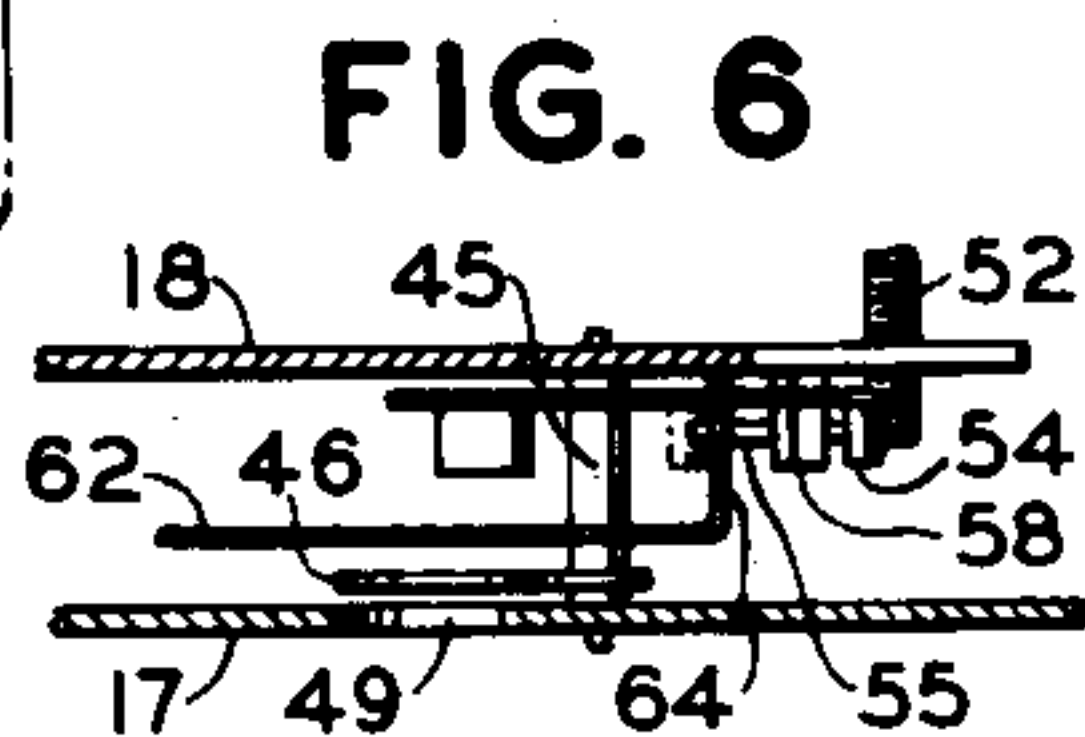
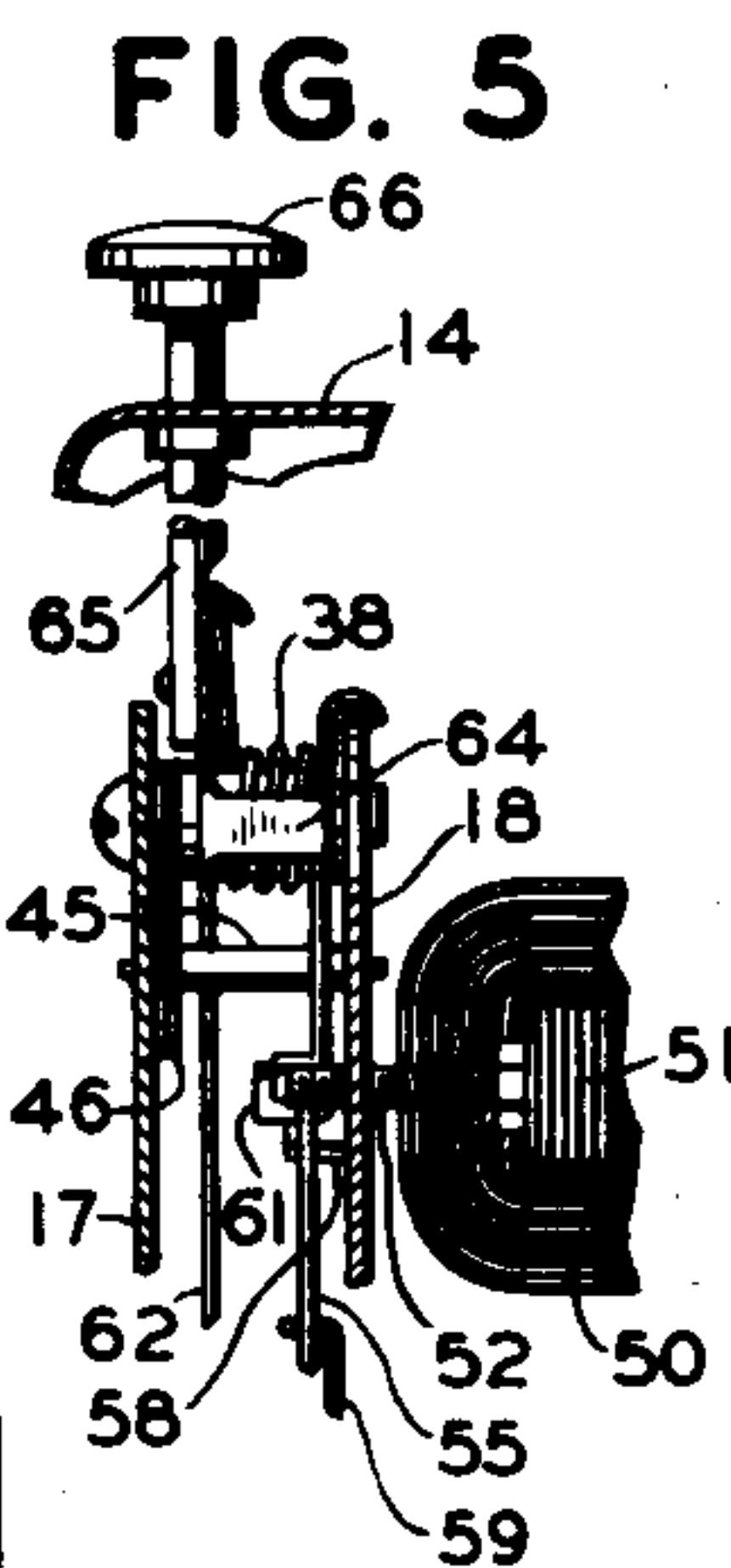
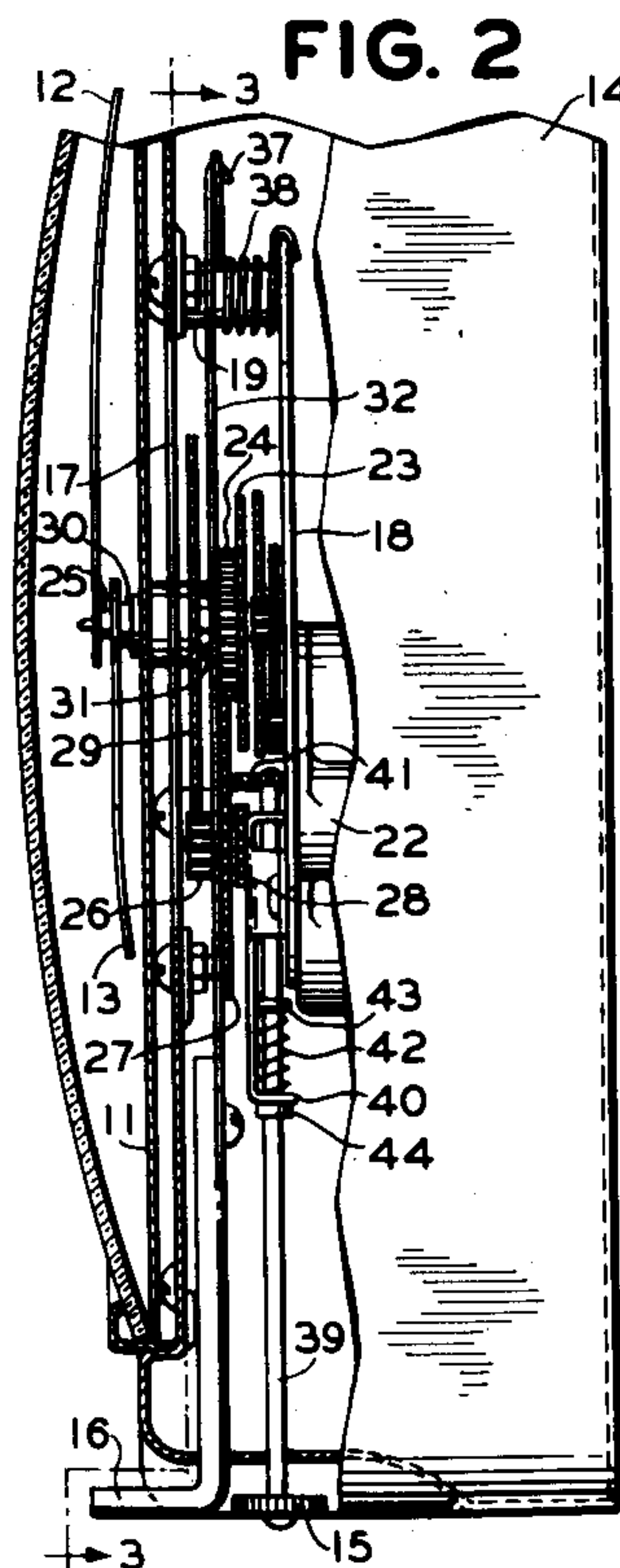
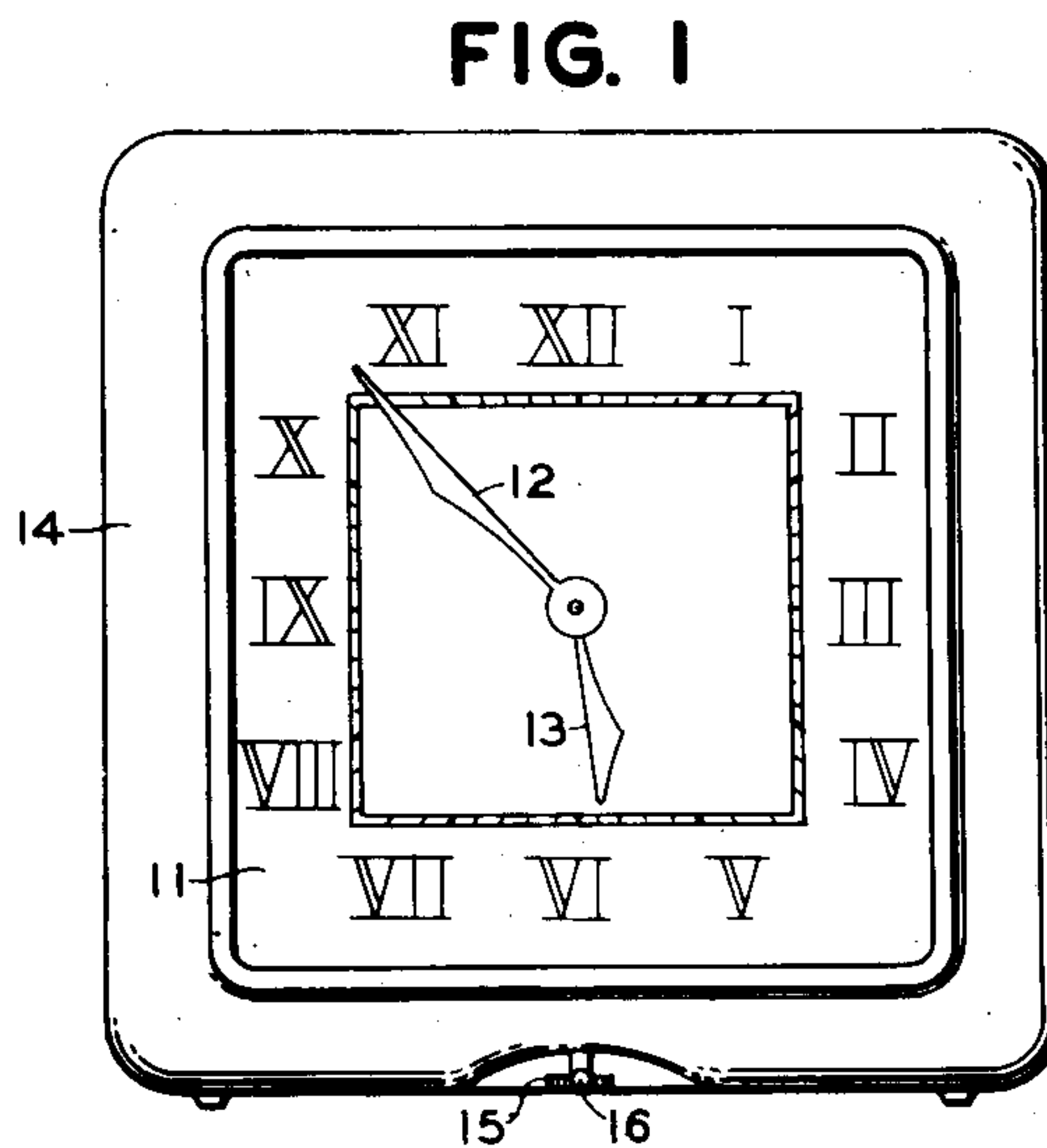


2,241,447

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CLOCK SYNCHRONIZING DEVICE

Filed Sept. 28, 1938

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FIG. 7

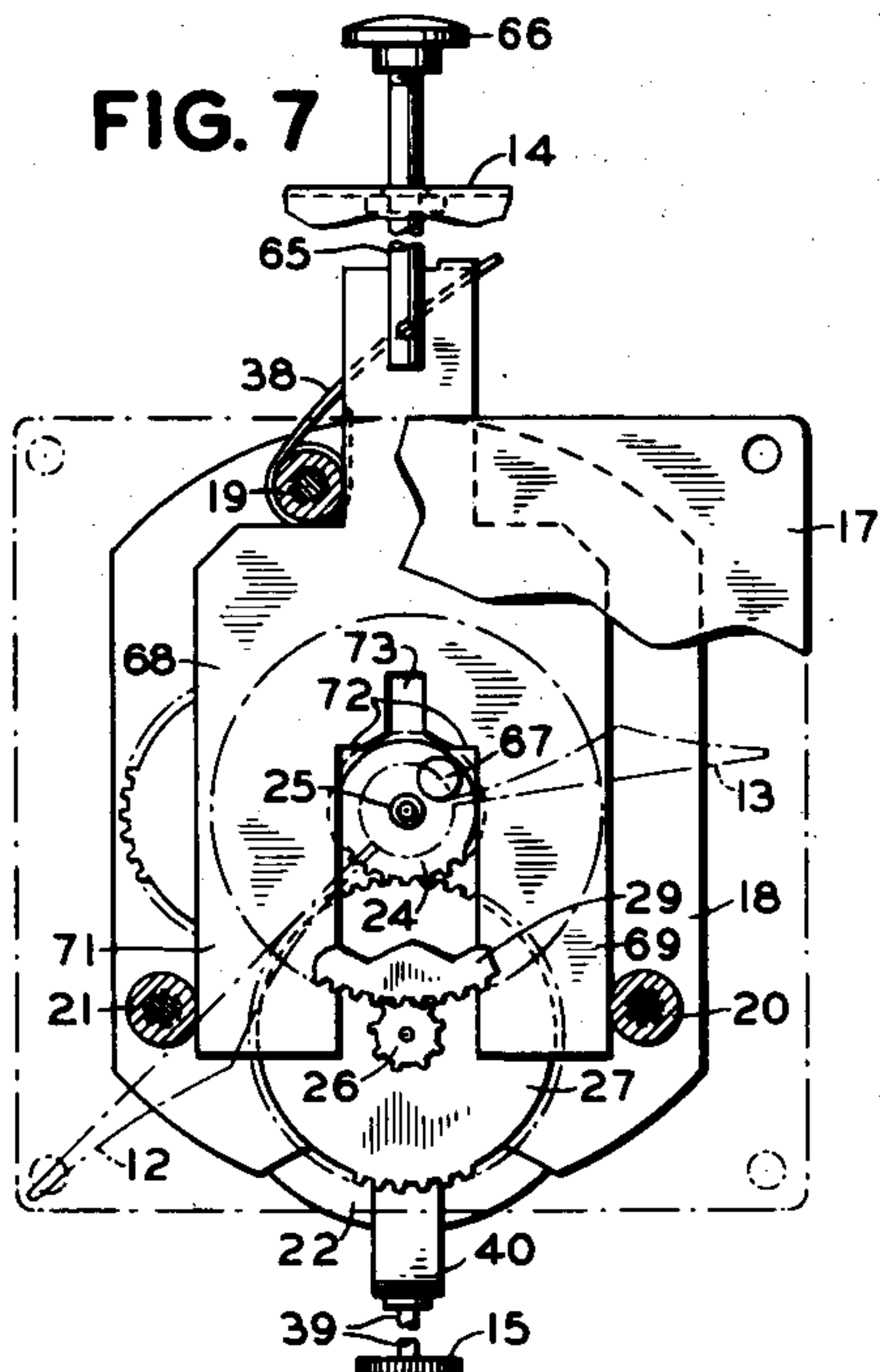


FIG. 8

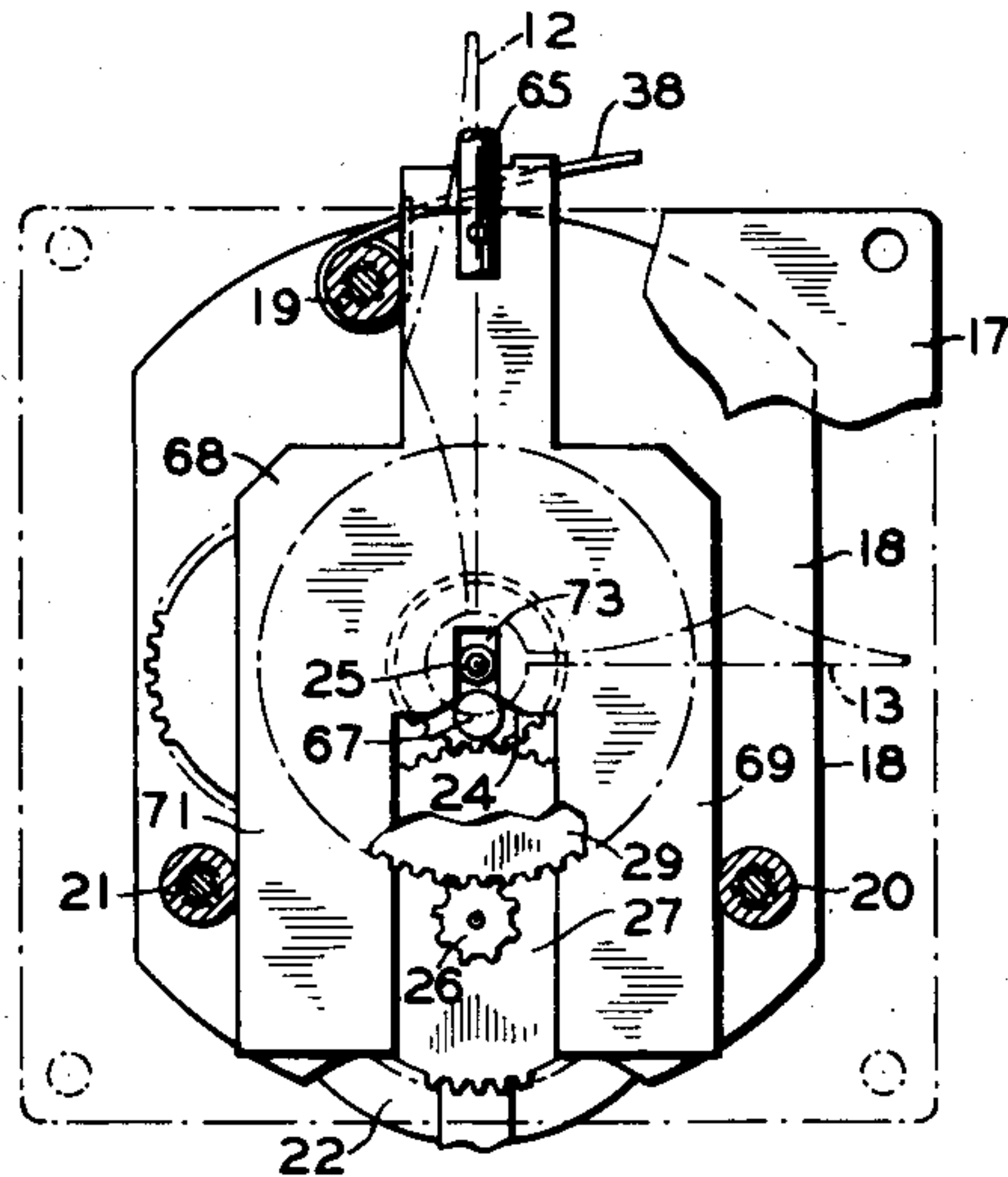


FIG. 9

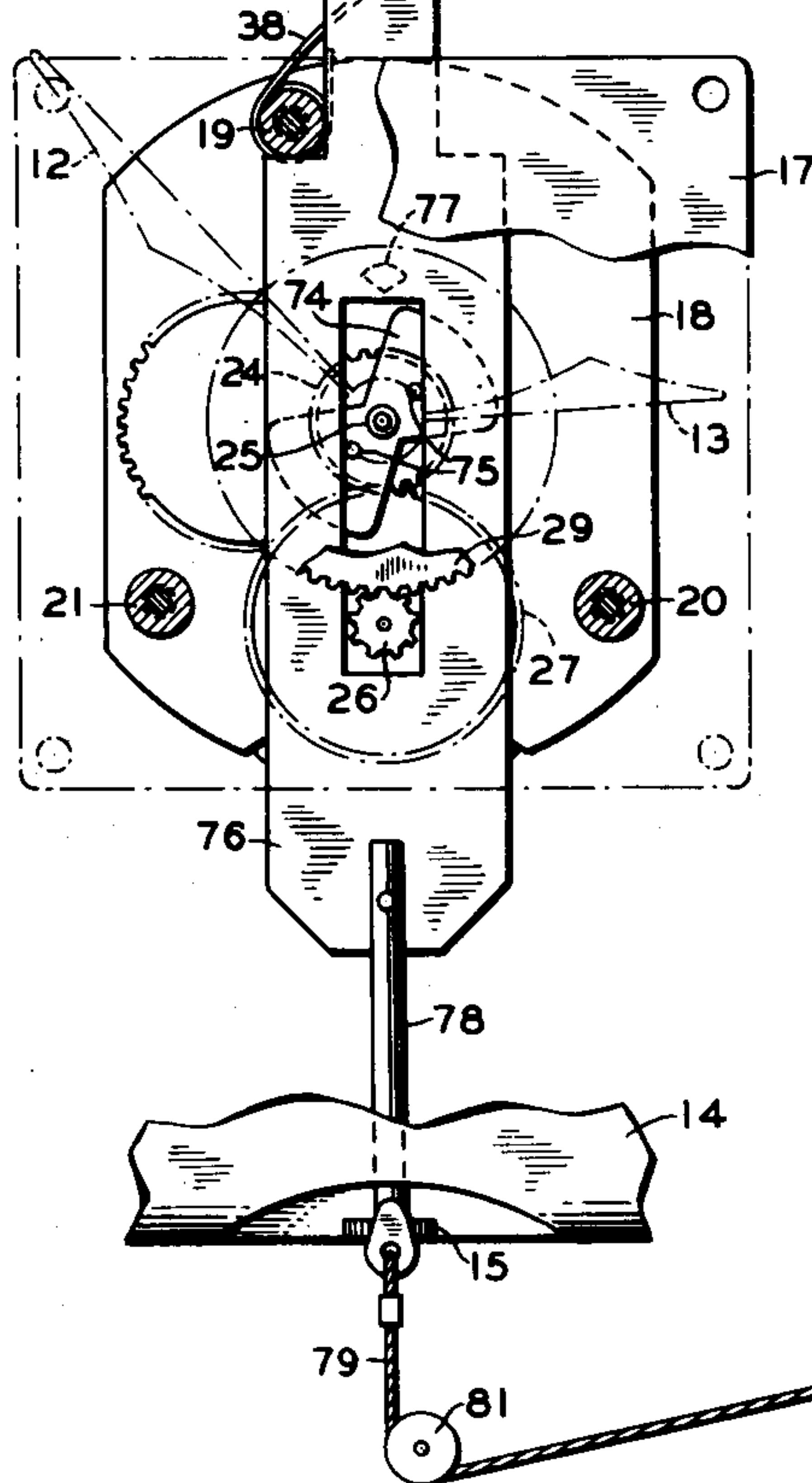
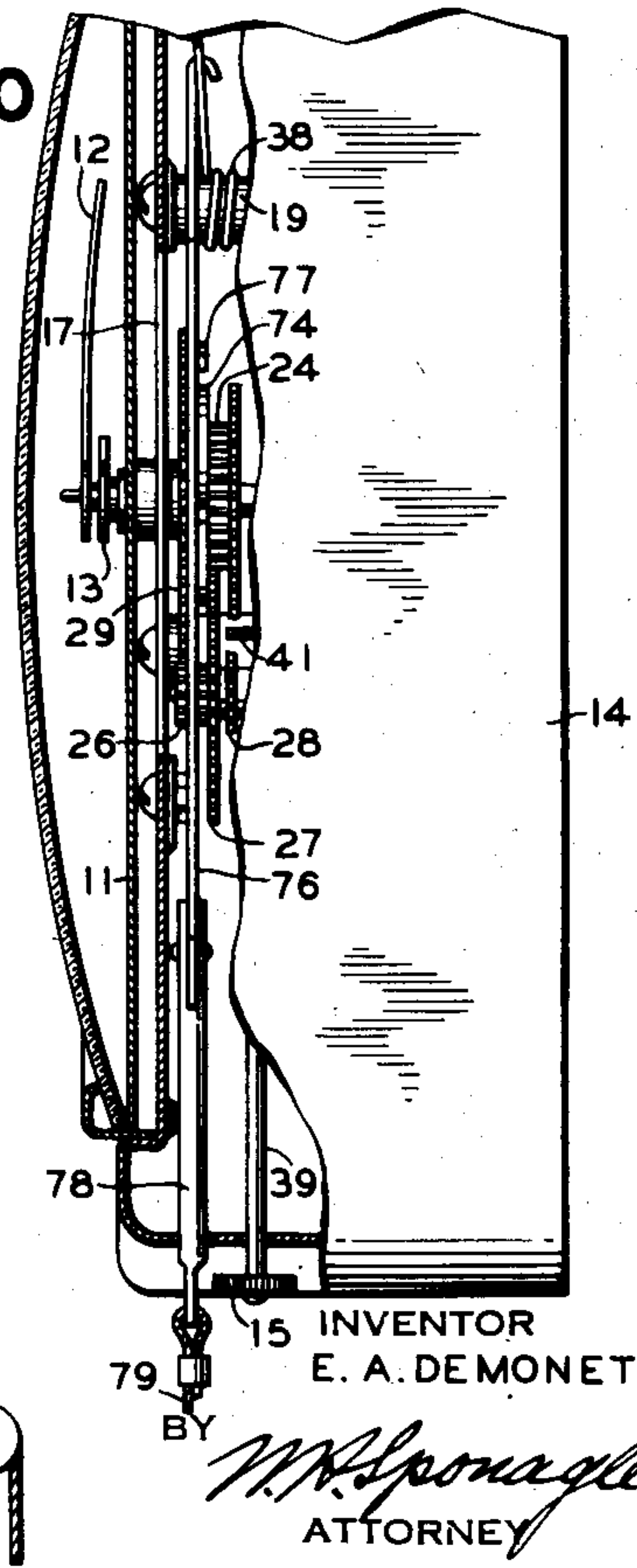


FIG. 10



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CLOCK SYNCHRONIZING DEVICE

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Application September 28, 1938, Serial No. 232,065

5 Claims. (Cl. 58—34)

This invention relates to clock synchronizing devices and has particular reference to a manual means for setting clocks having hands to which the driving force is transmitted by means of a clutch.

Heretofore, clocks were provided with mechanisms whereby the hands might be set to any desired position on the dial and thereby synchronized with any convenient standard. However, with such devices, the engagement of a setting member was usually required and a visual observation of the setting operation was always necessary. Hence, the accuracy of the synchronization depended upon the mechanical skill of the operator, his ability to avoid parallax in viewing the dial and his capacity to estimate the elapsed time between his perception of a standardizing signal and the completion of the setting operation.

Standardizing signals are now available exactly on every hour and, in many instances, also on every half hour. One form of signal commonly employed for synchronizing purposes is a distinctive tone transmitted over radio channels from a large number of broadcasting stations and may be obtained by any suitable arranged radio receiving set.

Since clocks are generally utilized for the observation of the correct time, they are located where they may best perform this function. To this end, clocks are frequently displayed in show windows, in elevated positions on walls and in numerous other relatively inaccessible positions. Clocks so disposed are not susceptible of expeditious and accurate synchronization by prior art means which require, among other things, a clear view of the dial during the setting operation.

Hence, it is an object of this invention to provide a clock with means for obviating the above enumerated difficulties.

It is another object of this invention to provide means whereby the hands of a clock may be set substantially instantaneously to any one of a plurality of predetermined positions.

Another object of this invention is to provide means whereby said aforementioned setting device may be actuated from a point remote from the clock.

A further object of the invention is to provide means in a reciprocating clock setting member for simultaneously restoring any alarm or signal device to its normal position.

Still another object of the invention is to provide a means for attaining said aforementioned

objects which may be inserted in an existing clock with a minimum of alteration thereof.

Although the invention will be described in conjunction with a clock the hands of which are driven by means of a synchronous electric motor of the self-starting type, it is contemplated that such a combination be considered as merely illustrative. It should be obvious to those versed in the art that the present invention may be used with equal facility on other types of clocks including those which are spring or weight driven. Accordingly, the following description is taken in conjunction with the accompanying drawings, of which:

Fig. 1 is a front or face view of the clock embodying the invention;

Fig. 2 is a partial side view drawn to an enlarged scale and broken away to show some of the clock mechanism;

Fig. 3 is a view taken on the line 3—3 of Fig. 2 and with the case removed;

Fig. 4 is a view similar to Fig. 3 of a modification of the invention;

Fig. 5 is a view taken on the line 5—5 of 4;

Fig. 6 is a view taken on the line 6—6 of Fig. 4;

Fig. 7 is a view similar to that of Fig. 3 of another form of the invention;

Fig. 8 shows the instrumentalities of Fig. 7 in their operated positions;

Fig. 9 is a view similar to that of Fig. 3 of another modification of the invention; and

Fig. 10 is a side view of the device illustrated in Fig. 9 and shows the details thereof in their relations to other parts of the clock.

Having reference first to Fig. 1, there is shown in front elevation a clock having a dial 11 and hands 12 and 13 mounted in a case 14. Projecting from the underside of the case 14 is a knurled knob or thumb screw 15 with which the hands 12 and 13 may be set by a rotating movement thereof. An arm 16 is also extended to a point on the exterior of the case 14.

The following portion of the description is taken with reference to Figs. 2 and 3. The mechanism for driving the hands 12 and 13 is disposed behind the dial 11, and that portion of the mechanism comprising the gear train is supported between the plates 17 and 18. These plates are spaced a suitable distance apart by means of a plurality of sleeves 19, 20 and 21. A synchronous motor 22 drives the gear train by which a suitable speed reduction is obtained whereby the gear 23 is driven at the rate of one revolution per hour. The gear 24 is securely fastened to the shaft 25 at the extremity of

which is mounted the minute hand 12. Interposed between the gears 23 and 24 is a clutch by means of which the rotary movement of gear 23 is transmitted to gear 24 and thereby drives the minute hand over the dial of the clock. Gears 26, 27 and 28 form a unitary structure and gear 27 is arranged to mesh with the minute hand gear 24. Gear 26 is arranged to mesh with the hour hand gear 29 which is secured to a shaft 30 carrying the hour hand 13 of the clock. The minute hand gear 24 has inserted in the front face thereof two short pins 31 which are located on a diameter of the gear 24. The minute hand 12 is placed on the shaft 25 so that it points at the numeral XII inscribed on the dial 11 when the minute hand gear 24 is in such a position that the pins 31 are horizontally disposed.

A thin elongated plate 32 is mounted immediately forward of the minute hand gear 24. As may be seen more clearly in Fig. 3, this plate 32 is provided with a generally rectangular opening 33 at the central portion thereof. The upper side of the opening 33 is horizontal and has an arcuate groove 34 formed at the center thereof. The lower part of the opening 33 is somewhat narrower and is adapted to permit the gear 26 to extend through the plate. The width of this lower portion of the opening 33 is slightly greater than the maximum diameter of the gear 26 so that the plate 32 may be freely moved up and down with respect to the gear 26 which is instrumental in preventing sidewise movements of the plate. A portion of the upper left hand corner of the plate 32 as viewed in Fig. 3 is cut away to provide a shoulder 35 which abuts the spacing sleeve 19 and thereby limits the upward movement of the plate 32. The formation of this shoulder also provides a longitudinal edge 36 which also abuts the sleeve 19 thereby limiting the sidewise movement of the plate 32 toward the left. At the top of the plate 32 is also provided a lug or ear 37. A spiral spring 38 is coiled about the spacing sleeve 19 and is attached with one end in engagement with the top of the plate 18 and the other end in registry with the under side of the lug 37. The effect of the spring 38 is to urge the plate 32 in an upward direction and at the same time toward the left so that the edge 36 is maintained in sliding contact with the sleeve 19.

The plate 32, being thin and located in a plane parallel to the planes of the various gears, is adapted to be moved up and down. Its normal position which is maintained by means of the spring 38 is up as shown in Fig. 3. However it may be moved downward against the force of the spring 38 by depressing the L-shaped operating lever 16 attached thereto. The manner in which this downward motion effects the setting of the hands is as follows. Let it be assumed that the hands 12 and 13 are disposed so that they indicate a time corresponding to a few minutes before the hour of six. In such a position the pins 31 which are carried by the minute hand gear 24 are disposed at an angle as shown in this figure. If at this time it be desired to set the hands of the clock so that they point directly to the numerals XII and VI respectively on the dial, the plate 32 is depressed by means of the lever 16 and the upper edge of the opening 33 engages one of the pins 31. Further movement of the plate 32 imparts a rotative movement to the gear 24 whereby, at the bottom of the stroke, the pins 31 will be disposed in a horizontal position and the hands of the clock will point directly to the numerals XII and VI. It will be noted that the

arcuate portion 34 of the upper edge of the opening 33 is for the purpose of avoiding contact between the plate and the shaft 25. Upon the release of the member 16, the plate 32 is restored to normal by means of the spring 38.

Because of the relation of the minute hand gear 24 and the hour hand gear 29 through the reduction gears 26 and 27, the resetting motion which is imparted to the gear 24 by the plate 32 is also transferred to the gear 29. It will be obvious that the device comprising this invention will also effect the setting operation when the minute hand 12 is located in a position past the exact hour position. It also will be noted that the hands of the clock may be reset to the exact hour when their positions indicate any time within the range between approximately ten minutes before and ten minutes after any exact hour. Also the disposition of the pins 31 is such that the hands may be set to the exact half hour from any point within a corresponding range.

The present invention may also be used in cooperation with any of the conventional types of resetting devices. One such device is shown in Fig. 2 and comprises a vertical shaft 39 carrying at its lower extremity the thumb nut 15 and mounted in a bracket 40 which is attached to the rear supporting plate 18. The shaft 39 carries at its upper extremity a horizontally arranged gear 41 and is arranged to be slidably moved up and down in the bracket 40. The shaft 39 is normally held in its upper position by means of a compression spring 42 which is attached to the shaft by a collar 43 and is arranged to engage the lower portion of the bracket 40. In this position the gear 41 is disengaged, but upon the depression of the shaft 39 it is brought into engagement with gear 28. A rotative movement which may be applied to the shaft 39, while being held in its depressed position, will cause rotation of the gears 26, 27 and 28 and thereby effect a movement of the hands 12 and 13. By means of such a resetting device the hands may be placed in any desired position and it will be noted that the movements of the shaft 39 and the plate 32 are entirely independent of one another. Upward movement of the shaft 39 is limited by the engagement of another collar 44 attached thereto with the lower part of the bracket 40.

It is customary to provide synchronous electrically driven clocks of the self-starting type with an indicator or alarm signal for the purpose of indicating that some abnormal condition exists or has existed. For example, if the current supply for the electric driving member is interrupted for substantially any period of time, the indicating device will be actuated and will remain in its actuated position until manually reset. An electrically driven clock having such a device is shown in Figs. 4, 5 and 6. A shaft 45 having its ends journaled in the plates 17 and 18, carries adjacent its forward end a sector-shaped disc 46. The front surface of this disc is divided into two parts, one of which 47 is preferably colored white and the other of which 48 is preferably colored red. A circular opening 49 is provided in the plate 17 in front of the disc 46 and a similar opening is also provided in the dial of the clock whereby the face of the disc 46 may be observed. In its normal position, indicated in Fig. 4 by the full lines, the white portion 47 of the disc face is visible through the openings. When the indicating device is in the position shown by the dotted lines, the red portion 48 is visible.

The movements of the disc 46 are controlled

by a member mounted adjacent the rear end of the shaft 45. This member comprises a plurality of arms or fingers extending radially from the shaft in such a manner that the center of gravity of the complete structure mounted on the shaft 45 lies to the left of the pivot point as viewed in Fig. 4. In the absence of any restraining influence, the disc 46 is moved by the force of gravity to its dotted position. However, when potential is applied to the field coil 50 of the synchronous motor the core 51 and the extended screw 52 become magnetized. When the indicating device is restored to its normal position one of the plurality of arms 53 which is provided with an angular projection 54 is brought into proximity with the screw 52. The arm 53 being of magnetic material, the device is held in this position magnetically as long as the coil 50 is energized. When the energization of this coil is interrupted for even a short time, the attraction for the projection 54 is removed and the disc 46 is carried to its dotted position under the influence of gravity.

A bell crank having a long arm 55 extending upwardly and a short arm 56 extending horizontally is pivoted at the juncture 57 of said arms on the rear plate 18. The horizontal arm 56 is arranged to bear against the under surface of the resetting gear 41. The outer edge of the long arm 55 is arranged to bear, adjacent its upper extremity, against a projection 58 extending forwardly from the plate 18. A wire spring 59 is coiled about the pivot point 57 and one end thereof placed against the under side of the spacing stud 20. The other end of the spring 59 is extended upward and has a loop formed therein which is placed in registry with the inner or left hand edge of the long arm 55. The purpose of the spring 59 is to hold the bell crank in the position shown. The inner or left hand edge of the upper portion of the long arm 55 is arranged to engage another arm 61 of the indicating device. When the device is in its lower or dotted position a projection on the arm 61 is brought into registry with the upper end of the long arm 55. When the hands of the clock are reset by means of the conventional shaft 39, the downward movement of the gear 41 carries with it the extremity of the short arm 56. This movement causes the upper end of the long arm 55 to be moved to the left to the position shown dotted. Thus the finger 61 is rotated in a clockwise direction, thereby restoring the indicating device to normal, in which position the projection 54 comes within the influence of the magnetized screw 52.

A thin plate 62 which is substantially similar to plate 32 on Fig. 3 is also provided as a means for resetting the hands of the clock and at the same time for restoring the indicating device to normal independently of the mechanism described hereinbefore. In addition to the details for resetting the hands of the clock, plate 62 is provided with an extension 63 having at its extremity an angular portion 64. This extension 64 is so disposed that when the indicating device is in its abnormal or alarm position and the arm 53 is raised to the position shown dotted, an engagement is effected between the angular extension 64 and the arm 53. Also the plate 62 is provided with a rod or plunger 65 attached to the upper part of the plate 62 and extending upward through the clock case 14 and carrying at its extremity a button 66. When the button 66 is depressed the plate 62 is carried downward

and the hands of the clock are set as previously described. Simultaneously, the arm 53 of the indicating device is restored to its normal position by the downward movement of the extended arm 64, whereby the projection 54 is disposed adjacent the screw 52.

Another form of the invention is shown in Fig. 7 wherein the minute hand gear 24 is provided with a single pin 67 which is larger in diameter than the minute hand shaft 25. As in the modifications previously described, this pin projects forwardly from the minute hand gear. The means for actuating this gear to synchronize the hands is a plate 68, the upper portion of which is guided by the spacing sleeve 19 in the manner previously described. However, the lower portion of the plate is not dependent upon the gear 26 for support or guiding. This lower portion is in the form of two legs 69 and 71, the outer edges of which are arranged to engage the spacing sleeves 20 and 21, respectively. Plate 68 is normally urged upward by the action of the spring 38 and, in the form shown, is arranged to be depressed by the application of pressure upon the button 66. However, it should be obvious that suitable arrangements may be made whereby the plate is actuated by being drawn or pulled to its lower portion. The upper part of the recess formed between the legs 69 and 71 is characterized by two substantially horizontal edges 72 spaced apart by the width of a second recess 73. The recess 73 is wide enough to permit passage of the plate 68 over the minute hand shaft 25 and yet is narrow enough to prevent the entry of the pin 67 thereinto. The junctures of the edges 72 with the vertical portions of the recess 73 are given beveled configurations.

The operation of the synchronizing device is as follows. The plate 68 is moved downward under pressure applied to the button 66 whereby one of the edges 72 is brought into engagement with the pin 67. Further movement of the plate causes the pin to be rotated about the axis formed by the minute hand shaft 25 whereby the minute hand gear 24 and the minute hand 12 are given a rotative movement. Just prior to the attainment of the synchronous position of the hands 12 and 13 one of the beveled portions of the plate 68 effects engagement with the pin 67. It will be noted that at this position the torque which is applied to the pin 67 by the edge 72 is small, but by applying the pressure to the pin through the beveled portions a substantial increase in the torque tending to rotate the gear 24 and the hand 12 is effected. Also, it may be seen by reference to Fig. 8 that upon the attainment of the synchronous position the beveled portions of the plate 68 afford a secure and positive seating for the pin 67. It should be obvious that the synchronizing operation may be effected in cases where it is desired to move the hands backward with equal facility since the instrumentalities provided therefor are symmetrical with respect to the center of rotation.

Such an arrangement permits the synchronizing of the clock at but one point on the dial, that is, in the exact hourly position. It will be noted, however, that with a suitable arrangement this synchronizing may be effected when the deviation of the hands from the synchronous position is much greater than is possible with the device described hereinbefore. It should be obvious that the beveled portions of the plate 68 may be made so that they predominate over the horizontal edges 73. However, the range within which the

hands may be synchronized by means of the latter arrangement will be materially reduced.

Another modification of the invention will be described by having reference to Figs. 9 and 10. In this form of the invention the instrumentalities for effecting the synchronizing are reversed with respect to the minute hand gear 24 and the reciprocable plate. The minute hand gear is provided with a notched member or disc 74 which is secured to the gear by means of a plurality of pins or rivets 75 or by any other conventional means of attachment. The disc 74 is provided with two diametrically opposed V-shaped notches or slots. A plate 76 which is supported and guided by one of the spacing sleeves 19 and one of the gears 26 is disposed between the disc 74 and the hour hand gear 29. A pin or projection 77 is carried by the plate 76 in a position which is normally free of the disc 74 and protrudes rearwardly from the plate. The lower or working portion of the pin is provided with a V-shaped configuration. Preferably the angle subtended by the two lower surfaces of the pin 77 is equal to or slightly greater than the angle of the V-shaped notches of the disc 74.

When it is desired to synchronize the hands of the clock, the plate 76 is given a downward movement whereby the pin 77 effects engagement with one side of one of the V-shaped notches of the disc 74. Further downward movement of the plate produces a rotative movement of the disc 74 and also the gear 24 and minute hand 12. When the plate 76 has been moved to the bottom of its stroke, the pin 77 is disposed at the bottom of the V-shaped notch. By providing the pin 77 with an angularity greater than that of the notch in the disc, a firm seating of the pin in the notch is secured. Also, such an arrangement permits an accurate determination of the synchronous position of the hands. By means of the two oppositely disposed notches in the disc 74 it will be seen that the hands of the clock may be synchronized either exactly on the hour or exactly on the half hour.

In this modification of the invention, the movement of the plate 76 is effected by drawing it downward by means of a depending rod 78. The value of such an arrangement is that where the clock is located in a relatively inaccessible position such as in a display window or in an elevated position on the wall, the rod 78 may have attached to its lower extremity a cord or cable 79. The cord may be passed around a plurality of pulleys such as 81 and 82 whereby its free end may be easily reached whenever it is desired to reset the clock. Obviously such a resetting may be effected by merely pulling on the free end of the cord which effects the downward movement of the plate 76.

The modifications of the invention shown in Figs. 7 and 9 may also have incorporated in them a means for setting an alarm or signal device where such is provided. The means for attaining this end is shown and described in connection with Fig. 4 and its adaptation to these modifications should be obvious. The nature of the instant invention may be ascertained from the foregoing description and the scope thereof determined from the appended claims.

What is claimed is:

1. In a clock, a train of reduction gears, a supporting structure therefor, a minute hand gear, and means for rotating said gear to a predetermined position, said means comprising two pins positioned diametrically on and projecting

from one face of said gear and a reciprocable member constrained to a longitudinal movement by one of said reduction gears and by said supporting structure and having a lateral portion to engage said pins.

2. In a clock, a plurality of gears including one associated with the minute hand of said clock, a plurality of pins diametrically positioned on and projecting from a face of said one gear, a reciprocable plate having a rectangular slotted guideway adapted to slidably engage the periphery of another of said gears, means having an edge thereof extending laterally of said plate in proximity to said pins, and manual means for moving said plate longitudinally relative to said other gear to rotate said one gear to a predetermined position by effecting engagement between said laterally extending edge and said pins.

3. In a clock, a train of reduction gears, a pair of spaced plates to journal said gears, a plurality of sleeves for suitably spacing said plates, a minute hand gear provided with diametrically positioned projections on one face thereof, a flat member disposed adjacent said face and having an opening for said projections and a guide recess formed therein, and manual means for moving said member to effect engagement of an edge of said opening with one of said pins to produce rotation of said gear, said rotation ultimately bringing the other of said pins into contact with said edge, said flat member being guided in a straight line movement by one of said sleeves coacting with said recess and one of said reduction gears coacting with edges of said opening.

4. In a clock, a plate having an opening and provided with a guideway formed in one side of said plate, a train of reduction gears, a supporting structure for said gear train, one of said gears and part of said structure serving in cooperation with said guideway to restrict the movement of said plate to a longitudinal one, a minute hand gear having projections on one face thereof extending through said opening and spaced from the center of rotation of said minute hand gear, and means including a manually operable device for effecting a reciprocating movement of said plate, said reciprocating movement effecting rotation of said minute hand gear by the engagement of an edge of said opening with said projections.

5. A clock comprising hands, a driving means therefor, a train of reduction gears, a pair of spaced plates for journaling said gears, a plurality of sleeves for suitably spacing said plates, one gear of said train being provided with two diametrically positioned pins extending from one face thereof, a device for rotating said one gear with respect to a second gear, said device comprising a flat member having a slot through which a third one of said reduction gears projects and serves as a guide for said member, said flat member being further characterized by a recessed portion having one edge thereof in sliding registry with one of said sleeves and an opening through which said pins project, a spring for urging said flat member in a manner to effect engagement between a second edge of said recessed portion and said one sleeve, and means accessible from the exterior of the clock for moving the flat member against the action of said spring to effect the engagement of an edge of said opening with said pins.

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