THE WORLD'S CHAMPION GOLFERS
THEIR ART DISCLOSED BY THE ULTRA-RAPID CAMERA

ARTHUR HAVERS
OPEN CHAMPION, 1923
THE DRIVE. 36 Positions
(NO. 3. FIRST SERIES)

BY
GEORGE W. BELDAM
AUTHOR OF "GREAT GOLFERS—THEIR METHODS AT A GLANCE"

Price Two Shillings
EXCLUSIVE COPYRIGHT PUBLICATION BY THE PHOTOCHROM CO. LTD
LONDON AND TUNBRIDGE WELLS
The World's Champion Golfers

The First Series, now ready, includes:

<table>
<thead>
<tr>
<th>Name</th>
<th>Series</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>WALTER HAGEN</td>
<td>The Drive</td>
<td>No. 1</td>
</tr>
<tr>
<td>WALTER HAGEN</td>
<td>Iron and Putting</td>
<td>No. 2</td>
</tr>
<tr>
<td>ARTHUR HAVERS</td>
<td>The Drive</td>
<td>No. 3</td>
</tr>
<tr>
<td>ABE MITCHELL</td>
<td>The Drive</td>
<td>No. 4</td>
</tr>
<tr>
<td>GENE SARAZEN</td>
<td>The Drive</td>
<td>No. 5</td>
</tr>
<tr>
<td>GENE SARAZEN</td>
<td>Iron Putt and Approach</td>
<td>No. 6</td>
</tr>
<tr>
<td>MISS JOYCE WETHERED</td>
<td>The Drive</td>
<td>No. 7</td>
</tr>
<tr>
<td>MISS JOYCE WETHERED</td>
<td>Driving Iron Bunker and Run-up Shots</td>
<td>No. 8</td>
</tr>
<tr>
<td>ROGER H. WETHERED</td>
<td>The Drive</td>
<td>No. 9</td>
</tr>
<tr>
<td>ROGER H. WETHERED</td>
<td>Medium Iron Putt and Run-up Shots</td>
<td>No. 10</td>
</tr>
</tbody>
</table>

By

GEORGE W. BELDAM

Author of

"Great Golfers—Their Methods at a Glance," &c.
NEW LIGHT ON GOLF

"O! I wad like to ken
The reason o' the cause an' the wherefore o' the why
Wi' mony anither riddle brings the tear into my e'e"

R. L. S.

IN THESE PHOTOS THE ULTRA-RAPID CAMERA HAS SOLVED THE RIDDLE OF GOLF AS THE CHAMPIONS PLAY IT

36 PICTURES REVEALING THE GOLF SECRETS OF ARTHUR HAVERS
I

HAVE been silent for many years as to the theory and practice of golf.

When my first action photographs appeared in "Great Golfers—Their Methods at a Glance" some twenty years ago, I warned others against making deductions from them without having the key to their interpretation.

Yet, as they opened up an entirely new line of thought on the game, and as they showed the players what they actually did for the first time in the history of the game, many writers set out to deduce theories from them minus the key to their interpretation—and I fear I also fell into the pit against which I had warned others.

I never gave up hope of eventually finding a key which would be the open sesame to the action photos, whether the player be a champion or otherwise.

It is because I believe the key has been found which gives the knowledge necessary to their interpretation, that I once more attempt to instruct others. To put into language what one means to convey, without photographs from which to demonstrate, would be to court disaster and confuse many.

I shall, therefore, as much as possible, rely on the demonstration of the movements as seen in the series of photographs to make the arguments clear.

As far back as 1907 some of the champions were good enough to hit twenty balls for me, so that I could time them at different parts of their swing, and piece together what a friend called a cinematographoid. It speaks volumes for their accuracy, for these cinematographoids might easily be mistaken for a series chosen from those made by the Ultra-Rapid Camera of one drive.
This camera was designed by Mr. Cox, of the Cinechrome Instruments, Ltd., to show the Admiralty the cause of the accidents which occurred to aeroplanes on returning to the deck of the mother ship.

The camera is worked by a motor, and 250 pictures pass the lens in one second. Enlargements from a choice of these give much finer detail than those enlarged from the ordinary cinema camera, in which only sixteen pictures pass the lens in a second. Those who have seen the slow-moving pictures on the screen must often have felt the desire to see them over again, possibly just to observe one point in the swing which struck them most, and it is because I felt the same desire that it occurred to me to stop the slow-moving pictures at every essential point in the swing—once and for all—and these series of enlargements are the result.

My thanks are due to Mr. Woods-Taylor, who operated the camera on behalf of his firm, and, without knowledge of the game, quickly assimilated what was required.

Also, my thanks are especially due to Thos. Carruthers, M.D., who possibly in his next incarnation—if not in this—will give us the most scientific treatise on golf which this world is likely to see. The research work done with his collaboration has greatly helped to the interpretation of action photos and slow-moving pictures, and, without this acknowledgment, I should not feel myself at liberty to produce these booklets. This preface would indeed be incomplete without acknowledging the courtesy of those who were good enough to play shots for me before the camera. What surprised me most was their concentration—the bir, bir of the motor seemed to be hardly noticed by them. When I mentioned this to a friend, he replied: "But they've played before silent crowds!"

When the champion with the many waggles appeared, I warned the operator, for every second meant 30s. worth of film, and his waggles I could foresee might easily cost a ten pound note! Somehow, his film was fogged, and the reason was never discovered. Lastly, my one aim is to help golfers of all ages and handicaps to become natural golfers—if they are not so already—and cause the chains of mechanical teaching to fall from their shoulders—and hands—so that they may forget the hundred-and-one details they have been taught to think of while making a swing. I fear many, including myself, have unwittingly misled others by deductions from action photos. Yet how easily they can be interpreted from "without to within," instead of from "within to without"; the hub moves the rim and not vice versa. From "within to without" means the club head is the last to be moved. I must leave
the chapter on "Flail" to make this clearer, though in these booklets I fear only the groundwork can be broken, but the Key Book explains in greater detail.

I was urged, whatever message I may have for the golfing world, to give it in book form—one large book—but, after carefully considering this matter, I came to the conclusion that for comparison of the series of photographs the Key Book should be a separate entity, so that reference to the letterpress and the series of photographs would be facilitated; for nothing is more annoying than to have to continually turn over to seek for any points of reference while analysing the photos.

Above all, I sincerely hope all teachers will try and grasp what is the teaching of the Ultra-Rapid Camera pictures. They give actual facts—not what the player thinks he does, but what he really does.

The message is: find out the principle common to all the champions, learn to read their movements as the photos show them in detail and as a whole, then apply the principle while taking into account the pupil's individuality or idiosyncrasy.

I am content to stand or fall by what I have attempted to show in these little booklets and the Key Book, because it is all there, in the analysis of the pictures by the Ultra-Rapid Camera, for those who have eyes to see.

The aim is to show how the world's champions arrive at the movement which leads the onlooker to feel that the maximum of effect has been achieved with the minimum of effort. That is a good measuring gauge for one's efforts during practice.

"Let the weight of the club head do it," is an old saying of the professionals. Yes; but how? I have tried in these booklets to give the answer; if they meet with any measure of success, then it is by no means the end, but just the beginning of new vistas for those who are led to cease from applying force and effort in the wrong way, and by understanding that the art consists in a uniform increase of the speed of the club head. The principle common to all the world's champions lies in the fact that the motive power comes from within and is transmitted outwards to the club—the "wrists" are the medium through which this power acts, but they do not supply the motive power.

G. W. B.

Boston Lodge,

Ealing.

1924.
THE KEY TO THE INTERPRETATION OF THE SLOW-MOVING PICTURES IS "FLAIL"

THE FLAIL

The Flail is an instrument which was generally used for beating out the ears of corn before more up-to-date methods came into use.

It consisted of two sticks, one longer than the other, which were joined together by leather thongs—here is an illustration:

DIAGRAM ONE

B was called the hand-staff, and will be referred to as the staff.

C is the thongs, and D the swiple, which was loaded at the end, similar to a golf club, which has lead in the back of the head.

The function of B was to move D by means of C in such a manner that D was flailed on to the ears of corn.

It is obvious that the staff had to stretch the thongs before the swiple could be moved—that is, any slack had to be taken up first, when the swiple would at once answer to any movement conducted to it by the staff operating on the thongs. If the staff pulled, the thongs would pull the swiple. If the staff turned round a moving or fixed axis, the swiple would do the same via the thongs—the wrists of the Flail. The movement was similar to that seen when three or four navvies are wielding sledge hammers on to one chisel in breaking up the road.

There were various methods of using the Flail, all, however, whether big or small movements, had to take into account the thongs.
CHAPTER ON FLAIL

IN WHICH ONLY THE GROUNDWORK IS BROKEN, AS FULLER INFORMATION ON THE SUBJECT IS GIVEN IN THE KEY BOOK

As space is limited in a booklet it is better to go straight to the point.

Firstly.—It is necessary to make plain what a Flail is, for there are many who have never heard even the name.

Secondly.—It is important to show how "FLAIL" is adapted to the human machinery.

Thirdly.—It is essential to show by demonstration of the photos, that the champion golfer’s movements can be interpreted by the application of "FLAIL."

But it was the discovery that Flail is the key to the interpretation of all natural movements—in which the maximum of effect is achieved with the minimum of effort—that led to the use of the very special Ultra-Rapid Camera, in the hope that it would prove beyond doubt that Golf was no exception.

The reader shall judge for himself whether the art of the champion golfers is not disclosed.

The movements governing "FLAIL" are diametrically opposed to most of the teaching on the golfing swing of the past twenty years.

That teaching, so far as the timing or order of the movement was concerned, was:—The hands take the club back (with turn or otherwise), and call on the arms, which call on the shoulders, which call on the hips.

The "FLAIL" movement will be seen to be just the reverse of this. Again, teaching has put the mind on "wrists," with the result that in many players they have become active, viz., supplying the motive power. In "FLAIL" it is the reverse of this, the wrists supply none of the motive power, and that is why they have been made the thongs, as applied to the human machinery. They are simply the medium by which the muscular effort originating in the Pedestal is translated into speed of the club head.

There is often confusion where the terms "wrists" and "wrist" are used. The former means the forearm and wrist joint—for the wrist joint can only of itself bend four ways, and only the humerus or radius can cause it to turn. The latter, viz., "wrist" is the generic term, as applied to wrist-work, the function of the wrists.
For further analogy the "wrists" may be looked upon as a reduction coil—they are but the medium through which the power passes, but do not supply it.

In "FLAIL" the timing or order of the movement is inherent, and because the movement is from "within to without," from the hub to the periphery, from the feet to the club head, almost any degree of motive power can be applied without fear of overbalancing, or upsetting the timing or order of the movement. That is why the champions and others can "press" without fear if they want to.

When the hands or wrists supply the motive power, and move the rim first, overbalancing at the hub must result. It is force misapplied which breaks clubs, and whoever heard of the rim starting to move the hub of a wheel!

Enough has been said to prepare the way, and perchance the reader's mind, for the assimilation of the various movements, as shown in the champion golfers' series, and the explanation. An illustration of a "Flail" is given. The following diagram shows how the "FLAIL" in principle is adapted to the human machine for the purposes of playing golf. The "wrists" have purposely been made the Thongs, so that it is evident they cannot supply any motive power.

A Diagram showing how "Flail" in principle is adapted to the Human Machine

DIAGRAM TWO (DRIVE)
A—White part—Feet and legs—The PEDESTAL.
The feet grip the ground, even inside the shoes.
The ankles and knees bend, and the legs are joined to the hips by ball and socket joints.
The Pedestal supplies lateral and up and down movement and rotation of the legs.
In A lies the motive power to move B.
The muscular effort generated causes a grip of the ground, felt on the inside of the feet and calves, up to the muscles above the knees, not only generating power to move B, but ensuring the firm stance so essential. This is in degrees for all shots, but infinitesimal for the putt and shorter shots.

B—The shaded part—made up of the hips, the spine, the shoulders and upper arms—The STAFF.
The Staff moves the Thongs (C).
The hips turn round with the legs of the Pedestal, revolving on their socket joints, they can, at the same time, be moved laterally, or caused to move up and down by the Pedestal. The character of the swing depends on the ratio of these respective movements to each other, but there should always be turn in greater or less degree. Any movement of the hips is conducted to the spine, the shoulders and upper arms. Irrespective of shoulder turn, or lateral, or up and down movement, the upper arms can both (or either) supply an additional movement, viz., rotation within the ball and socket joints, on their own. This causes the “radius” to turn, popularly known as “turn of the wrist.”
This movement of B, whatever its character, is conducted to the Thongs (C).

C—Outlined part—Forearms and wrist-joints. “Wrists” or The THONGS.
These are but the medium by which the movement supplied by B is conducted to the hands and club head (D).
The upper arm's rotation (both or either) has a distinct influence on them, irrespective of any turn, or up and down, or lateral movement of the hips.

It is this "arm rotation" which causes twist of the Thongs, or "turn of the wrists." If the Thongs are pulled on by B they are tautened, but they are twisted by upper arm rotation. Both movements influence "wrist work."

D—The black part—The hands, fingers and club—The SWIPLE. Whatever movement is given to C by A and B is conducted naturally to the SWIPLE.

The hands should be part of the club and move as the club moves, and turn as the club turns. If this is granted, the grip, whether overlapping, interlocking, or the old-fashioned (which takes a lot of beating when they are not allowed to supply the motive power) matters very little, since the hands do not supply the motive power, but conform to other movements conducted to them and the club.

The fingers simply guide and control all movement.

In all the champions, in degrees, will be seen a kind of "bracing-up," which, while drawing towards a centre the scattered forces, also causes the thongs to be "set," so that the power, acting on the staff, will immediately conduct any movement to the club head. In some, the bracing-up tautens or "sets" the thongs by vertical movement (the upward lift) emanating from the region of the feet to the knees, and causing a grip of the inside of the feet on the ground because of a centralising of the muscular effort, and tension is felt in the muscles above the knees. This lift would pull the club up and away from the ball, but the upper arms resist and press downwards and are drawn closer to the sides. (See R. H. Wethered series.) So the thongs are straightened also. A feeling of power
is thus generated and ready to be let off via the staff.

The other method is that as seen in George Duncan's series; his generation of power is not so obvious, but all the movements described as above are there in degree, but he relies on lateral movement of the hips via the legs of the pedestal to start his movement, which throws his thongs via staff forward slightly (the hands are the symptom); the reflex action back causes the thongs to stretch by the staff pulling on them, so that his hands are seen well behind the ball before the club head is moved; the staff is preparing to "flail" the club head back and round. This is the commencement of his movement and part of his swing.

In the drive, the twist of the thongs, or turn of the wrists, seems to take place with most at about the horizontal position on the way up, as they untwist naturally at the same position on the way down. This is analysis, and, in a certain way, it is wrists from start to finish—if by wrists is visualised thongs—and, therefore, it follows that the shorter the shot the sooner the thongs are seen to twist (analysis). The whole movement is adjusted to the length and kind of shot. The thongs can be "thrown" back, or "slung" round in any and every direction, and in any plane, causing the swiple (hands and club) to follow with turn and bend in varying degrees.

The timing or order of the movement is explained in the demonstrations of this series of photographs, but all seem to come down, giving the feeling of "all of a piece" movement.

The idiosyncrasies of the players are easily seen by comparing any of the series of the World's Champion Golfers.

When once "FLAIL" is understood, the player will find he has no longer any occasion to think how he will take the club back, and the
hundred-and-one details will sink into oblivion, and he will be well on the way to become a natural golfer.

"FLAIL" really means that the movement is from within to without—from the feet to the club head.

To understand the initial movement, visualise the club head as lightly glued to the ground until the movement from B releases it by means of the movement of C.

**DIAGRAM THREE**

Initial movements of "FLAIL" and Club XX. The hands are caused to move from H to H1 and back to H2 (G. Duncan's example), or they may only be moved from H to H2 without the club head moving away from the ball; in this method the thongs are stretched and the swing commenced.

If he sees the slow-moving pictures, he must remember that 250 of the pictures passed the lens in one second, whereas the speed of the ordinary cinema camera, which gives the movement more as the eye sees it, means only 16 pictures passing in a second. Therefore, multiply the slow-moving pictures by at least 12 to get the speed as the eye sees it; otherwise there may be created a race of slow-moving golfers, whose rhythm of movement will be but a spurious imitation of the pictures. The Key Book is left to deal with these and other points more fully, including the Golfing Swing.
ARTHUR HAVERS
(Born 1898)
OPEN CHAMPION, 1923

Arthur Havers broke the run of American successes when he won at Troon, with a stroke dividing him and Walter Hagen. For some few years he had been in the running in many big events, and had been looked upon as a possible champion. His style has been influenced by that great stylist, Harry Vardon, whom Havers always kept as his model.

It has borne fruit, but style is the man, and no one can ever quite be Harry Vardon, he must always remain the prototype of the stylist; the pity is that the Ultra-Rapid Camera cannot take him as he was at his zenith.

THE DRIVE

The peculiarity of this player’s series lies in the fact that the evident mind idea is to place the centre of gravity as near the left leg as possible and to keep it there throughout his swing. We shall see how he accomplishes this, and if his movements conform to those of “FLAIL.”

This series was taken at Sandwich in 1922, and the writer saw the shot, which left on him the impression of beautiful and “very delayed” wrist-work, and the ball flew away with very low trajectory, gradually rising with a very long carry. The photos show all these points and how the movement was worked out.
Nos. 1 to 6 show the player walking up to the ball from behind it, waggling, while taking his bearings and adjusting his stance subconsciously; the feet together in position, with the right gradually moving back from the left, then the full waggle, with very light grip of the right hand.

In No. 7 the club is being placed in position behind the ball, after the waggle and immediately the "bracing up" is seen to commence in Nos. 8 and 9.

No. 9 shows the bracing up and commencement of the swing as part of it. The left leg of the pedestal (A) has already bent at the knee, and the player is on his left toe (the shoe being at an angle of about 45 degrees). There is no doubt that the pedestal movement has caused the staff (B) to move C, which calls on D. There is no lateral movement, but from the start, up and down movement of the pedestal, left knee bending and right straightening, and the base of (B) the hips rotating round the ball and socket joints of the hips and pedestal, with its legs turning.

This movement of the staff (B), while the pedestal is moving as described, causes the thongs to flail back the swiple, the club head dragging slightly behind (No. 9), catching up and passing the hands in No. 12.

By this time the left thong is in line with the left upper arm (No. 11), and from this point the bending of the swiple from the wrist-joint ends is in evidence, but in No. 14 the "humerus" rotation is at work, doing a turn also on its own in addition to the hips and shoulders, and has twisted the thong and the swiple well over; from this point, the displacement of the club head is almost entirely due to bend and turn of the swiple from the wrist-joint ends of the thongs, with slight movement upwards (see Nos. 14 to 16), and
apparently the upward swing is finished by lift upwards from the "humerus" (see Nos. 16 and 17).

So the upward swing is completed, but notice the turn of the left foot on the ball of the left toe, from No. 15 onwards, with distinct pressure on the inside of the foot.

The Downward Movement is commenced in No. 19, and one can hardly believe it is the same player or the same shot, so great is the difference in position. But it is really a fine example of the reflex action of the "bracing up," lift upwards, resulting in the pull downwards from the pedestal, which lowers the position at the top by bending at the knees, the right knee bending and the left heel returning to its original position with the knee bent; a window is not pulled down by the arms, the hands are gripping with the arms extended, and these are pulled on by the pedestal. This pull downwards naturally undoes rotation.

The base of the staff (B) (the hips) has returned leaving the shoulders, upper arms, thongs and swiple behind. From No. 20 the right knee commences to bend more towards the left, and the left knee also bends (slight movement forward of the pedestal from the knees), but presently the left knee starts to straighten and the right to bend more, causing up and down movement of the hips, while they are turning on the pedestal at the ball and socket joints. The sudden return of the hips calls on the shoulders to catch them up, but the hips movement continues, restricted compared with the shoulders, but at impact they are both about in the same position, viz., half-facing the line of flight, as nearly all the champions' movements show them.

From about No. 23 the quick return of the shoulders and upper arms call on the thongs to flail the swiple on to the ball with increasing speed.
No. 23 shows how the other movements have not affected the relative position of the club to that which it assumed at the top (No. 18), a fine example of "delayed wrist-work," and no activity of the hands on the club to start it moving downwards.

At impact (No. 29) the hands were in advance of the club head, so that the ball is in contact with the club head, while its highest momentum is reached. The right thong is bent (bent elbow) and is stretched out by the momentum of the club head, which follows through as far as possible with its face square, as the ball was struck; then comes the turnover or twist of thongs when the right thong is at fullest stretch, and thereafter centrifugal force calls on B, which calls on A to finish the swing.

When the pedestal and hips are rotating, as they are before, at, and after impact, it is not a difficult matter for the head to be kept in the position it is. It is when the pedestal and staff lunge forward past the ball (or where it was) and upwards that it is well-nigh impossible.

Long driving, with direction, lies in the rotation as described, being in advance of the "squared" position of the shoulders and hips before impact is made. This is accomplished by the pedestal moving round by means of the right knee movement from the start of the pull downwards—at least, this is given as the reasonable solution.

But long driving comes from timing the swiple on to the ball with the greatest speed possible, and the later this is in the downward swing the better the results.
THE "KEY BOOK" TO
The First Series of
THE WORLD'S
CHAMPION GOLFERS

is
NOW ON SALE

and should be read in conjunction with the separate numbers containing the "sequence photos" taken by the ULTRA-RAPID CAMERA

PRICE TWO SHILLINGS

Exclusive Copyright Publication by
The Photochrom Co., Ltd.
LONDON & TUNBRIDGE WELLS