United States Patent [19]

Seze

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[54] **APPARATUS FOR PRACTICING TIMING FOR SPORTS TO BE USED MAINLY FOR GOLF**

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[73] Assignee: **Daiwa Seiko Co., Ltd.,** Higashi-Osaka-City, Osaka, Japan; a part interest

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[30] **Foreign Application Priority Data**

Feb. 21, 1972 Japan 47/18202

[52] **U.S. Cl.** ..... **35/29 A,** 58/130 R

[51] **Int. Cl.** **G04f 11/02**

[58] **Field of Search** ..... 35/29 R, 29 A, 29 C; 58/130 R, 130 A, 130 C, 130 E; 73/12

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Primary Examiner—Harland S. Skogquist
Attorney—James E. Armstrong et al.

[57] **ABSTRACT**

An apparatus for practicing timing includes a pointer to be rotated at a constant tempo in one direction and to be watched by the exerciser and an indicating member to be registered with the pointer at a predetermined position to be thereafter rotated in registry with the pointer. Upon reaching a predetermined position the indicating member is moved in a direction opposite to the direction of movement of the pointer at a higher speed than the pointer and returns to the previously registered position.

The exerciser prepares for the timing practice by the movement of the pointer and swings his club in unison with the movement of the indicating member for timing practice.

To assure more effective timing practice, auditory practice means is also disclosed in combination with visual practice means. The apparatus further includes means for providing profile of an actual swing form and means for minute adjustment of the swing tempo. Thus, swing form can be corrected along with practicing timing for swinging the golf club.

25 Claims, 19 Drawing Figures

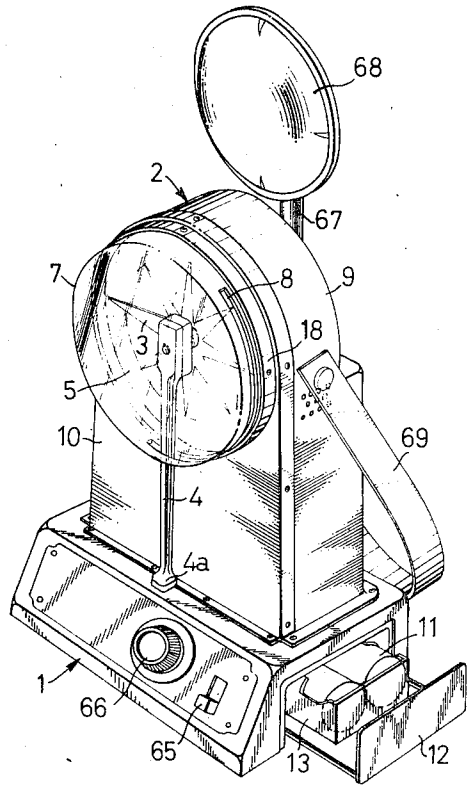

Fig 1

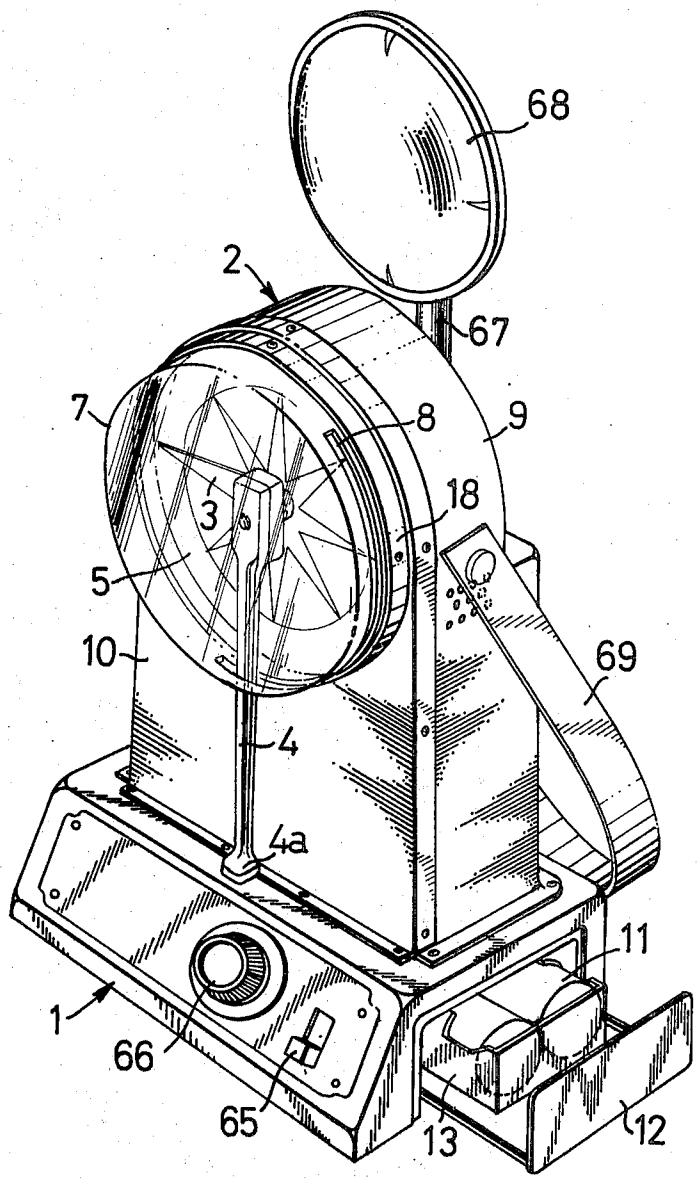

Fig 2

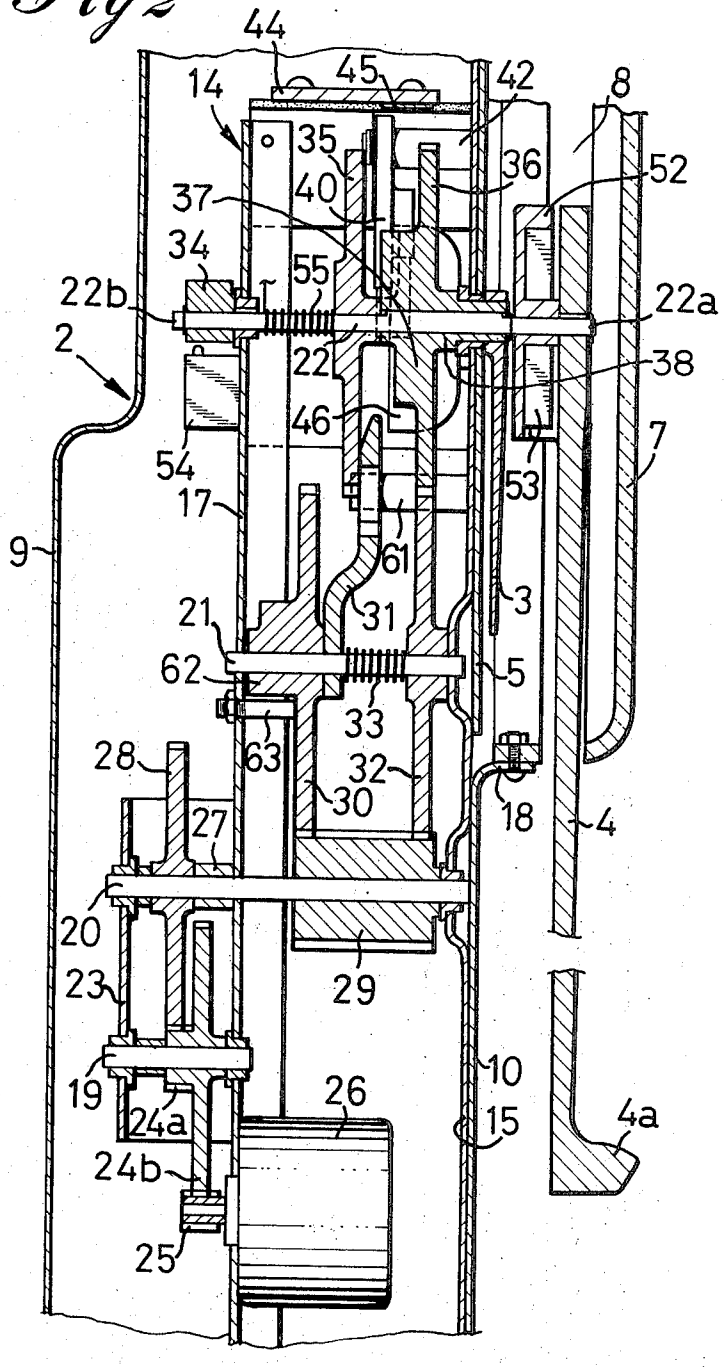
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Fig 3

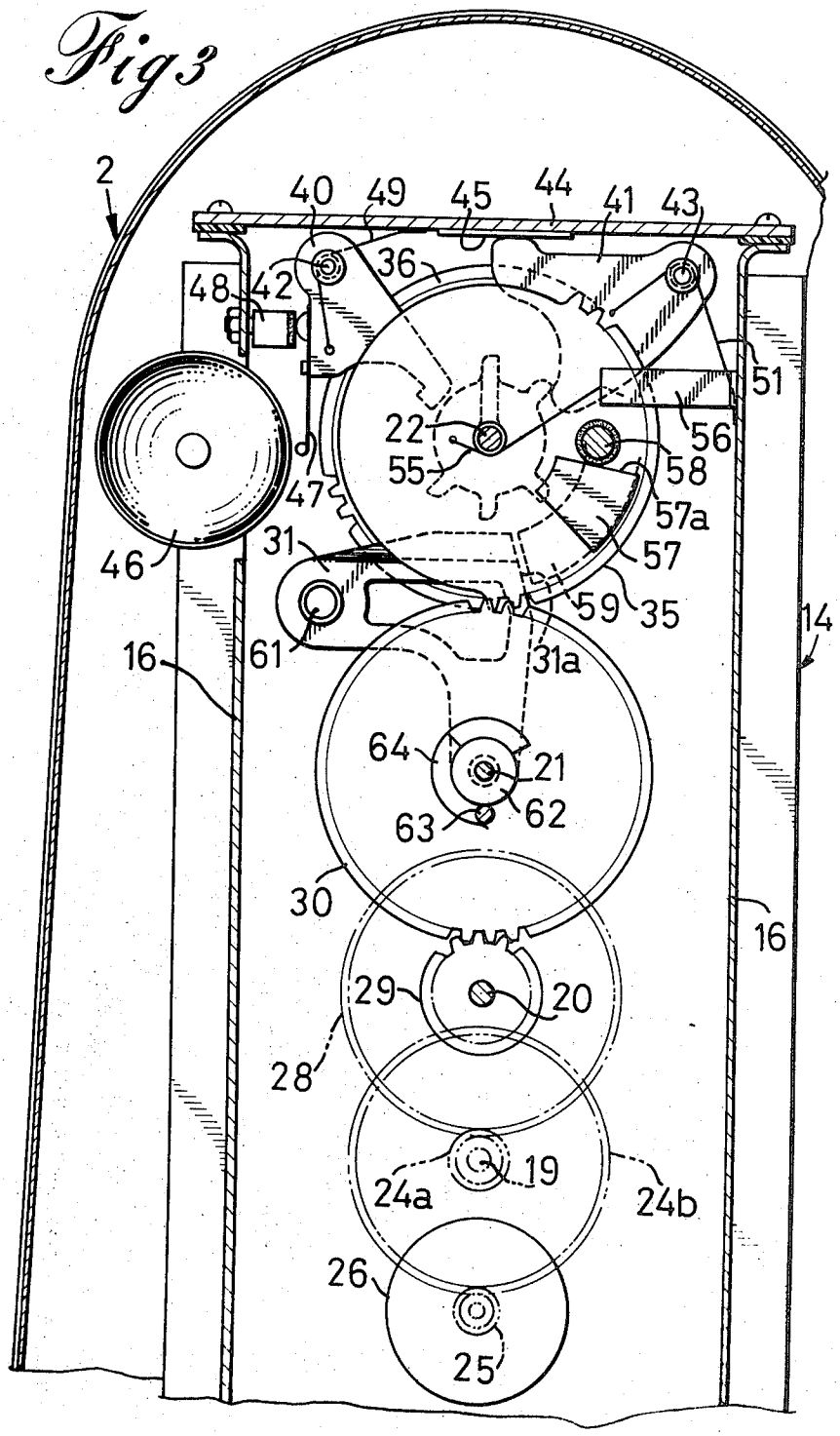
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Fig 4

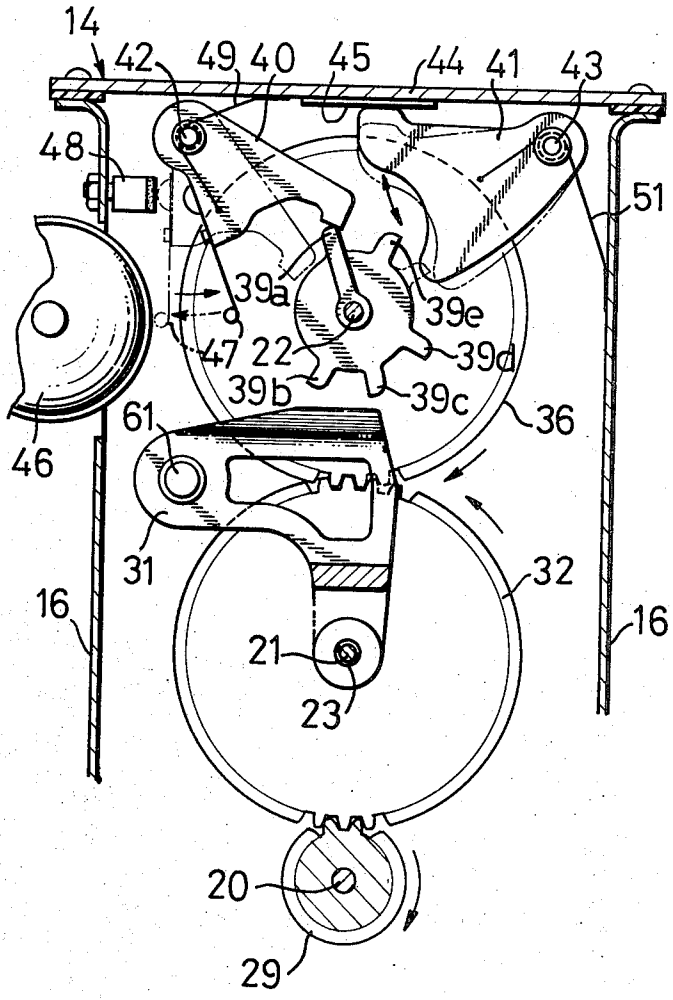
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Fig 5

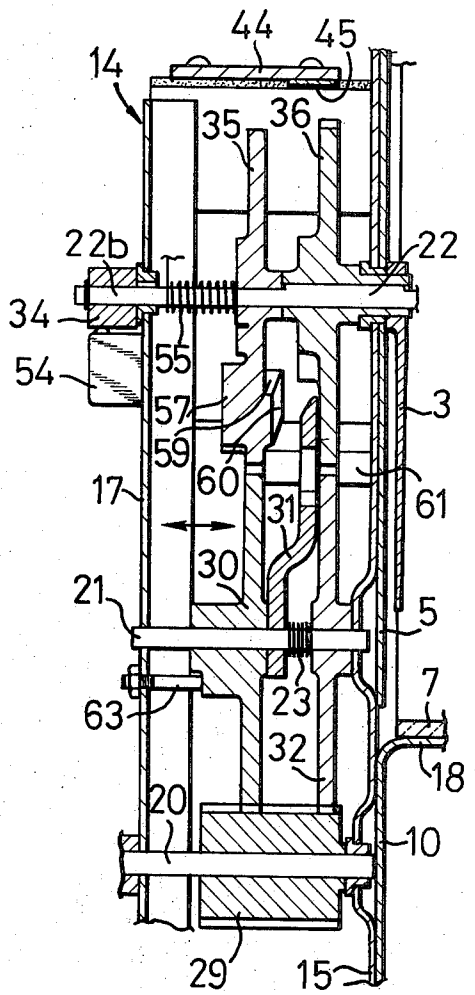
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Fig 6 (II)

Fig 6 (I)

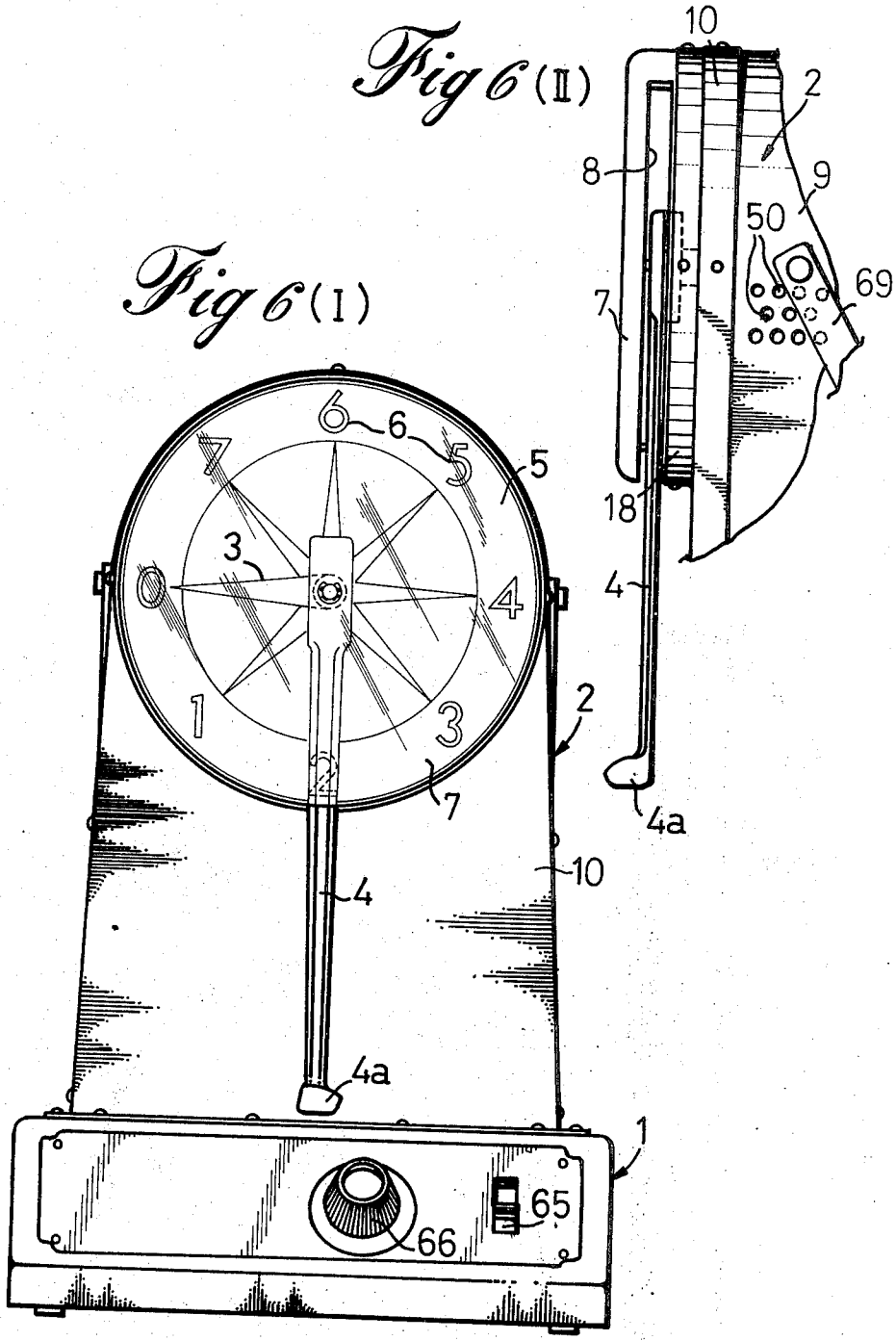


Fig 1

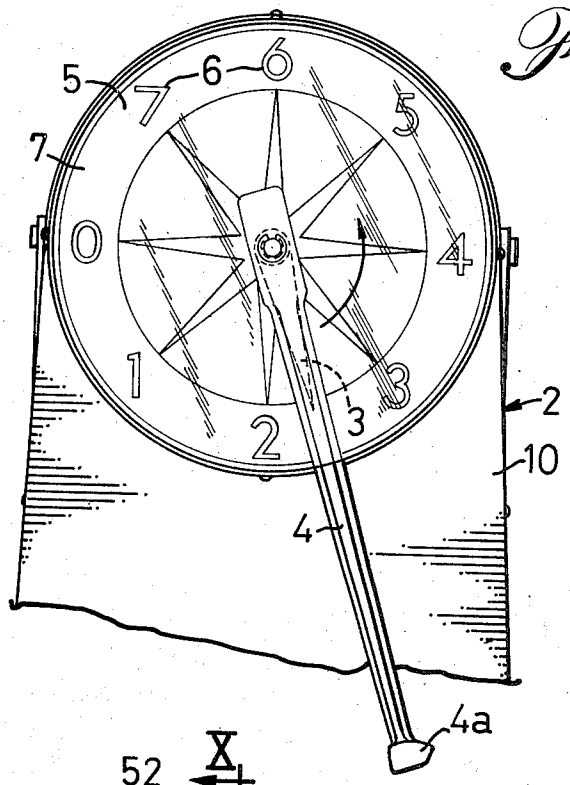
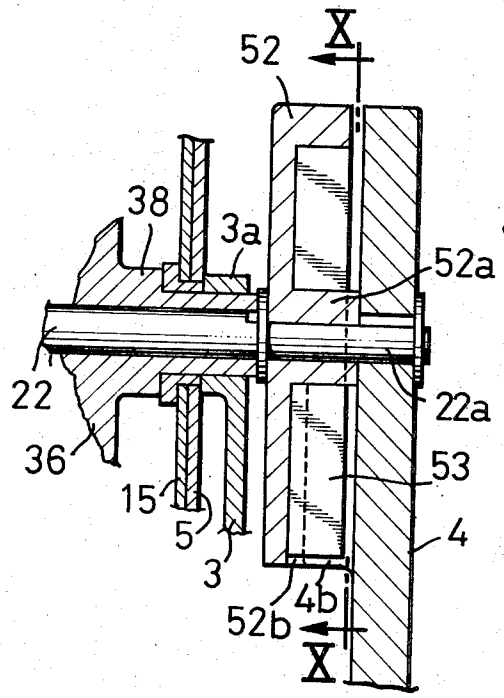


Fig 2



INVENTOR

BY

ATTORNEY

Fig 10

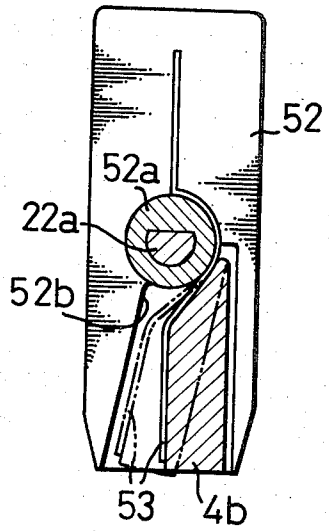


Fig 8

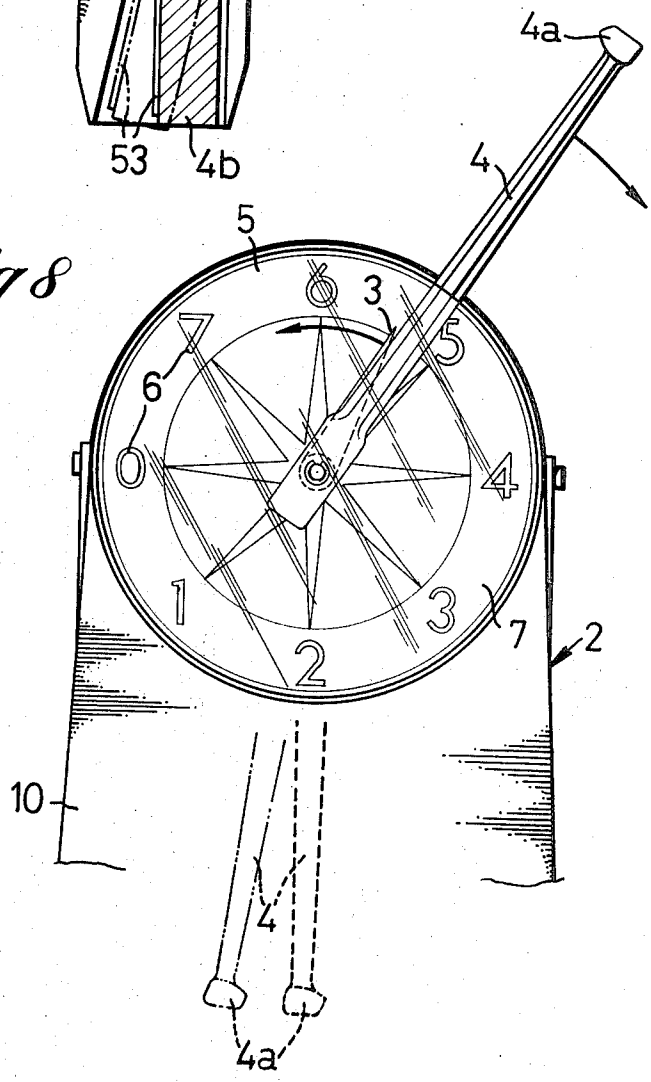


Fig 11

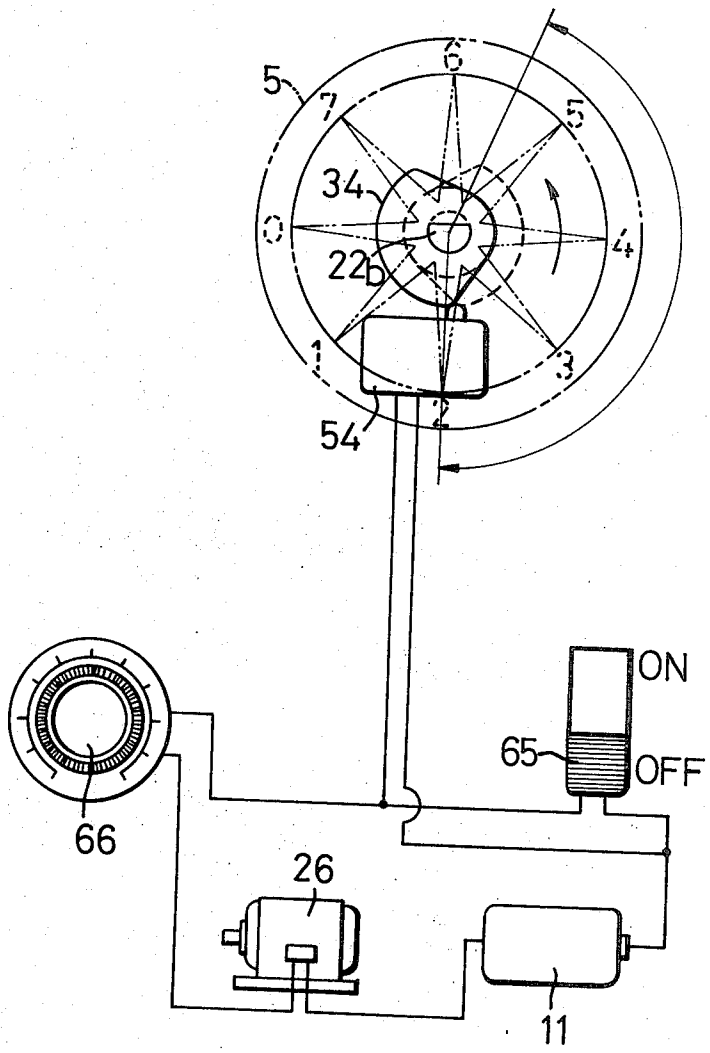


Fig 14A

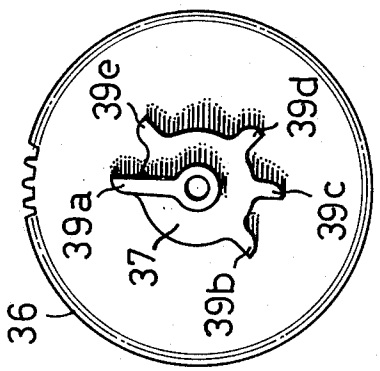


Fig 14B

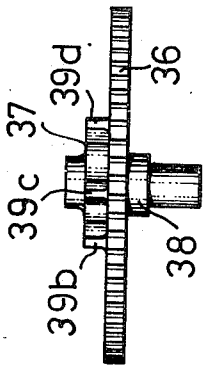


Fig 13A

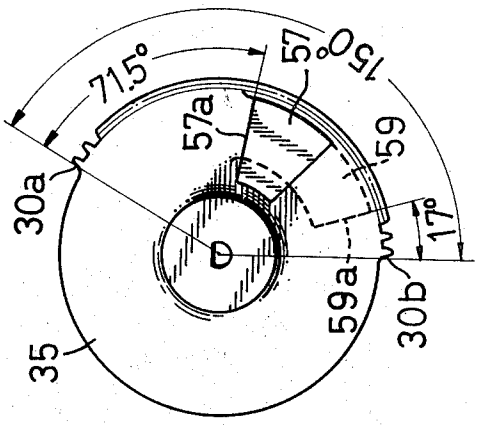


Fig 13B

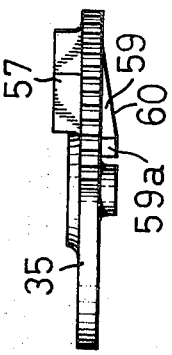


Fig 12A

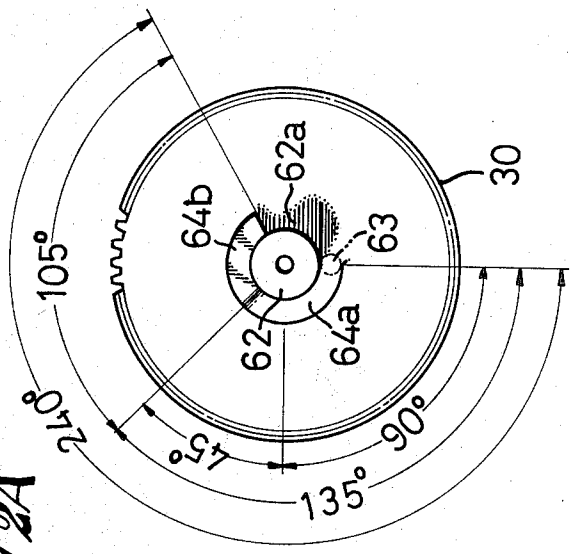


Fig 12B

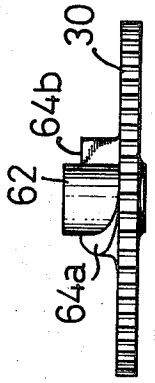
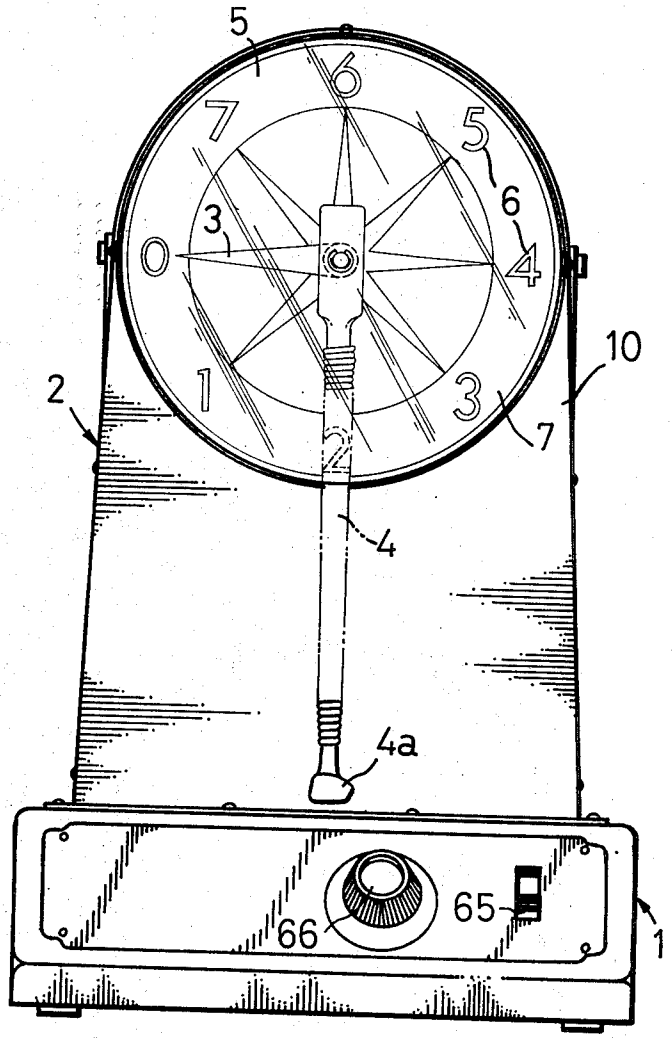


Fig 15



APPARATUS FOR PRACTICING TIMING FOR SPORTS TO BE USED MAINLY FOR GOLF

BACKGROUND OF THE INVENTION

The present invention relates to an apparatus for practicing sports, especially for practicing golf, more particularly to an apparatus for practicing timing of club swing in golf in a manner suitable to individual golfers.

It is well known to exercisers as well as to instructors that the timing and rhythm of a swinging or throwing action are essential factors in playing sports such as golf and baseball.

Experts are well aware that rhythm and timing are critical to a golf swing, but it is nearly impossible to let individual players learn swing timing in a manner suitable to the individual persons. Moreover, for one who is unable to learn directly from an instructor, it is difficult to find and master a timing suitable to himself, although he may be able to realize the importance of swing timing from books and the like.

Each ball is shot with the same rhythm and timing whether by a driver or putter and, to achieve a longer shot, a longer club may be used to cause the club head to strike the ball at a greater speed. Thus the rhythm or timing of the swinging action is the same all the time.

The swing timing in golf is characterized by its rhythm. It is not merely the rhythm of a stroke of motion but is closely related to the flexiblility of the golf club and the movement of the body. When a ball is hit, the body of the player and his hands may come to a halt for a moment at the top of upswing, (backswing) still permitting the club head to follow the same path of its movement (i.e., circular path) while the club is being flexed due to gravity, and the club is then brought into downswing by the body and hands in unison with the repellent force of the club. At this time it is most desirable that impact take place the moment when the club is restored to a rectilinear position free of flection.

Even at the sacrifice of a considerable period of time and expenditure, however, it is difficult to master the timing of a motion including an upswing, downswing and impact.

SUMMARY OF THE INVENTION

In view of the problems described above, the present invention provides a novel and useful apparatus for practicing timing for golf.

An object of this invention is to provide a useful apparatus which readily enables each golfer to learn accurate timing suitable to himself and to thereby improve his technique advantageously from the viewpoint of time, economy and health.

Another object of this invention is to provide an appratus which enables the golfer to audiovisually learn the timing of a cycle of motion including a preparatory movement (i.e., forward press) before upswing, initiation of upswing, topswing, downswing, impact and follow-through, the apparatus being such that the golfer can actually swing his club with the timing determined by the apparatus so as to master ideal timing suitable to himself.

Another object of this invention is to provide an apparatus whereby the golfer can master timing for effectively flexing the club at the moment of the topswing and causing the club to give an explosive energy at the moment of impact due to the resulting repellent force and inertia of the club so as to enable him to achieve the most effective impact peculiar to him.

Another object of this invention is to provide an apparatus adapted for minute adjustment of timing to provide suitable timing for each exerciser since the timing adopted differs from person to person.

Still another object of this invention is to provide an apparatus which enables the exerciser to find out a faulty swing during the practice of timing and which is portable and compact in overall construction.

These objects are fulfilled by the apparatus for practicing timing of this invention which comprises a pointer to be rotated at a constant tempo in one direction and an indicating member to be registered with the pointer at a predetermined position to thereafter rotate in registry with the pointer, the indicating member being such that upon reaching a predetermined position, the member is moved toward the direction opposite to that of movement of the pointer at a higher speed than the pointer and returns to the previously registered position. More specifically, the apparatus of this invention comprises the pointer and the indicating member which are coaxially supported on a shaft and positioned at the front of a main body provided with a support, the pointer being rotatable continuously in one direction at a constant tempo about the shaft, the indicating member being rotatable together with the pointer in registry therewith in the same direction when the pointer reaches a predetermined position during its continuous rotation, the indicating member being movable in a direction opposite to the direction of rotation of the pointer at a higher speed than the pointer to return to the position where the indicating member was initiated into rotation, when the pointer and the indicating member reaching a predetermined position in registry with each other. The apparatus further includes a construction for stopping the indicating member for a moment to impart a repellent force to the member at the second-mentioned predetermined position where the indicating member is moved out of registry with the pointer for reverse rotation, so that the indicating member can give an explosive energy due to its inertia and gravity upon returning to the position where it was initiated into rotation. The tempo of the pointer can be visually detected when the end of the pointer coincides with the indicating marks equidistantly spaced on the dial as the pointer rotates on the dial in a given direction. Furthermore, not only by the visual detection of position of the pointer relative to the indications on the dial, the tempo of the pointer can also be detected by auditory means. The provision of the auditory means enables the golfer to perform more effective practice of timing only through the auditory means after he has mastered timing to some extent by the present apparatus. On such occasion, the auditory means permits him to practice also for a better swing form, whereby a rapid improvement in the skill will be achieved. The indicating member may comprise a coil spring, which will effectively reproduce actual flexing of the club during a swing action, giving the highest energy upon impact.

These and other objects, features and advantages of this invention will become more apparent from the following description with reference to the accompanying drawings specifically showing an apparatus for practicing timing for golf embodying this invention only for illustrative purposes.

BRIEF DESCRIPTION OF THE INVENTION

FIG. 1 is a perspective view of an apparatus for practicing timing for golf embodying this invention, batteries serving as a power source being shown as they are partly pulled out;

FIG. 2 is a fragmentary side elevation in vertical section along a centerline showing the interior mechanism of the apparatus;

FIG. 3 is a rear view in vertical section along a centerline showing the same;

FIG. 4 is a rear view in section particularly showing a timing mechanism;

FIG. 5 is a side elevation in section showing the interior mechanism when the indicating member is in upswing;

FIGS. 6 to 8 are views illustrating the operation of a pointer and an indicating member for practicing timing, FIG. 6I being a view illustrating the apparatus when practice commences, FIG. 6II being a fragmentary side elevation of the same, FIG. 7 being a view illustrating an upswing operation, FIG. 8 being a view illustrating a topswing operation;

FIG. 9 is a side elevation showing a shock absorbing mechanism the moment then the indicating member effects an impact by its downswing under the action of gravity and inertia;

FIG. 10 is a view in section taken along the line X—X in FIG. 9;

FIG. 11 is a circuit diagram of a switching member for making it sure that the indicating member will be returned to an upswing initiating position;

FIGS. 12A and 12B are a plan view and a side elevation of a slide gear;

FIGS. 13A and 13B are a plan view and a side elevation of a return gear;

FIGS. 14A and 14B are a plan view and a side elevation of a timing gear; and

FIG. 15 is a front view showing another embodiment of the indicating member as it is mounted in place.

DETAILED DESCRIPTION OF THE INVENTION

With reference to FIG. 1, an apparatus of this invention includes a support 1, a main body 2 fixed to the support in an upright position, a pointer 3 disposed on the front face of the main body 2 and adapted to be rotated in one direction at a constant tempo, and an indicating member 4 mounted coaxially with the pointer 3. The pointer 3 is driven by the rotation of its shaft. When the pointer 3 is brought into registry with the indicating member 4 during rotation at a constant tempo, the pointer 3 rotates along with the indicating member 4 for counterclockwise rotation through about 150° in registry therewith. Upon completion of rotation through 150°, the indicating member 4 rotates 150° in the opposite direction at a higher speed than previously up to the original position. Attached to an upper portion of front face of the main body 2 is a dial 5 which is in the form of a disc as shown in FIGS. 6(I), 7 and 8. Marks 6 indicating tempo are provided on eight radial lines equidistantly spaced apart on the surface of the dial. The pointer 3 and indicating member 4 are supported at their base ends on the same shaft at the center of the dial 5. The dial 5 is provided with a protective cover 7.

The protective cover 7 made of acrylic resin is transparent and is formed in its peripheral portion with an opening 8 subtending an angle of 150° for permitting the indicating member 4 to move reciprocally through 150°. Thus a portion of the indicating member 4 from its intermediate part to its distal end projects outward from the cover 7.

The main body 2 comprises a rear cover 9 having an opening in the peripheral edge portion of its front and a front cover 10 having an opening in the peripheral edge of its rear. The rear and front covers are fixed together by screws with their peripheral flanges engaged in overlapping relation. The covers are fixed to the support 1 with their lower flanges secured thereto by screws.

The support 1 serves to support the main body 2 and constituent members of the present apparatus and to keep the overall apparatus in position against displacement or falling down. The support 1 has a hollow chamber in its interior for replaceably accommodating batteries as seen in FIG. 1.

A slide base 12 is fitted in the support 1 and is drawable from an opening formed in the side face of the support 1. Four batteries are placed in a battery box 13 fixed to the base 12.

The main body 2 comprising the front and rear covers 10 and 9 accommodates a timing mechanism for operating the pointer 3 and indicating member 4. A support frame 14 quadrilateral in plan is disposed within the main body 2 for supporting the timing mechanism.

As illustrated in FIGS. 2 and 3, the support frame 14 is composed of a front wall 15, opposite side walls 16 and a rear wall 17. The front wall 15 is in fitting contact with the inner face of the front cover 10 and the peripheral portion thereof is fixed to the cover by screws.

The dial 5 is placed on the upper front face of the front wall 15 of the support frame 14. The front cover 10 is open in its upper front wall to expose the dial 5. The peripheral side portion of the protective cover 7 is secured by screws to a peripheral flange 18 defining the opening (see FIG. 2). Along a vertical centerline of a box defined by the support frame 14, four shafts 19, 20, 21 and 22 are spaced apart by given distances and extend transversely in parallel relation.

In FIGS. 2 and 3, the shaft 19 is rotatably supported through bushes on the rear wall 17 and a bracket 23 secured to a lower portion of the wall 17 by screws. A double gear including a small gear 24*a* and a large gear 24*b* formed integrally therewith is mounted on the shaft 19. The large gear 24*b* meshes with a motor pinion 25. A motor 26 is fixed to the front face of the rear wall 17 below the shaft 19 and coupled to the batteries 11.

The shaft 20 is positioned above the shaft 19 and extends through the bracket 23, rear wall 17 and front wall 15 and is rotatably supported on bushes.

Within the bracket 23, a reduction gear 28 is mounted on the shaft 20 along with a distance collar 27 and meshes with the small gear 24*a* of the double gear to provide speed reduction means.

Between the rear wall 17 and front wall 15, another gear 29 is mounted on the shaft 20. The gear 29 acts as a main gear for power takeoff for swinging exercise and the timing thereof.

The shaft 21 positioned above the shaft 20 is rotatably mounted on the rear wall 17 and front wall 15 and carries a slide gear 30, lock cam 31 and idle gear 32, with a coil spring 33 wound around the shaft 21 between the lock cam 31 and idle gear 32 in resilient con-

tact therewith. The slide gear 30 and idle gear 32 are in meshing engagement with the main gear 29 all the time.

The shaft 22 disposed above the shaft 21 extends through the rear wall 17, front wall 15 and dial 5. The front end of the shaft 22 projecting from the dial 5 supports the pointer 3 and the indicating member 4, while the rear end thereof projecting from the rear wall 17 supports a switch cam 34 to be described later.

The shaft 22 carries a return gear 35 and a timing gear 36. The timing gear 36 is loosely mounted on the shaft 22 and meshes with the idle gear 32 all the time, so that the rotation of the timing gear 36 does not cause the shaft 22 to rotate.

The timing gear 36 has a boss 37 of a greater diameter and a boss 38 of a smaller diameter which passes through the front wall 15 and dial 5 and is supported by a bush.

The boss 38 is fitted into the base portion 3*a* of the pointer 3 (see FIG. 9) which is retained against removal by a stop ring, whereby when the timing gear 36 is rotated in one direction at a predetermined tempo through the idle gear 32 meshing with the main gear 29, the pointer 3 is also rotated together with the gear 36, the arrangement being such that the coincidence of the tip of the pointer 3 with the mark 6 on the dial 5 visually indicates the tempo of a golf swing for the exerciser.

If such visual indication is combined with auditory indication, the tempo will be detected with greater reliability. For this purpose, the boss 37 with greater diameter of the timing gear 36 is provided in its rear face with first to fifth pawls 39*a*–39*e* in radial arrangement as seen in FIG. 14. The first pawl 39*a* is higher than all the other pawls with provision of a stepped portion.

As shown in FIGS. 3 and 4, a ringing cam 40 and a timing cam 41 are disposed in opposing relation to each other so as to be engageable with the distal ends of the pawls, the cams mounted on pins 42 and 43 secured to the front wall 15. An upper cover 44 is secured by screws to the side walls 16 of the frame 14 to close the upper opening of the frame 14 and is provided with a striking face 45 at the midportion of rear face of the cover 44. Part of upper portion of the side wall 16 beside the ringing cam 40 is open to provide a metal bell member 46 whose outer periphery is positioned within the box. A striker 47 for striking the bell member 46 is secured by screws to the ringing cam 40. The striker 47 is in pressing contact with a stopper 48 which is adjustably mounted to keep the striker away from the bell member 46 by a small distance.

The ringing cam 40 has a spring 49 whose one end is implanted in the cam 40, with its intermediate portion wound on the pin 42. The other end of the spring 49 bears against the cover 44, the arrangement being such that the distal end of the cam 40 is driven only by the first pawl 39*a* against the spring 49 and that, when disengaged from the pawl 39*a*, the distal end can be urged in the opposite direction by the action of the spring 49, causing the striker 47 to strike the bell member 46. It is so designed that the metallic sound is produced by the impact when the pointer 3 is at 0 position on the dial 5. The metallic sound indicates the initiation of practice. To enable the exerciser to hear the sound, sound emitting apertures 50 are formed in the side wall of rear cover 9 in proximity to the bell member 46 (see FIG. 6(II)).

The timing cam 41 includes a portion engageable with the pawls and another portion to be disengaged from the striking face 45 by the engagement and adapted to be instantaneously returned to strike the face 45 before reengagement.

The timing cam 41 has a spring 51 having one end retained by and extending into the cam 41, an intermediate portion wound on the pin 43 and the other end bearing against the side wall 16. When the timing gear 37 is rotated with its pawl brought into engagement with the distal end of the cam 41, the cam 41 is driven against the spring 51, and when freed from the engagement, the cam 41 strikes the striking face under the action of the spring 51, delivering a dull sound of timing impact to the exerciser. It is so designed that during the foregoing movement of the pointer 3 the dull impact sound is emitted at a given tempo when the tip of the pointer coincides with the marks 1, 2, 5, 6 and 7 on the dial.

When the pointer 3 comes into registry with the marks 3 and 4, the dull sound will not be given, inasmuch as the indicating member 4 is initiated into upswing when the pointer 3 comes to the 2 position and a certain period of time following this moment is utilized for the exerciser to achieve mental concentration.

The visual and auditory indication of tempo thus effected enables the exerciser to learn a suitable rhythm for performing an upswing. The invention permits the exerciser to learn the timing with which he swings his golf club in accordance with the rhythm. The swing of his own club is indicated by the movement of the indicating member 4 supported at its base on the shaft 22. The indicating member 4 has a bulged portion 4*a* resembling the club head and is similar to a club in its overall shape.

As shown in FIG. 6(I), the clublike indicating member 4 is located at 2 position of marking 6 on the dial before it is initiated into movement. At this stationary position, it is initiated into upswing in a counterclockwise direction together with the pointer 3 (FIG. 7). The upswing will be terminated at 5 position of the mark 6 on the dial 5, but in spite of the interruption of movement at this position, the bulged portion 4*a* of the indicating member 4 substantially supported on the shaft 22 at its base moves in a counterclockwise direction along an arcuate path under the inertia of the upswing, with the result that a repellent force will be accumulate in the indicating member 4. This state is illustrated in FIG. 8.

Downswing is initiated at this topswing position, the downswing being effected at a greater speed than upswing. The indicating member 4 is returned, by the inertia and a quick return mechanism to be described later, to the 2 position of the mark 6 on the dial 5 at such tempo that when the pointer 3 moves out of registry with the indicating member 4 and reaches the 6 position of mark 6, the indicating member 4 returns to the position of the mark 2. The moment when the bulged portion 4*a* of the indicating member 4 returns to the position of the mark 2 is the moment of an impact. At this time, the indicating member 4 is in a rectilinear form to give the most effective energy.

At this moment, the indicating member 4 continues to move along the same path as indicated in the chain line in FIG. 8 due to the inertia and gravity. In order to mitigate this moment, the indicating member 4 is sup-

ported at its base on the shaft by a construction shown in FIG. 10.

The front end 22*a* of the shaft 22 carries a grip 52 by which the base portion of the indicating member 4 is supported on the front end 22*a*. The front end 22*a* is formed in a semicircular shape in cross section by cutting off part of periphery of the shaft 22 in an axial direction. A shaft bore extending through a boss 52*a* of the grip is fitted over the front end 22*a* to permit the grip 52 to rotate integrally with the shaft 22. The grip 52 is formed in its lower front side with a recess 52*b*. Further there is provided a plate spring 53 having one end implanted in the front of the grip 52, an intermediate portion extending along one side of outer periphery of the boss 52*a* and the other end extending into the recess 52*b*. A mounting portion 4*b* projecting from the rear side of base of the indicating member 4 is positioned between one end of the spring 53 and the inner wall of the recess 52*b*, with the shaft bore in the base of the member 4 fitted over the shaft 22. A stop ring prevents the member 4 from removal. Thus the indicating member 4 is adapted for rotation integrally with the shaft 22.

The rotation of the shaft 22 brings the indicating member into upswing and downswing. More specifically as illustrated in FIGS. 2 and 5, the rear end 22*b* of the shaft 22 is supported on the rear wall 17 of the frame 14 through a bush and has semicircular cross section like the front end 22*a*. The rear end 22*b* projecting from the wall 17 carries the switch cam 34 for integral rotation with the shaft 22. Under the cam 34 a microswitch 54 is secured to the wall 17.

The return gear 35 is mounted on the portion of the shaft 22 having a semicircular cross section. Meshing of the return gear 35 with the slide gear 30 as will be described later enables the shaft 22 to rotate in a counterclockwise direction. This rotation tensions a coil spring 55 wound on the shaft 22 for the accumulation of a restoring force, which when the gear 35 is disengaged from the gear 30, causes the gear 35 to quickly rotate in the reverse (i.e., right) direction to return to the original position.

The spring 55 for returning the gear 35 has one end fixed to the gear 35 and the other end caught on the distal end of a support member 56 fixed to the side wall 16 as seen in FIG. 3.

The return gear 35 and the timing gear 36 are mounted on the same shaft as illustrated in FIG. 2. It will be seen from FIG. 13 that the gear 35 is formed along its outer periphery with a gear over an angular range of 150° for meshing with the slide gear 30. Thus the return gear 35 is rotated in a rightward in FIG. 3 through 150° against the coil spring 55. The rotation of the gear 35 also rotates the shaft 22 integrally therewith, causing the indicating member 4 to rotate in a counterclockwise direction by a half turn for upswing. After the return gear 35 has rotated a definite range of angle (150°) against the spring 55 due to meshing with the gear 30, the restoring force of the spring 55 drives the gear 35 in the opposite direction at a greater speed than previous rotation. The shaft 22 which follows this rotation therefore causes the indicating member 4 thereon to rotate clockwise at a high speed for a downswing.

The high speed return of the return gear 35 has to be limited completely by suitable means when the return has been completed. Otherwise, a faulty meshing will subsequently result between the gears 30 and 35, which will further develop into an error in the timing of swing of the indicating member 4.

Accordingly, as shown in FIG. 13A and 13B, the return gear 35 is provided on its rear face with a wall 57*a* of a projection 57 at a position about 71.5° away from the terminal position 30*a* of meshing between the gears 30 and 35 and a stopper pin 58 is mounted on the rear wall 17 at such position that the outer periphery of the pin 58 is engageable with the wall 57*a* (see FIG. 3). With this arrangement, the wall 57*a* strikes the outer periphery of the pin 58 when the return gear 35 is returned to thereby limit the range of return of the return gear 35. To mitigate the impact of contact, a shock absorbing member made of rubber is fitted around the pin 58. Further it is noted that the repellent force produced by the striking force tends to rotate the return gear 35 in a direction opposite to the returning direction. To prevent this, another limiting means has to be provided in opposing relation to the foregoing limiting means. The limiting means comprises a wall 59*a* of a projection 59 formed on the front face of the gear 35 and the lock cam 31. In FIG. 13A, the projection 59 has the projecting wall 59*a* about 17° away from the initial position 30*b* of meshing between the gears 30 and 35. The front side continuous with the wall gradually decreases in its height beyond the projection 57 to form a taper face 60. The taper face 60 serves as a guide to prevent inadvertent slowing down or stoppage of the gear 35 when the front face of the gear 35 comes into engagement with the lock cam 31 in the course of return of the return gear 35.

As shown in FIGS. 3 and 5, the lock cam 31 is in the form of an L-shaped plate whose one end is mounted on the shaft 21, the other end thereof being loosely fitted on a guide pin 61 projecting from the front wall 15. The lock cam 31 is positioned between the gears 35 and 36 in contact with the front face of the return gear 35 (see FIG. 2). As seen in FIG. 3, the corner 31*a* of the lock cam 31 is so disposed as to oppose the wall 59*a* of the projection. The above-mentioned arrangement is such that when the gear 35 is rapidly returned by the repellent force of the spring 55 upon being unmeshed from the gear 30, the range of return is limited by the striking contact of the wall 57*a* of the projecting 57 with the stopper pin 58 and the subsequent rotation in the opposite direction caused by the striking force is limited by the contact of the wall 59*a* of projecting 59 with the corner 31*a* of the lock cam 31.

To effect the foregoing action, the lock cam 31 is slidable on the shaft 21 and guide pin 61 in timed relation to the slide gear 30.

As apparent from FIG. 3, the slide gear 30 mounted on the shaft 21 meshes with the main gear 29 all the time. In the rear side of the boss 62 of the gear 30, there is formed a guide face 64 for contact with the distal end of a slide post 63 to advance the slide gear 30. As seen in FIGS. 2 and 5, the slide post 63 comprises a nut positioned under the shaft 21 and extending from the rear wall 17. Further as shown in FIG. 12A and 12B, the guide face 64 comprises a slanting face 64*a* which gradually rises from the position where the distal end of the post 63 is located up to a position 135° away therefrom and a horizontal face 64*b* extending from the face 64*a* up to a position 105° away therefrom. From the terminal position of the horizontal face up to the position of

the distal end of the post 63, the boss 62 is recessed to provide a cutout 62*a*.

Thus, when the slide gear 30 rotates counterclockwise in FIG. 3 in meshing engagement with the main gear 29 all the time, the slide gear 30 advances on the shaft 21 while meshing with the gear 29 due to the contact of the slanting face 64*a* of the guide face 64 with the distal end of the slide post 63 (see FIG. 5). With this forward movement, the lock cam 31 is also pushed forward by the slide gear 30. When angularly displaced just by 90° (FIG. 12A) while advancing, the gear 30 comes into meshing engagement with the gear 35. Since the lock cam 31 is free from engagement with the projection 59 at this position, the return gear 35 is initiated into rotation.

Until the gear 30 is angularly displaced further 45° subsequent to the displacement of 90° (see FIG. 12A), the gear 30 and lock cam 31 are advanced by the slanting guide face 64. Thus advanced, the gear 30 fully meshes with the gear 35.

The forward movement of the slide gear 30 and lock cam 31 is effected while compressing the spring 33 disposed between the lock cam and idle gear 32 (see FIG. 3). When the gear 30 has rotated through 240° after initiation of its forward movement (FIG. 12A) while being retained at the advanced position during the angular displacement of 105° by the contact of the horizontal face 64*b* with the guide post 63, the guide face 64 of the gear 30 is released from the slide post 63, whereby the spring 33 is freed from compression. Due to the restoring force of the spring 33, the locking cam 31 and slide gear 30 are returned to the original position along the shaft 21 (see FIG. 2). As a result, the slide gear 30 is unmeshed from the return gear 35, which in turn returns to the original position under the action of the spring 55 as already described.

The slide gear 30 is identical with the idle gear 32 in its shape, pitch diameter and number of teeth, while the return gear 35 and timing gear 36 are identical with respect to shape and pitch diameter. The gears 30 and 32, as well as gears 35 and 36 are designed to be rotated at the same speed. Thus, the indicating member 4 is rotated in synchronism with the pointer 3 for upswing.

Now the operation of the apparatus will be described. A main switch 65 shown in FIG. 1 is turned on to drive the motor 26, whose rotation is transmitted to the main gear 29 through the reduction mechanism.

Since the gear 29 meshes with the slide gear 30 and idle gear 32, the rotation of the idle gear 32 provides a torque for the timing gear 36 all the time so as to rotate the pointer 3 together with the gear 36 at a constant speed in one direction.

On the other hand, the slide gear 30 advances during rotation and, upon reaching a predetermined position, meshes with the return gear 35 to drive the same in one direction at a constant speed. The rotation of the gear 35 drives the shaft 22 in the same direction at the same speed, causing the indicating member 4 to rotate integrally with the shaft 22 along with the pointer 3.

Referring to FIGS. 6 to 8, when the pointer 3 rotating at a constant tempo in one direction (in a counterclockwise direction in the drawing) comes to the position of mark 0 on the dial, the first pawl 39*a* actuates the cam 48, which in turn rings the bell 46 (see FIG. 4). The exerciser therefore knows this position audiovisually and set himself in address position. When the pointer 3 comes into registry with the mark 1, the fifth pawl 39*e* actuates the cam 41. When the pointer coincides with the mark 2, the first pawl 39*a* actuates the cam 41. Thus the pointer 3 provides a rotational rhythm as it passes over the marks 1 and 2. This rhythm is utilized for forward press and when the pointer 3 reaches the position 2, the slide gear 30 comes into meshing engagement with the return gear 35, whereupon the indicating member 4 and pointer 3 being to rotate together. This means the initiation of upswing as shown in FIG. 7.

After both members have rotated through 150° in registry with each other, the pointer 3 still continutes to rotate at the same tempo, but the return gear 35, disengaged from the slide gear 30 which is returned by the spring 33, tends to return to the original position under the action of the spring 55. When the pointer 3 comes to the position of mark 5, the second pawl 39*b* actuates the cam 41 to gives off a timing sound. The position is shown in FIG. 8.

When the parts are positioned as shown in FIG. 8, the indicating member 4 comes to a halt for a moment, still showing the tendency to rotate along with the pointer 3 and thereby accumulating a repellent force.

The indicating member 4 is thus temporarily stopped when the pointer 3 is located at 5 position on the dial 5. Thus actual topswing is at a position slightly beyond the 5 position, the displacement corresponding to the repellent force. Downswing is initiated at this position.

During the subsequent downswing, the indicating member 4 is quickly brought backward to the 3 position so that an impact is effected at the moment when the pointer 3 reaches the 6 position on the dial 5. Thus when impact is effected with the pointer located at the 6 position, the third pawl 39*c* actuates the cam 41 to give off a timing sound, this being followed by a continuous rotation of the pointer 3 in one direction at a constant tempo. When the pointer 3 reaches 7 position, a timing sound is produced again through the action of the fourth pawl 39*d*. Follow-through then follows and the first pawl 39*a* actuates the cam 40 again.

In this way, the timing of a golf swing at constant tempo is provided.

To make it sure that the indicating member 4 will be returned to the 2 position on the dial when the main switch 65 is turned off, the switch cam 34 is mounted on the shaft 22. The cam face of the cam 34 actuates the microswitch 54. More specifically as shown in FIG. 11, the microswitch 54 is connected in parallel with the main switch 65, so that while the cam face of the cam 34 presses the microswitch 54 (over an angular range of 150°), the motor 26 is driven independently of the main switch 65.

Further it is preferred that the rotational speed of the pointer 3 and indicating member 4, namely the speed of upswing, etc. be variable from a low speed to a higher speed because of the timing differs depending upon the exerciser himself. Accordingly, an adjusting dial member 66 comprising a variable resistor is employed according to this invention for fine adjustment for this purpose.

The apparatus of this invention further includes means for practicing the swing form which, along with practicing of timing, is essential to master golf. As shown in FIG. 1, a mirror post 67 is supported on the rear side of the rear cover 9 in vertically movable manner. A convex mirror 68 is mounted on the upper end of the post 67 with a joint member and is directed to

the front. Further, as illustrated in FIG. 1, a band 69 is attached to the side of the rear cover 9 to assure portability of the apparatus. The apparatus can be carried around in compact form with the post 67 moved down.

While the indicating member 4 in the foregoing embodiment has a bulged portion 4*a* at its distal end to effectively produce a repellent force, the indicating member 4 shown in FIG. 15 includes at its intermediate portion a coil spring in the form of a tubular rod, which can provide swing timing of a flexible club.

The present invention will be fully understood from the foregoing detailed description. Various modifications and alterations may of course be added to the embodiment. For example, the indicating member may be adapted, within the scope of this invention, for bowling for the practice of timing for bowling or for other sports involving throwing or swinging action.

What is claimed is:

1. An apparatus for practicing timing for a sport comprising a pointer to be driven at a constant tempo supported on a shaft at the front of a main body provided with a support and an indicating member supported coaxially with the pointer, the indicating member being rotatable together with the pointer approximately a half turn at the same tempo when the pointer comes into registry with the indicating member in the course of rotation, the indicating member being movable backward at a higher speed than in the forward movement from the position where the half turn of rotation is completed to the position where the pointer came into registry with the indicating member, whereby the rhythm of the sport is embodied.

2. The apparatus for practicing timing for a sport as set forth in claim **1** wherein a sound is emitted at a constant tempo when the pointer is driven so as to embody the rhythm of the sport.

3. The apparatus for practicing timing for a sport as set forth in claim **1** wherein a mirror is mounted on the back of the main body so as to embody the rhythm of the sport and enable the player to correct his form when playing the sport.

4. The apparatus for practicing timing for a sport as set forth in claim **1** wherein the indicating member comprises a spring member so as to embody the rhythm of the sport more practically.

5. The apparatus for practising timing for a sport as set forth in claim **1** wherein a member for adjusting the rotation of the pointer at a constant tempo is included in its circuit.

6. An apparatus for practicing timing of a swinging motion comprising:

a. a support structure;

b. a first shaft mounted on and projecting from said structure;

c. a pointer supported on the projecting end of said first shaft and adapted to rotate relative to said structure about the axis of said shaft in a given direction at a constant speed;

d. an indicating member supported coaxially with said pointer adapted to corotate with and at the same speed as said pointer from an initial position to a terminal position when said pointer comes into register therewith at said initial position and, upon reaching said terminal position, to rotate in the opposite direction at a greater speed returning to said initial position;

e. first means for rotating said pointer in said given direction at said constant speed;

f. second means for corotating said indicating member from said initial to terminal positions with and at the same speed at said pointer when the latter comes into registery with the former at said position and for rotating said indicating member at a greater speed in the opposite direction to return the same to said initial position; and

g. motive means for actuating said first and second means.

7. The apparatus of claim **6** wherein said motive means comprises a main spur gear driven axially by a motor.

8. The apparatus of claim **7** wherein said first means comprises a timing spur gear loosely mounted on said first shaft and connected to said pointer to corotate therewith, said timing spur gear being adapted to be driven by said main spur gear, said pointer being concentrically arranged to rotate independent of said first shaft.

9. The apparatus of claim **7** wherein said main spur gear and said timing spur gear are disposed in parallel and mechanically linked by an idle spur gear fixedly mounted on a second shaft.

10. The apparatus of claim **9** wherein said indicating member is fixedly attached to said first shaft and said second means comprises a return spur gear fixedly attached to said first shaft and engageable gear means adapted to selectively mechanically link said return spur gear and said main spur gear to rotate said indicating member from said initial to terminal positions, all of said gears and gear means being sized such that said pointer and said indicating member rotate from said initial to terminal positions at the same speed.

11. The apparatus of claim **10** wherein said engageable gear means is a slidable spur gear mounted on said second shaft.

12. The apparatus of claim **11** wherein said return spur gear is spring biased to rotate said indicating member to said initial position when said slidable spur gear is disengaged therewith.

13. The apparatus of claim **12** wherein said return spur gear includes gear teeth along the peripheral region corresponding to the movement of said indicating member from said initial to terminal positions.

14. The apparatus of claim **13** wherein said slidable spur gear is spring-biased against engagement with said return spur gear and said slidable spur gear includes a boss having a helical-like surface for engaging during rotation a pin predeterminedly fixed to said support structure such that said slidable spur gear is driven against said spring bias into engagement with said return spur gear, said helical-like surface being constructed to terminate at a position corresponding to said terminal position of said indicating member such that at said position said slidable spur gear moves out of engagement with said return spur gear.

15. The apparatus of claim **14** further comprising detent means for limiting the spring-biased return of said return spur gear to a position corresponding to said initial position of said indicating member.

16. The apparatus of claim **14** wherein said pin is adapted to be variably positioned in predetermined manners thereby varying at least one of said initial and terminal positions of said indicating member.

17. The apparatus of claim 14 wherein said first shaft is provided with a cam switch adapted to automatically maintain the actuation of said motor when said indicating member is between said initial and terminal positions whereby said indicating member is automatically returned to said initial position by the sliding action of said slidable gear.

18. The apparatus of claim 7 further comprising means for varying the speed of said motor whereby the speed of said indicating member and said pointer can be varied.

19. The apparatus of claim 6 wherein the initial position of said indicating member is in a substantially downward vertical direction and the terminal position of said indicating member is less than about 180° therefrom in a counterclockwise direction, the rotation of said pointer and said indicating member being in said counterclockwise direction.

20. The apparatus of claim 19 further comprising sound means for emitting sound at a constant tempo when said pointer rotates.

21. The apparatus of claim 20 wherein said sound means is adapted to emit no sound during the initial movement of said indicating member from said initial position.

22. The apparatus of claim 21 wherein said sound means is adapted to emit a relatively large sound when said pointer has rotated about 270° from said initial position.

23. The apparatus of claim 6 further comprising a mirror mounted on said support structure for enabling a person utilizing said apparatus to observe his swing.

24. The apparatus of claim 6 wherein said indicating member includes an enlarged end at the radial extremity thereof for simulating the head of a golf club.

25. The apparatus of claim 24 wherein said enlarged end is connected to the remainder of said indicating member by a spring-like member.

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