June 10, 1941. M. E. RHODE 2,244,803

TIMER MECHANISM

Filed Dec. 24, 1938 2 Sheets-Sheet 1

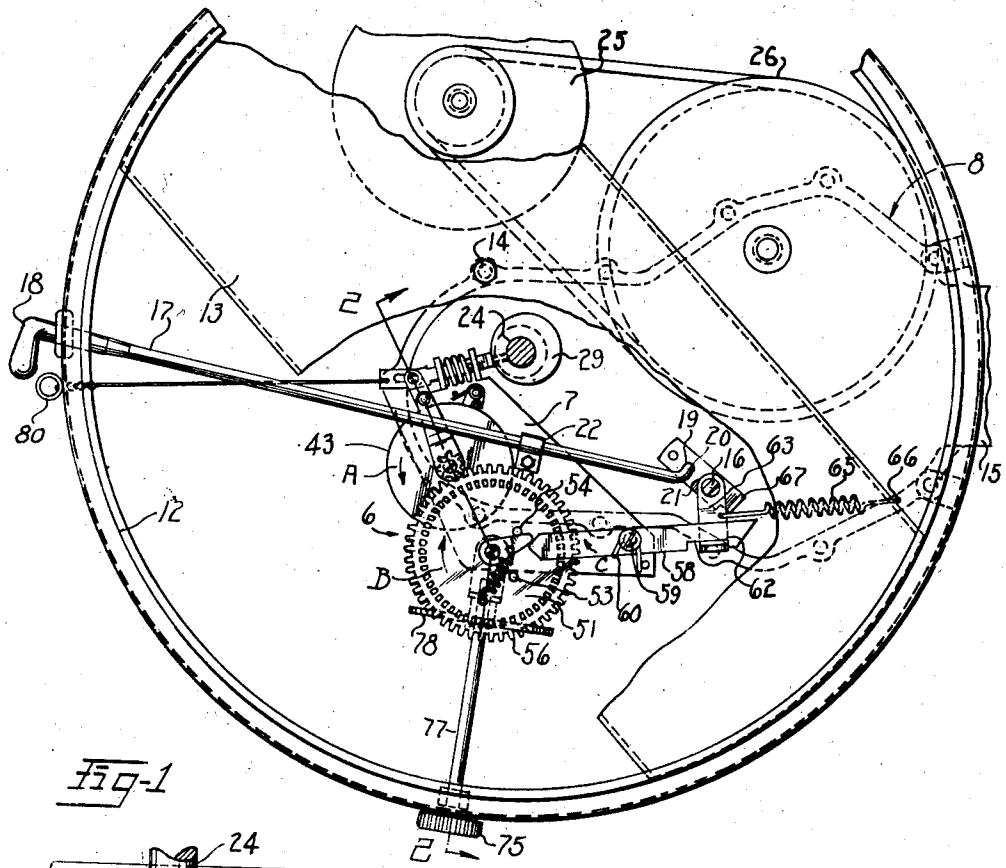


Fig-1

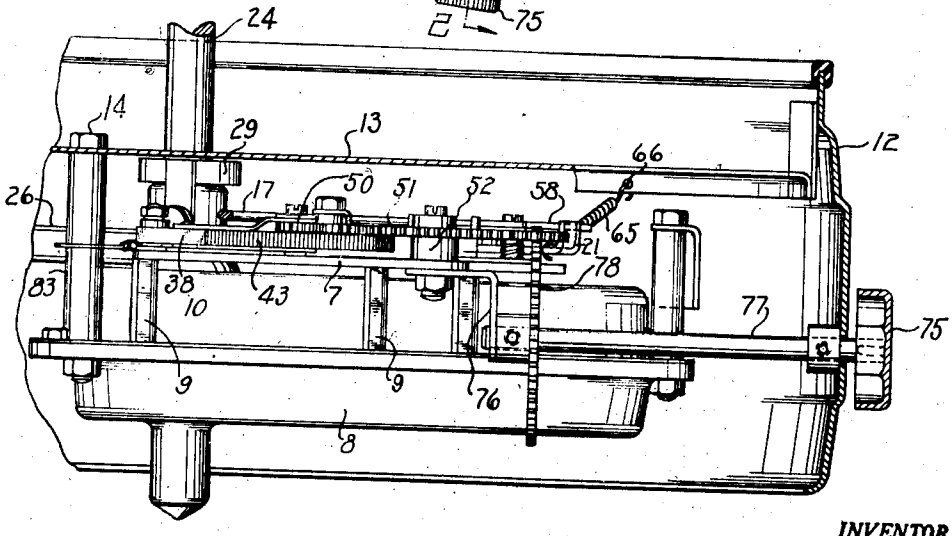


Fig-2

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TIMER MECHANISM

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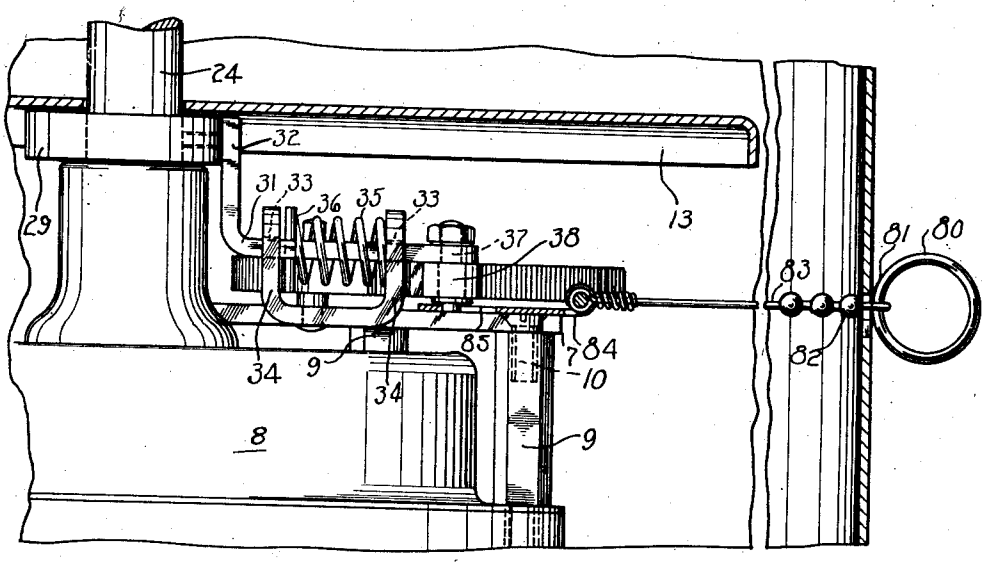


Fig. 3

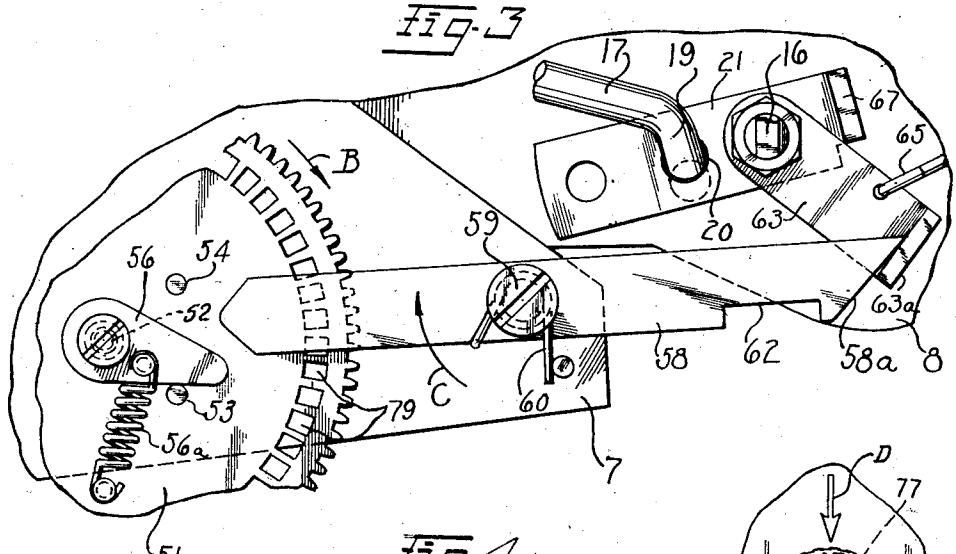


Fig. 4

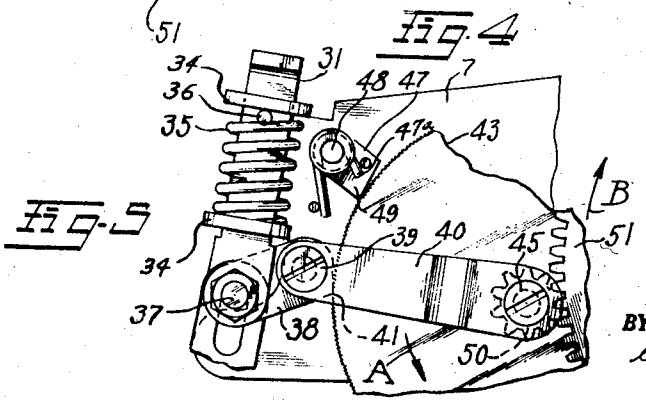


Fig. 5

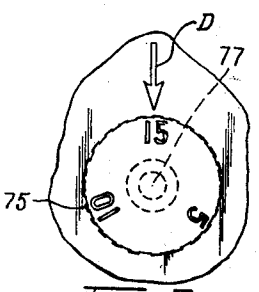


Fig. 6

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2,244,803

UNITED STATES PATENT OFFICE

2,244,803

TIMER MECHANISM

Martin E. Rhode, Euclid, Ohio, assignor to The Apex Electrical Manufacturing Company, Cleveland, Ohio, a corporation of Ohio

Application December 24, 1938, Serial No. 247,576

5 Claims. (Cl. 192—139)

This invention relates to washing machines and more particularly to an improved timer mechanism for a washing machine wherein the duration of the washing action is automatically controlled.

Numerous expedients have been proposed for automatically discontinuing the washing action in a domestic washing machine after the clothes have been washed for a predetermined period of time. Recent developments in the washing machine art have resulted in the general adoption for domestic use of a washing machine having a mechanism beneath the tub to oscillate an agitator arranged to project upwardly within the tub. Said mechanism is usually provided with a portion projecting beyond the outline of the tub and carries thereat an upwardly-extending, wringer-driving shaft. Among the automatic timer mechanisms heretofore provided for such type of washing machine are found timer mechanisms which are connected to the power unit so that the timer mechanism not only stops the agitator drive but also stops the wringer-driving shaft. The disadvantage of such an arrangement grows out of the fact that the wringer may be in use at the time the timer mechanism operates to stop the power unit. The stopping of the wringer leaves the washing machine power unit heavily loaded when an attempt is made to restart the same. In the event that the wringer is loaded with heavy articles and the washing machine tub is also heavily loaded with clothes and water, the combined load may exceed the starting capacity of the electric motor or other power unit designed to run the machine. This condition necessitates a wringer drive disengagement or a complete release of the wringer roll pressure and a manual removal of the clothes before the driving mechanism can again be placed in operation. The use of such a timer would also be objectionable in connection with a combined washer and centrifugal extractor where it would necessitate the use of the timer and the operation of the washer during the use of the extractor.

Other timer mechanisms which are intended to stop only the agitator operation have been proposed. The latter have involved such complicated and costly reconstruction of the washing machine drive mechanism that they have not enjoyed wide commercial success.

It is among the objects of my invention to provide a washing machine timing device which will automatically stop the oscillation of the agitator after a predetermined period of time, without interrupting the operation of the wringer or the extractor driving mechanism.

It is a further object of my invention to provide a timer mechanism according to the preceding object which may be applied to a conventional washing machine driving mechanism and wherein its application to such driving mechanism will not involve a reconstruction or modification of the driving mechanism itself.

It is a further object of my invention to provide an automatic timer mechanism in accordance with the preceding objects which is positively driven by the agitator shaft, exteriorly of the gear case housing the washing machine driving mechanism.

It is a further object of my invention to provide a timer mechanism in accordance with the preceding object wherein the timer mechanism establishes an operative connection between the agitator shaft and the clutch control for the agitator driving mechanism.

It is also an object of my invention to provide a timer mechanism in accordance with the two preceding objects wherein each oscillation of the agitator shaft positively advances a member operatively connected to a clutch for the agitator drive.

Further objects and advantages relating to simplicity in construction and economies of manufacture will appear from the following description and the appended drawings wherein:

Figure 1 is a plan view, with parts broken away, of a washing machine provided with a timer mechanism constructed according to my invention;

Figure 2 is a sectional view taken along the line 2—2 of Figure 1;

Figure 3 is an enlarged showing, with parts in section, of the timer driving assembly;

Figure 4 is an enlarged plan view, with parts broken away, showing the clutch control moved to an "off" position in response to timer action;

Figure 5 is an enlarged plan view, with parts broken away, showing the timer driving assembly; and

Figure 6 is an elevation of the timer control knob.

I have attained the objects generally described above and avoided the disadvantages associated with the prior art constructions by arranging my timer mechanism between the agitator shaft and the clutch control for the agitator shaft so that upon each oscillation of the agitator, a clutch-operating member will be progressively advanced toward a position where it effects disengagement

of the agitator driving clutch. More specifically the mechanism of my invention is indicated in its entirety as at 6 and comprises a flat metal supporting plate 7 arranged to extend over the upper surface of the washing machine gear case 8. The plate is secured to the gear case by means of sleeves 9 and bolts 10 threaded into sleeves carried by gear case (see Fig. 3).

As will be understood by those familiar with this art, the gear case is supported within the washing machine frame 12 on a cross brace 13, by means of depending bolts 14, and a portion of the gear case as at 15 is designed to extend beyond the outline of the circular frame 12 to support the upwardly-extending wringer shaft (not shown) which is intended to drive the wringer (not shown).

The washing machine driving mechanism includes a clutch control shaft 16 which projects upwardly through the top of the gear case. It will be understood as this description proceeds that any suitable clutch and driving mechanism may be employed such as for instance that disclosed in the United States patent to W. A. Frantz et al. No. 2,046,258, and that my timer mechanism is suited to perform the functions for which it is designed without regard to the specific mechanism employed to drive the agitator and wringer.

The clutch control shaft 16 is normally moved to its operative and inoperative positions by means of a rod 17 having a handle 18 at the outside of the frame 12 and a depending end portion 19 extending into an aperture 20 formed in the clutch control plate 21. It will be observed that a rocking of the handle portion 18 will rotate the rod 17 in bearing bracket 22 upon its longitudinal axis and that the depending inner end 19 will swing through an arc so as to carry the plate 21 and the shaft 16 into "on" and "off" positions. When the clutch shaft 16 is turned to its "on" position (Fig. 1), the agitator shaft 24 will be placed in driven connection with the electric motor 25. As will be better understood by reference to said Walter A. Frantz application, the motor 25 is arranged to rotate the pulley 26 and through suitable gearing effect an oscillation of the agitator shaft 24. It will also be understood by reference to said application that so long as the pulley 26 is rotated by the motor, the reduction gearing leading to the wringer drive shaft will continue to rotate and that the operation of the agitator may be interrupted without affecting the continued rotation of the wringer.

To drive the timer mechanism in a positive manner, the agitator shaft 24 is provided with an eccentric or cam member 29 in that portion of the shaft immediately beneath the cross brace 13. The timer mechanism is provided with a reciprocating slide element 31 having a tappet portion 32 arranged to bear against the outer periphery of the cam 29. The member 31 is preferably mounted to slide through apertures 33 formed in the spaced, parallel, upturned ears 34 and is normally urged toward the cam 29 by means of the spring 35 interposed between the lug 36 on the slide and one of the upturned ears 34. The end of the slide 31 remote from the cam 29 is pivoted as at 37 to a driving pawl 38. The driving pawl 38 is in turn pivoted as at 39 to a radius member 40 and is provided as at 41 with a sharp edge adapted to engage the serrated periphery of the disk 43.

It will be observed by reference to Figures 1 and 5 that as the high point of the cam 29 bears against the slide, the slide will move axially in opposition to the spring 35 and rock the pawl 38 upon its pivot 39. The initial rocking of the pawl 38 is effective to engage the portion 41 with the serrated periphery of the disk 43 and continued movement of the slide 31 is effective to rotate the disk 43 upon its pivot 45. The degrees of rotation in the disk 43 effected by the pawl may be varied within relatively wide limits depending upon the gear ratios employed in the timer and other variable factors. In the embodiment shown, the disk 43 is turned about 5.75 degrees in response to each oscillation of the slide 31 and I have found this to be a satisfactory arrangement in connection with the gear ratios and lever proportions shown.

To insure that the disk 43 will not be carried back in a reverse direction as the slide 31 moves toward the agitator shaft on its return stroke, I have provided a spring-pressed pawl 47, which is pivotally mounted as at 48 on the plate 7. The pawl 47 is provided with a spring 47*a* and a sharp edge portion 49 adapted to engage the serrations in the disk 43 and effectively prevent any reverse movement of the disk.

Suitable gear reduction is obtained through a small pinion 50 fixed to the upper surface of the disk 43 adapted to drive a gear 51 pivotally mounted as at 52 on the plate 7. The gear 51 carries on its upper surface a pair of spaced pins 53 and 54 which limit the arc through which a loosely-pivoted dog 56 may swing.

Referring to Figure 1, it will be observed that each successive oscillation of the agitator will cause a progression of the disk 43 in the direction of the arrow A and that this progression is in turn effective to rotate the gear 51 in the direction of the arrow B, so that the pin 54 will bear against the dog 56 and carry the dog into engagement with a rocking lever 58. The rocking lever is preferably pivotally mounted as at 59 on the supporting plate 7 and is normally urged by the spring 60 in the direction of the arrow C. The end of the rocking lever 58 is notched as at 62 to receive the upturned end 63*a* of a plate 63 pivotally carried by the clutch control shaft 16.

A spring 65 which may be anchored as at 66 to the brace 13 normally pulls the plate 63 in a counter-clockwise direction with respect to the clutch control shaft 16 and an upturned end 67 on the plate 21 is arranged to bear against the plate 63 so as to be similarly-carried in a counter-clockwise direction. Any movement of the plate 63 and the attendant movement of the plate 21, in response to the spring 65 is restrained by the rocking lever 58 as long as the rocking lever is in the position shown in Figure 1. It will be observed, however, that as soon as the dog 56 has advanced a few degrees in the direction of the arrow B that the rocking lever will be moved to a position such as shown in Figure 4 and release the plate 63. When the last-mentioned action has taken place, the spring 65 becomes effective to carry the plate 21 in a counter-clockwise direction and thus place the agitator clutch control in an "off" position. The washing machine agitator drive controls will remain in said "off" position until manually restored to "on" position by rocking the rod 17. Such manual rocking will turn the plates 21 and 63 in a clockwise direction and will force the upturned end portion 63*a* of the plate 63 over the cam face 58*a* on the rocking lever 58. The rocking lever 58 may move freely with respect to the pivoted dog 56 which is moved away from the pin 54

to a position against the pin **53** in response to the spring **56***a*. The last-named position of the pivoted dog becomes effective as soon as the dog has thrown the clutch control parts to an "off" position as heretofore described.

In the "off" position of the rocking lever **58**, it will be observed by reference to Figure 4 that the end of the lever adjacent plate **63** bears against the portion **63***a* so as to limit the swing of the rocking lever. After a manual movement of rod **17** to the "on" position, the oscillation of the agitator advances the dog **56** in a clockwise direction about its pivoted axis until it again trips the rocking lever **58**. The engagement between the end of the lever **58** and the portion **63***a* which is received in the notch **62** maintains the other end of the lever in the path of the dog **56** upon the next revolution of the dog **56** and its carrying plate **51**.

In the embodiment shown, the parts are proportioned so that one complete revolution of the dog **56** and its carrying plate **51** will occupy a period of 15 minutes. Since it is frequently desired to automatically operate the washing machine for a period less than fifteen minutes, I have provided a reset or control device indicated at the exterior of the tub by the handle **75**. A shaft **77** secured to the handle or knob **75** projects through the frame **12** of the tub, is pivotally supported at its inner end on a bracket **76**, and has fixed thereto at its inner end a gear **78** having teeth arranged to project through apertures **79** formed in the gear **51**. The tub frame **12** is provided with an arrow D or other suitable indicia as shown in Figure 6 and the knob **75** bears the time indicia marked off in equal segments.

By means of the manual reset or control just described, the gear **51** and the dog **56** carried thereby may be advanced in a clockwise direction any predetermined amount. This advance is permitted by reason of the driving and holding pawl arrangement **38—47**. The handle **18** may be turned to place the clutch control parts in an "on" position after any predetermined advance of the dog **56** and the remaining period of time as measured on the gear **51** will determine the washing period.

In the event that it is desired to operate the washing machine in the usual manner, through the manual control **18**, without utilizing the automatic timer mechanism, the neutral control **80** may be pulled outwardly and held in its outward position in keyhole slot **81** by reason of the engagement of knobs **82** carried on the neutral control rod **83**. The inner end of the control rod, it will be observed by reference to Figure 3, is secured to a flat plate **84** having a slot **85** to receive the lower end of the pivot pin **37**. During the normal, automatic operation of the timer mechanism, the slot **85** accommodates the sliding or reciprocating movements of the pin **37**, effected by the cam **29**. When the neutral control rod **83** is pulled outwardly, however, the slide **31** is restrained from bearing contact with the cam **29** and thus the cam is ineffective to operate the timer mechanism. The last-described arrangement presents certain advantages where it is desired to operate the washing machine agitator for a long period of time or where the operator desires to control the washing period manually, without the benefit of the automatic control.

Although I have described and shown my timer mechanism in the environment of a washing machine, it will be understood that my invention may be suited to the automatic control of other machines and that although the mechanism is described in considerable detail, numerous modifications may be made therein without departing from the scope of the invention as defined in the following claims.

I claim:

1. A timer for controlling the period of operation of an oscillating shaft comprising a gear case for supporting said shaft and timer, a clutch-control shaft projecting through said gear case, an eccentric on said oscillating shaft, a pair of operatively connected rotatable timer elements, a pawl and ratchet operatively connected to said eccentric and to said rotatable timer elements, to progressively advance said elements upon each oscillation of said eccentric and oscillating shaft, said pawl and ratchet and rotatable timer elements constructed and arranged to rotate one of said timer elements more slowly than the other, means operatively connected to said clutch-control shaft and to the slow moving timer element whereby said clutch control shaft is moved by said means in response to a pre-determined number of oscillations of said eccentric.

2. A timer for controlling the period of operation of a driven shaft comprising a gear case for supporting said shaft and timer, a clutch control projecting from said gear case to interrupt the drive to said driven shaft, an eccentric on said driven shaft, a pair of operatively connected rotatable timer elements, a pawl operatively connected to said eccentric and said timer elements to progressively advance said elements upon rotational movement of said eccentric and driven shaft, said pawl and rotatable timer elements constructed and arranged to rotate one of said timer elements more slowly than the other, means operatively connected to said clutch control and to the slow moving timer element, whereby said clutch control is moved by said means in response to a predetermined number of rotational movements of said eccentric.

3. A timer for controlling the period of operation of an oscillating driven shaft, comprising a gear case for supporting said shaft and timer, a clutch control projecting from said gear case operative to interrupt the drive to said driven shaft, an eccentric on said driven shaft, a pair of rotatable timer elements, a pawl operatively connected to said eccentric and to said timer elements to progressively advance said elements upon movement of said eccentric and driven shaft, said pawl and rotatable timer elements constructed and arranged to rotate one of said timer elements more slowly than the other, a cam connected to the slow-moving timer element, means operatively connected at one end to said clutch control and engaging said cam at the other end whereby said clutch control is moved by said cam and means in response to a predetermined number of movements of said eccentric.

4. A timer for controlling the period of operation of a washing machine agitator comprising a gear case for supporting a driven shaft projecting therefrom and timer, a clutch control projecting from said gear case and adapted to be moved so as to interrupt the drive to the agitator, an eccentric on said driven shaft exteriorly of the gear case, a pair of operatively connected rotatable timer elements, an oscillating member having one end thereof engaged and moved by said eccentric, a pawl operatively connected to

said member at the other end thereof and to said timer elements to progressively advance said pair of timer elements upon movement of said eccentric, said pawl and timer elements constructed and arranged to rotate one of said timer elements more slowly than the other, means operatively connected to said clutch control and to the slow-moving timer element, whereby said clutch control is moved by said means in response to a predetermined number of eccentric movements and manually-operable means connected to said slow-moving timer element to advance said slow-moving element through its cycle and thereby control the period of operation of the agitator.

5. A timer for controlling the period of operation of a driven shaft comprising a gear case for supporting said shaft and timer, a clutch control on said gear case adapted to be moved to operative and inoperative positions so as to establish or interrupt the drive to said driven shaft, an eccentric on said driven shaft, a pair of rotatable timer elements, a pivoted pawl connected to said timer elements and to said eccentric whereby said elements are progressively advanced in response to movement of said eccentric, said pawl and rotatable timer elements constructed and arranged to rotate one of said timer elements more slowly than the other, a cam carried by and rotated with the slow-moving timer element, means operatively connected at one end to said clutch control and to said cam to move said clutch control in response to cam movement and manually-operated means connected to said slow-moving timer element whereby said slow-moving timer element and said cam may be advanced through their cycle of operation and the period of operation controlled by the timer varied.

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