Dec. 22, 1959 J. L. LEGER 2,917,955

TESTING DEVICE FOR SELF-WINDING MECHANISMS

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Fig. 1

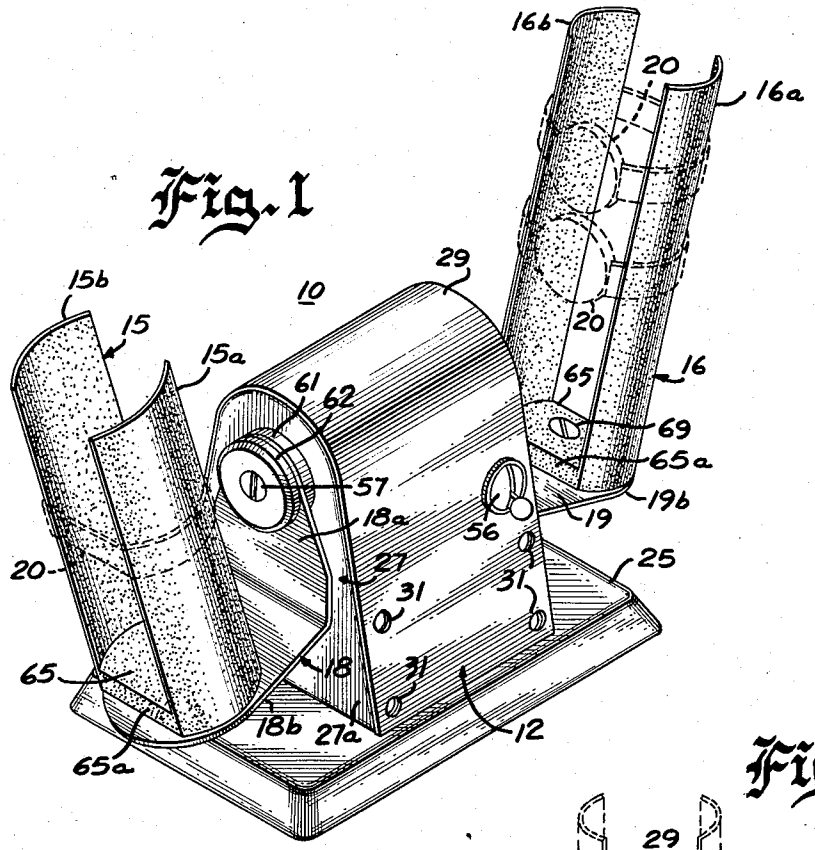


Fig. 2

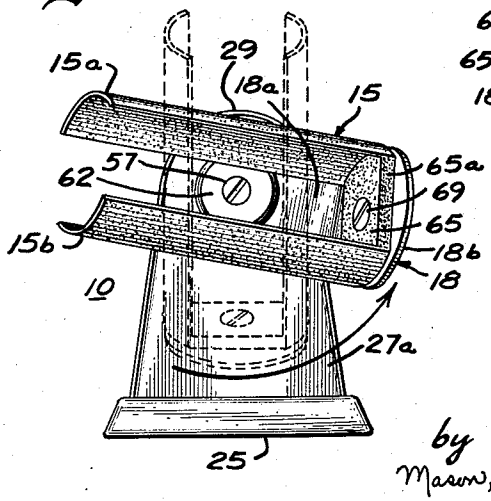
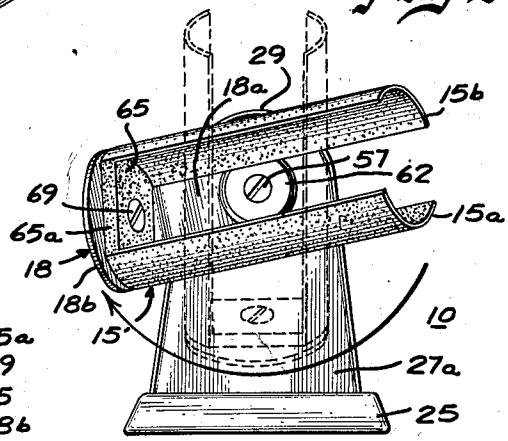


Fig. 3



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TESTING DEVICE FOR SELF-WINDING MECHANISMS

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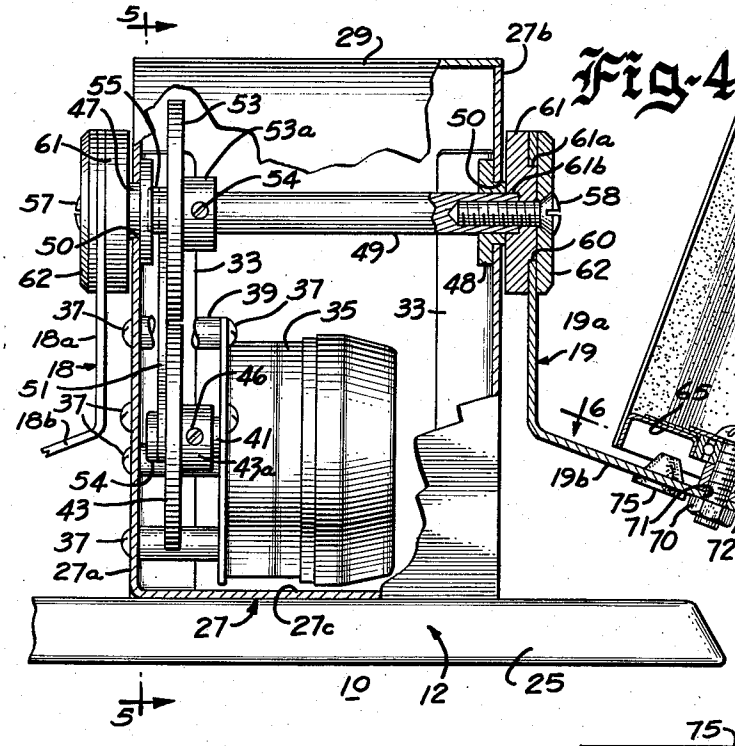
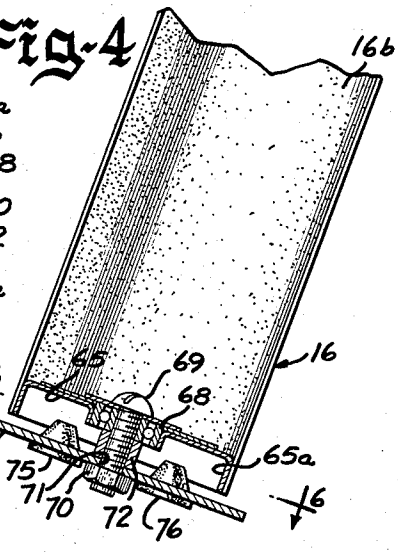


Fig-4



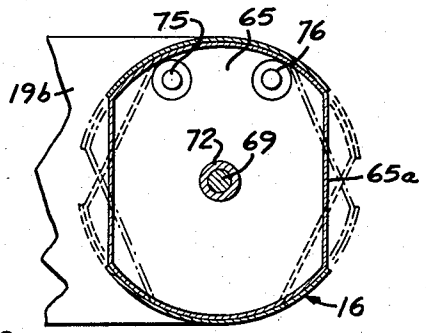
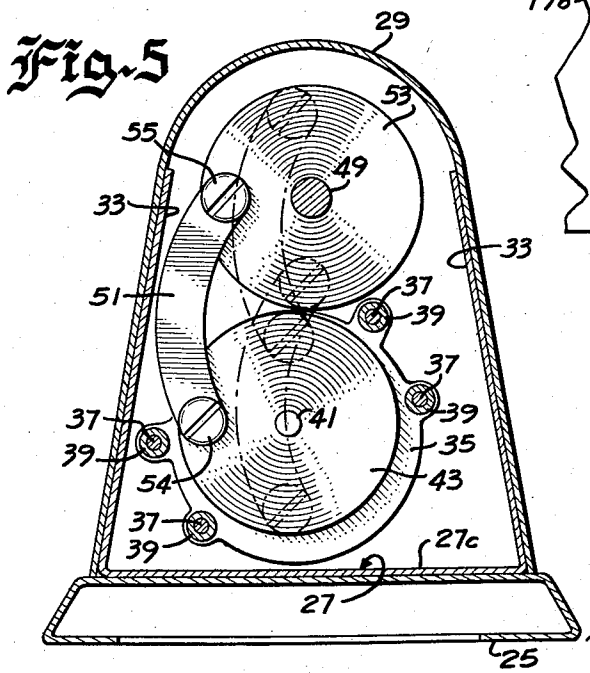


Fig-6

Fig-5



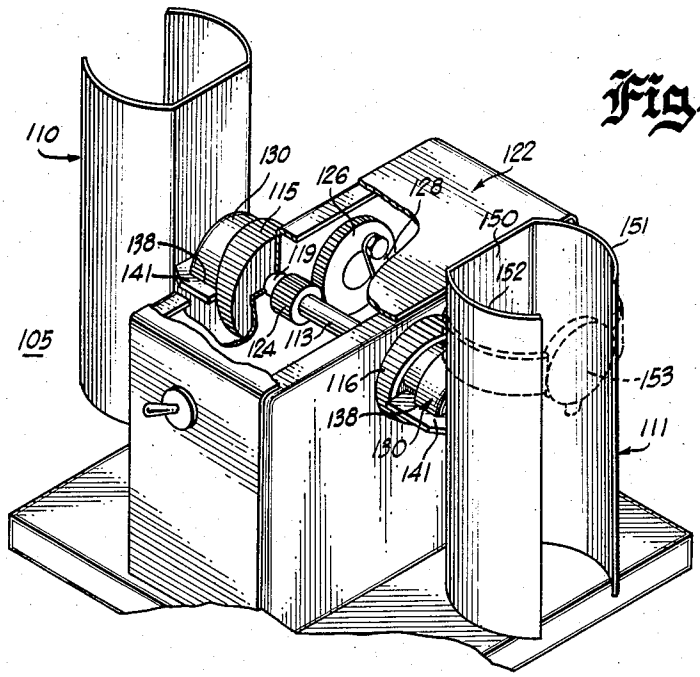
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TESTING DEVICE FOR SELF-WINDING MECHANISMS

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Fig. 7



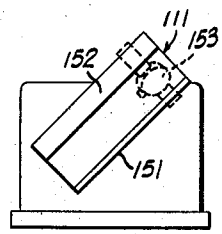


Fig. 9

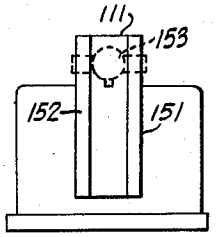


Fig. 10

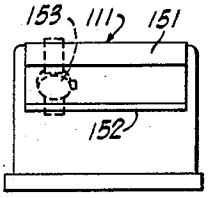


Fig. 11

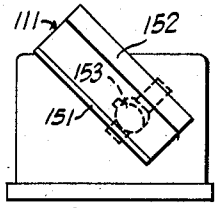


Fig. 12

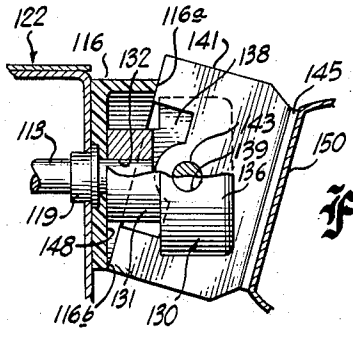


Fig. 8

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2,917,955

TESTING DEVICE FOR SELF-WINDING MECHANISMS

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Application November 19, 1956, Serial No. 623,022

8 Claims. (Cl. 81—7.5)

The present invention relates to testing devices and, more particularly, to devices for testing the self-winding mechanism of self-winding type wrist watches. More specifically, the present invention is a continuation-in-part of my prior copending application Serial No. 528,-245, filed August 15, 1955, now abandoned.

Automatic self-winding wrist watches, in general, comprise an oscillatable weight or inertia member which winds the mainspring of the watch as it rocks back and forth during normal movement of the wrist of the wearer. These watches are primarily of two types, those that wind as the weight rotates in either a clockwise or counterclockwise direction and those that wind only when the weight rotates in a particular direction. The first types are known as 360 degree self-winding movements, and the second types are known as 180 degree self-winding movements.

In recent years manufacturers have been selling more and more wrist watches of the so-called self-winding type. Although most of these watches include manual means for winding the watch, it is intended that with normal use the watch will maintain itself in a satisfactorily wound condition. Whenever a watch repairman performs a repair operation, he prefers to test the watch to make sure that it functions properly before releasing it to the customer. Obviously, self-winding watches must also be tested to determine that the repair operation performed on the self-winding mechanism is satisfactory. The repairman cannot, however, hang the watch on a hook on the wall as is commonly done and make sure that the self-winding mechanism operates properly. As a matter of fact, a self-winding watch after it has been cleaned and repaired and wound by stem wind may test perfectly on the timer commonly employed by jewelers but may fail to wind properly when on a customer's wrist. It may be that there are various defects, such as a dent in the case, which cause the weight of the self-winding mechanism to bind in its movement. It is necessary, therefore, for a watch repairman to actually test the watch by wearing it on his wrist. Obviously, he needs very long arms and many arms to test a large number of such watches. It would be desirable, therefore, to provide a mechanism for subjecting such self-winding watches to the type of motion that will be encountered when worn on the wrist so that the watch repairman may be sure of his repair work when releasing the watch to the customer. Such a machine should be provided with means for providing a simulated arm motion so that the self-winding mechanism will be tested in the same manner as it would be when worn by the user. The impulses or forces applied by such mechanisms to the self-winding watch should be gentle and the mechanism should be capable of testing a large number of self-winding watches at the same time.

Accordingly, it is an object of the invention to provide a new and improved testing device for self-winding wrist watches to perform the functions noted above.

Another object of the present invention is to provide

a testing device which simulates the motions of the human wrist so that accurate testing of self-winding watches may be achieved.

Still another object of the present invention is to provide a device for simultaneously and accurately testing a plurality of self-winding watches of both the 180 degree and 360 degree types.

A further object of this invention is to provide a testing device which is quiet in operation and reliable in use so that it may be used by watchmakers for testing watches and which will give long years of satisfactory service.

Briefly, the above objects are realized in accordance with the present invention by the provision of a testing device comprising a base, an extending support member rotatably supported by said base, and watch support means pivotable on said support member.

The invention, both as to its organization and method of operation, together with further objects and advantages thereof, will best be understood by reference to the following detailed description taken in connection with the accompanying drawings, in which:

Fig. 1 is a perspective view of a testing device embodying the present invention;

Fig. 2 is a side elevational view of the testing device of Fig. 1 showing the watch support cylinder in one extreme condition;

Fig. 3 is a view similar to that of Fig. 2 showing the watch support cylinder in its other extreme position;

Fig. 4 is an enlarged partial front elevational view, partly in section, of the device of Fig. 1, with portions of the housing broken away to show the drive mechanism;

Fig. 5 is a sectional view taken along the line **5—5** of Fig. 4;

Fig. 6 is a sectional view taken along the line **6—6** of Fig. 4 showing two extreme positions of a watch supporting cylinder;

Fig. 7 is a perspective view of another embodiment of the present invention;

Fig. 8 is an enlarged fragmentary view, partly in section, of a portion of the device of Fig. 7; and

Figs. 9, 10, 11 and 12 are elevational views of the device of Fig. 7 showing the watch support member in two intermediate and two extreme positions.

Referring now to the drawings, and more particularly to Fig. 1 thereof, there is shown a watch testing device **10** embodying the present invention. The device **10** comprises an enclosed power unit **12**, a pair of watch support members or cylinders **15** and **16** and a pair of actuating arms **18** and **19** for supporting the members **15** and **16**, respectively. The members **15** and **16** are each freely rotatable on the associated actuating arm **18** or **19**, as the case may be. Moreover, the actuating arms **18** and **19** are driven to rock back and forth through an angle of something less than 180 degrees (see Figs. 2 and 3). Consequently, a plurality of self-winding watches **20** to be tested when placed on the support members **15** and **16**, as shown in Fig. 1, are subjected to simulated wrist motion which will wind the mainsprings of the watches if they are in proper working order.

The enclosed power unit **12** as illustrated in the drawings comprises a rectangular base plate **25** and an upstanding enclosure supported thereon which comprises a U-shaped member **27** having upstanding leg portions **27*a*** and **27*b*** interconnected by a bight portion **27*c***. The bight portion is illustrated as being disposed in face-to-face engagement with the base plate **25** and preferably secured thereto by any suitable means such as welding or the like. To complete the enclosure, a U-shaped bridging or cover member **29** is provided to enclose the

space between upstanding leg portions 27*a* and 27*b*. As illustrated, inwardly directed flanges 33 are provided on each of the upstanding leg portions 27*a* and 27*b* whereby cover 29 may be secured thereto as by screws 31.

To produce motion of the actuating arms 18 and 19, a suitable prime mover is provided in the power unit 12. This prime mover includes an electric drive motor and associated reduction gear unit generally indicated at 35 which is suitably supported within the enclosure defined by members 27 and 29. As illustrated, drive motor unit 35 is secured to the inner side of the leg 27*a* by means of a plurality of screws 37, each of these screws being threadedly received in central bores in the plurality of spacer and mounting members 39 which are provided intermediate the unit 35 and the leg 27*a*. The motor unit 35 is provided with an output shaft 41 which drivingly supports a crank wheel 43. Crank wheel 43 may be secured to shaft 41 in any suitable manner as, for example, by means of a set screw 46 provided in the hub 43*a* thereof.

In order to oscillate the actuating arms 18 and 19 from the power unit 12, there is provided a shaft 49 mounted for oscillating movement near the upper part of unit 12. The ends of this shaft protrude through aligned openings 50 in leg members 27*a* and 27*c* which support suitable flanged sleeve bearings 47 and 48. To convert the rotary motion of shaft 41 and crank wheel 43 to oscillating movement of shaft 49 there is secured to shaft 49 for movement therewith another crank wheel 53 having a hub 53*a*. A suitable set screw 54 extending through hub 53*a* secures crank wheel 53 to shaft 49. The crank wheels 43 and 53 are located in the same vertical plane one spaced above the other with their shafts 41 and 49 arranged in parallel. The crank wheel 43 is provided with a crank pin 54 while the crank wheel 53 is provided with a crank pin 55. These crank pins are interconnected by a crank rod 51. The crank pin 55 is disposed at a slightly greater radius relative to the axis of shaft 49 than is the crank pin 54 relative to the axis 41. Thus rotation of shaft 41 will cause oscillation of shaft 49 through an angle somewhat less than 180 degrees. In an embodiment built in accordance with the present invention where crank wheels 43 and 53 each had a diameter of one and three-quarters inches, the radius of the axis of crank pin 54 was 0.676 inch while the radius of the axis of crank pin 55 was 0.6875 inch.

From the above description it will be apparent that when motor unit 35 is energized oscillation of shaft 49 through an angle of something less than 180 degrees will occur. It will also be noted that all parts of the power unit 12 except the ends of shaft 49 are fully enclosed. Preferably an electric switch 56 accessible from the outside of unit 12 is provided to control the energization of motor unit 35.

In accordance with the present invention each end of shaft 49 protruding from the power unit 12 is drivingly connected to a different one of the arms 18 and 19. The actuating arms 18 and 19 are each of somewhat L-shape but instead of the legs of the L being disposed at a right angle they are disposed at an obtuse angle as clearly shown in the drawings. The two legs of actuating member 18 are designated as 18*a* and 18*b* while the two legs of member 19 are designated as 19*a* and 19*b*.

As shown in Fig. 4, the ends of the shaft 49 extend outwardly beyond the respective sleeve bearings 47 and 48 and are provided with tapped axial openings to receive screws 57 and 58. Since the manner in which the actuating arms 18 and 19 are connected to the opposite ends of shaft 49 is identical, only the arrangement associated with the end of shaft 49 having screw 58 secured thereto for supporting the actuating arm 19 is described in detail. To this end arm 19 is provided in the leg portion 19*a* thereof with an aperture 60 for receiving a centrally located cylindrical protrusion 61*a* provided on a clamping plate 61 which cooperates with a clamping plate 62. Thus portion 19*a* of L-shaped actuating arm 19 is clamped between plates 61 and 62 and secured to one end of shaft 49 by screw 58 which extends through aligned openings in clamping plates 61 and 62 as well as the opening 60 in arm 19. As illustrated, clamping plate 61 is provided with a recess 61*b* on the side opposite the protrusion 61*a* to receive the corresponding end of shaft 49.

From the above described arrangement it will be apparent that actuating arms 18 and 19 oscillate through an angle slightly under 180 degrees about the axis of shaft 49 whenever the motor 35 of the power unit 12 is energized.

For the purpose of providing simulated arms to support wrist watches thereon the support members or cylinders 15 and 16 are provided. Since these support cylinders are identical, only the support cylinder or member 16 is described in detail, and similar reference numerals are employed to denote identical parts. As illustrated, the support cylinder 16 is substantially cylindrical in shape being formed of a pair of oppositely disposed cylindrical segments 16*a* and 16*b* which extend upwardly from a base member 65. The diameter of the cylindrical members 15 and 16 is preferably such as to have a peripheral dimension of the order of the average human wrist. In the case of arm 15 the cylindrical segments are designated as 15*a* and 15*b*. The base member 65 is substantially circular with diametrically opposed arcuate segments being removed intermediate the cylindrical segments 16*a* and 16*b*. The support cylinder 16 is effectively a U-shaped member with cylindrical segments 16*a* and 16*b* defining the legs of the U and the base member 65 defining the bight of the U.

The base member 65 is pivotally mounted at its center to the portion 19*b* of L-shaped actuating arm 19. To insure a low friction pivot point there is provided a ball bearing 68 with the outer race thereof suitably supported in base member 65 and secured thereto and with the inner race secured to arm 19 by a screw 69 and nut 70, the screw 69 extending through an aperture 71 in portion 19*b* of actuating arm 19. In order to space the lower end of the support member 16 from the portion 19*b*, a cylindrical sleeve 72 is positioned between the top surface of the leg 19*b* and the bottom surface of the inner race of the ball bearing 68. With this arrangement the support 16 and similarly the support 15 are freely rotatable about their longitudinal axes. Moreover, these axes are osciliated through an angle of slightly less than 180 degrees by the above described movements of the actuating arms 18 and 19.

The supports 15 and 16 each effectively simulate a human wrist and are capable of having a plurality of wrist watches supported thereon. Preferably these supports are covered with a suitable flock to have a pleasing feel as well as a pleasing appearance. In an embodiment built in accordance with the present invention, the cylindrical supports 15 and 16 had a length of the order of five inches, so that six wrist watches of large size could readily be supported on each arm. It should be appreciated, moreover, that although only two support arms 15 and 16 have been illustrated, additional arms could be provided on the same mechanism if a greater capacity is desired.

From the above description it will be apparent that as the actuating arms 18 and 19 oscillate through an angle of something less than 180 degrees, the cylinders 15 and 16 can be caused to pivot about their longitudinal axes, providing the center of gravity thereof is not on these longitudinal axes. To insure that the center of gravity of "simulated wrists" 15 and 16 are not along their principal axes but at points considerably displaced therefrom, heavy weights (not shown) may be secured to the bases 65 of each member 15 and 16. Since relatively heavy

wrist watches are to be tested by this device it is expedient to utilize the weight thereof to effect this displacement of the center of gravity from the longitudinal axes of the supports. Therefore, as shown in Fig. 1, if a majority of the watches are placed on the support cylinders **15** and **16** so that the weighted portions thereof are on the same side of the longitudinal axis of the support, this displacement of the center of gravity of the support is accomplished. Thus as the actuating arms **18** and **19** oscillate through an angle close to 180 degrees the arms **15** and **16** also pivot about their longitudinal axes due to the fact that their centers of gravity are displaced relative to these axes.

It has been found that small dents in the covers of the watches or worn bearings on which the oscillating weights are mounted might interfere with proper operation of the self-winding mechanism. If the watch is moved rapidly enough, such obstructions may be overcome. Obviously, the testing device should not move the watches faster than when on the arm of the user since otherwise they might test all right and still not be functioning properly. Therefore, it is desirable to subject the watch to gentle movements and to some small amount of jarring corresponding to the normal shocks to which a watch is subjected in use. To this end a plurality of stop members in the form of resilient conical plugs **75** and **76** are provided in suitable apertures in the extending arms of the support members **18** and **19**. The stop members **75** and **76** are positioned to engage the flats on the flanges **65***a* of the support base **65** to limit the angle of reciprocation provided by the off-center weights on the support members **15** and **16**. Therefore, as the cylinders **15** and **16** pass through the vertical axis (as shown by the dotted lines in Figs. 2 and 3) the off-center weights of the watches cause the cylinders to rotate about their principal axes, and because of the presence of the resilient stop members, this rotation is limited to approximately 20 degrees so that with an angle of inclination on the arms **18** and **19** of 100 degrees, the oscillatable weight in the watches rocks back and forth throughout an angle of less than 180 degrees. It is important to so limit the movement of the oscillatable weight since rotation thereof through 360 degrees would be ineffective to indicate the operativeness of a 360 degree self-winding type movement as this type of movement uses a system of reversing gears to cause a winding action with any motion of the oscillating weight. Therefore if the testing device permitted continuous rotation of the oscillating weight, a true test would not be made. Moreover, the stop members **75** and **76** insure that sudden jars or impacts will be imparted to the watches undergoing test so that the oscillating weights of the self-winding mechanisms therein will pivot about their respective axes.

In view of the detailed description included above, the operation of the device **10** will be clear to those skilled in the art. However, in order more clearly to point out the advantageous characteristics of the invention, the manner in which it is used and operated will be discussed herein. When using the device **10** to test a plurality of watches **20**, the watches are placed one above the other with the wrist bands thereof around the support cylinders **15** and **16**. Although, as shown in Fig. 1, all of the watch cases are aligned on one side of each support cylinder, the exact manner in which they are placed on the supports is immaterial so long as the center of gravity of the composite cylinder including the watches does not fall upon its pivotal axis. The lever of switch **56** is then manipulated to energize the motor unit **35** so that the arms **18** and **19** are rocked back and forth between their extreme positions, shown respectively in Figs 2 and 3. Shortly after the arm **18** passes through the bottom of its swing as it moves from left to right, as viewed in Fig. 2, the off-center weight thereof causes the cylinder to pivot about its pivotal axis which passes through the center of the bearing **68**. This rotation continues and the speed of rotation increases until one of the stop members **75** or **76** is engaged by the flange **65***a*, thereby to prevent further rotation of the cylinder **18** in that direction about its pivotal axis. When the arm **18** reaches the upper limit of its travel, the watches under test are momentarily stopped before movement thereof in the opposite direction begins because of the mechanism employed to convert the continuous rotation of the shaft **41** into oscillating movement of the arms **18** and **19**. The stopping of the watches is relatively gentle but sufficiently abrupt to prevent the oscillating weights in the watches under test from remaining stationary due to their own inertia if, of course, they would move under normal operating conditions. As pointed out above, rapid jolts and jars are undesirable, since watches which do not operate satisfactorily under normal conditions will frequently appear to be performing properly when subjected to violent movements. Also, by moving the watches slowly during the test, the watchmaker may observe the self-winding mechanism to determine the cause of its trouble.

When the arm **18** passes through its bottom position as it moves from right to left, as viewed in Fig. 3 of the drawings, the cylinder **15** rotates in the reverse direction until the other of the stops **75** or **76** is engaged by the flange **65***a*. Therefore, the watches under test are rocked back and forth thereby to oscillate their respective self-winding weights in the normal manner, and because of the angle of inclination of the principal axes of the support cylinders **15** and **16**, the pivot bearings on which the oscillatable weights are mounted are subjected to an off-center drag. Consequently, any irregularities in the watches under test such as dents in the case which would cause undesirable operation thereof under normal operating conditions may be observed by utilizing the device **10**.

Referring now to Figs. 7 to 12 of the drawings wherein is shown a device **105** which is another embodiment of the present invention particularly adapted for winding the 360 degree type of self-winding watches. The device **105** comprises a pair of watch support members **110** and **111** which are pivotally connected to an oscillatable shaft **113**. In addition to oscillating about the central axis of the shaft **113**, the supports **110** and **111** pivot about respective axes which are perpendicular to the oscillatory axis of the shaft **113**. The angle through which the supports **110** and **111** may be pivoted with respect to the shaft **113** is limited to an angle of approximately sixty degrees and proper pivoting of the support members **110** and **111** is insured by means of a pair of inclined annular cam members **115** and **116**.

As best shown in Fig. 8 of the drawings, the cams **115** and **116** are identical and have their maximum rise **116***a* at the top and the minimum rise **116***b* at the bottom. Consequently, as the shaft **113** is oscillated through an angle of approximately 270 degrees, the watch support members **110** and **111** are oscillated about the principal axis of the shaft **113** through the same angle of 270 degrees and, in addition, rock or pivot back and forth through an angle determined by the cam surface on the cams **115** and **116**. It may thus be seen that the oscillation of the watch support members **110** and **111** through the 270 degree angle checks all parts of the case to insure that there are no irregularities which may interfere with the necessary movement of the winding weight thereby to insure proper winding of the watches being tested. In addition, the pivoting or rocking of the support members **110** and **111** about their respective pivotal axes, subjects the watches to the desired off-center drag which tests the operation of the shaft on which the oscillatable winding weights or pendulums of the watches are mounted thereby to insure that the winding mechanisms are operating properly.

Considering the testing device **105** in greater detail, the shaft **113** is journaled in suitable bearings **119** which are mounted in suitable apertures in opposite sides of

the housing **122**. A spur gear **124** is positioned on the shaft **113** within the housing **122** and is driven by another spur gear **126** to cause the shaft **113** to oscillate back and forth through an angle of 270 degrees. As partially shown in Fig. 7, a connecting rod **128** is pinned to the gear **126** for driving it in the necessary oscillatory manner, the remainder of the mechanism for so driving the gear **126** not being visible in the drawing, but preferably being similar to the arrangement described in connection with Fig. 4 of the drawings.

In order to mount the supports **110** and **111** on the opposite ends of the shaft **113** for pivotal movement about respective axes which are perpendicular to the axis of oscillation of the shaft **113**, a pair of connecting members **130**, each having a shank **131** and a central bore **132**, are positioned over the respective ends of the shaft **113**, which ends are disposed outside the housing **122**. The members **130** are secured to the shaft **113** by means of suitable set screws (not shown). Inasmuch as the supports **110** and **111** are identically mounted on the ends of the shaft **113**, only the mount for the unit **111** is described in detail.

Therefore, referring to Fig. 8 of the drawings, a head portion **136** of the connecting member **130** is provided with a slot **138** which is perpendicular to a hole **139** provided in the head **136**. A generally U-shaped bracket **141** having an aperture which is in registry with the hole **139** when the bracket **141** is positioned in the slot **138** is pinned to the member **130** by means of a suitable pin **143**. The slot **138** is slightly wider than the thickness of the bracket **141** and the aperture in the bracket **141** is larger than the pin **143** so that the bracket **141** is freely pivotable about the pin **143**. Since, as shown, the pin **143** extends perpendicularly to the longitudinal axis of the shaft **113**, the bracket **141** is pivotable about an axis which is perpendicular to the oscillatory axis of the shaft **113**. The bracket **141** is provided with a base or flange portion **145** to facilitate connection thereof to the center of the associated one of the watch support members **110** or **111** as the case may be. Since the center of gravity of the support **111** is displaced from the axis of the pin **143**, as the shaft **113** oscillates, the support **111** rocks back and forth about the pin **143**.

As indicated above, the rocking of the watch support members **110** and **111** is controlled by means of annular cam member **115** or **116** which surround the respective ones of the shanks **131**. As shown in Fig. 8, the cam **116** has a reentrant flange **148** having a plurality of holes through which extend headed screws (not shown) for fastening the cam **116** in a fixed position to the housing **122**. The cam **116** has a flat cam surface which is inclined with respect to the vertical at an angle of approximately 30 degrees, having the maximum rise portion **116***a* at the top and the minimum rise portion **116***b* at the bottom.

The supports **110** and **111** are identical and, therefore, only the support **111** is described in detail. The support member **111** thus comprises a generally U-shaped elongated member having a web **50** to which are attached the flanges **145** of the member **141**. The web **150** is provided with arcuate flanges **151** and **152** thereby defining a sort of cylindrical construction. The support **111** thus provides a simulated wrist on which wrist watches may be placed for testing. A watch **153** under test is positioned between the opposing edges of the flanges **152** and **151** in the manner indicated in dotted lines in Fig. 7. Preferably the entire support **111** is covered with a flocculent material to give it a pleasing appearance and particularly to prevent scratching or other damage to the watches which are placed thereon for testing.

To understand the operation of the device **105** in testing self-winding wrist watches reference may now be had to Figs. 9 through 12 of the drawings. When using the device **105** to test a plurality of watches, the watches are placed one above the other on the supports **110** and **111** with the wrist bands thereof surrounding the flanges **151** and **152** and the web **150**. In Figs. 9 through 12, only one watch **153** is shown, but it will be understood that other watches may be similarly disposed for simultaneous testing. Let it be assumed that when operation of the device **105** is initiated the support **111** is in the position shown in Fig. 9 wherein its principal longitudinal axis is tilted at approximately 45 degrees with respect to the vertical and, by virtue of the cam **116**, the principal axis of the casing of the watch **153** and thus the shaft on which the winding weight thereof is mounted is tilted through a substantial angle with respect to the longitudinal axis of the shaft **113** and thus with respect to the horizontal. This is evident in Fig. 9 where the apparent width of the flange **152** greatly exceeds that of the flange **151**.

As shaft **113** rotates counterclockwise, the support **111** is rotated through a vertical position as shown in Fig. 10, at which point the winding shaft of the watch **153** is disposed in a horizontal position parallel to the shaft **113**, the apparent widths of the flanges **151** and **152** being equal. As the shaft **113** rotates through another 90 degrees, the support **111** tilts downwardly about the pivot pin **143** through its maximum angle which, in the illustrated embodiment of the invention, is 60 degrees. Further counterclockwise rotation of the shaft **113** rotates the support **111** through an additional 45 degrees with respect to the vertical as shown in Fig. 12, which reverses the angle of tilt of the support **111** with respect to the horizontal from that which exists when the support **111** is in the position shown in Fig. 9. The shaft **113** then stops and commences rotation in the opposite direction, clockwise, to return the support **111** through the positions indicated in Figs. 11 and 10 back to the position shown in Fig. 9, at which time the direction of rotation is again reversed, and the cycle is repeated. It will be apparent that as the wrist watch **153** moves through the positions shown in Figs. 9 through 12, the winding weight or pendulum which is mounted for rotation on a shaft which is disposed along the principal central axis of the watch case is pivoted through 270 degrees and at the same time the shaft on which the winding weight of the watch is mounted is rocked back and forth about a vertical plane through an overall angle of 60 degrees, 30 degrees on each side of the vertical. Consequently, any irregularities in the watch **153** such as dents in the case which would cause undesirable operation of the winding mechanisms are checked, and in addition, an off-center drag is provided on the pivot bearings about which the winding weights are mounted to insure proper operation thereof.

While the invention has been described by particular embodiments thereof, it will be understood by those skilled in the art that many changes and modifications may be made without departing from the invention. Therefore, in the appended claims it is intended to cover all such changes and modifications as fall within the true spirit and scope of the invention.

What is claimed as new and is desired to be secured by Letters Patent of the United States is:

1. A watch winder, comprising, a housing, a motor mounted in said housing, a drive shaft supported for rotatable movement in said housing, means driven by said motor oscillating said shaft through an angle of less than 180 degrees, an arm supported for pivotal movement by said drive shaft, a watch support member, and means pivotally mounting said support member on said arm to permit displacement of the center of gravity of said support member from the axis about which said support member is pivotally mounted.

2. In testing apparatus of the type described, a support member having a first arm and a second arm, the planes of said arms being relatively transverse, means for rotatably mounting said support member about an axis passing through said first arm, a watch support structure mounted on said second arm for pivotal movement about an axis

through said structure, and stop means on one of said arms for limiting the angle of rotation of said structure about said pivotal axis to substantially less than it would normally rotate in the absence of said stop means.

3. A device for testing self-winding watches comprising a shaft, means for oscillating said shaft about a longitudinal axis thereof, a pintle mounted on said shaft along a transverse axis thereof, a watch support pivotally mounted on said pintle, and means including a cam for operatively engaging said support to cause it to rock about said pintle as said shaft oscillates.

4. Apparatus for testing the self-winding mechanism of horological instruments, comprising a housing, a shaft journaled in said housing, means for oscillating said shaft, a support pivotally secured to said shaft, and means operatively disposed between said housing and said support to cause relative pivoting between said support and said shaft as said shaft is oscillated.

5. The apparatus set forth in claim 4 wherein said means includes a cam mounted on said housing.

6. A testing device for horological instruments, comprising a housing, a support member journaled in said housing, motor means for oscillating said support member about a first axis, watch support means, and means mounting said watch support means on said support member for free pivotal movement under the force of gravity about an axis transverse to said first axis, said first axis

being horizontal and said second axis intersecting the vertical plane at a substantial angle.

7. A testing device for horological instruments, comprising a housing, a support member journaled in said housing, means for oscillating said support member about a first axis, watch support means carried by said support member, and means mounting said watch support means on said support member for oscillating said support means about an axis transverse to said first axis.

8. A testing device comprising a support member mounted for oscillatory movement about a first axis, means supported by said support member for carrying a plurality of watches along a second axis of said member lying transverse to said first axis, and means for effecting oscillatory movement of said first mentioned means through a relatively small angle about said second axis incident to oscillatory movement of said support member about said first axis.

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