethren, due to the improved technique and coaching of to-day, the result of careful scientific research of experts.

For athletics to be beneficial it is essential that both the instructor and performer should possess a sound knowledge not only of the practical aspect but also of the object and general effect of the events executed.

While to the spectator the breaking of standing records appears to be the immediate object of athletics, in reality its fundamental purpose is much more comprehensive. It aims at the development of such qualities as organic vigour, skill, speed, accuracy, alertness, a feeling of well-being, discipline and character. Its effect, under proper guidance, is indeed psychological as well as physiological.

The author of this book is an authority on this subject, both as a performer and instructor. A member of the staff of the State's Gymnastic Institute, Copenhagen, and of the English College of Physical Education, Fredensborg, he is also in charge of the coaching of some of the leading athletic clubs in Copenhagen. Mr. John Hansen's vivid and enthusiastic method of presenting the subject based on his intimate knowledge of all its branches, should render this book as valuable to English readers as to the Danish students for whom it was originally intended.

SVEND HOLTZE

## AUTHOR'S PREFACE

ALTHOUGH this book was produced chiefly for the use of students of the State's Gymnastic Institute, Copenhagen, and the English College of Physical Education, Fredensborg, it is my hope that it may prove a profitable source of information for teachers in schools and colleges, also for athletes who are interested in athletic technique and rational methods of training.

The illustrations should be regarded as an explanatory support of the text and not as a faultless representation of the performance of the exercises.

My thanks are due to Professor Emmanuel Hansen, Professor of Gymnastic Theory at the University of Copenhagen, to whom I am greatly indebted for much helpful information and discussion on technical details dealt with in this book.

JOHN HANSEN



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## INTRODUCTION

EVERY athletic exercise is composed of a number of elementary movements. It is the task of the teacher (and of the pupil) to find the form and the tempo with which these elementary movements in each separate case shall be composed and performed, in order to produce just the degree of motion that gives the best athletic result for the athlete in question.

The correct performance of the elementary exercises and their appropriate combination is called the *technique of the exercise*.

For this certain general rules apply to each exercise ; but at the same time it is individually determined by the natural propensity of each athlete.

If the instruction of the teacher is to be effective, not only must he be intimate with the fundamental rules that apply to the technique of the exercise, but he must also be able to estimate the ability of the pupil and, in accordance with the latter, give instruction in the special technical methods which in this case will be most suitable.

During the training in technique the pupil practises the performance of the assembled combinations of movement in the most appropriate way. He must learn to perform the movements in the correct course with the correct tempo and in the correct order.

Most of the athletic exercises require considerable co-ordination. The changing movements and fixations must be so adapted to each other that the body is always prepared for the next movement. To procure these changing innervations is one of the most important technical tasks.

Furthermore, calm and slow movements very often alternate with short and sudden ones, a circumstance that requires co-ordination to a marked degree.

The general claim, that athletics should induce *uniform* physical development, is not the least important factor where children's athletics is concerned. Athletic instruction in schools must be given unconditionally in such a way that it may give the children the opportunity of uniform training in the special form of exercises suitable for the different ages, and that these may be performed with equal consideration of the left and right sides of the body, that is to say, that in jumping one should use alternately the left and right foot in the take-off, and in throwing alternately the right and left arm.

The increase in training must be even, that is to say, that the demands made on each pupil must be adapted to his existing physical and technical standard. This necessity for the teacher's knowledge of the athlete's standard makes *rational* training with athletes difficult, so difficult that one, in most cases, ignores it and, with the exception of a chosen few, allows all to train in the same way. It should be obvious that this condition is unsatisfactory (and in many cases quite unjustifiable) when there is a question of violent effort, e.g., in competitive running, the immediate effect of which on the internal organs and on the nervous system one hardly knows, and the after-effect of which is a matter of conjecture based upon the observation of the condition of the athlete immediately after the run.

Neither is it superfluous to call to mind the fact that a regularly increasing physical development is the healthiest development and, moreover, that which in the long run produces the best athletic results, also that the progress that can be estimated with watch or measure need not necessarily paint the right picture of progress in uniform physical development.

The fact that athletics allow an objective control of the progress in the different exercises can without doubt be of great pedagogic significance ; but it can also, and especially with regard to the pedagogical aspect of the affair, be of danger if it leads to the fact that the resulting performance absorbs the interest of the pupil at too early a stage and in too great a degree. Of this the teacher must constantly be aware, especially in the instruction of children, as a too early and a too strong emphasis of the result not only gives the children a false impression of the value of the result in itself, but also easily comes to disturb the natural and systematic training, as it should be applied, if it is to fulfil the general aim of athletics.

The exercises that may be used in school are first of all determined by the age of the pupils, and thereafter by the element of danger associated with many of the exercises. The practice of the technique of running is admirably suited to all classes of the school right down to six-year-old children, even though the three youngest classes must make the acquaintance of running technique through game-like exercises, in which only the simplest form of arm and leg movements occurs ; but with ten-year-old children the practice of some more advanced running technique and starting exercises, and also small light standing jumps, can be included in the physical exercises. With eleven-year-old children and onward can be added relay running, hurdle running, practice of high and long jump with a run, also introductory exercises for pole vault and long throw, when a sling ball is used instead of a discus and a cricket ball or a base ball instead of a javelin. From twelve year old upwards, when the teacher exercises due control, almost all athletic exercises may be included (with the exception of hammer throwing, weight throwing, and hop, step and jump).

In view of the element of danger that is associated with a number of the exercises the application of these is conditioned by the observation of certain corresponding rules. If during the instruction the pupils are divided into teams, which in many ways will be appropriate (see later), the practice of pole vault and shot put, also of throwing with javelin and discus of the regulation type should only take place when the instruction can be so arranged that the teacher is able to devote himself entirely to the team that is occupied with one of these exercises. Where javelin throwing is concerned a good deal of the danger can be overcome by replacing the ordinary javelin, which is provided with a metal tip, by a light bamboo javelin, equipped with a rubber ferrule, and extra ferrules made of cloth or wash leather to the extent that is necessary to provide the correct balance of the javelin. The discus may be replaced by a football provided with a short straphandle and containing so many extra bladders that the ball acquires the suitable weight for the pupils and for the character of the throw.

Instruction in athletic jumping can only be justified on condition that the sports field is equipped with proper landing places (for high jump and pole vault it is necessary to have pits of an area of  $4 \times 4$  m. and a depth of  $\frac{1}{2}$  m., and for long jump a pit of an area of  $1\frac{1}{4} \times 5$  m.

and a depth of  $\frac{1}{2}$  m. ; these pits are filled with sand or smooth gravel), since the object of athletic jumping is to reach the maximum performance and, therefore, does not require a special form of landing.

Until a certain amount of skill is acquired it will be expedient, during the practice of the technique of single exercises, to instruct the whole class together so that the teacher has an opportunity of demonstrating the movements to all the pupils at one time, just as it will be possible at the same time to correct frequently occurring faults and give those instructions that the first efforts always call for.

In mass running exercises first the correct arm and leg movements, together with elastic movements in the joints of the feet, must be practised, and afterwards the more advanced running technique that is associated with the start and the first steps after the start. In throwing exercises the correct starting and finishing positions must first be learned before special emphasis is laid upon the study of the movements lying between these two extremes. In jumping exercises the correct take-off and the steps or movements that immediately precede the take-off must be practised. This practice of fundamental positions and technique should form a short introduction to every athletic lesson with school children ; thereupon the pupils may work in teams on the exercises which have been gone through in the introduction.

Since athletic exercises in their final stage are pronounced individual exercises, and since, as a rule, there will be neither sufficient space nor sufficient apparatus for the whole class to perform the same exercise simultaneously, the advanced work must, to a great extent, be carried out in teams.

The unity in position and movement that is necessary during mass work should not be applied to the team exercises ; in the latter a certain amount of scope must be given to the individual, i.e., one must not waste time on trying to abolish small peculiarities in movements which the single pupil possibly may possess, unless they are quite superfluous or are a direct hindrance to the attainment of the best possible result.

In the beginning it may sometimes be difficult to secure the interest of the pupils in athletic instruction, until they have progressed so far that they have acquired some knowledge of and skill in the special technique of the different exercises. Therefore the

corrections and demonstrations of the teacher should always be informative, i.e., so that at the same time as he corrects an exercise or explains *how* it should be performed, he should also briefly explain the reason *why* it should be carried out in just that way ; thus the teacher secures interest for the work and in addition, among the cleverest pupils, succeeds in time in training capable team leaders.

As was previously mentioned, the fact that athletics permit an objective control of the performer's progress can be of great pedagogical significance, since the teacher utilises the encouragement which lies in the uniform progress of the pupils. But this must be done in such a way that all share the encouragement, even those whose performance is extremely insignificant. This is easily put into practice, if only one always considers the personal record of each pupil (i.e., the best performance to date of the pupil in the different exercises), not only with regard to time, length or height, but also with regard to understanding, technique, diligence, endurance, etc. Existing records, whether international, national, or only school records, must never be used as a standard for the proficiency of the individual, although knowledge of records may in other ways be used to some purpose during the instruction.

In the demonstration of an exercise the teacher must first and foremost pay attention to the position of the pupils, that they are so placed that they can both see the demonstration and hear the accompanying explanation. Many of the difficulties experienced with beginners are due to sinning against this elementary rule. Furthermore, it is not sufficient to demonstrate an exercise so that it is only seen from one side ; the demonstration must be repeated so that the pupils gradually see it from all sides.

An important link in the instruction lies in teaching the pupils to observe an exercise with the object of recognising and judging eventual faults in the performance. That ability is naturally most important for the teacher but also for the pupils, since the better the latter are trained to observe and appreciate their comrades' performance of the exercises the greater will be their interest for the technique of the exercises and their understanding of its significance. The ability to observe the performance of an exercise can be developed so that the observer is capable with certainty of judging the performance of the exercise, regardless of the aspect from which he sees it ; this end is attained by repeated observation, whereby one

gradually has the opportunity of seeing the exercise from all sides.

The more calmly the movements can be performed during the demonstration the more easily can they be apprehended by the pupils, e.g., in the demonstration of a high jump the bar should be placed only so high that it can be cleared with ease, so that all one's attention can be devoted to the correct performance of the jump, just as in the demonstration of a throw one should not emphasise distance but should concentrate upon performing all the movements in a well-balanced way, technically correct, and in such a calm tempo that the pupils receive a distinct impression of how the movements should be combined, and when the grip on the apparatus should be released.

During team work the teacher should remember that athletic exercises, running excepted, are not remarkable for the amount of movement they provide, because normally the walk in the exercise takes the form of a relatively calm ensemble of movements which, only when the adjustment feels correct, seeks completion in a "muscle explosion." It is therefore necessary to see that there are not too many pupils in each team, and that the change from one exercise to another takes place comparatively frequently; also that in the changes the character of the exercises is taken into account and changes are made between running, jumping and throwing exercises and not between one exercise and another of the same character. It is expedient to use the skill of the pupils as a foundation for team selection, since in this way there arises a competitive element which, used in the right way, will have a stimulating effect upon the work of the pupils.

While the team exercises in most cases may, without danger, be left in the charge of a team leader, as was previously mentioned, the teacher himself should take charge of the training in pole vault and in throwing exercises with the regulation (dangerous) pieces of apparatus.

Just as the instruction should always be begun with mass training in technique, so it should conclude with mass training in running a relatively long distance (3-4 minutes). This mass running should be led by a leader; if the teacher himself is unable to partake he should appoint a reliable pupil as a leader. The running must not under any circumstances take on the character of a race; it must be run with changing speed and length of step (eventually

directed by the whistle signal of the teacher) for every 20 or 30 metres. Before the run starts instructions should be given by the teacher as to how it shall be carried out, and the troop should be told to remain behind the leader throughout the run.

In open-air training, if the pupils are not provided with track suits (training suits), the choice of suitable team exercises will naturally be influenced by the weather conditions. A track suit is essential for the older pupils. Such a suit is loosely fitting and is designed to be worn over the ordinary athletic costume. It is made of half woollen material which in damp weather has the property of shrinking slightly and is thus better able to retain the body heat. Clad in such a track suit, one is able to train throughout the open-air season, in all kinds of weather, without the slightest risk of catching cold. The suit is quite cheap and is so devised that it can easily be thrown off, if one wishes complete freedom of movement during the performance of an exercise, and can quickly be donned again when the exercise is finished.

Every athletic lesson should, as a matter of course, conclude with a bath. If there are no changing rooms with shower baths at the disposal of the pupils, they may remedy the lack by the improvisation of a primitive bath (e.g., a screen made of sacking, a floor made of bars of wood placed at a distance from each other, and a water-can provided with a spray). In an emergency the pupils can manage with a cold sponge down (with a wet cloth) followed by a vigorous rubbing of the whole body with the hands.

The use of spikes for jumping practice should be prohibited, since as long as the pupil is somewhat uncertain in the special technique of jumping he runs great risk of injuring himself with the spikes during the scissor-kick and landing. In children's schools spikes should never be permitted.

One often sees so-called "training schemes" for use in voluntary practice in athletics. Such schemes, however, should not be generally used, since the differences in the foundation and adjustment of athletics are such that the procedure must differ in the individual cases.

A sensible training scheme can doubtless be of benefit if, among other things, it is compiled in such a way that it inspires the athlete to systematic training; but in such a case the scheme must be the result of a collaboration between the teacher and the pupil, so that

the teacher from his knowledge of the pupil's existing athletic standard, ability and possibilities, supplemented preferably by some knowledge of his work and whole mode of living outside the sports field, may compile a training scheme for this *individual*, and may explain as well as possible why the procedure, recommended in the scheme, has been chosen. As the training proceeds the scheme should be constantly altered by a thorough co-operation between the teacher and the pupil. In this case the ideas of the pupil may be expressed, or he may witness the further construction of the scheme.

The system is not as difficult as one might suppose, especially if one teaches the pupils to carry out control schemes, that is to say, schemes of performances accomplished, by means of which they can ascertain wherein their weak points lie.

Besides, it naturally must be borne in mind that the maintenance of a uniform and strong condition is not achieved by athletic training alone, but also necessitates a sensible and hygienic mode of living outside the sports field.

Athletic exercises are divided into 3 groups : running, jumping and throwing. Each of these groups is again subdivided into different exercises, which are more closely designated by their character.

#### RUNNING GROUP

1. Sprinting (quick running over short distances up to and including 400 m.).
2. Short medium distance running (from 800 m. to 1500 m.).
3. Long medium distance running (from 1500 m. to 5000 m.).
4. Long distance running (from 5000 m. to about 42 km.).
5. Cross-country running (running a medium distance over uneven country).
6. Obstacle running (running over voluntarily selected distances with obstacles where jumping over water ditches, hurdling, balance walking, climbing, etc., are included in the exercises).
7. Hurdling (running over sprinting distances, at the same time passing a certain number of obstacles in the form of "hurdles").
8. Relay running (running over sprinting distances and short medium distances in which several runners participate, each

one running only part of the full distance and delivering a baton, which must be conveyed from the start to the finish).

#### JUMPING GROUP

1. Long jump, with or without a run.
2. High jump, with or without a run.
3. Pole vault (high).
4. Hop, step and jump, with or without a run.

#### THROWING GROUP

1. Discus throwing.
2. Javelin throwing.
3. Shot putting.
4. Hammer throwing.
5. Weight throwing.

As has already been stated, only some of the above-named exercises may be used for instruction in children's schools, since many of them either require too great a physical effort, or are of such a character that they can only take place in forms in which the pupils are not constantly under the control of the master. Thus running may be used only in the forms of sprinting, relay running and hurdling, besides the previously described mass running.

With the exception of the hop, step and jump, the other forms of jumping are practicable. With regard to throwing, attention must be drawn to the fact that here in Denmark throwing apparatus (javelin, discus and shot) are specially made for the use of boys 12-14 years old, and for juniors 14-16 years old; youths 16-18 years old use senior apparatus. Nevertheless, hammer throwing and weight throwing are unsuitable for school use.

## RUNNING

THE running movement is brought about by the body falling forward, whereupon the fall is interrupted by the alternate placing of one foot a suitable distance in front of the other in the direction of the fall.

During this interruption of the fall there takes place a spring-like movement in foot, knee and hip joints ; immediately afterwards the body is pushed forward during the so-called unrolling that takes place through a stretching of hip, knee and foot joints in succession.

If a lying start is used, the foot in the beginning is not immediately moved forward beyond the vertical line through the centre of gravity (fall line) ; relatively short steps are taken, but the steps are lengthened regularly during the subsequent run until, when the normal running position is assumed shortly after the start, they have become so long that the foot now touches the ground beyond the fall line. The movement forward is not stopped due to the kinetic energy which by now has become so great that it can bring the body forward over the stationary point, while the supporting leg performs the spring-like movement, and immediately afterwards commences the unrolling.

Thus the speed during the run is not regular but will be greatest during the very last part of the unrolling movement. From the moment that the unrolling is completed the speed will decline until the commencement of the unrolling of the other leg. The speed, then, will be least at the moment when the landing movement is completed, and the centre of gravity has passed forward over the base of the supporting leg. From this it follows that correct length of step is exceedingly important for the attainment of a fast run.

Furthermore, it naturally follows that the more quickly the unrolling movement itself can be performed the greater will be the speed attained.

The arms are moved during running in order to compensate (counter-balance) as far as possible the trunk twistings and the displacements from side to side that are the result of the movements of the legs. Since all superfluous movements are a waste of strength, the body, during the run, should be held as quiet as possible facing in the direction of the run. If the runner's movements are correctly adjusted, and if the spring-like movement and unrolling is performed correctly and at the right time, the run will assume the character of an even gliding movement.

As a rule the respiration will spontaneously adopt the most appropriate procedure. At times, however, it may be necessary to see that needless hindrances to the breathing do not arise through unnecessary tension in the musculature of the thorax and the abdomen. Never under any circumstances should an attempt be made to adapt the respiratory frequency to the rhythm of the running movements.

#### SPRINT

The lying start is recommended when the duration of the run is not greater than the endurance of the runner permits of maximum speed from the start to the finish, because one can more quickly cause the body to fall from this position than from the standing position. Start exercises are an important link in the training in running, both in the achievement of speed at the commencement of the run, and also in the practice and control of the general running technique ; therefore runners of all categories should include start exercises in their programme.

It is permissible at the start to dig holes in the ground in order to make better use of the take-off at the moment of starting. These holes should be of such a depth that the whole of the ball of the foot can rest against the hind wall of the hole. The position of the holes in relation to each other and to the starting line is evident from the following explanation of the starting positions ; here it need only be noted that the hind wall of the rear hole should be vertical, while the hind wall of the fore hole should be inclined

backward at an angle of approximately  $45^{\circ}$  (see the position of the legs in Fig. 2).

The command for the start is : On your mark !—Get set !—Go ! or a shot from a starting pistol.

On your mark ! (see Fig. 1). Half kneeling position is assumed with the arms held fully stretched, shoulder breadth apart and the fingers resting on the ground *immediately behind the starting line*. The thumbs point towards each other and the four fingers held together point away from the middle line of the body.

*The fore foot* is placed one foot breadth out to the side of and with the toe in line with the knee which is resting on the ground and at such a distance behind the starting line that the fore knee and arms are in the same vertical plane (look at the runner from the side). The body is inclined so far forward that the weight is about equally distributed between the resting knee and the arms (see Fig. 1). As the real take-off falls upon the fore foot

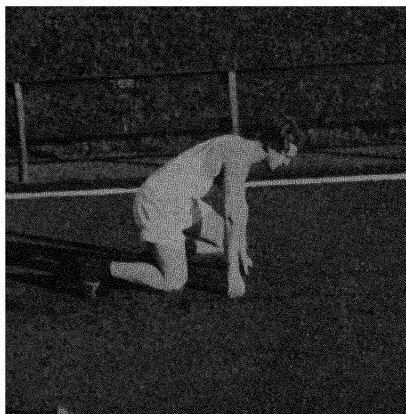


FIG. 1.

it will usually in competitions be the “jumping foot,” i.e., the foot which one preferably uses for a take-off, that should be placed in front.

*The rear foot* is placed just behind the knee with the heel vertically above the ball of the foot. Seen from behind, the ball of the foot, knee and hip should be in the same vertical plane ; the same is true of the fore leg.

In this position (on your mark position) the arm swing for the first step of the start is practised in such a way that, without altering the position of the body, one swings forward the arm on the side of the fore knee, and the other arm backward ; they are then both swung back to the starting position. The arm swing should be

carried out completely and so quickly that the hands are again supported on the ground before one has time to fall over.

*Get set!* (see Fig. 2). On the command "Get set!" the seat is raised so high that the knee of the rear leg lies a little higher than the heel. During this movement, the shoulders should *not* be pushed either forward or backward, but should be kept still so that it is not necessary to have to seek balance after assuming the "Get set" position.

*The head* should not be bent backward in this position, in spite

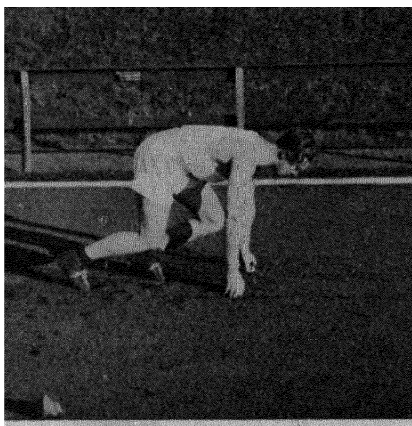


FIG. 2.

of the temptation to look down the track, but should be kept in its natural position in continuation of the neck.

The muscles in the "Ready" position should only be so tense that one is prepared to react as quickly as possible to the starting signal. This position must be thoroughly practised, since a poor starting position renders a quick start impossible.

The most common faults in the "Get set" position are :

1. That the runner is either too rigid, or too relaxed.
2. That the body is inclined too far forward over the hands so that, at the moment of starting the runner cannot raise his body high enough to permit the correct leg movements during the first steps.
3. That the seat is lifted so high that the rear leg is almost stretched giving the first step the character of a jump out of the holes. The faults named under 2 and 3 also cause difficulty in attaining good balance during the first steps.
4. That the body is inclined backward in an impractical crouching position, from which it is difficult to make a quick start.

*On the command Go!* (or on the starting shot) the body should be pushed forward and at the same time raised a little by movement

in the hip joint. Thus the hands are lifted from the ground and the arms, which are almost stretched, are swung quickly, one forward and one backward, so that opposite arm and leg accompany each other in the movement in order to maintain the balance and prevent the twisting and lateral movements of the body. At the same time as the body is raised a vigorous push off is made with the rear leg, and the knee is immediately afterwards moved forward for the first step (see Fig. 3). The body, at this time, should *not* be suddenly raised to the normal angle of inclination. The raising should take place gradually during the first 15-20 m. of the run, at the same time as the steps, which immediately after the start are relatively short and quick, gradually lengthen and within this distance reach the length which will be most suitable for the rest of the run.

A quick and assured push off from the starting holes at the moment that the starting signal is given is dependent upon one's ability to take up with

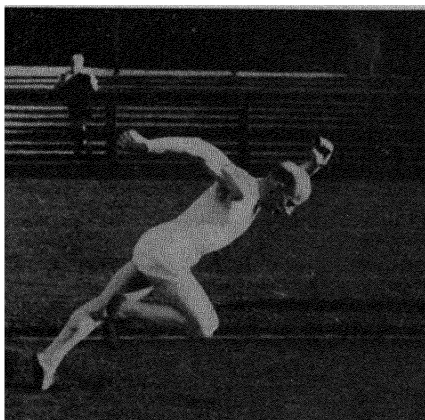


FIG. 3.

ease and precision the "Get set" position; but this again is governed by the correct assumption of the "On your mark" position. This last position as well as the change to the "Get set" position should therefore be practised very thoroughly during the starting exercises.

As a rule the starting exercises are arranged in such a way that the teacher can maintain contact with the pupil all the time; thus they are also, as previously mentioned, well suited to the practice of the general running technique, since during the relatively short run (20-40 m.) that is added to the start itself, one can work at improving the arm movements, leg movements, length of step, position of the body and any other details which at that time are requisite for each individual.

During the first step the arm swing should be performed with almost straight arms for various reasons, but chiefly because of the raising of the body ; but already at the beginning of the next step they should be bent to about a right-angle—because of the speed of the movement—and should maintain that degree of flexion throughout the remainder of the run, so that the movements take place in the shoulder joints (see Fig. 4). During the forward swing the hands should not move inward beyond the midline of the body, that is to say, the arms, in order to balance the other running movements, should always swing in the direction of the run and *not at an angle*

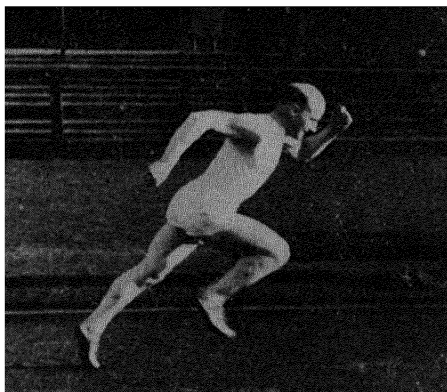


FIG. 4.

*to it.* The extent of the arm swing backward should be so great that the hands pass the hips.

A common fault of frequent occurrence is an incomplete arm swing during the first step, this results in a poor balance of the body, a deficiency that can only be remedied by increased muscle work.

The lifting of the body to normal running position takes place gradually, as previously mentioned, during the first 15-20 m. of the run.

After the push off for the first step, the leg movement must take place by the knee being  *jerked*  directly forward in the direction of the run, whereupon the foot should again be quickly placed upon the ground to complete the step ; a fault often found in beginners is that the foot is straightway thrust forward and as a result the whole movement becomes tense, and the length of the step wrong.

Training in finding the correct length of step is for the most part a question of finding the most suitable fall angle for the individual runner, since the natural length of step is dependent upon the fall angle.

As the length of step gradually approaches that which for the

individual must be regarded as the normal length of step, that is to say, when the normal fall angle is acquired, the movement of the lower leg should assume more and more the rôle of the lower part of a double jointed pendulum, so that one more easily finds the correct length of step. During the movement forward of the knee the heel should not swing backward and upward, since, as a result, the foot cannot swing sufficiently far forward before it is placed upon the ground ; thus the steps become heavy and stamping instead of light and spring-like.

Moreover, during the forward movement of the knee the muscles



FIG. 5.

of the lower leg should be relaxed, and only immediately before the foot is placed on the ground should the muscles be contracted in preparation for the following spring-like movement and unrolling. When the foot is placed upon the ground it should point directly forward in the direction of the run, partly in order to make the stride cover as much ground as possible, partly to make the following unrolling completely effective. If one ensures the correct knee movement there will, as a rule, be little difficulty in acquiring the correct foot position also. Here it is necessary to call to mind the fact that a correct leg movement depends to a great extent upon the correct arm swing, both with regard to direction and tempo. An increase in the speed of movement, when one runs "at top speed"

(the so-called finishing spurt), can be made by suddenly shortening a step during the run so that the fall angle of the body is increased ; as a result of this, the runner is forced to perform a quicker leg change ; this is a useful factor near the end of a run, when fatigue has caused disturbance of balance, length of step and speed.

When working with the more advanced pupils, one should be careful that, in an effort to make records in time, they do not forget technique for the display of strength, but during training constantly see that the movements are performed in the correct direction and in the correct tempo. The following points should be specially borne in mind :

1. The arm swing, its direction and extent.
2. The leg movement : the knee should advance directly forward in the direction of the run without the heel being swung backward and upward or the muscles of the lower leg becoming tense.
3. The foot position : the toe should point directly forward in the direction of the run.
4. The body position : too great a tension of the muscles of the trunk during the run may be a sign of poor balance.

#### MEDIUM DISTANCE RUNNING

*(Short and long)*

The designation middle distance running covers running over distances from 800 to 5000 m. The shorter the distance is the more will the principle of sprinting prove to be efficacious (including greater speed in the beginning), and actually short medium distance running has more in common with sprinting than it has with long medium distance running, and, similarly, there are greater differences between the working methods in short and long medium distance running than there are between the latter and long distance running.

In the longer distances it will be necessary to establish a more moderate speed in the beginning and during the run to preserve greater economy with one's strength than in shorter distances. It takes a long time, requires intensive training and not a little self study to realise with certainty at any point of the run whether the speed is too great or is not great enough to provide an opportunity

for the best possible result. Without this knowledge of one's own ability and standard of training, there can be no question of making use of incidentally necessary tactics during racing.

In short medium distance running, and to just as great an extent in sprinting, it is important to acquire the correct running technique, balance and length of step, since all movements that do not either balance the movements of the body during the run or impel the body forward in the direction of the run are superfluous and



FIG. 6.

consequently cause a waste of strength just at a time when it is very necessary to economise.

Training in endurance is provided by increasing the distance or the duration of the run and by running with changing length of step and changing speed in such a way that occasionally the average speed with which such a run should be performed is surpassed. Persistent correct technique during the whole run produces greater endurance and shorter running time and, further, a more beautiful run than that which is produced if only strength predominates. Training should therefore aim at practising the technique of running, placing emphasis upon the acquisition of the most suitable (most economical) length of step and tempo of movement for the individual. Training in the balance of the body is carried out by running with changing length of step and changing speed (see Fig. 5).

## LONG DISTANCE RUNNING

Running on the road over long distances is an objectionable form of competition, among other reasons, because the strain is of so long a duration, that only few are equipped with the endurance necessary for so long a run. Thus, as a rule, the run becomes unsightly and, at the best, mechanical (Fig. 6).

As a rule the training for long distance running is too one-sided, the runner tries as often as he can to cover one kilometre after the other with a constant and rather high speed with the object of improving the time for a given distance. He does not realise that what he gains by this means in tough endurance does not at the same time improve his ability to develop speed (an aspect of training which no runner should neglect) and also that such monotony in the work may have a stupifying effect. It will be most expedient during training for long distance running to arrange the separate training periods so that they are of a certain duration, and not so that they cover a definite number of kilometres, and to arrange the training on the whole, as described for middle distance running, with technique, speed and endurance in view.

## CROSS-COUNTRY RUNNING

Running in uneven (untracked) country is a good deal more valuable exercise than long distance running on a track. Cross-country running increases skill to a great extent because of the number of different situations to which the runner is exposed, such as jumping over different kinds of obstacles, running up slopes, running down steep hills and slopes or over uneven stretches where the ground is alternately soft and hard.

It is a very exacting run, which cannot be performed with mechanical movements, but which all the time requires, and consequently develops, control over the movements of the body.

## OBSTACLE RUNNING ON A TRACK

This running may perhaps be justified when it is arranged for the amusement of children. But with the obligatory Olympic obstacles—hurdles and water-ditches with growing hedges in front of them—where not only the kind and dimensions of the obstacles, but also the exact mutual distance of them is known beforehand, the

runner will not be confronted with the necessity of making a sudden decision as to the best method of clearing the obstacles ; accordingly, the special value of the obstacle race lies in an increased demand on the endurance, since the required skill is confined to the already known combined movements that occur in :

1. Hurdling.
2. Crossing the water-ditch, which may be performed either as a high long jump over the hedge in front of the water-ditch, followed by the landing in the water and wading ashore, or by using the fixed hurdle that is hidden in the hedge as a take-off in the same way that a plinth is used in the gymnasium as a take-off for a high long jump with a run.
3. Ordinary track running.

As a rule there are many opportunities of competing in flat running and in hurdling at sports meetings in general, and if the water-ditch is to be included in the competition, there should be, just as is the case in other exercises, an opportunity of training in jumping over this obstacle during the daily instruction. But with a freer choice of obstacles, such as balance beams, raised platforms provided with water-buckets the contents of which the first comer may empty upon the head of his follower, water-ditches with hedges in front, etc., the run at its best will acquire the character of an item in a circus programme, and as such will impress the adult spectators.

#### HURDLING

The usual distances are as follows :

for boys . . .	60 m.
for juniors . . .	80 m.
for youths . . .	110 m.
for seniors . . .	140 m.-200 m. and 400 m.

Hurdling is an obstacle run over short distances, that is to say, a quick run during which the runner must pass a number of obstacles in the form of hurdles.

The height and mutual distance of the hurdles, etc., varies according as the runners are boys, juniors, youths or seniors, and according to the distance that is to be covered.

In order to achieve the greatest possible speed throughout the distance the hurdles must be cleared as flatly as possible, that is to

say, that the take-off should be so far from the hurdle that the flight may be performed like a flat striding running jump from one leg to the other (see Fig. 9). The fore leg should be forced downward, as soon as the foot has passed the hurdle, so that the jump is succeeded by the run at the earliest possible moment.

In order to acquire speed between the hurdles after one hurdle has been cleared, the body must be adjusted for the following run as soon as the foot reaches the ground. Therefore, during the flight over the hurdle, the body must be inclined forward, so that



FIG. 7.

the conditions for falling forward in the subsequent run are present as soon as the front foot touches the ground.

During the approach to and the flight over the hurdle it is the task of the arms to counteract the other movements, so that the balance of the body is maintained.

In hurdling for seniors, the distance from the start to the first hurdle is 13.72 m., and the distance between the hurdles 9.14 m.; this distance between the hurdles should be covered in three steps. Since, in order to make possible a flat jump, the take-off should be made about 2 m. in front of the hurdle (see Fig. 7), and since, in the landing, the fore foot—because of the subsequent running step—cannot be placed less than about 1 m. behind the hurdle, there will

remain about 6 m. between the hurdles to be covered by the three steps—about 2 m. per step, a distance which corresponds more or less to the normal running step of an adult.

The approach to the first hurdle should never be performed so fast that the runner cannot completely control the take-off (see Fig. 8).

The take-off should be made so far from the hurdle that the “swinging leg” can be swung forward and upward without touching the hurdle even when the body in preparation for the subsequent

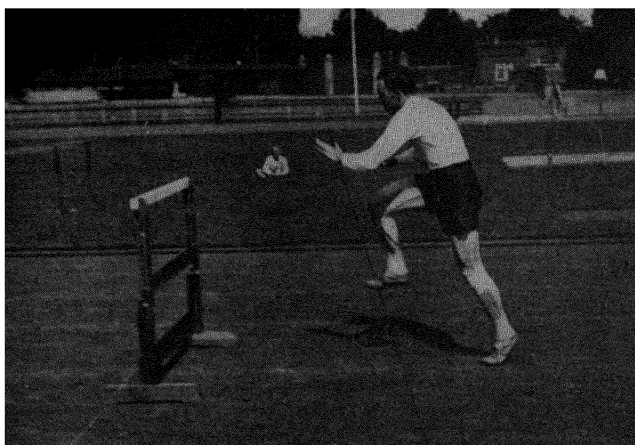


FIG. 8.

run is inclined forward (see Fig. 9); the take-off will, as previously mentioned, lie normally about 2 m. in front of the hurdle.

*During the take-off* the following movements are performed simultaneously (see Fig. 9):

- (a) The swinging leg is swung with slightly bent knee forward and upward so that the heel passes close to the hurdle.
- (b) The opposite arm is swung forward to a little under shoulder height, while the other arm is *lifted* out to the side with the elbow bent and the forearm pointing forward in the direction of the run, so that the body in passing the hurdle also faces in the direction of the run (see Fig. 9).

(c) The body is forced forward by a leaning in the hip joint (not by a bending of the back).

Since the flight over the hurdle should be made as low as possible, as soon as the foot has passed the hurdle the swinging leg should be moved downward and the rear leg out to the side with the knee bent and lower leg pointing backward in the direction of the run; the lower leg and foot in this position lie in the same horizontal plane, the position of the body and of the arms is maintained until the seat is over the hurdle (see Figs. 10-11).

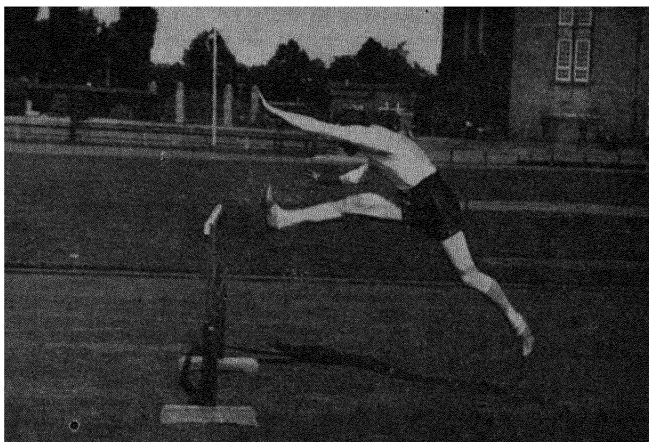


FIG. 9.

During the descent from the hurdle, the body should still be inclined forward so that it is natural to fall forward in the direction of the run when the fore foot reaches the ground. As soon as the seat has passed the hurdle and the fore foot has almost reached the ground, the rear leg is pulled quickly over the hurdle and moved forward, with the knee raised high, for the first step (see Fig. 12).

Since at the moment when the rear knee is pulled forward over the hurdle the body is inclined forward with the pelvis turned slightly to the side of the rear leg so that the hip of the fore leg lies lowest, the flight does *not* require abnormally great suppleness in the hip joint.

When one has reached the stage in the movement where the rear leg is moved forward for a new step, the arms are swung—opposite



FIG. 10.



FIG. 11.

arm and leg still accompanying each other—respectively forward and backward in the direction of the run with the object of counter-

acting the movements of the legs so that the body is correctly adjusted for the subsequent run between the hurdles.



FIG. 12.

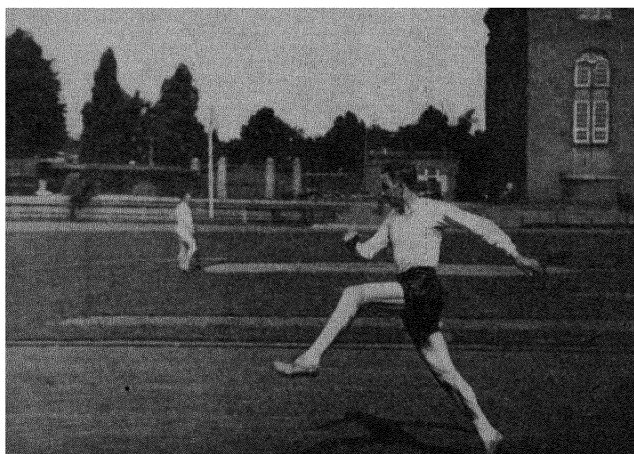


FIG. 13.

The first step after the hurdle is of decisive importance to the run between the hurdles. If the step is too short, which as a rule is

due to lack of height in the knee movement or to too vertical a position of the body, it is difficult to reach the next hurdle in 3 steps and to achieve complete control over the subsequent jump. If, on the contrary, the hurdle is cleared in the correct way, no difficulties will arise, i.e., if there is notably the high knee raising forward of the jumping leg (see Fig. 13), and the correct fall angle of the body which play such a decisive rôle in the achievement of sufficiently long steps between the hurdles or of maximum speed during the run. No advantage is derived from making a long jump over the hurdle with the object of making it easier to cover the distance between the hurdles in three steps. With a long jump there will be a loss of speed and it will be exceedingly difficult to maintain the balanced position of the body, also the landing will be heavy and the first steps relatively short and slow. On the contrary, it is necessary that the foot should be placed on the ground again before the speed forward of the body has diminished too much, that is to say, so soon after the hurdle has been cleared that the landing assumes the character of a running step so that the speed can be increased as soon as possible.

#### *Common Faults*

1. That the flight over the hurdle has the character of a high or long jump.
2. That the arms do not compensate the movements of the legs with regard to the position of the body during the flight over the hurdle. The arm on the side of the swinging leg swings backward causing the body to twist so that in the landing it faces obliquely instead of directly forward in the direction of the run.
3. That the body during the descent from the hurdle is raised too much or at too early a point, which causes difficulty in performing the correct leg movement and makes the first step too short.

#### TRAINING IN HURDLING

*(The distances are suitable for seniors)*

1. Practice of the flight over 1 low hurdle (70 cm.) from standing position.

- (a) One stands about a half step from the hurdle in kick standing position, with the lifted leg carried over the hurdle and with the arms in the position they should have during the above described take-off (see Fig 14).

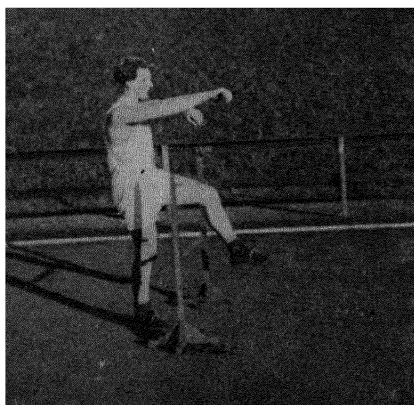


FIG. 14.

- (b) From the above-named position, one steps down on the other side of the hurdle so that one now stands astride it with both feet on the ground and the arm in the same position as before (see Fig. 15).

- (c) The body should be inclined forward in the direction of the run, whereupon the rear leg should be quickly brought forward with the knee lifted high and turned well outward in preparation for the first step after the hurdle (see Fig. 16). At this time the inclination of the body should be steadily maintained, and the first step followed by 3 or 4 quick running steps in an effort to find the correct form for the "sprint" (see Fig. 17).

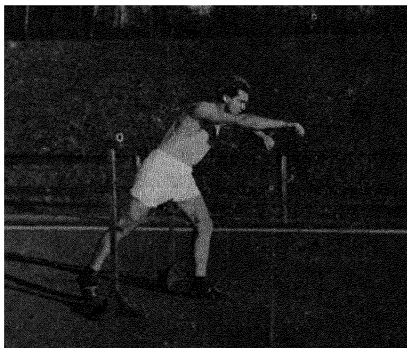


FIG. 15.

in an effort to find the correct form for the "sprint" (see Fig. 17).

2. Running over 1 low hurdle (80 cm.) as flat as possible with 3 or 4 subsequent quick running steps ; at the same time, the practice of the correct approach to the hurdle and the take-off at the right distance together with the technique during and after the flight over the hurdle should be included.

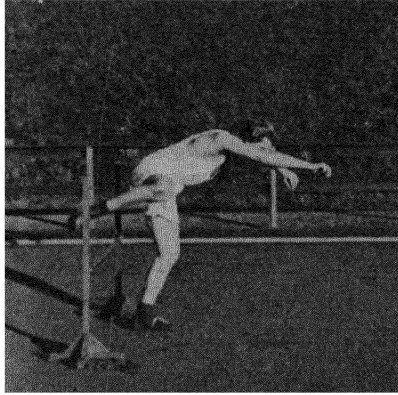


FIG. 16.

3. Running over 2 low hurdles (80 or 90 cm.). To begin with the hurdles should be placed a little closer to each other than the regulation

distance, but gradually as competence is acquired in clearing the hurdle correctly and in making the first step after the hurdle sufficiently long the hurdles may be moved further apart, until the regulation distance is reached.

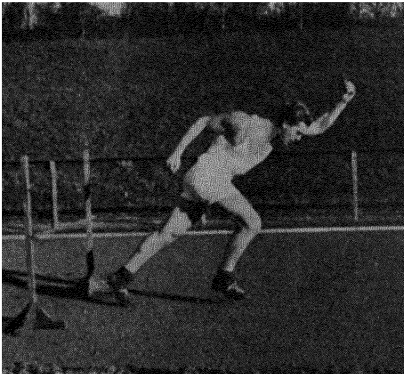


FIG. 17.

4. Running over 1 high hurdle (90 or 106 cm.) with 3 or 4 subsequent quick running steps. The aim and procedure are the same as in running over 1 low hurdle, namely practice in the correct technique and the acquisition of the correct adjust-

ment for the continuation of the run.

5. Running over 2 or more high hurdles as indicated under 3.

6. Practice of the approach to the first hurdle. This should always be practised with the regulation distance (13·72 m.).

The teacher can most easily exercise control over the movements of the runner by observing him from the side, standing so far from the hurdle that he can watch not only the flight of the runner over the hurdle, but also the preceding and succeeding running steps.

#### RELAY RUNNING

The common distances for relay running are for boys 60 m., for juniors 80 m., for youths 100 m., and for seniors 100 m., 200 m., 400 m., and 1500 m. per participant.

The intrinsic value (that which determines a well-finished run) lies in the change over of the baton. This should take place within a previously marked space that should be 20 m. long and 1·25 m. wide. In short distances the change should be made while both runners are at the same and, as far as possible, at maximum speed, and an adequate change can only be made when one is able to judge correctly the speed of one's partner, and when one is aware of one's own ability to make a quick start from the standing position and of one's endurance and speed during the end of the run, when the baton is to be delivered.

The special training in relay running is therefore training in the passing of the baton. The rest of the training in relay running is included in ordinary running training, in which it is unnecessary to run with the baton in the hand.

Since on an oval running track the runner always has the shortest stretch of the marked track on his left hand, the one who is to deliver the baton holds it in his left hand, and the one who is to receive it uses his right hand. Thus the receiver is able to keep to the inner side of the track during the start and the change, and only when he is to deliver the baton again may he move so far out on the track that he can avoid treading on the heels of his partner during the change.

Before the baton change during the run is practised, one should be quite certain of placing the baton in the correct way in the hand of the receiver.

The baton used in races should be a hollow wooden tube, 12 cm. in circumference, not more than 30 cm. long, and weighing at least 50 gr. For use during training a bit of round wood (for example, a piece

of broom stick about three handbreadths long) would be satisfactory.

The baton is held by one end with the full grip of the left hand, the receiver stands in walk standing position a step in front of the one who is to deliver it, inclines his body slightly forward in the direction of the run, and stretches his right arm backward with the palm facing upward (in pronation). The one who is to deliver the baton places his left hand on the inner side of the receiver's right and places the baton—with a movement from above downward—in the upturned hand, so that the receiver only needs to close his

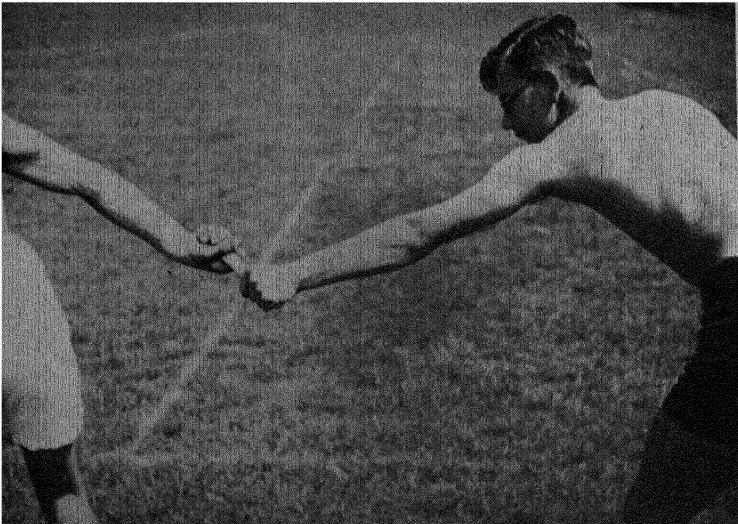


FIG. 18.

fingers to secure a full grip on the free end of the baton (see Fig. 18). Thus the long axis of the baton lies almost at right angles to the direction of the run during the delivery (across the hand). Thereupon the baton is carried in front of the body and changed into the left hand with which the free end is grasped in such a way that the thumbs of both hands point towards each other during the change, and the baton is at once ready for further delivery. It is of importance that the baton should always be grasped with a full grip at the end (and not in the middle) in order to avoid failure of the change through an insecure grip.

## TRAINING IN THE BATON CHANGE

1. Standing baton change : If there are many participants the change can be made in lines in front arrangement at double arm distance. The participants assume stride standing position with the body inclined forward and the hands supported on the knees, which are slightly bent ; the head is turned to the right, so that the whole row looks up towards the right leader. The baton change begins at the right end and the baton goes from hand to hand down the line, the change taking place in the manner described. When the baton has reached the left leader, he gives a signal whereupon the whole row turn about with a jump and the baton is returned down the line to its starting-point.

To add to the interest of this exercise, a competition can be held between several lines at the same time, or the time taken.

2. The baton change during walking : The participants assume the position described in standing baton change in a circle, but with so great a mutual distance that after the baton has been received (in the right hand) there is time during the walk to the next man in the circle to change it to the left hand. The receiver should begin to move so early that the change of the baton takes place while both participants are walking. It should be specially emphasised during this exercise that the change itself is correctly performed, and that the receiver immediately after he has received the baton moves it from right hand to left ready to deliver it again.
3. Training in starting from standing position : Since the receivers during relay running are forced to start from the standing position, the method of starting should be thoroughly practised. This can be done with many participants at a time, when for example the following procedure is made use of :

The starting position is in flank arrangement with a liberal mutual distance.

- (a) On the command " In position " the runners assume stride standing position with the left side towards the direction in which the run would take place. In this position, the knees are slightly bent, the body inclined forward and the hands supported on the knees. The head is turned to the right so that the gaze is turned in

- the direction from which the runner is expected to come.
- b) On the command "Ready" the left arm is carried in front of the body and stretched backwards as far as possible towards the coming runner (see Fig. 19).
  - c) On the command "Run" the left arm is swung downward and forward in the direction of the run; simultaneously, a turn is made on the balls of the feet so that one faces in the direction of the run. The body is thrown forward and then the right leg is jerked forward for the first step. During this movement of the right leg forward, the



FIG. 19.

right arm is swung backward and the left forward, so that full running balance is acquired at once (see Fig. 20).

- 1. Training in baton change during steady running: The participants are placed in two parallel lines with 10-15 m. distance between the lines. Those that are to receive the baton assume the same starting position as that described under "standing start," while the other line assume kneeling starting position with the baton in the left hand. The runners holding the batons start with the ordinary starting commands: "On your mark!—Get set!—Go!" whereupon they begin to move evenly to deliver the baton to the waiting second row. The second row cannot start on a command, since the arriving

runners do not move with equal speed ; therefore each receiver must decide for himself the right moment at which to start. After having received the baton a distance of 10-15 m. is covered, then the runners halt and prepare for a new baton change, in which the two lines change rôles. During this training the receivers should practise the correct judgment of the speed of the approaching runner, that is to say, start so soon and with just so much speed in the start that one has the same speed as the deliverer, when the change takes place (see Fig. 21).

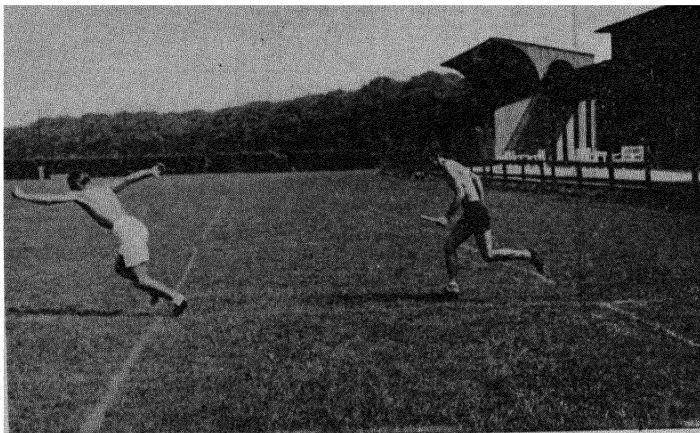


FIG. 20.

5. Training in changing at full speed within the regulation 20 m. takes place in this way : the field for the change (the 20 m.) is marked off, and the receiver places himself within the field close to the line nearest the approaching runner, having beforehand made a mark on the ground about 6 m. outside the line. As the runner approaches, the receiver assumes the position described under point 3 (a), and when the runner is near the 6 m. mark, the receiver changes over to the position described under point 3 (b). At the moment the runner has lifted his leg for the step with which he will pass the 6 m. mark the receiver starts, as described under point 3 (c), and attains full speed at once, as if he had just left the holes at the start of a 100 m. run.

The receiver should *not* look back, but should do his utmost to increase speed. When the deliverer has approached so close to the receiver that he perceives that he can lean forward to effect the change without losing his balance, he should call " Now ! "

That call is the signal for the receiver to stretch his right arm backward with the palm turned upward. The receiver should keep his hand as still as possible ; he should not begin to fumble for the baton or to look at it or the runner, neither should he decrease the speed for fear of passing the line before the change has taken place.

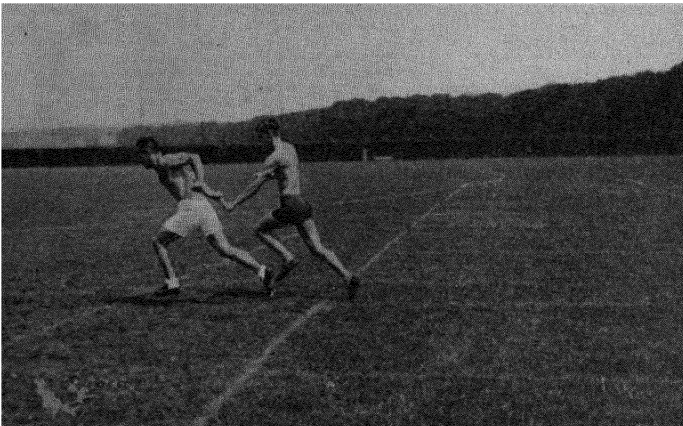


FIG. 21.

If it is obvious during the training that the runner cannot reach the receiver so early, that the change may be made within the 20 m. field, the 6 m. mark is moved forward, and if the runner reaches the receiver too early (that is to say before the latter has reached full speed) the mark is moved the other way. By experimenting in this way, assuming that both runners run at top speed each time, one can gradually find the correct moment for the start so that the change will at last become satisfactory.

If the instruction is carried out on an oval running track, the practice of the baton change should take place on one of the curves, partly because the change there is more difficult than on the long side, but especially because *at that point* it is easier for the teacher to control and guide the training. In order to obtain a general

oversight the teacher should not allow more than two couples to run simultaneously, even though there are several tracks at his disposal.

## JUMPING

ATHLETIC jumping is not determined by form, as is, for example, gymnastic jumping. It requires the observation of only a few definite rules with regard to the performance of the exercise; for example, high jump should not be performed like a fly spring or somersault, and in pole vault one must not move the hands up the pole after the take-off has been made (a condition that should hinder clambering up the pole).

In contrast to gymnastic jumping, where the landing and especially its finish is regarded as a very difficult part of a correctly performed jump, in athletic jumping the *finish* of the jump is of no importance to the decision, where high jump or pole vault are concerned; in such, the jump is regarded as complete as soon as the bar is cleared. The conditions are somewhat different in long jump and step, hop and jump; these jumps are measured from the jumping plank to the nearest landing mark, that is to say, the impression that the jumper leaves in the sand pit, regardless of which part of his body was responsible for the impression. It will be of decisive importance for the length of the jump that the body is so adjusted during the latter part of the jump itself and during the moment in which the landing is made that the individual can place his feet far forward and all the same preserve his balance after the landing is made, so that he does not fall in the direction of the take-off plank.

The run for the athletic jump is free, that is to say that it can be made long or short, according to the character of the jump, or to the ability of the jumper to accelerate; for example, a long jump or a pole vault requires a greater horizontal velocity and, therefore, a longer run than a high jump; but in all circumstances it is only the speed in the moment of the take-off that is of significance to the jump, and not the speed of the preceding part of the approach. It

will be natural, therefore, to increase the speed steadily during the run, but not so much that the jumper is unable to exercise full control over all his movements at the moment in which the take-off is made.

To be able to increase the speed at the end of the run, and all the same to keep full control over the movement during the take-off, can be done more easily if, during the approach, the last steps are lengthened so much that there is time to complete the unrolling before the body has gone too far beyond the jumping foot ; one cannot, then, in high jump or long jump, sprint the last steps of the run, since the body in such a case will have moved too far forward over the jumping foot before the latter has completed its unrolling (take-off).

An essential part of the training in jumping should be the practice of a correctly adjusted run and a completely balanced take-off. In general, the run is too long and thus represents superfluous work. It therefore pays, during the training, to spend some time on finding the most suitable run for each separate jump, that is to say, a run in which one, with steadily increasing speed and with full control of one's movements, attains the desired speed immediately in front of the place for the take-off, and can then adjust the position of the body accordingly, so that it will be possible to perform the take-off in the desired direction.

Since the path of the centre of gravity during high and long jump does not alter after the take-off, even though the different parts of the body can be moved in relation to each other, the result of the jump is essentially dependent upon the correct performance of the take-off.

#### LONG JUMP WITH A RUN

Long jump consists of the run—the take-off—the flight (that is to say, the movement of the body between the place of the take-off and that of the landing), and the landing. The jump is practised in such a way that in each jump (try) emphasis is placed upon only one of these phases. Gradually, as some proficiency is acquired in the performance of the separate phases, they are linked together in the correct order, until the whole is so well co-ordinated that the jump can be performed correctly even though, during the run, one aims at the greatest possible speed.

*The run* : It is advantageous to isolate the run and practise it alone, and then the procedure is as follows : About 25-30 m. from the take-off plank (a plank dug into the ground in the same plane as the run, which marks the place for the take-off) a starting mark is made—for juniors and boys the run should be considerably shorter—and about 7 running steps (that is to say, about 14 m.) from the plank another mark is made ; that should coincide with the foot of the swinging leg, and from this point the speed is increased as much as possible, and at the same time the steps are lengthened so much that the centre of gravity during the last step before the plank lies so far behind the jumping foot that during the movement of the body over the jumping foot in the take-off there is time for complete utilisation of the unrolling of the jumping foot.

In the above-described method of practising the run the jump should usually not be included, since as a rule, the legs will not be able to stand the continual violent take-off on the hard jumping plank ; instead of performing the violent unrolling of the jump, one *runs out* over the plank, although one tries to perform the run to the plank as though it is to be terminated with a jump.

*Take-off* : During the practice of the take-off it is especially important to adjust the body correctly over the jumping foot at the moment when the take-off is made (see Fig. 22), and also to have the arm movements united correctly to the run, so that, without interrupting the rhythm of the movements, they can be adjusted with the object of contributing to a completely controlled and well-balanced take-off, where the path of the centre of gravity should be correctly laid down, namely, with a rise of about  $35-40^{\circ}$ , the rise indicating the direction of the movement of the centre of gravity immediately after the take-off.

On account of the last lengthened step, the centre of gravity will, as previously mentioned, be behind the jumping foot when the latter is placed on the ground, but, moreover, the centre of gravity will, during the last lengthened step, lie lower than it did during the run, before the lengthening of the steps took place. Because of the relatively low position of the centre of gravity, even during the unrolling of the swinging leg, during the last step before the take-off, there will take place a decided lifting of the centre of gravity ; it is therefore at this stage in the exercise already moving forward and upward, a condition that eases the work of the jump-

ing leg during the subsequent violent unrolling of the take-off. The following movements are performed simultaneously with the unrolling of the jumping leg: the swinging leg is swung, with a slightly bent knee, forward and upward. The opposite arm to the swinging leg is swung forward to a little beyond horizontal position, while the other arm with a circular movement is swung a little downward and thence, with bent elbow, lifted outward with the forearm pointing forward.

After the take-off, the jumping leg should hang down slackly, and the take-off position (standing with one knee lifted) should, when, as in this case, it is a question of practising the *take-off*, be

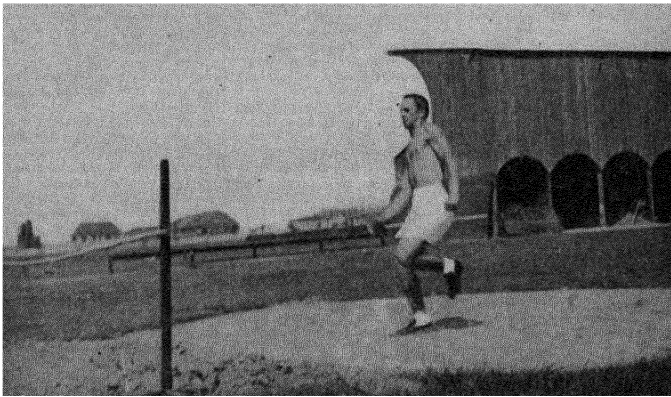


FIG. 22.

maintained until the landing has taken place, so that the landing is made in the landing pit upon the jumping leg, which gives in foot, knee and hip joint, and the exercise is completed with 2 or 3 running steps.

*The Flight* : In the case of a long jump the technique of the jumping during the flight of the body from the take-off to the landing is not so simple or casual as here described. There are then two parts to the flight which, for their correct performance, require the undivided attention of the jumper. The first part extends from the finish of the take-off until immediately before the highest point in the curve of the jump is reached ; the take-off position should be

maintained during this part of the jump—this is the immobility of the body and limbs in relation to each other which is technically described as “Hanging” (see Fig. 23)—and the object of the hanging is to preserve the balance during the jump, so that in the middle of it—without losing control over the movements of the body—one can begin the second part, which consists of a scissor kick of the legs, making it possible for both legs to move forward simultaneously in the landing. The scissor kick itself, which should be started immediately before the highest point of the curve of the jump is reached, consists of pulling the rear leg forward for the landing, while the fore leg in an opposite compensatory movement



FIG. 23.

is lowered, so that both feet reach the landing place simultaneously (see Fig. 24).

During the last part of the scissor kick the body is inclined forward, and the arms, which during the scissor movement of the legs quite automatically perform compensatory movements, are at last stretched forward in order to place the centre of gravity of the body as far forward as possible (see Fig. 25).

*The Landing* : Since, at the moment in which the landing is made, the legs are moved as far forward as possible in the direction of the jump, and in addition practically stretched, and since the body is much inclined forward, the whole position is such that the landing

must be made on the heels (see Fig. 24); it is therefore necessary to ensure soft and even landing places.

But the jump is not complete, because, when the jumper has



FIG. 24.

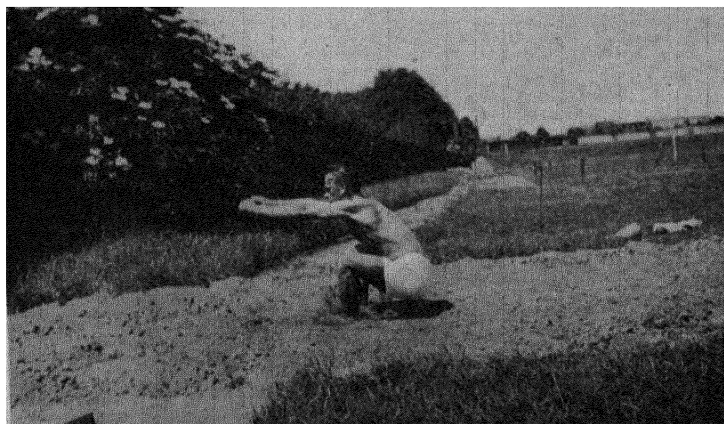


FIG. 25.

landed in the landing pit, it remains for him to move the centre of gravity, which, because of the position of the body at the moment the landing is made, lies behind the feet, over the feet without

touching that part of the landing pit that lies between the jumping plank and the place where the landing has been made (see Fig. 24).

Although at the moment of landing the legs are so far forward that, unless he does something to prevent it, the jumper will fall backwards towards the jumping plank, he can avoid this backward fall by combining a turning on his heels with a knee bending (whereby the centre of gravity is lowered) and by a simultaneous displacement sideways of his seat over his feet, just as his heels touch the ground.

The different phases of long jump which together make up the finished jump (competition jump) are then the following : The run—take-off—hang—scissor kick landing and displacement of the centre of gravity after the landing ; of these the hang and the scissor kick together make up the flight.

#### TRAINING IN LONG JUMP

1. Training in *the run* is carried out as described under the “run itself,” and it should be noticed that the run should always commence with a definite foot, for example, the jumping foot, and that the 7 steps mark should be touched by the foot of the swinging leg. During training in the adjustment of the run, the mark may be moved forward or backward until the run is of a suitable length for the individual, and until certainty is acquired in performing the run with uniform length of steps so that, when the individual reaches the 7 steps mark with the correct foot, he knows that the run is suitable. He can then devote his attention to the speed and the take-off.
2. *The take-off* is practised with a run and take-off on a grass track, which, with its relatively soft and springy surface, makes it possible to perform the take-off several times without injury to the legs. During the practice of the take-off the run should not be too long or too violent, and the jumping foot should not touch a previously determined spot in the take-off ; neither should emphasis be placed on the length of the jump.
3. Practice of *the flight* takes place after a run and a take-off from a grass track into the landing pit, but during this exercise the run is somewhat longer than during the preceding practice of the take-off itself, and the speed of the run is increased without the individual trying to jump far ; here it is only necessary to acquire, through practice, the correct balance in the “hang”

and the correct direction in the take-off. On account of the greater speed in the run, and the greater length in the jump, the swinging leg should be swung farther forward than during training in the take-off only, and for the same reason the jumping leg should be carried farther backward after the take-off (see Fig. 23). The difficulty in the acquisition of good balance during the take-off increases with the speed of the run.

It is difficult to maintain the "hang" for a sufficiently long time after the take-off; in order to animate the pupils and at the same time provide them with an opportunity of controlling the duration of the hang, one may place loose hurdles or jumping posts with bamboo cross-bars at a height of 50-60 cm. at a suitable distance out in the landing pit, and let the individuals train in "hanging" until the rear leg during the jump *has passed* the cross-bar (see Fig. 23).

When the rear leg has passed the cross-bar, it is pulled forward for the landing at the same time as the fore leg is lowered, so that the landing is made on both legs at once. In reality, in this exercise one trains in both the hang and the scissor kick, a natural result of the fact that the commencement of the scissor kick takes place during the hang.

A strict warning should be issued against the serious fault of training to acquire length in the jump at the cost of technique.

#### STANDING LONG JUMP

In the starting position one should face in the direction of the jump. The feet should be parallel, and at a distance of a good foot's breadth from each other. The arms should be lifted above the head so that the position is stretched without being rigid (see Fig. 26).

From this position the arms are swung in a long soft swing forward, downward, backward; simultaneously the body is inclined forward and the knees bent without the heels being lifted from the ground. As soon as the arms have reached the extreme of the backward movement (see Fig. 27) they are again swung forward with a quick movement and stopped in the horizontal position. Simultaneously, with the commencement of the forward swing of the arms, the body is inclined forward in the direction of the jump and the legs stretched for a vigorous take-off (see Fig. 28). These movements should be performed so that at the moment when the toes leave the ground in the take-off, the trunk and legs form an

angle of about  $45^{\circ}$  with the ground, while the arms are stretched horizontally forward.

No scissor kick takes place in the standing long jump ; on the

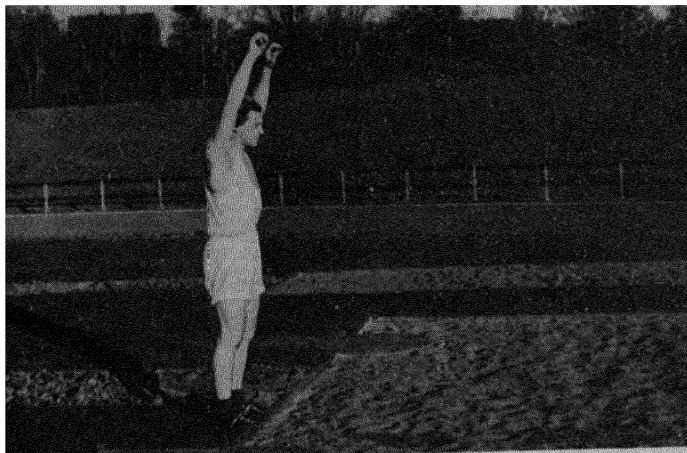


FIG. 26.



FIG. 27.

other hand, one should “hang” from the moment that the take-off is completed (see Fig. 29) until immediately before the highest point of the curve of the jump is reached ; thereupon the legs, with a

quick movement, are drawn up under the body and moved forward for the landing (see Fig. 30). This movement of the legs is compensated for by a downward backward swing of the arms ; but as



FIG. 28.



FIG. 29.

soon as the legs have been moved forward the arms are stretched (not swung) quickly forward again, so that their weight aids the maintenance of the balance after the landing (see Fig. 25).

### *Common Faults*

1. The take-off is made too late so that the jump becomes too flat.
2. The arms *swing* forward in the landing instead of being drawn up to the trunk and then stretched forward.

### HIGH JUMP WITH A RUN

Since, as already mentioned, no definite form for the jump is demanded, different methods of jumping have in time past been



FIG. 30.

developed, of which only some of the most commonly used will be mentioned here.

1. The "scissor jump." This is very reminiscent of the gymnastic oblique jump. By using this method one or two athletes have occasionally achieved a high jump of 2 m.
2. MacLaughlin jump. This is distinguished by the fact that the centre of gravity during the flight of the body over the cross-bar lies lower than is the case in the scissor jump ; it is thus a more economical method of jumping, and one with which, in Denmark, a height of about 1·80 m. has been reached, but with which, in other countries, athletes have achieved heights of over 2 m.

“Horine jump.” This was named after the first jumper that attained a particularly outstanding result (2 m.) in high jump by using this special method. Horine jump is reminiscent of MacLaughlin jump, and distinguishes itself by being just as economical.

The two last-named methods originated no doubt in California and, therefore, are often designated as “Western Style.” They are worth knowing, and Horine jump in latter years has been widespread in U.S.A. and elsewhere, and, although the style alters a little each



FIG. 31.

time one or another outstanding jumper shows it, the principle is still the same as in the original Horine jump.

*The Scissor Jump*: When training in high jump, the point as a rule is to practise the take-off thoroughly before one tries to achieve results in height. Where the scissor jump is concerned, emphasis must be laid upon keeping the trunk vertically over the jumping foot during the last part of the take-off. The horizontal movement during the jump appears as a result of the speed that has been attained in the run. If the speed is too great one is forced to make the take-off far from the cross-bar (which means a waste of strength),

The position of the take-off should be maintained until immediately before the highest point in the curve of the jump is reached (see Fig. 33), (if the place for the take-off is correctly chosen, the highest point will lie directly above the cross-bar); in other words, one should "hang" from the moment in which the take-off has been made until the swinging leg has passed a little over and the seat has almost reached the height of the cross-bar. When this point in the jump has been reached, there should take place a scissor kick of the legs, together with a turning and bending of the body

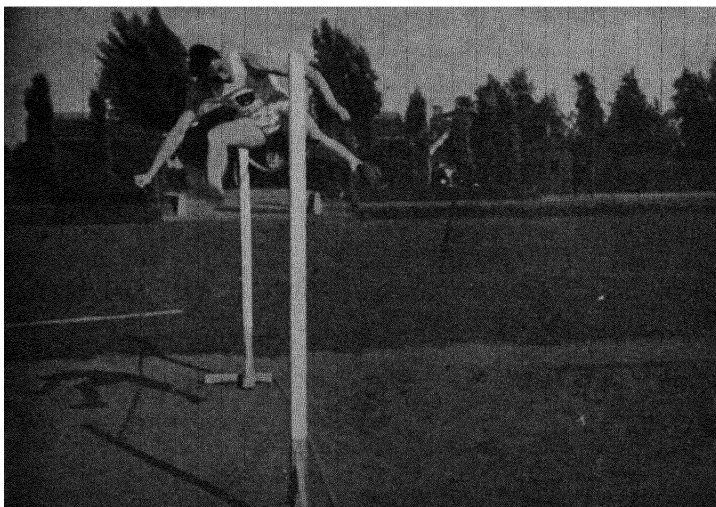


FIG. 34.

towards the cross-bar, that (see Fig. 34) should bring the seat clear of the cross-bar and ease the passage of the jumping leg over the bar.

The scissor kick commences, then, when the swinging leg has passed the cross-bar, and is carried out by swinging that leg in an arch downward, backward, and upward away from the cross-bar, and with the heel foremost in the direction of the movement, simultaneously lifting the jumping leg forward and upward and then, with bent knee and heel foremost, moving it over the cross-bar (see Fig. 35) and downward so that it is ready to make the landing (see Fig. 36).

In order that the scissor kick may take place in the manner described, there must also take place at the same time a turning of the trunk, whereby the seat is lifted and the flight over the cross-bar facilitated. This turning of the trunk, which should be so extensive that the jumper faces the cross-bar (see Fig. 35), should not be performed as a trunk twisting, but should arise as a natural result of the movement of the swinging leg during the scissor kick, and it can most easily be acquired if one, simultaneously with the commencement of the scissor kick, turns the head and looks towards

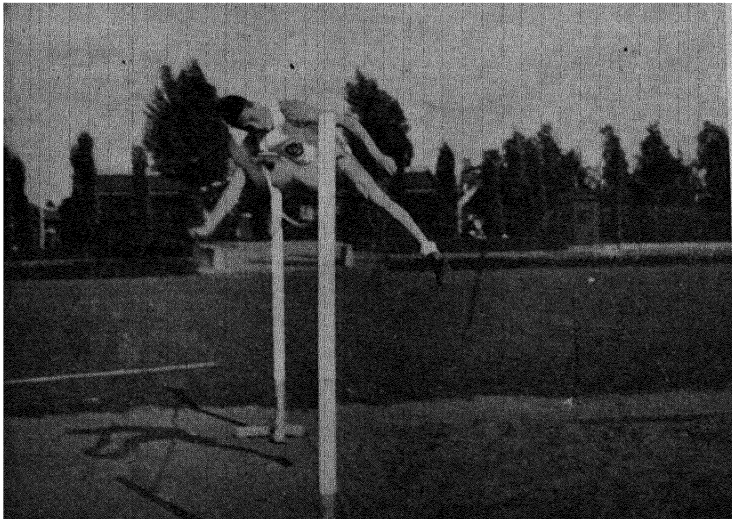


FIG. 35.

the cross-bar. The scissor kick commences on the take-off side of the cross-bar and is continued during the flight over it, to be completed in the landing. The landing takes place on the jumping foot facing the cross-bar and with the swinging leg pointing horizontally backward (see Fig. 37); the jumping leg gives, so that the landing finishes in half-spring sitting position in the landing pit.

*The arms*, which during the run are swung as in ordinary running, should, during the take-off and the "hang," work in the same way as during the take-off and the "hang" in long jump; during the scissor kick and trunk turning, the arms, with bent elbows, should

be lifted above the head so that they clear the cross-bar during the landing.

#### TRAINING IN SCISSOR JUMPING

1. Training in the run and take-off : where, during the run, special emphasis is placed on the fact that the last step is of such a length that in it the lifting of the centre of gravity should already begin (see the take-off for long jump, p. 51). In order



FIG. 36.

- to protect the legs this training should preferably be carried out on a grass track.
2. Practice of the direction, length and speed of the run with the subsequent jump over a relatively low height. Here special emphasis should be placed upon practice of the movements of the swinging leg with regard to direction and force in the upward swing.
  3. Training in the "hang" after the run and take-off on a grass track with observation of the correct position of the trunk and arms.



FIG. 37.



FIG. 38.

4. Practice in the scissor kick during relatively low jumps.
5. Training in skilful landing, which naturally takes place as a completion of every practice jump.

#### MACLAUGHLIN'S JUMP

The length and the direction of the run should be the same as in scissor jump, but in contrast to the latter the speed of the run should be regular, and the take-off should be made with the leg that is nearest the cross-bar during the run (see Fig. 38).



FIG. 39

Since the position of the body during the unrolling of the jumping foot is not vertically over it but is inclined backwards, and at the same time moved sideways, towards the cross-bar, the movements of the whole body during the take-off acquire more the character of an *upward swing* (see Fig. 39) (when one regards the movements of the legs and lower part of the trunk in relation to the shoulders) than a take-off where the whole body lies perpendicularly over the unrolling leg. During the flight the body at the highest point should lie horizontally over the cross-bar facing downward

(see Fig. 39), and with the face close to the cross-bar (see Fig. 40). The upward swing takes place in almost the same way as that in which from side towards walk standing position one swings up to the front lying position on a horse with a pad. If, for example, the horse is on the left with the surface in one's own chest height, it is unnecessary to raise the upper part of the body during the upward swing, since that is at the necessary height beforehand. It is then principally the right leg and the lower part of the trunk which should be lifted in a swinging movement over the horse. It is the same principle that is decisive during MacLaughlin's jump, where

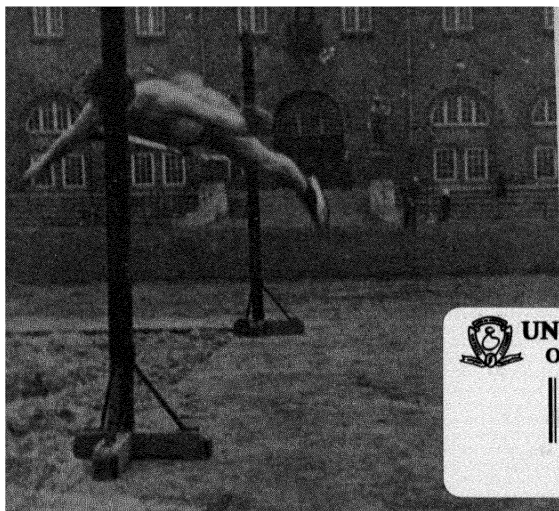


FIG. 40.

one should pass the cross-bar with chest towards it and the trunk horizontal (see Fig. 40).

At the moment in which the take-off is made, the shoulders are held back a little in the movement forward, at the same time as the body is inclined towards the cross-bar. The swinging leg, that is to say, the leg farthest away from the cross-bar, is at the same time swung vigorously obliquely forward and upward over the cross-bar to be forced downward as soon as it has passed the latter, ready to make the landing.

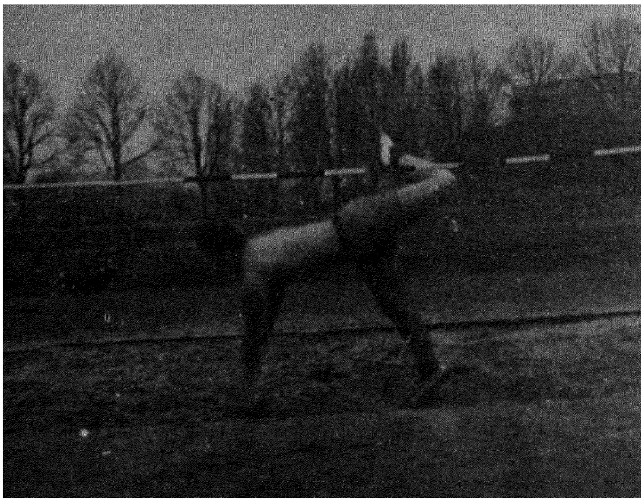


FIG. 41.

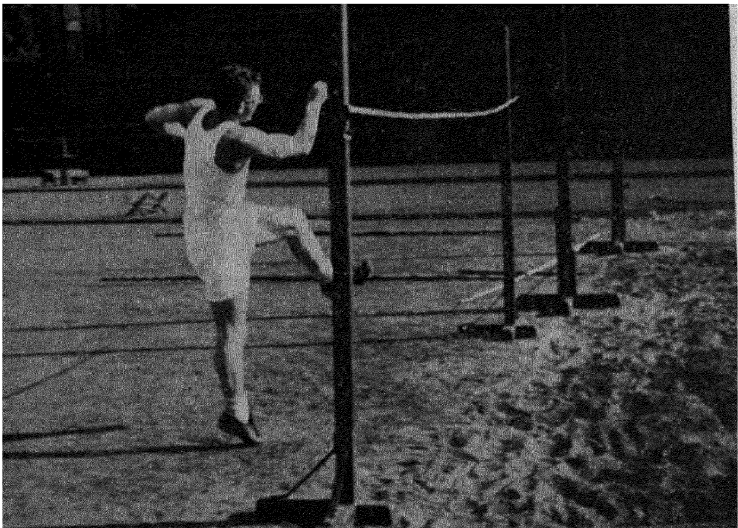


FIG. 42.

Simultaneously with the movement of the swinging leg, the arm of the same side is swung over the cross-bar, and during the first part of this movement the take-off is made with the jumping leg. As the swinging leg, after passing the cross-bar, is forced downward the jumping leg is swung backward and upward and, with a kick, is stretched out parallel to the cross-bar in order to clear it. The arm of the side of the jumping leg is swung either backward to the body or forward and upward in continuation of the body in order to clear the bar.

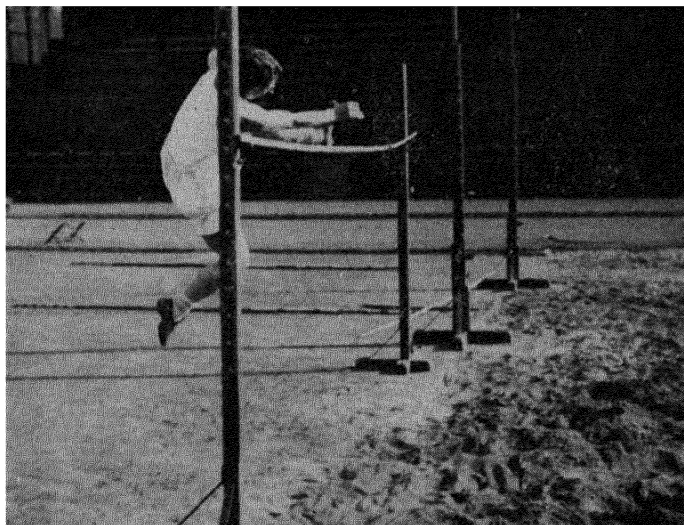


FIG. 43.

If one ensures that the body during its flight lies parallel to the cross-bar, it is a method of jumping with which one can easily achieve particularly good results without the necessity of quick muscle contraction or strength. It is of great importance that the downward movement of the swinging leg should be performed so that one lands on that leg instead of the hands. In the latter case the wrist joints are greatly exposed to injury (see Fig. 41).

#### HORINE JUMP

In MacLaughlin's jump, one passes the cross-bar with chest towards it, since the turning of the body is aided by the fact that the

arm and leg of the same side accompany each other in the movement of the take-off. On the other hand, in Horine jump, one passes the cross-bar *side towards* it in a rolling movement from the side of the take-off to the side of the landing, with the body lying parallel to the cross-bar (see Figs. 43 and 44).

The run and the take-off are performed almost in the same way as in MacLaughlin's jump, the only difference being that the run is a little more lively. Furthermore, during the take-off the body is held in the same position, and the first part of the movement of the



FIG 44.

swinging leg takes place in the same manner as in MacLaughlin's jump, but in contrast to that jump; in Horine jump the opposite arm and leg accompany each other in the movement upward over the cross-bar (see Fig. 42).

When the trunk has been lifted so high that it lies with side towards above the cross-bar, the arm nearest the cross-bar (opposite to the swinging leg) should be stretched vertically downward, and simultaneously the swinging leg, which at that time has passed well over the cross-bar, should be swung backward and upward to compensate the movements of the jumping leg. The latter (the

jumping leg) should, at the same time that the scissor kick is made with the swinging leg, be drawn quickly up over the cross-bar, to be stretched vertically downward as soon as it has passed the bar in order to make the landing, which should take place on the jumping leg while the swinging leg points backward in an almost horizontal position. On account of the sideways rolling over the cross-bar that takes place during the jump, the body will face downward in the landing (see Fig. 45).

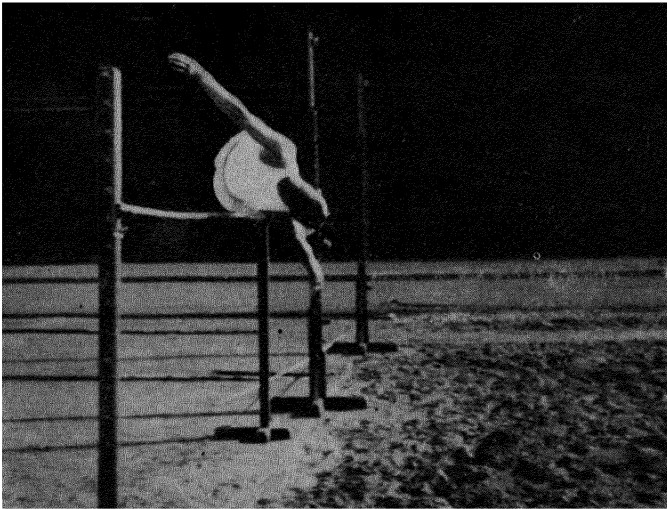


FIG. 45.

The arm on the side of the swinging leg, during the upward swing, is with bent elbow lifted obliquely outward and upward almost as in scissor jump, so that, when the body is above the cross-bar, it is carried a little past the latter. From this balanced position there will take place, during the subsequent scissor kick and landing, involuntary, compensatory movements.

The whole jump has not so much the character of an upward jump as of a swinging movement (around the shoulder line) that is followed by a side turned rolling (forward in the direction of the jump) over the cross-bar, during which there takes place a vertical scissor kick with the legs.

## TRAINING

The training in MacLaughlin and Horine jump should be intensive and frequent without unduly tiring the legs. The following phases of the jump should be specially studied during training :

1. The position of the body and the limbs at the moment of the take-off.
2. The rolling over the cross-bar in the middle of the jump.
3. The direction of the scissor kick and the complete performance of the scissor kick, so that the landing is made on the jumping foot.

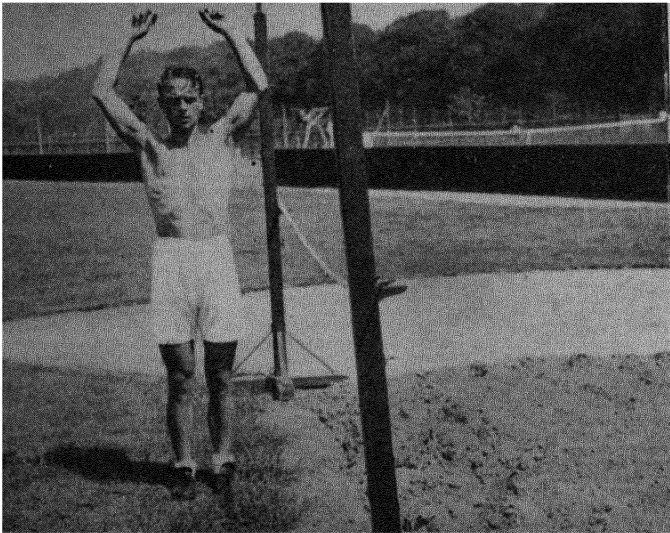


FIG. 46.

### *Common Faults*

1. The run is too violent and does not take place at the correct angle to the cross-bar (about  $45^{\circ}$ ).
2. The take-off is not performed so that the highest point in the curve of the jump lies immediately above the cross-bar.
3. During the take-off the body is too far forward, so that it does not lie parallel to the cross-bar during its flight over the latter.
4. The rolling of the body is stopped during the performance of

the scissor kick, so that the scissor kick of the swinging leg backward and upward is directed backward over the cross-bar instead of vertically upward.

#### STANDING HIGH JUMP

In the starting position the jumper stands with side towards the cross-bar and at about one-half arm's distance from it. The feet are parallel and slightly apart. The arms are lifted above the head

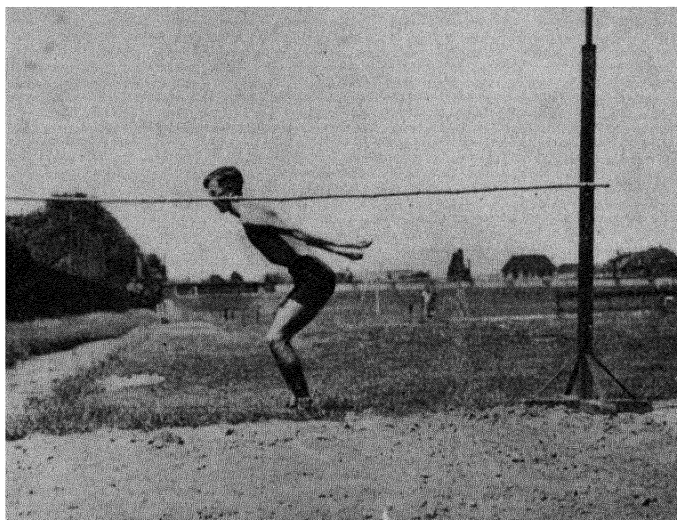


FIG. 47

so that the position is stretched without being rigid (see Fig. 46). From this position the arms, with an easy swinging motion, are moved forward, downward and backward; at the same time the body is inclined slightly forward and the knees slightly bent without the heels being lifted from the ground (see Fig. 47). The movement of the arms is continuous, as soon as they have reached the extreme of the backward movement they are swung vigorously forward and upward, and suddenly stopped a little over the horizontal position. During the forward and upward swing of the arms, the body is raised and the legs stretched for a vigorous take-off.

Since, as well as jumping upward, one must also jump sideways over the cross-bar, as soon as the arms have reached the limit of the backward movement one should incline the body slightly towards the bar (see Fig. 48). This angle of inclination increases regularly during the subsequent knee stretching, so that the jump acquires an oblique upward direction over the bar. When the take-off is completed the leg nearest the cross-bar is swung forward and upward over the latter at the same time as the opposite leg is swung back-

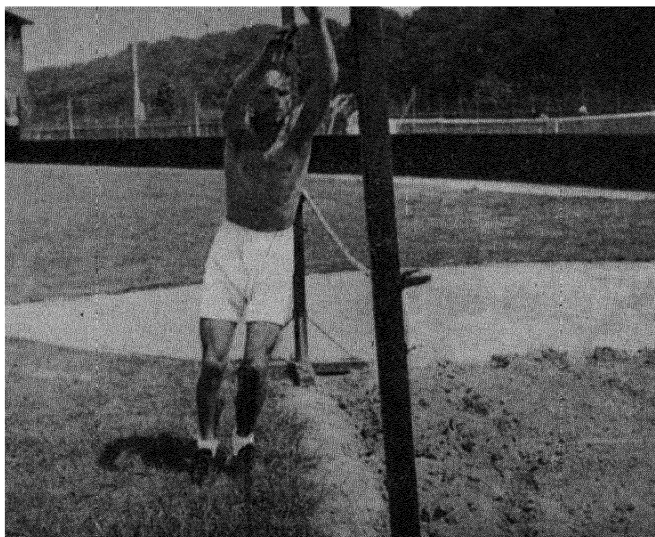


FIG. 48.

ward, in order to preserve the balance of the body during the take-off (see Figs. 49 and 50). When the fore foot is a little past the bar, the leg is swung downward on the side of the landing. Simultaneously the rear leg is swung forward and upward over the bar and downward on the other side ; in other words, a scissor kick takes place.

If the direction of the take-off is correct the highest point of the jump will be directly above the bar at the moment in which the jumper is in the midst of the scissor movement (see Fig. 51). While the scissor kick takes place there is also a displacement sideways of the pelvis during its flight over the bar. This movement of the pelvis away from the bar will result in a position of the body in which the

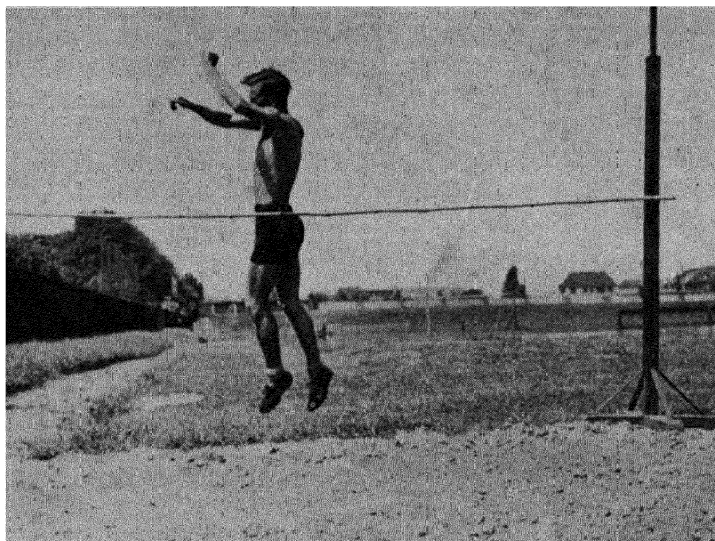


FIG. 49.



FIG. 50.

shoulders or arms are easily disposed to knock down the bar, and which can cause a clumsy landing, unless the jumper moves the pelvis in the opposite direction immediately *after* the cross-bar is passed, so that the body is moved back again over the landing leg before the landing itself takes place in the landing pit.

#### TRAINING

1. Stretch standing rhythmical arm swings combined with knee bending and stretching without a take-off.



FIG. 51.

2. Standing vertical take-off combined with the scissor kick of the legs and soft landing.

#### *Common Faults*

1. The direction of the take-off is incorrect so that the jump is made obliquely forward instead of sideways.
2. The backward swing of the leg during the take-off is not sufficiently extensive so that the body is moved too far backward as a result of the lifting of the swinging leg.

## HOP, STEP AND JUMP

Hop, step and jump consists of a *hop* (wherein the take-off and the landing are made on the same foot), a *step* (wherein the take-off is made on one foot and the landing on the other), and a *jump* (wherein the take-off is made on one foot and the landing on both). The jump is measured from the take-off of the hop, that is to say, from the jumping plank, to the impression left on the landing pit after the finished jump. Consequently there are between the first take-off and the final landing two intermediate landings.

A hop and a step sound very innocent, but if the hope, step and jump is to have an appreciable length both the hope and the step must be of such a length that in reality each may be regarded as an independent jump. In practice this means that, in the two intermediate landings, the jumper must land heel first and then "roll" forward on his foot in order to take-off with the ball of the foot. Such a landing on the heel in 99 cases out of 100 will result in a very violent impact, because the shock of the landing on the heel must be broken by a giving in the knee and hip joint, a movement which, if it is to be sufficiently extensive to break the shock of the landing, will to a great extent increase the difficulty of attaining an effective combination of the subsequent movements. The fact that the intermediate landings must be made upon the heel is in itself sufficient to prohibit hop, step and jump in school athletics, and when, in addition, because of the intermediate landings, it can never be of practical significance as a jump, it ought also to be excluded from the list of exercises in voluntary athletics.

In hop, step and jump, performed from standing position, there is not the same danger of a hard landing on the heel as there is in hop, step and jump with a run, but since standing hop, step and jump is of no practical significance either, it is only mentioned here to draw attention to the absurdity of regarding it as a *jump*.

## POLE VAULT

Even for the beginner pole vault can be an enjoyable but also a fatiguing, and not entirely danger-free exercise. The enjoyment lies in being able almost at once, with the aid of the pole, to clear much greater heights than one could ever clear in ordinary high jump. The element of fatigue lies in carrying the pole during the

run, and the danger comes to the fore if one has not sufficient patience to practise the style until it is correct, and to jump over easily surmountable heights until one has learnt the art of falling down on the feet after the jump and, moreover, of falling skilfully. The exercise itself consists of swinging up with the help of the pole to the greatest possible height and then, after clearing the bar, of releasing the pole and landing without it.

There is no doubt that the performance of pole vault requires courage, and not a few clever athletes have received hard blows (and unnecessary injuries) by trying to achieve a high jump at once. A fall on the head or the back in the sand pit, even from a height of 2 m., can be a decidedly uncomfortable experience. If, on the other hand, one practises the jump, beginning with the fundamental principles, all these discomforts will, as a rule, be avoided, since, little by little, one becomes accustomed to landing from increasing heights.

The pole should be of bamboo. It is dangerous to use a pole that will splinter, and a sufficiently strong pole of ordinary wood would be too heavy to manipulate during the run and take-off. The bamboo pole must be so substantial that it does not bend very much during the performance of the jump. It is a temptation to choose a lighter pole because it is easier to run with, but it is dangerous because the pole is most likely to break at that moment during the swing when the legs are higher than the head, so that a fall from a broken pole takes place as a rule upon the back of the neck or the shoulders.

The landing pit should be of a surface area at least  $4 \times 4$  m. and of a depth of  $\frac{1}{2}$  m. It should be filled to the brim with sand or smooth gravel.

The slide way, that is to say, the wooden box in which one places the lower end of the pole during the take-off, should be so placed that its rear wall from the boundary of the landing pit and its brim lies in line with the path of the run.

The jumping stands may be of variable length, but each must have a solid base. For use during training the cross-bar should preferably be of bamboo.

For seniors the pole should be  $3\frac{1}{2}$ - $4\frac{1}{2}$  m. long. For juniors and boys it should naturally be somewhat shorter, but it must never be so short that the jumper is forced to hold the end of the pole during

the jump, and it should preferably be so long that the upper end can act as a counter weight during the run, thus increasing considerably the possibilities of a well-balanced run. The part of the pole that one holds during the run and take-off should be bound with adhesive tape, and also such tape should be placed at intervals on the upper part of the pole between the rings in the bamboo, partly to strengthen the pole and partly to prevent it splitting. The pole should not be made brittle by being allowed to lie out in the sun and rain.

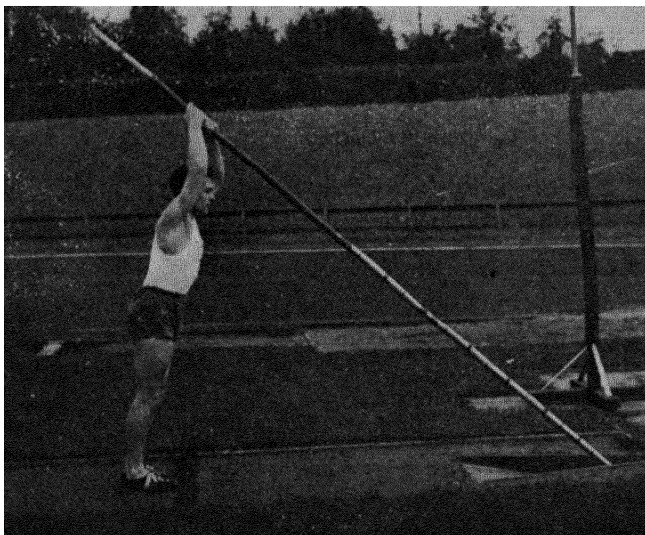


FIG. 52.

If one has no knowledge at all of pole vault it is most sensible to begin without the cross-bar, so that it is only necessary for the body to swing like a pendulum with the hands as the fixed point. One might perhaps describe this introductory exercise as a "swing." In this exercise one should, with the lower hand, grasp the pole in stretch height when the pole is placed vertically in the slide way, and when one stands at the side of it (not in it). The upper hand during the run grasps about 40 or 50 cm. higher up towards the top end of the pole. The grasp should be such that the thumbs of both hands point towards the top end of the pole.

During the run, which for this introductory exercise should not be longer than 15-20 ordinary steps and which should be performed at a regular speed, one should do one's utmost to face in the direction of the run, and at the same time hold the pole in horizontal position a little above hip height, or resting on the hip, with the lower end pointing towards the slide way (see Fig. 53).

The correct place for the take-off is found in the following manner. After gripping the pole at the given height, one stands facing the landing pit, the lower end of the pole is placed in the

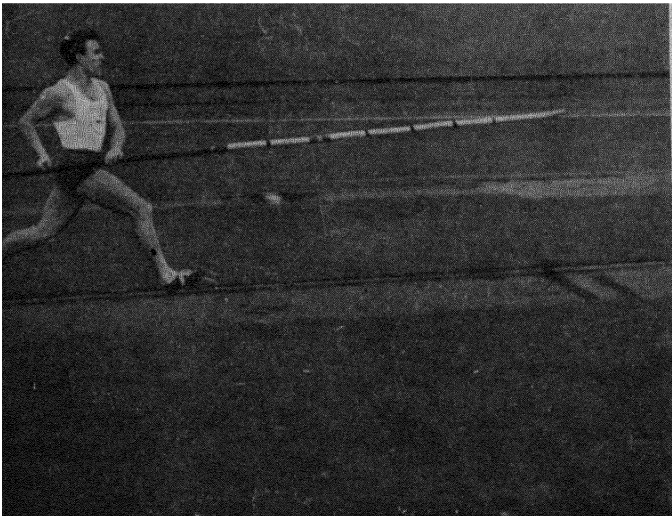


FIG. 53.

bottom of the slide way, the pole is moved forward in front of the body with the arms straight, and the feet are moved until they are vertically under the uppermost hand (see Fig. 52). Immediately in front of the toes a mark is made across the path of the run ; this mark indicates the nearest point to the slide way that the jumping foot may approach during the take-off. This method of finding and marking the place of the take-off is not only for use in the introductory exercises but also for the highest jumps, and should be diligently used as a means for controlling the correct choice of the place for the take-off.

During the last steps of the run, at the same time as the lower end of the pole is placed in the slide way, the hands should be moved forward in front of the individual so that the pole is in the vertical plane and directly in front of the body during the *take-off* (see Fig. 54).

If during the run the pole is held on the right side the take-off should be made on the left foot, and the right leg should be swung forward and upward as in the take-off for long jump. As soon as the left leg has completed the take-off, it should be swung forward



FIG. 54.

to the right leg. During the subsequent swing of the whole body, the pole must not be released before the landing has been made. During the take-off and the swing past the pole, the latter will be forced slightly to the side out of the vertical plane ; the form of the swing should be such that the pole is again forced back to the original plane as soon as the body has passed it ; in addition the swing of the body past the pole will cause the latter to rotate on its own long axis, so that the jumper faces the place of the take-off when he lands in the landing pit. If the pole has been placed in the vertical plane before the take-off, and if the body during the swing

has moved in the same plane, the landing will take place in exact continuation of the run, a condition that should be observed as a means of control in all jumps, also high jumps.

If the pole is *not* moved forward in front of the body so that it is in the same vertical plane *during the take-off*, there may, even in a little innocent swing, take place a number of surprising events, such as, for instance, landing on the back with the pole on top of one, or being exposed to a helter-skelter, the conclusion of which cannot be foreseen. As a rule these clumsy landings are not dangerous as long as a low grip is used ; the affair assumes a very different aspect if, immediately after the take-off, the jumper becomes nervous and releases the pole ; he then risks landing on his back across the margin of the slide way, an event that is so dangerous that the necessity of holding on to the pole with both hands until the swing is finished should be regarded as the most important rule for beginners in pole vault.

As long as one is not fully confident in the swing a jump over the cross-bar is senseless.

When the difficulties that beset the beginner are overcome the jump should be practised with a higher grip, though still without a cross-bar ; but the character of the jump is altered a great deal, the run should be both longer and faster, the take-off should assume to a greater extent the character of a real take-off, and the swing of the body should be greater than was the case with a lower grip. The higher the grip on the pole the greater must be the speed of the run, and the more vigorous the *take-off* (see Figs. 54 and 55).

In order to swing farther on the pole the body during the take-off should be so energetically moved that, as a result of it, the pole can be raised to the vertical position, notwithstanding the fact that during the jump there takes place mutual displacements of body and limbs, or that the body maintains unaltered the position of the take-off. In other words, it is *not* sufficient that there is energy enough during the take-off to raise the pole to about  $45^{\circ}$  in the supposition that the subsequent swing will be able to pull the pole upward to the vertical position. If we suppose that the energy provided by the run and the take-off is already used when the pole has reached a position in which it forms an angle of  $45^{\circ}$  with the path of the run, an attempt to swing the body farther upward towards the cross-bar will result in the pole being pulled backward towards

the place of the take-off, since the hands, which are the fixed point (starting point) for the movement at that instant, lie behind the lower end of the pole (the supporting base). It is quite a different thing that, in order to lift the legs over the cross-bar at the correct time, one may begin the "swing" when the pole is raised to about  $45^{\circ}$  (see Fig. 56).

The higher one can grasp the pole and complete the take-off the higher the jump will naturally be, but one should remember that the ability to raise the pole to the vertical position, with a high

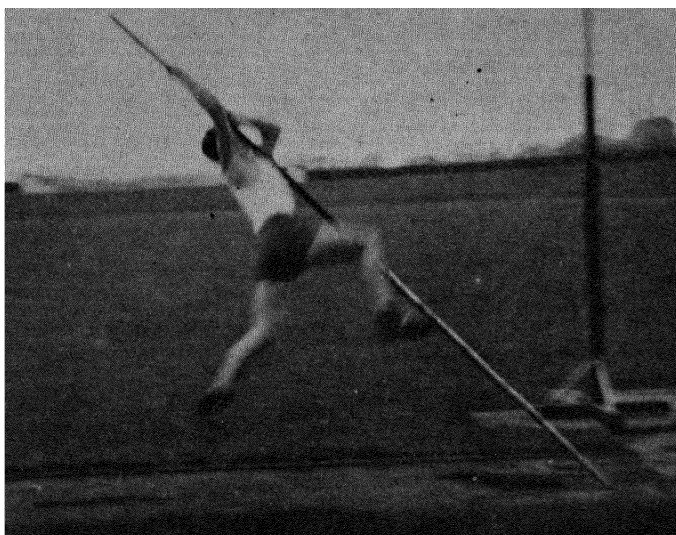


FIG. 55.

grip, is not only a question of the speed of the run, but to just as great an extent a question of an appropriate combination of the movements of the take-off and also of the *position of the pole* during these movements. This is a factor on which the concentration of the jumper should ways be focussed during training.

If the run is in order, and if the pole is moved correctly in front of the body, and the take-off made in the correct place, it is very seldom that the jump is technically unsuccessful. Therefore, it is of the utmost importance that the beginners *teach themselves* to manipulate the pole correctly. By making use of an assistant, whose

task it is to grasp and steer the pole during the take-off, the jumper will never learn to overcome his difficulties.

During the swing the hands maintain the grasp that they have during the run, but before one progresses to jumping over the cross-bar at a greater height, one must learn to move the hands closer together immediately before the take-off is made. It is always the lower hand that should be moved up towards the upper one, and

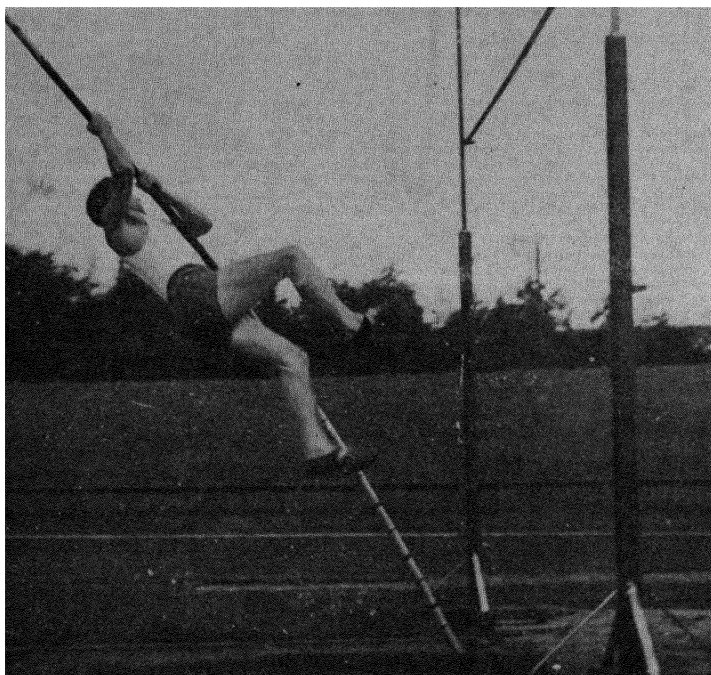


FIG. 56.

that movement of the hands takes place during the two last steps of the run and in the following way : As the pole is moved in front of the body to be placed in the slide way, the lower hand releases its grip so that the lower end of the pole *falls* (is not placed) into the slide way. The hand should not be taken away from the pole but slid quickly up until it is about a distance of one hand's-breadth from the upper hand, where the grip is resumed. During this movement it is the upper hand that moves the pole in front of the

body, so that it is placed in the vertical plane in the instant that the lower end reaches the bottom of the slide way, and the take-off is made.

When one without difficulty can place the pole correctly during the take-off, and can move in the vertical plane during the jump so that the landing is made in continuation of the path of the run, training in jumping over the cross-bar may be commenced ; the cross-bar should never be placed below stretch height, even for beginners it should be at such a height that, in order to clear it, it is necessary to swing so high that during the swing the feet are higher than the head.

While jumping with a relatively low grip on the pole, the jumping stands should be placed far back (in the jumping pit) so that there is space for the swing of the legs in continuation of the path of the run. Placing the cross-bar too close to the place of the take-off is often the reason for knocking the cross-bar down, because the legs during the swing come under it instead of over it. If, on the other hand, the stands are so placed that the cross-bar is between 10 and 20 cm. behind the vertical rear wall of the slide way, there is room for the swing even when the jump is low. The correct position of the stands is found by observing the jumper from the side and noticing, during a successful jump, the relationship of the position of the jumper to the cross-bar at the moment when he is at his highest point. That point should be exactly above the cross-bar.

If one is unable to discover how long the run should be by measuring with the eye, and if one has difficulty in determining the *place for the commencement* of the run, the following method may be used :

After grasping the pole at the correct height, one stands with one's back towards the jumping pit beside the slide way, so that the heels are in line with the vertical rear wall of the latter. One then runs away from the jumping place. When the speed of the run is sufficient for the accomplishment of a jump of the height at which one at that moment is training, the lower end of the pole is placed on the ground in the same way as in a take-off, but as soon as the pole touches the ground it is released and the run is continued until it can be stopped in the normal way. The mark which in this way has been made by the pole is used as the starting-point for the run in the correct direction.

The run should be of such a length that the jumper (in accordance with the height of the grip) can attain the necessary speed immediately in front of the place of the take-off. During the first half the velocity is increased to a good regular speed. During the last half the speed is increased to the utmost at the same time paying due regard to the maintenance of full control of the running movements and of the correct position of the pole. In order to have good control over and good balance in the take-off the steps must be lengthened somewhat during the last part of the run.

The position of the body and of the legs during the take-off has much in common with the take-off for long jump. At a moderate height the technique is not especially difficult, because the grip on the pole is so low that the pronounced take-off is rendered superfluous so that one, even at the completion of a regular run, can go over into the "swing" immediately after the take-off and still be able to raise the pole to the required vertical position. A moderately good jumper can thus, with the upper hand gripping the pole at a height of about 2.90 m., swing with comparative ease over a bar at the same height. The affair assumes an entirely different aspect when the jump requires a higher grip. The higher the grip is, the less will be the angle formed by the pole and the path of the run at the moment of the take-off, and the greater must be the speed of the run and the force of the take-off in order to raise the pole to the vertical position.

With a high grip on the pole the swing should not be commenced too early. Since the immediate continuation of the "swing" must be a "pull" (a lifting of the body), a swing that is commenced too early will result in the "pull" taking place too early in the jump, so that it hampers the raising of the pole to the vertical position and makes difficult the rest of the swing which should bring the body over the cross-bar. It is, therefore, necessary immediately after the take-off to "hang" (see Fig. 55) (to maintain the position of the take-off) until the pole approaches an angle of  $45^{\circ}$ .

If the run is fast enough and the take-off well balanced, there is no difficulty whatever in performing the "hang" or in combining correctly the subsequent movements, just as the correct moment for the change from hang to swing, from swing to pull, etc., is quite easily found, as will be seen from the following :

After the take-off and the “hang” the legs are swung forward and upward over the cross-bar. The swing takes place preferably by a movement in the shoulder joints, which during the beginning of the swing are almost vertically below the hands.

When during the swing the legs have moved upward towards the cross-bar the arms will to a great extent be relieved of the weight of the body. This is felt very distinctly and is a signal to perform

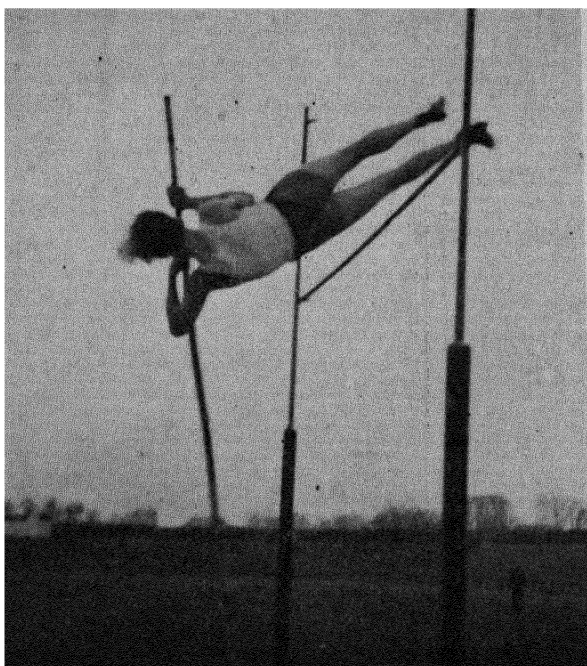


FIG. 57.

the movement technically called the “pull,” and which is simply a body raising, the object of which is to lift the body to the height of the hands without stopping the swinging movement (see Fig. 57). A pull performed too early will, as already mentioned, not only stop the swing of the body but also the raising of the pole towards the cross-bar. The position of the body during the pull will be with the chest turned towards the pole and the side turned towards the cross-bar, which is a natural result of the grasp of the hands

(see Fig. 57). The pull should stop naturally when the chest is level with the hands, but the movement up towards the cross-bar as a whole should not stop here ; it should continue as a trunk-turning, which—combined with an upward pressure of the arms—is technically called “ push ” (see Fig. 58).

When one has reached the point in the jump where the “ pull ” is completed and the “ push ” commenced, the legs are well over



FIG. 58.

the cross-bar and should then, simultaneously with the commencement of the trunk turning, be forced down on the landing side of the cross-bar. As a result of these simultaneous movements—the push, the leg movement, and the trunk turning above the cross-bar—the seat will be the highest point of the body, when the jump is at its highest (see Fig. 58). This circumstance makes it possible to grasp the pole an appreciable distance below the height of the cross-bar and still clear the latter.

If the jump is successful the jumper now finds himself in an angle position with the legs on the side of the landing, trunk and arms on the side of the take-off and the seat, as the highest point, immediately above the cross-bar (see Fig. 59). A condition for the success of the remainder of the jump is that the trunk and arms can be moved over to the landing side without knocking down the cross-bar. This can be done by exerting a vigorous *downward*

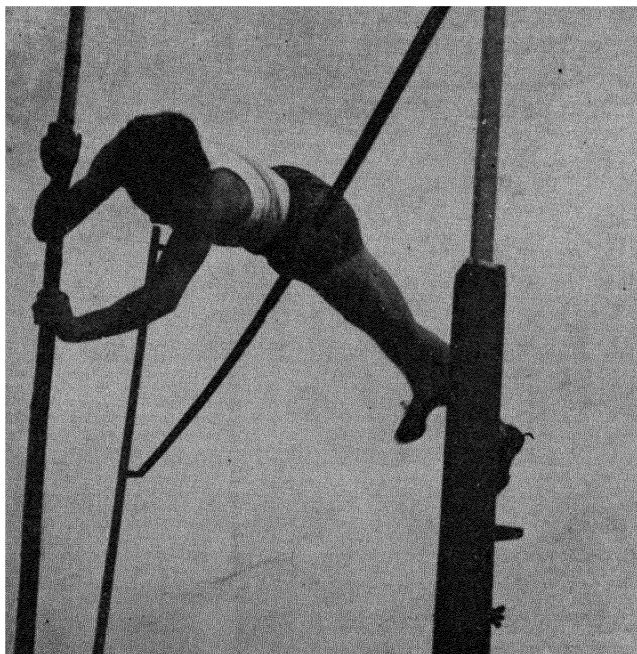


FIG. 59.

*pressure in the direction of the long axis of the pole with the hands during the unrolling. This unrolling takes the form of a divided push-off, first with the lower and then with the upper hand, and should be balanced by compensatory movements of the legs, a scissor kick (see Fig. 58). Immediately after the unrolling of the hands the trunk is thrown upward and the arms are lifted to clear the cross-bar during the landing. The scissor kick, which is performed by the legs to balance the divided push-off of the hands,*

should conclude with a backward movement, so that the angle position of the body is straightened out, and the landing is prevented from taking the form of a fall on the back or the neck. During the push-off of the hands a trunk twisting is again commenced, which is continued during the landing so that one lands with the back towards the cross-bar.

Of the landing itself it may be said that it can never be too skilfully performed. One can, when one begins with low jumps and increases the height gradually, train oneself to land skilfully even from greater heights, and it is absolutely essential to carry out this training thoroughly, since a clumsy landing from heights between 3-4 m. can be exceedingly dangerous.

#### COMMON FAULTS DURING TRAINING

1. That care is not taken in digging and levelling the landing pit before and during the training.
2. That the solidity of the pole is not tested before it is used for jumping.
3. That training with the object of technical efficiency is too little and too rare.

#### EXAMPLES OF SPECIAL TRAINING

1. Sprinting with the pole for distances from 20 to 40 m. on a grass track.
2. Take-off and "hang" performed without a pole as in long jump, the run taking place on a grass track.
3. Fall hanging heaving exercises.
4. Unrolling exercises for the arms, for example, front hand lying arm bendings with subsequent quick arm stretchings, etc.
5. Climbing and angle hanging vertical arm travelling in a single rope.
6. Continuous heave swing in a single rope with turning at the end of each swing.

## THROWING

ATHLETIC throws are long throws and are designated according to the apparatus, as discus, javelin, hammer and weight throwing. In addition, there is included in the throwing group an exercise that is called shot putting, because the apparatus—an iron ball—must not be thrown but must be thrust. This difference will be dealt with in detail in the description of shot putting.

In throwing and putting technique plays just as great a rôle as in running and jumping. It is, therefore, of the utmost importance that, while practising these exercises, one puts the greater part of the work into acquiring the correct technique. The acquisition of the correct technique is easier during the *preliminary practice* than later, when eventual unsuitable habitual movements have become permanent.

In throwing the relatively heavy apparatus used in athletics the greater part of the work falls necessarily upon the legs and the trunk. During the greater part of the throwing movement the arms have the comparatively passive task of steering the apparatus, and it is only towards the completion of the throwing movement, at a point where the movement of the trunk has almost reached its maximum speed, that the arm performs active work as a sort of conclusion of the movement that is started by the legs and continued by the trunk. Therefore, in all throwing exercises, there is included a stretching of the legs as well as a turning and raising of the trunk.

The starting position and the run are different in the different throwing exercises, but it is obvious from the preceding remarks that the run must not be performed faster than that the correct leg and trunk position can be assumed immediately before, and can be maintained during the throwing movements of the arms with which the run is concluded.

In discus throwing, javelin throwing and shot putting the *finish position* (throwing position) is the same, namely, an oblique position in relation to the direction of the throw, with a suitable distance between the feet, that is to say, such a distance that it allows a certain turning of the pelvis, and afterwards gives the condition for the accomplishment of an effective trunk twisting and trunk raising at the moment of the throw, a position that also enables the "direction of the force" to coincide with the desired direction of the throw.

The advantage of a throw with a run lies in the fact that the body, besides making the movements that are made in the standing throw, is at the same time in motion forward in the direction of the throw.

The greater the speed of the apparatus at the commencement of the throw the longer the latter will be, all else being equal. But the length of the throw depends besides upon many other factors, among which may be named the direction of the movement at the moment of delivery, the height of the hand over the surface when the apparatus is released, and in javelin and discus throwing the position of the apparatus at the same moment. The last-named condition is to a great extent decisive in the effect of the resistance of the atmosphere.

#### DISCUS THROWING

The discus is an almost flat circular wooden object enclosed in an iron ring, and bored out in the centre so that molten lead may be poured into it until it acquires the regulation weight. The diameter, thickness and weight is different for different ages. For seniors (from 18 years and upwards) the diameter should be 21.9 cm., and the weight at least 2 kg.; and for youths (16-18 years) a diameter of 20 cm. with a weight of 1.5 kg. For juniors (14-16 years) a diameter of 18 cm. with a weight of 1.5 kg. should be used; and for boys (12-14 years) the diameter should be 15 cm. and the weight 1 kg.

The throw is made from a ring 2.5 m. in diameter, and is measured from the mark made by the fall of the discus to the inner edge of the ring, so that a continuation of the line between these two points would pass through the centre of the ring.

The method of learning to throw the discus is as follows :

1. Learn the grip and balancing of the discus, then practise
2. The standing throw, and, when that can be performed more or less correctly,
3. Practise the run, and finally
4. The throw with a run.

To practise the grip and balance of the discus one should hold it in front of the body in chest height, resting on the tips of the fingers of the left hand, surface downward. The right hand should be placed over the discus with the fingers spread out and bent at the last joint, so

that the finger ends extend over the edge of the discus. The thumb should be moved as far from the other fingers as possible. Then the discus should be moved down to the right side, the left hand should leave go so that the discus stands on its edge resting in the last joints of the fingers of the supporting hand and supported by the

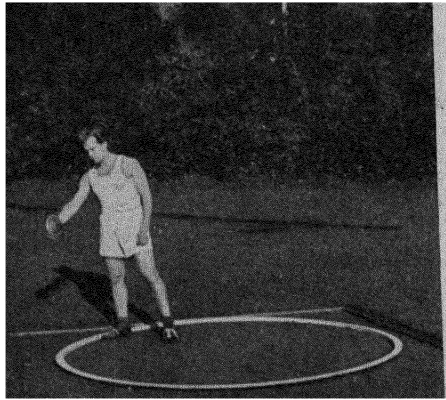


FIG. 60.

palm of the hand, the thumb, and the lowest part of the under arm (the fingers should not grip the edge of the discus). How well the discus is balanced in the hand should be tested by swinging it forward and backward in the relaxed, hanging arm (see Fig. 60).

#### STANDING DISCUS THROWING

• *The starting position* : The direction of the throw is indicated by scratching or chalking a line on the ground. The thrower stands with the right heel on the far end of the line so that the foot pointing obliquely forward forms an angle of  $45^{\circ}$  with the mark. The left foot is then placed one step forward in the direction of the

throw with the toe close to the line and the foot parallel with the right foot.

*Preparatory swing* : The discus is grasped in the manner previously described and is held forward in front of the body in chest height, supported by the left hand. Both legs are kept straight, the right heel is lifted from the ground, and the trunk turned so far to the left that it faces the direction of the throw (see Fig. 61). From this "Starting position" the discus is moved as



FIG. 61.

far from the body as possible in an easy swing obliquely downward and backward to a little below hip height, at the same time the trunk is turned to the right. During the movement the right heel is again placed on the ground, both hips and both knees are bent slightly, and the left heel is lifted to facilitate a freer and more extensive turning of the trunk (see Fig. 62).



FIG. 62.

Throughout the backward swing the back of the hand should be turned upward, and the arm should not be moved far behind the shoulder line. It is of great importance for the technically correct performance of the throw itself that the preparatory swing is regular, that is to say, is carried out without sudden interruptions, violent movements or jerks, and in such a way that it feels like one continuous movement.

The throw itself begins at the moment that the body has reached the limit of the turning movement (see Fig. 62). During the immediately subsequent movement forward the speed should be increased to the greatest possible extent, simultaneously with a forceful stretching of the legs. During this stretching the right heel is raised so that in the finished position *both* heels are lifted from the ground (see Figs. 64, 65 and 66). By this movement it is possible—provided that the correct oblique position has been assumed—to turn the

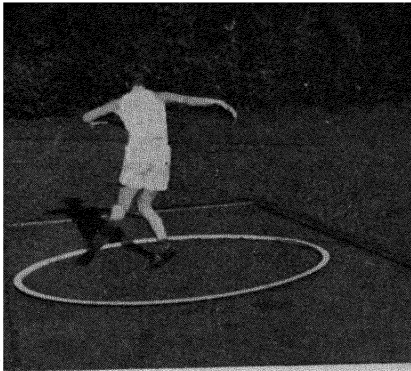


FIG. 63.

pelvis so much that the right hip can be moved forward in front of the left, and at the same time the position of the legs makes possible a fixation of the pelvis in the finish position, thus providing the best conditions for the performance of an effective twisting of the body.



FIG. 64.

The movement of the body should be a “throw twisting” combined with a forceful body raising (hip stretching) and the right shoulder, which during the carrying backward of the discus is moved farther back than the hip, should be “pressed” as far forward in the direction of the throw as possible (see Fig. 66).

The arm, as already mentioned, should not come far behind the shoulder line during the backward movement and should, during the first two-thirds of the throwing twist, remain in that position

in relation to the body. During the last third of the twist (in which the speed approaches the maximum) an effort should be made to further increase the speed of the discus by swinging the arm from



FIG. 65.

yard to reach position (see Fig. 66) without interrupting the forward movement of the shoulder. This movement should not be stopped before the discus has left the hand. At the moment in which the discus is released the hand should be level with the ear.

The right hand, which during the first two-thirds of the throwing

movement is bent slightly to the little finger side, should, during the whole turning movement, have the palm downward and should, during the last part of the throw, give the discus a rotary movement by stretching the wrist so that the index finger, during the side movement from right to left, presses upon the rear edge of the discus during the delivery.

During the backward movement of the right arm, the left elbow should be slightly bent and lifted forward in the direction of the throw in order to balance the movements. During the



FIG. 66.

throwing movement the left arm, still bent at the elbow, should be pulled backward in shoulder height, partly to increase the speed of the twisting and by the increased kinetic energy thus

acquired to make the throwing twist more effective, and partly to counteract the tendency to bend the body to the left during the throw itself (see Fig. 66).

When a little competency is acquired in the standing throw, a lifting of the front leg and a simultaneous displacement forward of the supporting hip in the direction of the throw should be practised during the last part of the backward movement of the discus. Thus the body is made to fall forward in the direction of the throw. The fall is interrupted by placing the lifted leg (with raised heel and straight knee) on the ground to the left of the direction of the throw, and then without hesitation the throwing movements already described are performed.

The path of the discus in the air should neither be too steep nor too flat. A gradient of  $36^{\circ}$  to  $40^{\circ}$  will provide sufficient height. The greater the air resistance the flatter should be the throw. The rise in the throw is acquired by the stretching of the legs and the raising of the trunk during the throwing movement and *not* by alteration in the direction of the arm movements, in which case the discus seen from the side describes an undulating curve. The discus should sail away without wobbling and with the front edge a trifle higher than the rear one, spinning at the same time on its own axis clockwise from a right-hand throw, and counter clockwise from a left-hand throw.

#### PRACTICE OF THE RUN

When the standing throw has been practised so that fair certainty with regard to the direction and technique can be perpetrated, the run should be practised. This is carried out by performing a complete turn while moving forward in the direction of the throw to the same finish position as during the standing throw, and, to begin with, this is practised without the discus and outside the ring. Since the element of danger is removed by removing the discus, the run may be practised by several at a time. In order to facilitate the instruction and to improve the control of the performance, it will be advantageous to practise the run by numbers until the understanding of the turning movement of the run and certainty in the assumption of the oblique position is acquired.

All turnings should be performed with slightly bent knees and upon the balls of the feet.

*The starting position:* The thrower stands with left side towards the direction of the throw and both feet at a distance of about  $1\frac{1}{2}$  foot length from each other upon an imaginary or marked line that indicates the direction of the throw. The arms should hang loosely at the side, and the whole position should be unrestrained and well balanced.

*On the command "One!"* the discus (imaginary) is moved forward in front of the body in the manner described under "preparatory swing" (see Fig. 61).

*On "Two!"* the discus is carried backward as in "preparatory swing" (see Fig. 62).

*On "Three!"* a turn to the left is made on the ball of the left foot with movement forward, since the ball of the right foot is placed on the ground about  $1\frac{1}{2}$  foot length forward in the direction of the throw, so that the right side is now turned in the direction of the throw. During the turn the arms are held well away from the trunk.

*On "Four!"* a similar turn is made upon the ball of the right foot, still to the left and with movement forward in the same direction as before. During this last turn, the left knee is kept well bent until the foot has passed the direction of the throw (see Fig. 63), whereupon the knee is stretched and the foot with raised heel is placed on the ground a long step (about 3 foot lengths) forward in the direction of the throw, and about  $1\frac{1}{4}$  foot lengths to the left of it, so that exactly the same finish position as in standing throw is reached.

*On "Five!"* the "throw itself" is made, as described under standing throw.

As soon as the understanding of how the run should be combined and a little practical competency is acquired, one begins to practise the movement in time, that is to say, without hesitation in the turns, while, at the same time, one still sees that the starting position and the finishing position are correct.

During the practice of the run, which should begin calmly and should be carried out on the balls of the feet, one aims at increasing the speed of the turning. The knees are kept slightly bent (see Fig. 63) until the instant in which both feet after the turning jump are again on the ground and the throw itself is to commence.

The advantage of the throw with run over the standing throw, as previously mentioned, lies in the fact that the performer is in motion (a turning motion combined with motion forward in the direction of the throw) (see Fig. 63) at the moment when the throwing movement is to commence. This advantage, however, is only complete when the thrower can control the technique of the run, assume the correct finish position, throw the discus in the correct direction, and give it the correct position in the delivery.

During the turns of the run the feet should not be lifted so high that the run takes on the character of a high hop. It should preferably assume the character of a waltzing turn that is performed with slightly bent knees. During the first turn, while both feet are off the ground, the movement of the hip line should take place so quickly that the right hip is farther forward in the turning movement than the right shoulder at the moment when the right foot is placed on the ground, in order to provide conditions for the fixation of the pelvis at the correct time, immediately before the throw itself and during the trunk twisting of the throwing movement.

During the run the body should not be inclined backward, partly because it decreases the stability, partly and especially because a backward inclination of the long axis of the trunk, about which the turning takes place, causes the direction of the throw to become too steep or, if the right direction is attained, causes a decrease in the speed in the same direction. Therefore, even in the preparatory swing, where the discus is carried backward, one should incline the trunk slightly forward and maintain that position during the turn, until the moment when the raising of the body takes place for the throw.

*The arms*, during the turns of the run, should swing as far out to the side as is the natural result of the speed of the turn, and the palm of the hand, as previously mentioned, should throughout the run face downward so that the discus hangs under the hand in the position it is to have at the moment of the delivery. During the turns of the run, the arm should not come far behind the shoulder line. A condition that enables the hand to follow the discus sufficiently far in the throwing movement itself is that the feet are correctly placed in relation to the direction of the throw, so that the work of the hip and trunk can be accomplished (see Figs. 65 and 66). (See standing throw.)

The curves described by the discus during the turns of the run, as a natural result of the spring-like movements in the joints of the lower extremities, should not be confused with the *less fortunate* curves that are the result of accessory arm movements in the vertical plane performed during the run.

During the run and the throw the head is lifted naturally so that during the preparatory swing, and when possible during the turn, one looks forward in the direction of the throw.

#### TRAINING

So as not to lose the encouragement that is always present in seeing quick progress in the exercise on which one is working, in discus throwing—instead of trying at once to throw as far as possible—it will be judicious to plan the training on the following principles :

1. Training in standing throw until the combination of the throwing movements themselves become natural ; the correct finishing position can be assumed in every throw, and the discus after the delivery lies correctly in the air.
2. Special training in the run until it can be performed correctly within the distance permitted by the ring (diameter 2.50 m.). If this training is done with the discus emphasis must *not* be laid upon throwing far.
3. As well as training in strength—giving exercises for the trunk and the arms, a discus thrower should also train diligently in sprinting (starting exercises), standing high and long jump, successive long jumps on a grass track with feet together and without a preceding run, high jump with a run where the take-off is practised with both right and left leg, etc.

#### COMMON FAULTS DURING TRAINING

1. That the hand during the introductory swing is turned backward so that the discus rests upon the upturned palm of the hand instead of hanging under the hand, a fault that makes it difficult to attain the correct position of the discus during the delivery.
2. That the trunk during the turn of the run or in the beginning of the throw itself is moved to the side opposite to that on which the discus lies. This movement of the body in the first case

results in the run taking the wrong direction and in the second case in the curve of the throw becoming too steep.

3. That the fore foot in the finishing position is placed on the ground in the direction of the throw instead of to the side of it (see finishing position during standing throw).
4. That both heels are not lifted in the act of throwing.

#### JAVELIN THROWING

The regulation competition javelin is of wood equipped with a metal tip, and it should be so made that the distance between the tip and the centre of gravity is at least 90 cm. and at most 110 cm. It should at its centre of gravity be bound with a thick string for a space of 16 cm., which serves as a grip for the hand. The thickness of the binding should not be more than 25 mm.

The length of a senior javelin should be at least 2.60 m. and its minimum weight 800 gr.

Junior javelin : minimum length 2 25 m.—minimum weight 700 gr.

Boy's javelin : minimum length 2 25 m.—minimum weight 500 gr.

It is possible to purchase javelins of bamboo for training purposes. They are easier to handle than wooden javelins, do not break so easily during the throw, are cheaper to buy and easier to keep in condition. It will, therefore, be practical to use bamboo javelins during the practice of the technique of throwing.

*The run* for javelin throwing is free, both with regard to length and form. For the recognition of the throw it is only necessary that the thrower does not overstep the boundary, which is marked by a piece of wood, 7 cm. broad and about 4 m. long, painted white and lying level with the ground. The throw is measured from the mark made by the fall of the javelin to the nearest point of the rear edge of the boundary, or a continuation of the latter ; in other words, at right angles to the boundary.

With regard to technique, javelin throwing is the most difficult of all athletic throws. This is due to the form of the apparatus, which excludes the possibility of the hand and body movements accompanying each other during the run, as is the case, for example, in discus throwing, shot putting, hammer and weight throwing ;

in this last case it is even an essential that the hands accompany the turning movements of the body during the run. Throughout the run and the subsequent throwing movement the javelin should be held almost horizontal and should point in the direction in which the throw is to be made, since, at a certain point in the run, one should perform a trunk twisting so that it becomes possible to move the arm with the javelin backward (without altering the position of the javelin) and at the same time to increase the speed of the run and adapt the body and legs for the performance of the throw itself.

There are two known methods of carrying out this backward movement of the javelin :

1. The one in common use, in which the javelin, during the last 5 or 6 steps, is carried backward *above* the shoulder, and
2. The so-called "stone throwing method" that consists of moving the javelin forward, downward, backward and upward in a long, soft swing during the last third of the run until the javelin, hand and arm have reached the correct backward position in which the arm is fully stretched, and from whence the throw is to take place.

With the second method it is easier as a conclusion to the run to acquire complete balance in the starting position for the throw itself without decreasing the speed of the run. Nevertheless, it is seldom used at home, because the "great throwers" who make use of the method seldom take part in competitions in this country, and consequently it is little known.

The procedure in the practice of javelin throwing is, on the whole, the same as in the other throwing exercises—namely, practice of :

1. Standing throw.
2. The run.
3. The throw with complete run.

Because of the more complicated combinations of movements that are found in the throwing of the javelin, it will be suitable to an even greater extent than in the other throws to undertake the practice of the technique bit by bit.

*The grip on the javelin* should be such that the index finger and the thumb are placed against the hind edge of the binding, whereupon the other fingers are closed upon the binding with a firm grip, so that the thumb lies almost parallel with the long axis of the

javelin. This grip is maintained throughout all the movements that take place during the run from the time when the javelin is pulled back *over* the shoulder, until the moment in which it is to be released for the throw. At that instant the fingers open from the little finger side so that the final pressure that is to be made in the direction of the length of the javelin is carried out by the index finger and the thumb simultaneously.

The balance of the javelin in the hand naturally depends upon the correct placing of the binding. It is tested by gripping the javelin in the manner described, holding it up above the shoulder so that it lies horizontally, and then opening the hand so that the binding rests upon the upturned palm. In this position the javelin should have a slight tendency to fall forward. When the javelin lies well balanced in the hand, it is easier to make it lie correctly during the arm movement backward and during the throw itself.

*1st method* (the javelin is moved backward *above* the shoulder).

#### STANDING THROW

##### 1. *Throwing according to a mark in a sand pit*

A mark is made lengthwise in the sand pit. The thrower assumes oblique standing position facing, and at a distance of 4 or 5 steps from, the pit, the right foot in line with the mark and the left foot placed obliquely forward to the left. The javelin is moved up until it is level with or a little higher than the ear, with the tip pointing forward and downward towards the mark. From that position the javelin is moved obliquely backward and upward at the same time as the trunk is slightly twisted to the right and bent away from the direction of the throw. The left arm is stretched forward in the direction of the throw.

From this position the javelin is thrown at the mark at the same time as the trunk is raised and twisted to the left. From the position of the javelin in the pit it is possible to see mistakes made during the throw. If the throw has been correct the javelin points back exactly towards the right shoulder of the thrower. Throwing in the *sand pit* is a practical arrangement which prevents the javelin from being broken by a faulty throw.

## 2. *Parallel throw*

Is also standing throw, but it differs from the latter in that the javelin is held horizontal and a long throw is made. Parallel throwing is training in making the javelin lie horizontally (parallel with the ground) during the delivery, and also training in raising the body during the throwing movement in order to give the javelin, that is to say, its centre of gravity, sufficient rise in the throw.

*The throw itself* starts from a side starting position by lifting the fore leg forward in the direction of the throw and simultaneously displacing the hips in the same direction. This movement (a fall forward in the direction of the throw) is interrupted by the front foot being placed on the ground with lifted heel obliquely forward in the direction of the throw, whereupon the movement continues without cessation in a combined "throw twisting" and body raising. The finishing position for the legs and the body is the same as in discus throwing.

Simultaneously with the "throw twisting," the left arm, which was stretched in the direction of the throw, is, with bent elbow, pulled backward in shoulder height, partly to make the trunk twisting of more effect and partly to balance the other movements.

The arm that carries the javelin should, before the commencement of the throwing movement itself, be fully stretched (point away from direction of throw) and should be so much outwardly rotated (supinated) that the back of the hand is turned downward towards the ground. During the throwing movement the hand should be moved forward in the vertical plane since it passes above the shoulder above head height. During this movement there takes place first a bending and then a stretching of the elbow joint at the same time as the wrist is bent far backward to be stretched again in the last part of the throwing movement during the delivery of the javelin. During this movement the path followed by the hand should rise constantly until the javelin is delivered. The position of the javelin in the air should be almost horizontal, with the point inclined slightly upward, the path followed by the centre of gravity of the javelin immediately after the delivery should have a rise of about 35-40°.

## THROWING WITH A RUN

I. *Throwing with a run of 3 steps by numbers.* (That is training in the backward movement of the javelin during the forward movement of the body.)

Starting position: Front towards the direction of the throw with the javelin held horizontally a little above ear height (see Fig. 67).

On "*Oue!*" the left foot is moved a step forward, the body twisted to the right and the right arm carrying the javelin half stretched backward (see Fig. 68).

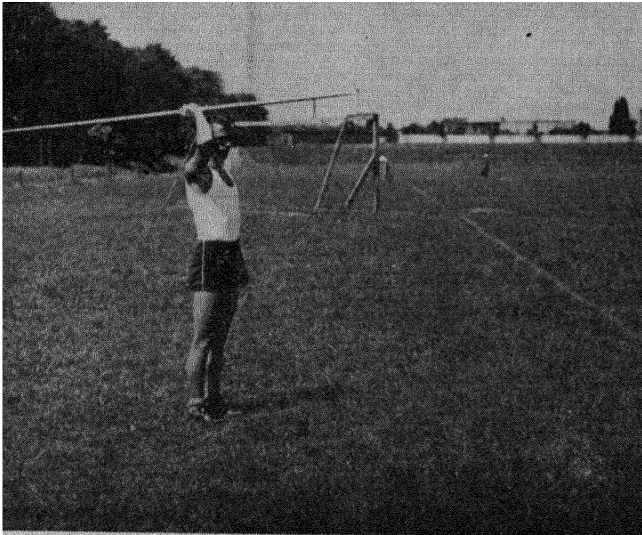


FIG. 67.

On "*Two!*" the right foot is moved in front of the left, the body twisted so much to the right that the shoulder line now lies parallel with the direction of the throw, and the right arm is fully stretched. At the same time the left arm, with slightly bent elbow, is lifted forward in the direction of the throw (see Fig. 69).

On "*Three!*" the left foot is moved obliquely forward in front of the right and the throw is performed as described under parallel throw (see Figs. 70 and 71).

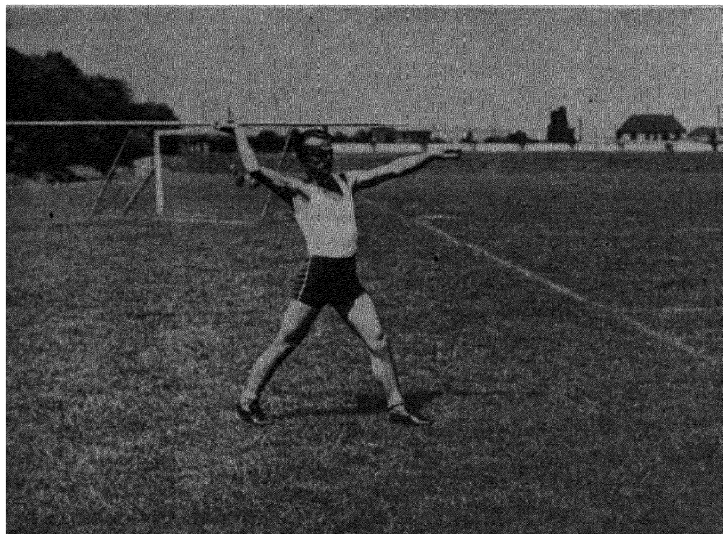


FIG. 68.

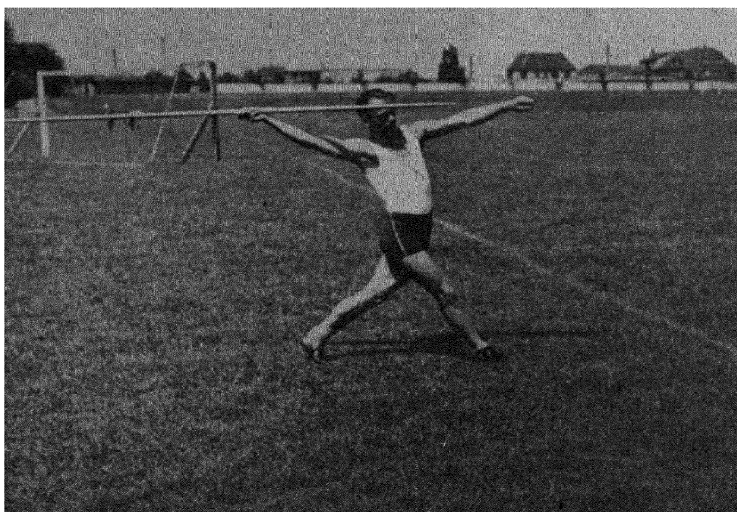


FIG. 69.

II. *Throwing with a run of 3 steps without numbers.* (That is, training in assuming the correct starting position during the run and performing the throw without interruption before the javelin is delivered.)

*The starting position.* To acquire the starting position most easily one should stand with front towards the direction of the throw, twist the body to the right and carry the javelin backward with the arm fully stretched so that it lies horizontally a little over ear height with the point in the direction in which the throw is to

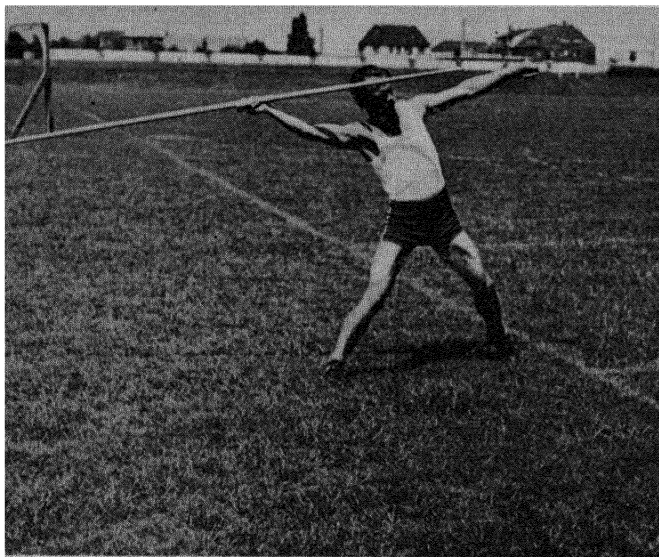


FIG. 70.

be made. From this position 3 consecutive steps should be made in the following manner :

*1st step* should be made as long as possible (the body should be made to fall forward before the foot is moved). (See Fig. 72.)

*2nd step* should be performed like a long, flat hop from the left foot to the right, the right foot swinging well forward in front of the left (see Fig. 73) before being placed on the ground. During the hop the body is twisted so that it is side towards the direction of the throw at the moment in which the right foot reaches the ground (see Fig. 74).

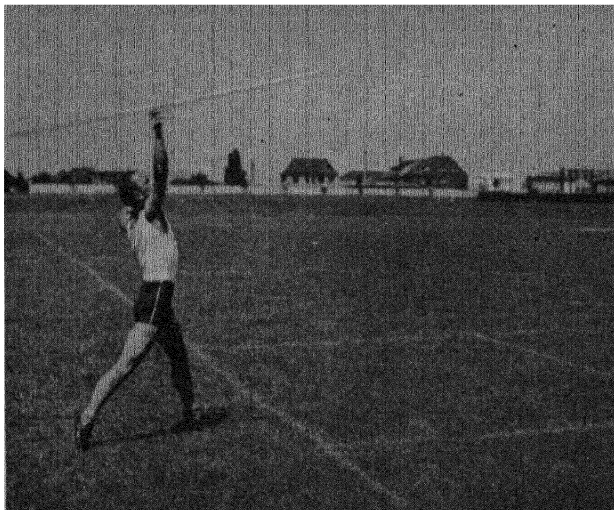


FIG. 71.

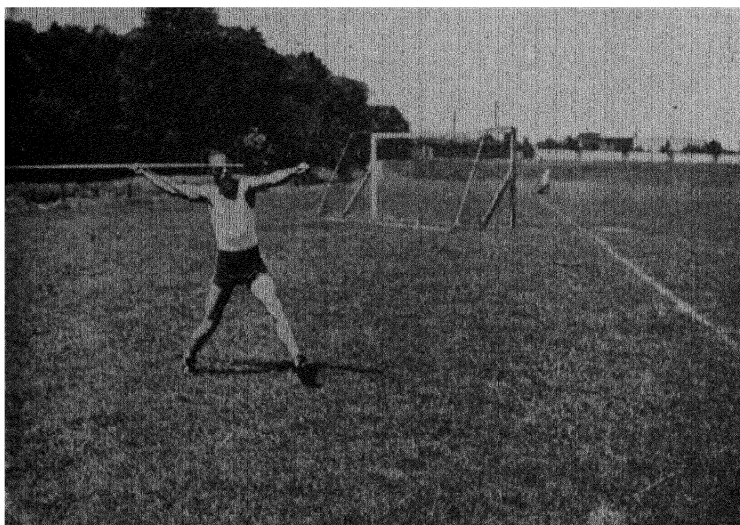


FIG. 72.

3<sup>rd</sup> step should be performed like a wide "stride" forward to the oblique position already mentioned from which the throw is made (see Figs. 74 and 75).

### III. *Throwing with a run of 5 steps.*

*Starting position* : Front towards the direction of the throw and the javelin horizontal a little above ear height.

*The first 2 steps* should be performed as in the run by numbers, so that the trunk is twisted to the right and the arm fully stretched when the right foot is placed on the ground in the second step.

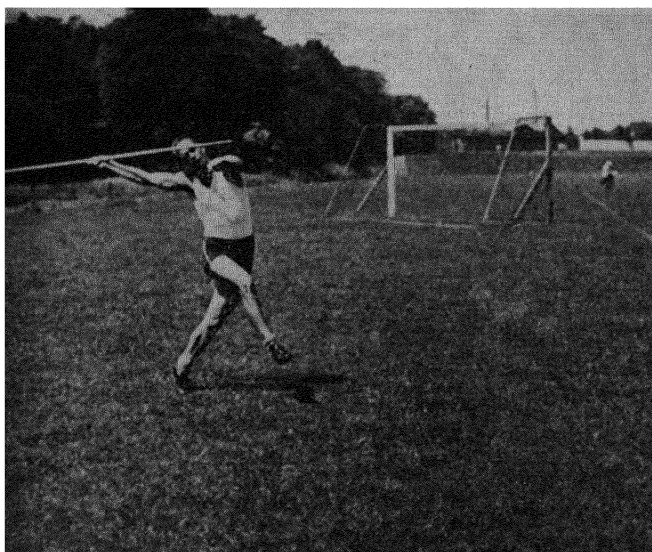


FIG. 73.

Thereupon, without stopping the movements, the 3 last steps and the throw itself are performed as described under "Throwing with a run of 3 steps without numbers." When the throw with the run of 5 steps has been practised so that it can be performed glidingly and with more or less certainty, the practice of the final form of javelin throwing is commenced.

### IV. *Throwing with complete run.*

*The length of the run* should be such that without strain a regular speed can be obtained before the commencement of the last 5 steps.

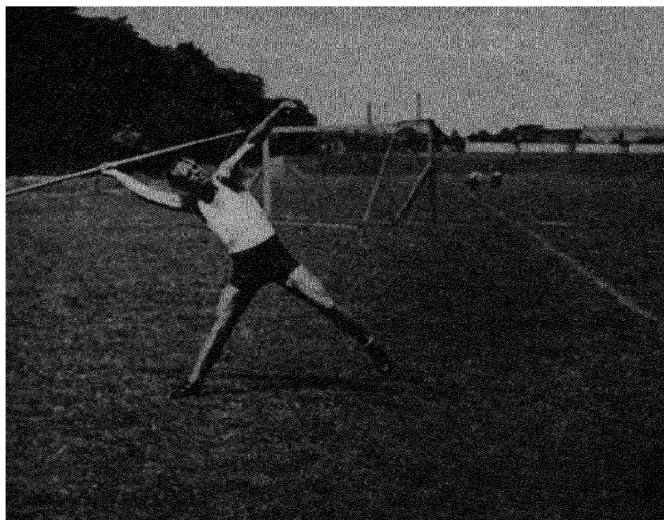
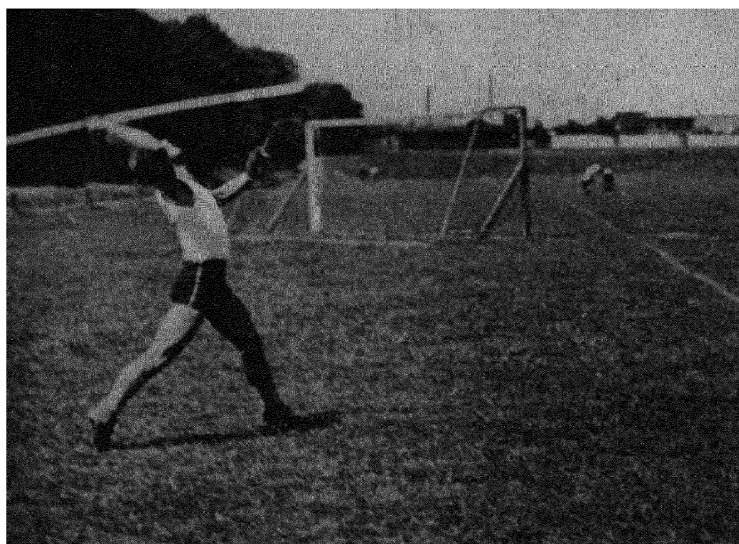


FIG. 74.



F.G. 75.

*The run is measured* at right angles to the boundary of the throw in the following manner : A mark is made about 9 ordinary steps from the boundary of the throw. From that mark a further 9 steps will indicate the spot for the commencement of the run.

*In the starting position* the thrower should be facing in the direction of the throw and should hold the javelin a little above ear height. The run to the 9 steps mark should be performed with a regularly increasing speed (no jerk or trip). The right foot should,

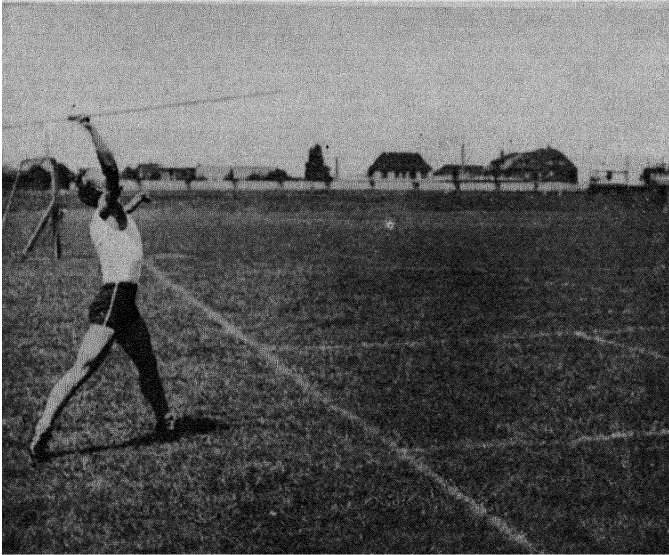


FIG. 76.

during the run, hit the 9 steps mark and simultaneously the backward movement of the javelin and the subsequent trunk twisting, which naturally result, should commence.

*The last 5 steps* will, since the steps naturally increase in length during the increasing speed of the run, bring the thrower from the 9 steps mark forward to the place of the throw immediately behind the boundary of the throw. The steps should be performed as described in "Throwing with a run of 5 steps," but are naturally more difficult to perform in this case, since the backward movement of the javelin must commence in the middle of the run. The speed of the

run should increase until the last step but one, where it should culminate.

Since during the delivery the centre of gravity of the javelin should not only have speed forward but also upward, and since the latter is partly brought about by the raising of the trunk, and partly by the stretching of the arm, the speed of the run should not be greater than that these movements can be controlled and be performed with full effect. An effective trunk raising and arm stretching, combined with the greatest possible speed in the run and in the final trunk twisting, provides the best result.

*The delivery of the javelin* should take place as described under "Parallel throw." In order that the delivery should take place at the right time, that is to say, when the hand has reached the highest point in the path of its movement, a broad finishing position, and quick trunk, arm and wrist movements are necessary (see Fig. 76).

During training in throwing with the complete run the throwing boundary should be observed just as in competitions.

#### " THE STONE-THROWING METHOD "

This method is practised in the same way as described in throwing, with 3 or 5 steps run, but with the difference that the arm, instead of moving the javelin backward over the shoulder, performs an arm swing in a circle forward, downward, backward and upward. Throughout this arm movement the javelin should lie horizontally, pointing in the direction of the throw.

In the starting position the javelin is grasped in the usual way, but during the movement forward and downward, the hand is opened so that only the thumb and index finger grip the javelin, while the other fingers lie under the javelin bearing it. As soon as the arm has passed the vertical line and begins the movement backward and upward, the fingers are closed again on the javelin in the usual way.

#### THROWING WITH 3 STEPS RUN BY NUMBERS

The starting position is the usual one, facing in the direction of the throw and the javelin horizontal above ear height (see Fig. 77). On "One!" the left foot is moved forward and the arm is moved forward and downward to a little below hip height (see Fig. 78).

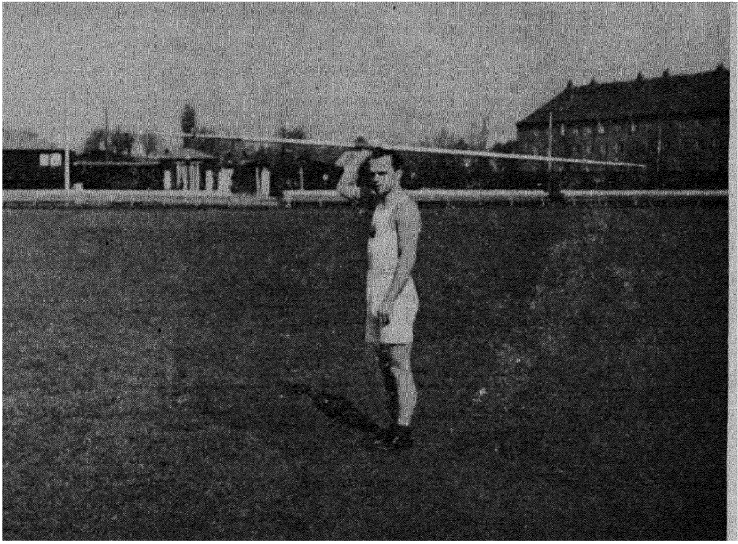


FIG. 77.



FIG. 78.

In this position the tip of the javelin will point a little to the left of the direction of the throw, but will, as soon as the arm has passed the vertical position and the trunk twisting commenced, again point in the direction of the throw.

On "Two!" the right foot is placed forward in front of the left, the trunk twisting takes place and the arm continues its movement backward and upward until the hand lies a little above shoulder height (see Fig. 79).

On "Three!" the left foot is moved obliquely forward in front of the right, and the throw is performed as described under "Parallel throw" (see Fig. 80).

During the throw with a complete run it is unnecessary for this movement of the javelin, once it has been learnt, to take place during a certain number of steps if only, while turning on the last step but one (hop from left foot to right), the javelin is moved backward and upward to shoulder height, so that it lies correctly at the moment in which the throwing movement itself is to commence.

#### COMMON FAULTS IN JAVELIN THROWING

1. The first half of the run is too quick and therefore the speed and the length of step decrease during the backward movement of the javelin, just at the point where the speed ought to increase and the steps become longer.
2. The backward movement of the javelin commences too late and is carried out with a jerk which greatly increases the difficulty of acquiring the well-balanced starting position for the throw itself.
3. The last steps are too short, so that the centre of gravity of the body lies in front of the supporting base before the delivery takes place.
4. Both feet are not on the ground at the moment of the throw. As a rule, this fault is due to the fact that the speed of the run has been so great that the performer is unable to complete the throwing movements of trunk and arm, before the trunk has come so far forward that the unrolling of the rear leg is completed; but the fault may also be due to a too narrow oblique position of the feet in the throwing position (see point 3).



FIG. 79.

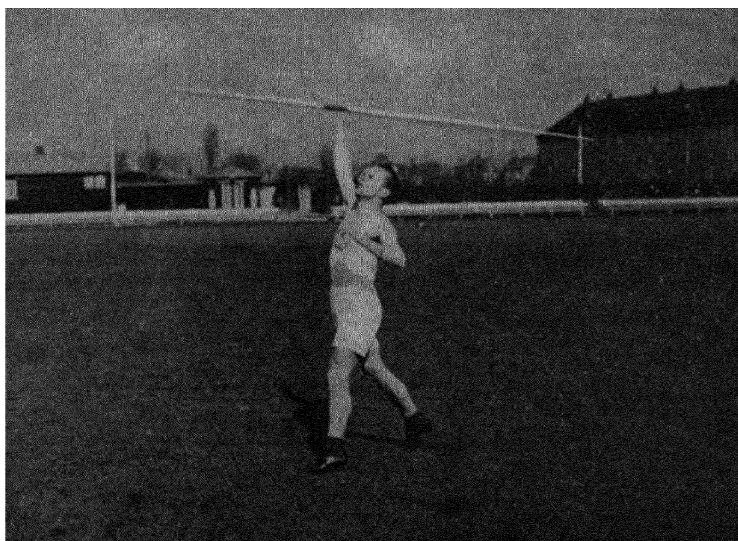


FIG. 80.

5. The front end of the javelin points too much upward instead of lying almost horizontally in the delivery, as a result of which the pressure during the delivery is *not* directed along the long axis of the javelin.
6. There takes place a side bending or leaning of the trunk during the throwing movement instead of a trunk raising, so that during the delivery, instead of upward pressure (resulting from the trunk raising in the throwing movement), there is a downward pull upon the javelin.
7. The hand grasping the javelin during the throw is moved *to the side* of the shoulder instead of *over* it. This fault is due, practically always, to the fact that the hand during the backward movement ends in a starting position, too low for the throwing movement. This fault can be of danger to the elbow joint.

#### TRAINING IN JAVELIN THROWING

As well as practising the separate phases of the throw already described under the technique of the exercise, it will be advantageous for the throwers to train especially in :

1. Standing throwing in a sand pit with the object of acquiring quick and more certain throwing movements of the trunk and the arm.
2. Running on a grass track with the javelin held in the horizontal position above ear height. From this position the movement of the javelin either backward over the shoulder or, as in the stone-throwing method, forward, downward and backward, or in the opposite direction with the object of acquiring proficiency in moving the javelin in the correct way and in the correct position (horizontal) *during the run*.
3. Jumping from the left to the right leg during the last step but one of the run with simultaneous trunk twisting and correct transport of the javelin. The exercise concludes either with a slight throw or by simply releasing the javelin when the correct finishing position has been assumed.
4. Adjustment of the run, paying special regard to the performance of the last 5 steps and the backward movement of the javelin at the right time. This exercise should not be concluded with a violent throw (see point 3).

## SHOT PUTTING

The regulation shot is of iron or consists of a special metal shell filled with lead.

*For seniors* the minimum weight should be 7.257 kg.

*For youths* the minimum weight should be 4 kg.

If shot put is to be used with juniors and boys, one must use a shot of a suitable weight, for instance :

*Junior shot*, 3 kg. and

*Boy's shot*, 2 kg.

In competitions the put is made from a ring, the inside diameter of which must not be over 2.135 m. The ring should be made of iron, wood or rope, or it may be simply scratched or chalked on the ground. The length of the put is only measured when the shot falls within an angle of  $90^{\circ}$ . The point of the angle should lie in the centre of the ring, and the side lines extending each upon its own side of the direction of the put should form an angle of  $45^{\circ}$  with the latter. In order that the put might be recognised, the performer must neither during nor after the throw touch the upper margin of the ring or the ground outside it. Only when the put is marked may he leave the ring, and then he must pass out of the rear half of it. The put is measured from the rear edge of the mark made by the landing of the shot to the nearest point on the inner margin of the ring.

As the name of the exercise suggests, the shot must not be thrown, that is to say, that neither during the preliminary movements nor during the put itself should it be moved behind the shoulder line, but should be thrust directly from the shoulder.

Until the standing put and the combination of the run have been thoroughly practised, it is unnecessary to increase the difficulties by putting from the ring. The practice of the different phases of shot putting should be carried out so that the exercise is built up from the starting to the finishing position with regard to the technique.

## THE GRIP OF THE SHOT

The shot should rest upon the upturned palm of the hand (see Fig. 85). It is an advantage, if one has strong fingers, to place the shot as far out upon them as possible, but normally the shot will

rest upon the junction between the hand and the fingers, so that the rear side of it is supported by the four fingers, which as far as possible are held close together, and the side nearest the neck is supported by the thumb. The fingers should not grip the shot; it should lie balanced on the upturned palm.

It will be practical to practise the put and the movement of the run *without apparatus*, because, as long as one is not intimate with the leg and body movements, the presence of the shot will distract the attention from the correct combination of these movements. When some competence in technique has been acquired, it is easier to overcome the difficulties that lie in the acquisition of the correctly balanced position of the shot during the run and during the putting movement itself. For the same reason it will also be wiser to use a lighter shot (for instance, a 5 kg. shot) when training in the technique of putting with apparatus is to be commenced.

#### STANDING PUT

*In training in the starting position* the apparatus is excluded, and oblique standing position is assumed with the rear foot on the mark that indicates the direction of the put, and the front foot placed a little forward and a little to the left of it. After this position has been taken, both knees are bent (without raising the heels from the ground), the hands are supported on the knees, and the head is turned to face in the direction of the put. Thereupon the right hand, holding an imaginary shot, is moved up to

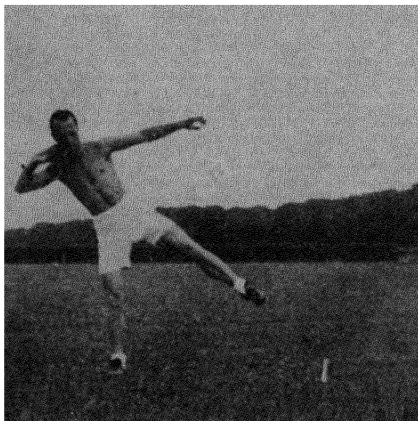


FIG. 81.

the shoulder with the elbow lifted out to the side without any other alteration being made in the position. Then the left arm is stretched forward in the direction of the put and the body twisted

so much to the right that the shoulder line points accurately in the same direction.

In order to carry out the putting movements correctly so that



FIG. 82.

the right foot, hip, shoulder and arm are in the same vertical plane behind the shot in the finishing position of the put, it is necessary to be able to assume the starting position correctly (with the shot in the hand also), and this should be so thoroughly practised that, without requiring special consideration, it can be assumed with absolutely

correct style before each put.

If this position is correctly assumed *the put itself* is made by performing simultaneously the following movements :

1. A forceful and quick stretching of both legs, including a complete stretching of knee as well as ankle joints (right upon the ball of the feet).
2. Raising of the body to the vertical position, turning of the hip line and a "throw twisting" to the left at the same time as the



FIG. 83.

- left arm, with bent elbow, is pulled backward in shoulder height.
3. In the moment in which the "throw twisting" is to be completed the right arm is thrust quickly forward, so that in

the finished position the hand is level with the top of the head.



FIG. 84.

The finishing position for the put, like the starting position, is oblique standing, but now the trunk is stretched and turned so much to the left that the right shoulder rises farthest forward in the direction of the put.

When these movements (points 1-3) have been practised, training in long putting without a run is commenced, in which, from standing position, one performs the displacement

■■■■



FIG. 85.

of the pelvis in the direction of the put, described below, in order to provide better conditions for great speed in the put itself; *but* until

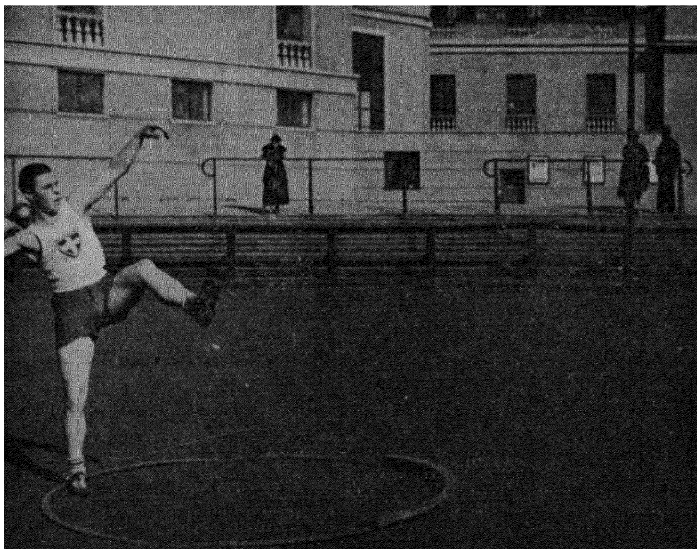


FIG. 86.

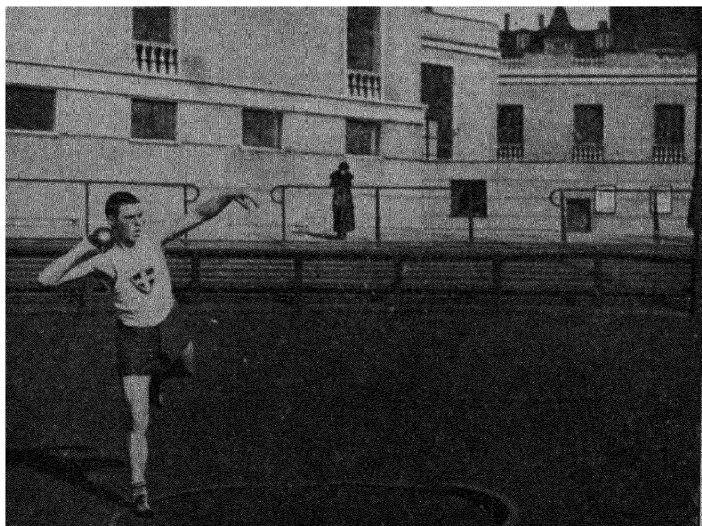


FIG. 87.

the movement can be performed both quickly and correctly, one should train with the light (4-5kg.) shot. The exercise is performed in this way: from erect oblique standing position, with the shot resting on the right shoulder and with the left arm stretched forward in the direction of the put, the weight of the body is moved on to the right leg, and the left leg is lifted forward in the direction of the put (see Fig. 81). From this balanced starting position, the right knee is slightly bent, the body turned slightly to the right, so that the shoulder line points in the direction of the put, and at the same time

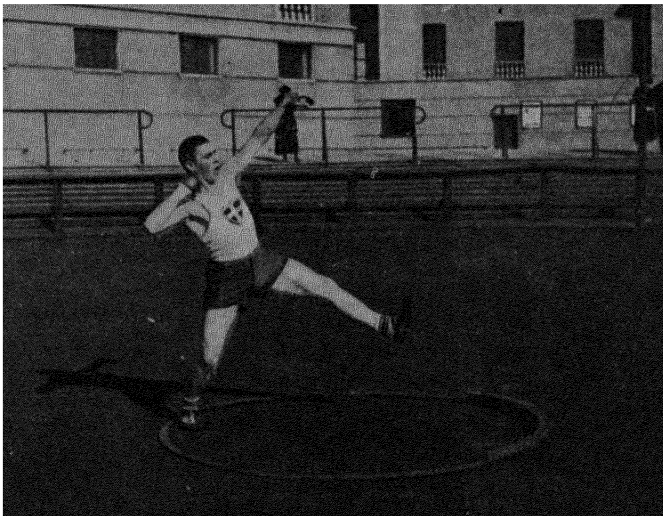


FIG. 88.

the hips are pushed forward in the same direction, so that the body is made to fall (see Fig. 82). As soon as the body, by this means, is put into motion, the left foot is placed on the ground with the heel raised (see Fig. 83), and the put is carried out as described under "the put itself" (see Fig. 84).

*The run* for shot put is best practised without the shot. The starting position is kick standing position with the front towards the direction of the put (see Figs. 85 and 86). The imaginary shot rests upon the right shoulder and the left arm stretched forward. From this position an easy leg swing backward

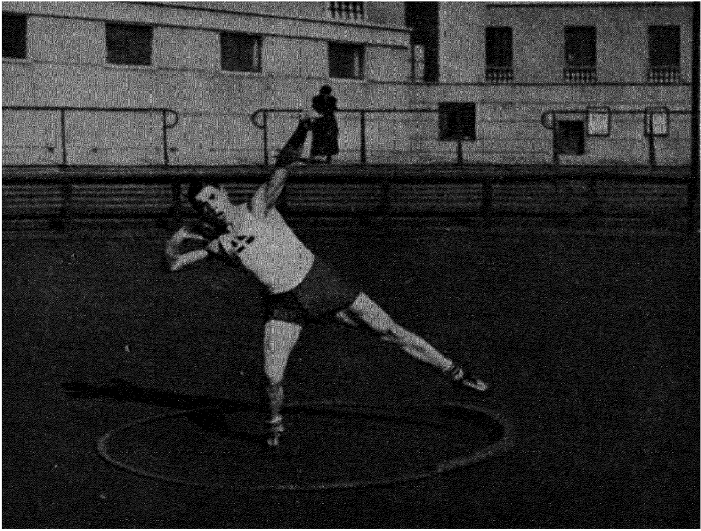


FIG. 89.

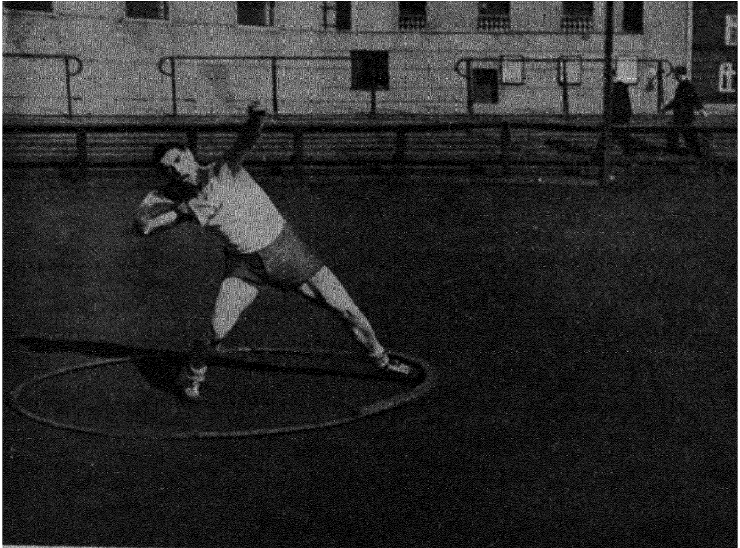


FIG. 90.

III

is performed by the left leg, at the same time as the supporting knee is slightly bent and the body inclined slightly forward (by a bending in the hip joint) (see Fig. 87). Without interruption in the backward movement the left leg is again swung forward (see Fig. 88) and a short, flat hop in the direction of the put is performed by the supporting leg. During the hop forward the bending of the supporting leg is increased, and because of the movement of the swinging leg during the hop the body turns so that the left side is towards the direction of the put, when the right foot is again placed

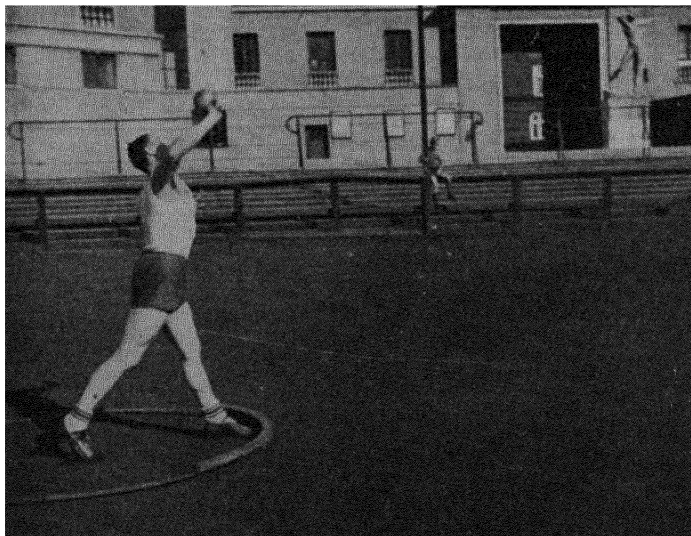


FIG. 91.

upon the ground (see Fig. 89).

The hop must not be made too high or be of such a length that the forward movement of the body is stopped when the foot is again placed on the ground. As soon as the right foot, after having performed the hop, is placed upon the ground the rest of the movement is carried out as described under training in long put from standing position, that is to say, the right hip is pushed forward in the direction of the put, the left foot is placed obliquely forward on the ground, with the heel raised (see Fig. 90). The legs are stretched at the same time as the trunk is raised to the

vertical position and twisted to the left. During this movement the left arm is pulled backward in shoulder height, and when the throw twisting is almost complete, the thrust is made with the right arm. In the moment of the delivery itself both feet should be on the ground and the right hand level with the top of the head (see Fig. 91). The run can also be performed as a hop sideways from the position shown in Fig. 82 to the position shown in Fig. 83, whereupon the put itself is performed. The run should always be practised within a ring or within a space corresponding to the diameter of the ring.

#### TRAINING

1. Diligent training in standing put with a light shot in order to acquire speed and the correct technique.
2. Practice of the run outside the ring with the aim of making the hop calm, flat and short, so that the finishing position is made broad and the putting movement performed comparatively quickly.
3. Diligent training in sprint, standing jump and jump with a single running step.

#### *Common Faults*

1. The training with the full-sized shot is commenced before the technique and speed in the putting movement are established.
2. That the ring (or space corresponding to the diameter of the ring) is not observed when training in shot put with a run.
3. That the hop in the run is quick and long instead of slow and short, and that the distance between the feet in the oblique position (finishing position) is too small.
4. That in the putting movement a side bending or leaning forward is performed instead of a trunk raising and "throw twisting."

#### HAMMER THROWING

Originally an ordinary sledge hammer or a similar weapon was used for this exercise, thus has been derived the name hammer throwing. At the present day the apparatus is composed in the following way: *The head* consists of a leaden sphere, *the shaft* of a

piano string, attached to the free end of which is a triangular *iron hand grip*. The total length of the apparatus is 1.219 m. and the weight 7.257 kg.

In competitions the throw is made from a ring, 2.135 m. in diameter. The regulations and the measurements of a valid throw are the same as in discus throwing and shot putting.

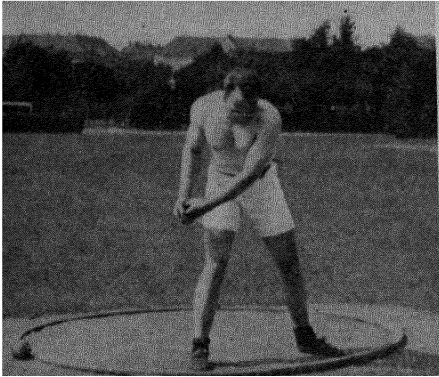


FIG. 92.

In *the starting position* the back should be towards the direction of the throw and the feet placed slightly astride. The left hand should grasp the handle so that it rests between the two last joints of the fingers. The right hand should grasp on top of the left.

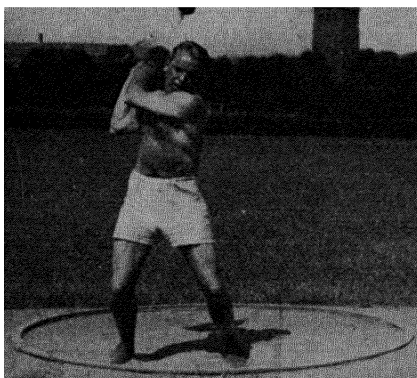
Thereupon, with a little swing, the head of the hammer is laid so far obliquely backward to the right that the hammer string and the arm are fully stretched, even when the right hip is pulled a little backward and the trunk twisted slightly to the right and at the same time inclined forward (see Fig. 92).

#### PREPARATORY SWING

From this position the "hammer is taken up" by raising the trunk to the vertical position and twisting a little to the left at the same time as the arms, without bending, swing the hammer in a large circular movement forward in front of the body, past it and obliquely upward and to the left. When the hands during this movement have reach ear height the arms are quickly bent so that the hands, while the hammer in continuous motion swings behind the head, can be moved by a quick movement past the head, close to it and level with the forehead (elbows in chest height) (see Fig. 93) at the same time as the body is twisted from left to right. During the last part of this trunk twisting the arms are again stretched

(see Fig. 94), so that the position from which the hammer was just lifted from the ground is again passed through.

The hammer has now described a complete circle, the highest point of which lies obliquely backward to the left, and the lowest point obliquely forward to the right, a hand's-breadth or two above the ground. During the swing in front of the body the arms should be kept stretched as long as possible, and the twisting from



left to right should be performed so quickly that one is ready to begin a new circular movement at the moment when the hammer again "appears" after the swing behind the head.

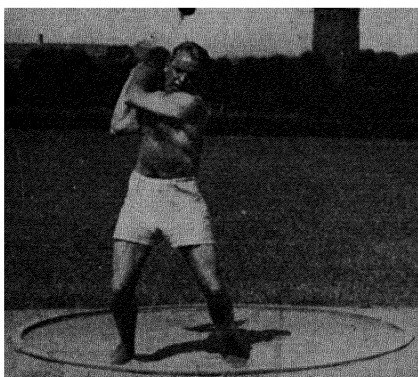


FIG. 94.

and the right knee bent, and the body is inclined slightly forward, as one glides over to "receive" the hammer on the right with the right knee straight and the left slightly bent. During the swing

The pull that is exerted during the circular movement of the hammer is counteracted by a leaning of the body in the opposite direction. This movement is supported by simultaneous movements in the joints of the lower extremities (see Fig. 95). When, during the swing, the hammer reaches the left side of the trunk the left knee is stretched

in front of the trunk both knees are again bent a little and the body inclined slightly backward, and so on.

These preparatory swings must be thoroughly learnt so that they can be performed with well-balanced movements without jerking the hammer. When a satisfactory standard is reached, practice of the standing throw is commenced, which must chiefly be regarded as training in increasing the speed of the introductory swings and in finding the correct position for the throw itself.

#### THE STANDING THROW

When in the introductory swing the hammer reaches the lowest

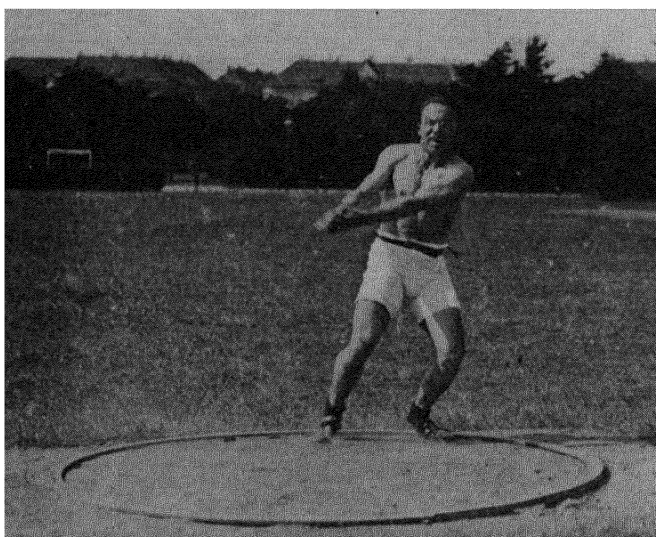


FIG. 99.

point of the circular movement the speed is increased. This is brought about by increasing the speed of the trunk twisting and arm movement (from right to left) (see Fig. 95). In this attempt to increase the speed the arms must not be bent (a common fault in beginners), and the speed must not be so great that the pull of the hammer cannot be counteracted by the simultaneous counter-movements. When a suitable speed is reached the hammer is released immediately before it has reached the highest point in the

swing. The body, which, during the swing, has assumed changing positions, should be raised to the vertical position, and the trunk twisting should be carried on so that the chest is turned in the direction of the throw when the hammer is released (see Fig. 96).

The arms should be kept fully stretched, also during the delivery itself, and both feet should be on the ground, but with raised heels, so that the twisting can be supported by a simultaneous turning of the hip line. It is the work of the legs and body that provide the



FIG. 96.

possibilities for a long throw. The arms may be regarded as steering apparatus for the hammer (sometimes the different difficulties that beset beginners can be overcome by the beginner trying to imagine that his arms are a continuation of the shaft of the hammer).

#### PRACTICE OF THE RUN

The starting position is the same as in the standing throw. The hammer is "taken up," and the introductory swing performed in the manner already described. The speed in the introductory swing should be absolutely regular, and, when the balance "feels right," a complete turn is made, moving backward in the direction

of the throw in the following way : When the hammer reaches the highest point in the circular swing (obliquely backward to the left), the right leg is quickly swung outside the left (a turn is made on the ball of the left foot) and is again placed on the ground with the foot a little behind its original position. As soon as the right foot has reached the ground, the left foot is moved a corresponding distance backward, so that the starting position is again assumed, only a little farther back than the original one.

When the turning commences the arms should be stretched forward in front of the trunk (which is turned to the left) with the hammer lying in the highest position. The turn is performed so quickly in relation to the movement of the apparatus that the arms point obliquely to the right when the turn is complete. The position thus acquired is a provision for the further increase in speed in subsequent turnings (see later).

As soon as the position is assumed after the turn, the throw itself is commenced and is carried out as described under the standing throw.

The run may also be practised by numbers, when an imaginary hammer is used ; it is carried out in the following way :

On “ *One!* ” the hammer is taken up and swung to the left while both heels are raised. At the same time a turn is made on the balls of the feet, so that the front is over the left foot.

On “ *Two!* ” the turn is completed, the right leg swinging outside the left, and being placed on the ground again, just behind its original position.

On “ *Three!* ” the left foot is moved so far backward that the position becomes a true copy of the original starting position.

On “ *Four!* ” the throwing movement itself is performed by stretching both legs at the same time as the trunk is raised to the vertical position and twisted completely to the left, so that it finishes with front towards the direction of the throw. The arms should be stretched throughout, even during the throwing movement itself.

*In throwing with two or more turns in the run*, it is requisite that the thrower is well balanced during the swing and is able to perform the turns so quickly that, in the position assumed after the turn, he is so much beyond the hammer in the turning movement that, by means of a trunk twisting, he can increase the speed of the hammer

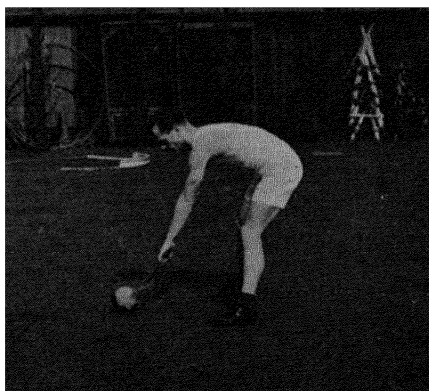
in front of the trunk and *still* be leading the hammer in the next turn, so that its speed can be still *further* increased. If this cannot be done, there is no advantage in making several turns in the run.

#### WEIGHT THROWING

The apparatus for weight throwing consists of a spherical "weight" that is equipped with a handle. The "weight," which may be made of iron or a metal shell filled with lead, should in all (handle included) weigh 15 kg.

The handle is made of 12·7 mm. tubular iron bent to form an equilateral triangle, the inside dimensions of which must not be more than 184·15 mm.

FIG. 97.



The whole length of the weight should be 40·64 cm.

The throw is made from a ring, the diameter of which should be 2·135 m., and the rules for the validity and measurement of the throw are the same as for hammer throwing.

The run and the method of throwing are the same as in hammer

throwing, but because of the lesser length and greater weight of the apparatus, the weight is "taken up" in a different manner than the hammer.

*The starting position* is the same as that described under hammer throwing, namely, a short stride standing position with back

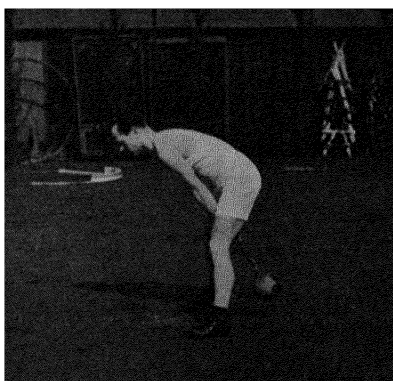


FIG. 98.

towards the direction of the throw. The handle of the weight is grasped with overgrip (palms downward side by side with thumbs towards each other) and,

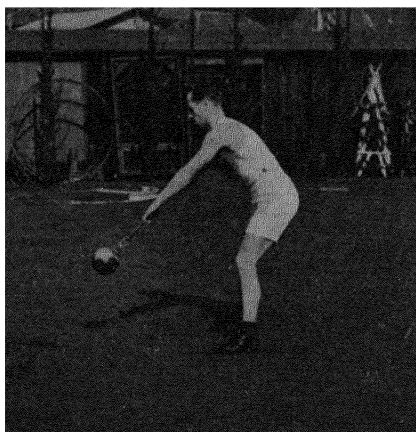


FIG. 99.

as the performer assumes reach stride angle standing position (see Fig. 97), the weight is placed on the ground a short distance in front of the feet. From this position the "weight is taken up" by raising the trunk so much that the weight, like a pendulum, swings backward between the legs (see Fig. 98) and forward again. When the weight is farthest forward in the swing (see Fig. 99), the body is twisted and swung so far to the right that the weight swings out to the right, the direction of the swing being obliquely backward (see Fig. 100).

At the moment when the weight is farthest back in the swing obliquely backward to the right, we have a somewhat live copy of the starting position: "Ready to take up the hammer," and from this point in the movement the weight throwing should be performed like hammer throwing, with the one exception that in weight throwing there is only one introductory swing with the weight above the head before the turning movements of the run commence.

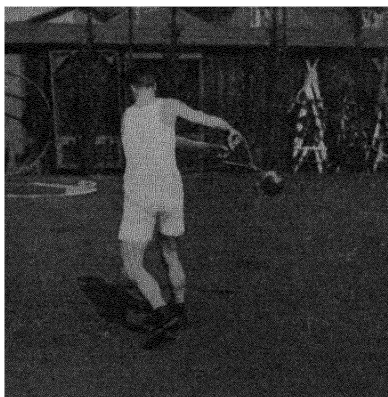


FIG. 100.

## TRAINING IN HAMMER AND WEIGHT THROWING

1. It should be remembered that a long throw is not made by increasing the speed as much as possible during the preparatory swing and then "following the hammer round" in the turns of the run. Therefore, training in the run and the throwing movements should seek to increase the speed at the end, that is to say, that one should begin so calmly that the subsequent movements can be fully controlled.
2. Never try to make a long throw with the help of strength alone. Instead, place emphasis upon correct technique and correct speed in the movements.

### *Common Faults*

1. That the speed in the first turn is too great so that a further *increase* is impossible in the second turn.
2. That the distance between the feet during the turns of the run and in the throwing position itself is too small, so that one is unable to increase the speed by means of trunk twisting, but is reduced to following the apparatus round in the last turn and in the throwing movement. Thus it is the apparatus and not the thrower that directs the movements.
3. Incorrect finishing position (throwing position), which, as a rule, is due to one or both of the above-named faults in conjunction

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