July 4, 1933. A. P. HODGE 1,916,665

TIME CONTROLLING SWITCH DEVICE

Filed March 15, 1930

Fig. 1

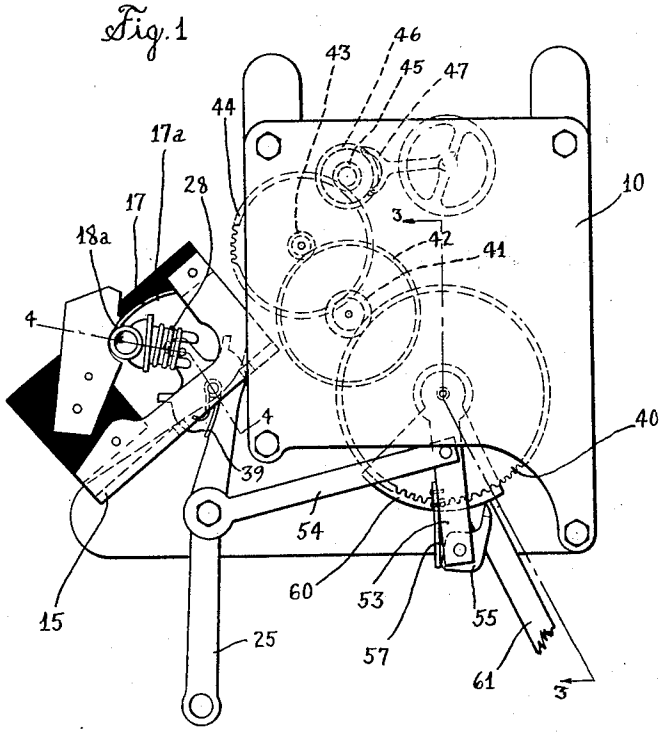


Fig. 3

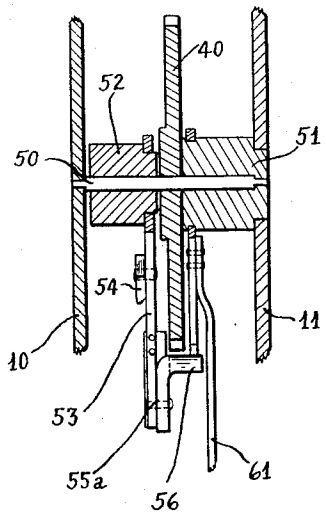


Fig. 2

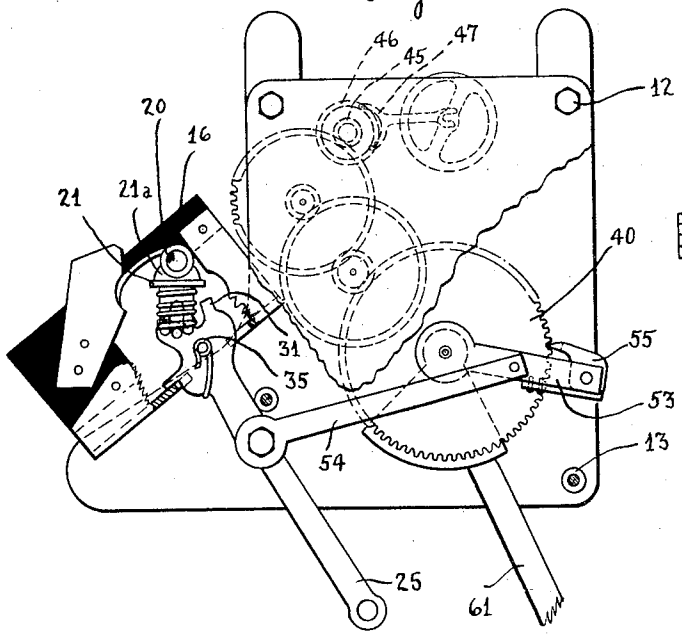
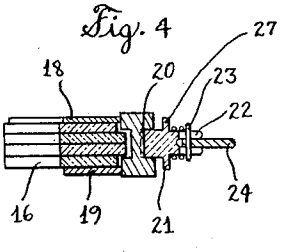


Fig. 4



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UNITED STATES PATENT OFFICE

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TIME CONTROLLING SWITCH DEVICE

Application filed March 15, 1930. Serial No. 436,070.

The present invention relates broadly to time-controlling devices and is more particularly concerned with a mechanical assembly which includes, as essential parts thereof, an actuating mechanism and time-controlling instrumentalities which are intimately associated with the former to operate the same upon the elapse of a predetermined interval of time.

For illustrative, and not limiting purposes, the present invention is shown as including an electrical switch which is operated by the time-controlled instrumentalities. In such an assembly the ease, accuracy, and reliability of adjustment as to the interval which elapses from the setting of the device to the moment when the switch is thrown are features of essential importance. This fact has been borne in mind in the devising of the switch device of this invention which includes these properties to a high degree.

A particular feature of the invention is associated with the provision of mechanism for varying the time-controlling instrumentalities. It is my idea to provide mechanism which functions to throw a switch at the same point in the operation of the mechanism regardless of the length of the time interval which is to be governed. Differences in the length of the interval are obtained by varying the point at which the time-controlling instrumentalities become effective. This will be developed more fully hereinafter.

Other objects will be in part obvious and in part pointed out more in detail hereinafter.

This invention accordingly consists in the features of construction, combination of elements and arrangement of parts which will be exemplified in the construction hereinafter set forth and the scope of the application of which will be indicated in the appended claims.

For a full and more complete understanding of the invention, reference may be had to the following description and accompanying drawing wherein:

Figure 1 is a side view in elevation of a device made in accordance with the present invention, with the operating parts illustrated during the act of setting the switch in "on" position.

Figure 2 is a view similar to Figure 1, but developing the switch in "off" position.

Figure 3 is an enlarged detailed sectional showing taken about on the plane indicated by the line 3—3 of Figure 1, and

Figure 4 is another enlarged detailed sectional illustration taken about on the plane indicated on the line 4—4 of Figure 1.

Referring now to the drawing, a time-controlling switch such as proposed hereby is shown as mounted on a pair of supporting plates 10 and 11. Obviously the particular supporting means employed in any embodiment is susceptible of wide variation and the invention is not to be limited in this respect. The plates 10 and 11 may be maintained in spaced relation in any preferred manner such as by bolts 12 and sleeves 13.

The switch, the operation of which is designed to be controlled by time-controlling instrumentalities carried by the plates 10 and 11, may be of any suitable construction. In the illustrated embodiment this switch is shown as being of the snap-over type and comprises a pair of spaced metallic plates 15 between which is mounted a block 16 of fibre or other insulating material. The block 16 is formed of four sheets of fibre material and a curved track 17 is formed in this block 16. A rib 17*a* constitutes a part of the track 17 and this rib is formed by causing the two inner sheets of the block 16 to project a greater distance into the curved track than the outside sheets.

Carried by the block 16, but spaced from the plates 15, are a pair of contact plates 18 and 19. These plates 18 and 19 are mounted on the block in any appropriate manner and are provided with curved edges which are in alignment with the outer edges of the track 17 at one end thereof. This is clearly shown at 18*a*. The circuit which is controlled by the switch now being described is broken when there is no conductive connection between the plates 18 and 19, but is closed when they are connected.

A spool-like roller 20, of the construction developed in Figure 4, is designed to conduc-

tively connect these plates 18 and 19 when the circuit is to be closed. The end portions of the roller normally ride on the outer sheets of the block 16 along the trackway 17. The latter is cut away immediately adjacent the plates 18 and 19 so when the roller is at one end of the track a good engagement with the contact plates is insured. The rib 17*a* is complemental to the spool-like construction of the roller and serves to retain the spool on the track.

A link 21, of any preferred insulating material has a grooved head 21*a* which fits over the middle portion of the roller 20. The other end of the link is bifurcated as shown at 22 and this bifurcation receives a pin 23 carried by an arm 24 of a lever 25. The latter is pivotally mounted on a pin 26. A coiled spring 28 is disposed about the link 21 and bears against a flange 27 on the link 21 at one end and the pin 23 at the other. This spring 28 has a tendency to urge the link 21 in a direction to maintain the roller 20 in a position at one end or the other of the track 17. This spring is also an essential element to the snap-over action of the switch. As the angle between the link 21 and arm 24 is increased the pin 23 compresses the spring 28 until these parts 21 and 24 are at an angle of 180 degrees which is the critical point. Immediately this point is past the spring 28 expands to snap the roller to one end or the other of the track 17.

The lever 25 is provided with ears 30 and 31 which are designed to engage the frame at the ends of a slot therein through which the lever 25 passes, and these ears 30 and 31 constitute a means for limiting the swinging movement of the lever 25.

A spring 35 has one end anchored to one of the frame plates 15 and the other end fastened to the lever 25. This spring 35 normally urged the switch to "off" position and also constitutes the source of power for operating the time-controlling instrumentalities. To the end of clearly describing this action it is noted that this spring constantly urges the lever 25 in a counterclockwise direction, speaking with reference to the drawing. This lever 25 is of sufficient length to permit of the use of the end thereof as an operating member.

The time-controlling instrumentalities illustrated may be, of course, of various construction. In the present instance they are shown as comprising a train of gears which are "braked" by an escapement mechanism. This is developed in the drawing in a diagrammatic manner. A main gear 40 meshes with a pinion 41 which is carried by a gear 42 which in turn operatively engages a pinion 43 which is carried by a shaft which also carries a gear 44 that meshes with a pinion 45 which operates an escapement ratchet 46. The escapement mechanism is of the conventional type and includes an escapement lever 47. All of the foregoing gear mechanisms are carried by shafts which are journaled in the plates 10 and 11.

A shaft 50 carries the main gear 40 and this shaft has one end journaled in the plate 10 while the other end fits in a bushing 51 which is affixed to the plate 11. A sleeve 52 is freely mounted on the shaft 50 between the plate 10 and gear 40 and this sleeve 52 has an arm 53 extending radially therefrom. The latter is operatively connected by a link 54 with the lever 25. A pawl 55 is pivotally mounted at 55*a* on the arm 53, and this pawl has a tooth 56 which is adapted to engage with the teeth of the gear 40 and at the same time extend laterally therebeyond. A leaf spring 57 is carried by the arm 53 and normally urges the pawl into engagement with the teeth of the gear 40. A plate 60, in the form of a segment, is carried by the bushing 51 and this segment is positioned so that its arcuate edges project slightly beyond the edge of the gear 40. An operating member 61 is fastened to the segment 60 and is operative to adjust the position of the latter with respect to the gear 40.

The operation of the foregoing mechanism may be briefly outlined as follows:

Assuming the switch is in a position breaking the circuit and it is desired to complete the circuit and have it remain closed for a certain predetermined period after which it is to be automatically broken: the segment 60 is first adjusted with respect to the gear 40 to provide the desired interval. The lever 25 is then rotated in a clockwise direction sufficiently to "snap-over" the switch into a position wherein the roller 20 connects the plates 18 and 19. The lever 25 is then released and the tooth 56 slides over the segment 60 until it engages the teeth of the gear 40. The train of gears and the escapement mechanism is then brought into effective operation under the influence of the spring 35. The latter slowly urges the lever 25 in a counter-clockwise direction until the critical point of the switch is reached and the roller 20 snapped over into circuit breaking position.

It is notable that the switch is always thrown at the same point, speaking with reference to the gear mechanism and lever 25. The time interval is varied by varying the position of the segment 60 so as to properly change the point with which the pawl tooth 56 comes into engagement with the teeth of the gear 40.

As many changes could be made in the above construction and many apparently widely different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be

interpreted as illustrative and not in a limiting sense.

It is also to be understood that the language used in the following claims is intended to cover all of the generic and specific features of the invention herein described and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

What is claimed is:

1. A timing device of the character described comprising a supporting frame, a gear having gear teeth, carried by said frame, a switch including a lever and a spring urging said lever into a direction wherein the switch is in "off" position, an arm extending from said lever and including means for engaging said gear teeth to turn the gear under the influence of said spring, and means for maintaining said engaging means inoperative until it has reached a certain predetermined point with respect to the said gear teeth.

2. A timing device of the character described comprising a gear train including a main gear, escapement mechanism for braking the operation of said main gear, a switch of the snap-over type including an operating lever for throwing the switch, an arm connected to said lever, a second lever mounted coaxially with said main gear, said arm being connected to said second lever, a pawl carried by said second lever for engaging said main gear, and a segment also mounted coaxially with said main gear and having an arcuate surface for maintaining the pawl out of engagement with said gear until it has reached a certain predetermined point on the periphery of said gear.

3. In a timing device of the character described and in combination, a switch adapted to assume off and on positions and including a lever, a spring for urging the lever into a position wherein the switch is off, an arm pivotally connected to said lever, a gear having gear teeth, a second lever mounted coaxially with the said gear, the said arm being pivotally connected to said last mentioned lever, a pawl carried by said last mentioned lever and having a tooth for engaging the gear teeth of said gear, said tooth extending beyond said teeth, a member coaxially mounted with said gear and having an arcuate surface, said pawl tooth being adapted to engage and ride over said arcuate surface, and an operating member for adjusting the position of said member having the arcuate surface.

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