May 9, 1933. O. T. ANDERSON 1,908,298

TIMING MECHANISM

Filed Nov. 3, 1932 2 Sheets-Sheet 1

Fig. 1.

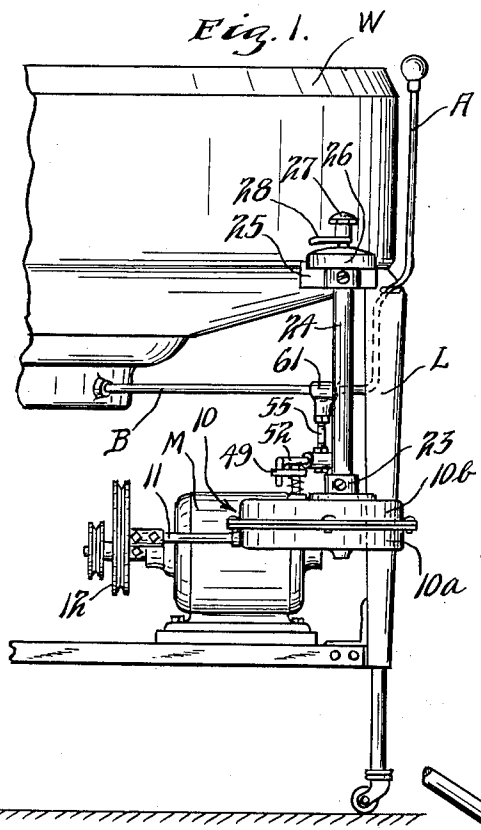

Fig. 8.

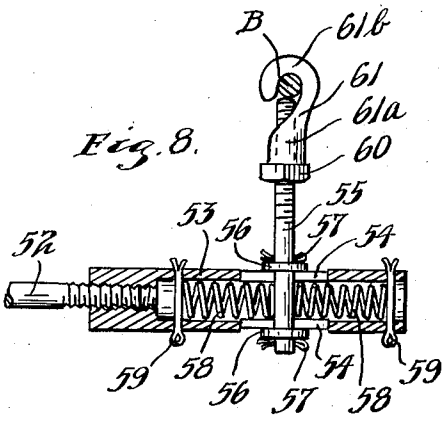

Fig. 2.

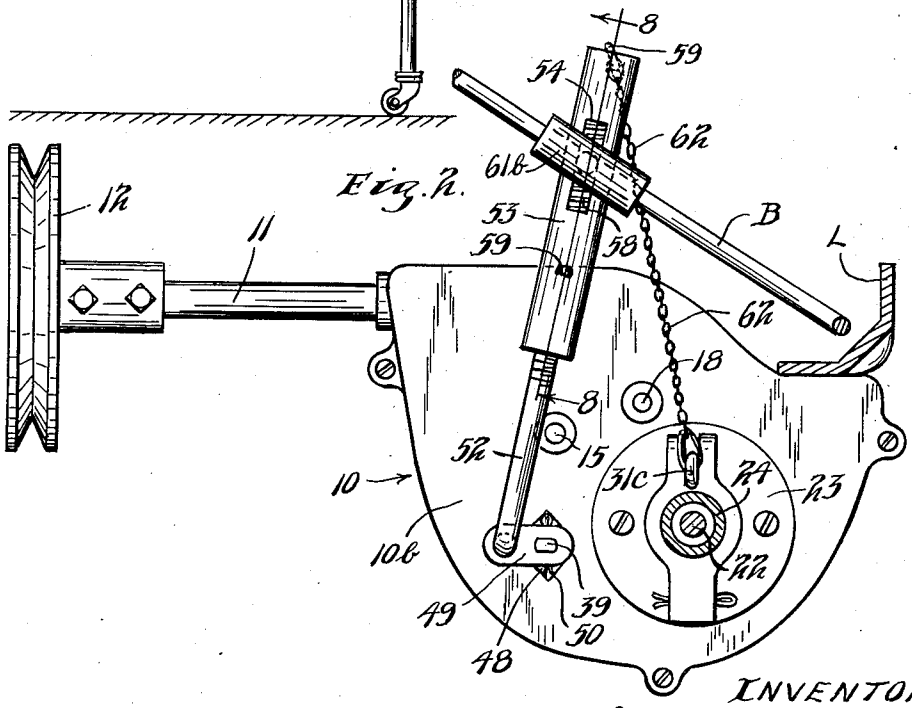

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Fig. 3.

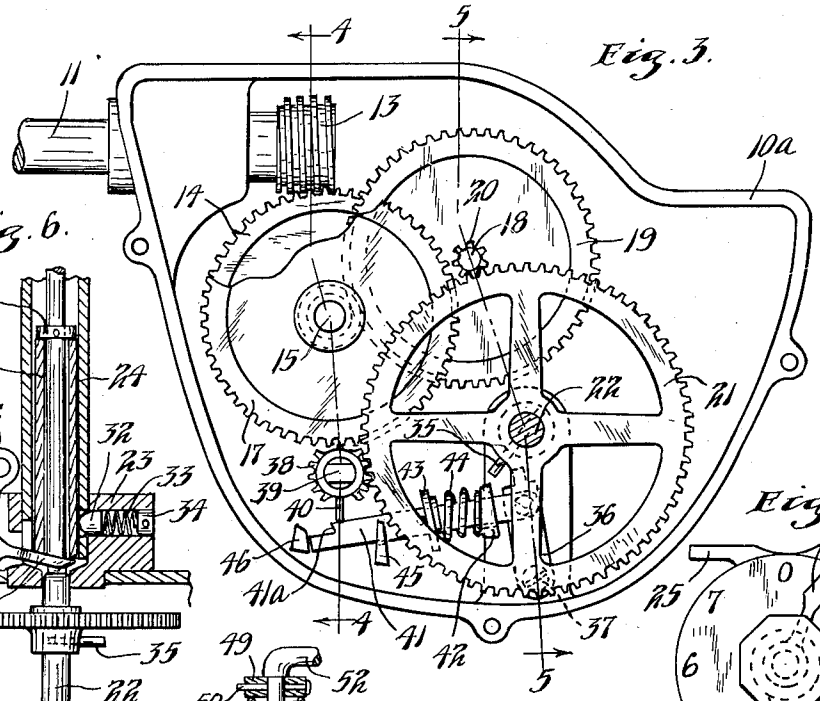


Fig. 6.

Fig. 7.

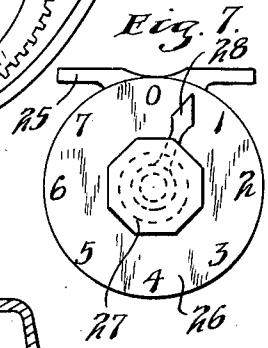


Fig. 4.

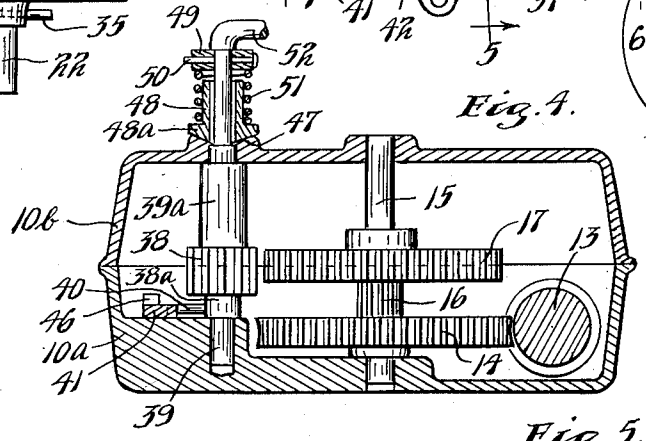
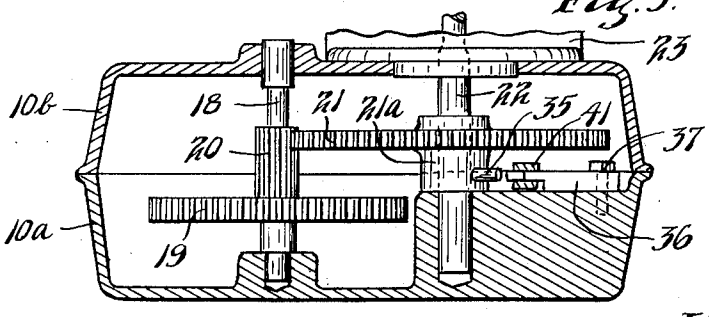


Fig. 5.



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Patented May 9, 1933 1,908,298

UNITED STATES PATENT OFFICE

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TIMING MECHANISM

Application filed November 3, 1932. Serial No. 640,944.

My invention relates to timing mechanisms and particularly to timing mechanisms for automatically stopping or starting a power driven machine.

It is an object of my invention to provide a timing mechanism which may be used to automatically stop or start a power driven machine after a predetermined period of time has elapsed and wherein means is provided for adjusting the duration of the period of time.

Another object is to provide such a timing mechanism which may be easily attached to a power driven machine and which may be driven by the source of power associated with the machine.

Still another object is to provide such a machine which is inexpensive of manufacture, simple, rugged, and compact.

These and other objects and advantages of the invention will be apparent from the following description made in connection with the accompanying drawings, wherein like reference characters refer to similar parts throughout the several views, and wherein:—

Fig. 1 is a view of my timing mechanism as applied to a conventional form of washing machine;

Fig. 2 is a plan view of my mechanism including portions of the washing machine;

Fig. 3 is a horizontal sectional view of the gear case of my mechanism with the upper portion of the case removed;

Fig. 4 is a vertical sectional view taken along the line 4—4 of Fig. 3 as indicated by the arrows;

Fig. 5 is a vertical sectional view taken along the line 5—5 of Fig. 3 as indicated by the arrows;

Fig. 6 is a vertical sectional view of a portion of my mechanism;

Fig. 7 is a top view of the time adjustment knob and dial of my invention, and

Fig. 8 is a vertical sectional view of the elements connecting my mechanism to a portion of a washing machine taken along the line 8—8 of Fig. 2.

Referring to the drawings, my invention includes a gear case comprising a lower half 10*a* and an upper half 10*b*. A shaft 11, carrying a pulley 12 on the outer end thereof, extends through the side of the lower portion 10*a* of the case to the interior thereof. A worm 13, carried on the inner end of the shaft 11, is meshed with the teeth of a worm wheel 14. The worm wheel 14 is mounted on a vertical shaft 15 which carries a pinion 16 above the worm wheel and a gear 17 above the pinion. Shaft 11 is journaled in suitable apertures in the lower and upper portions 10*a* and 10*b* of the gear case.

On a second vertical shaft 18, journaled in suitable apertures in the lower and upper portions 10*a* and 10*b* of the gear case, a gear 19, the teeth of which are meshed with the teeth of the pinion 16, and a pinion 20, located above the gear 19, are mounted. Another gear 21 is mounted on a relatively long vertical shaft 22. The shaft 22 is journaled at its lower end in a suitable aperture in the lower portion 10*a* of the gear case and is free for limited longitudinal movement. When the shaft 22 is in its lowermost position the teeth of the gear 21 are meshed with the teeth of the pinion 20 and when the shaft is in its uppermost position the gear 21 is disengaged from the pinion 20.

An apertured flanged member 23 is attached to the upper side of the upper portion 10*b* of the gear case in concentric relation to the shaft 22. Shaft 22 runs through the apertured portion of member 23. Secured to and extending upwardly from the flanged member 23 is a tubular housing 24 surrounding the medial portion of the shaft 22 in spaced relation therefrom. Attached to the upper end of the housing 24 is a bracket 25 bearing a horizontally disposed dial 26 on the upper side thereof. The shaft 22 extends upwardly through the bracket 25 and the dial 26 to a point slightly above the dial and carries on its upper end a knob 27 and a pointer 28 associated with the dial.

The shaft 22 has a collar 29 secured thereto within the medial portion of the housing 24. A tubular sleeve 30, disposed in the annular space between the shaft 22 and the housing 24, abuts at its upper end the lower side of the collar 29 and rests at its lower end on a forked arm 31*a* of a bell crank 31 which extends

through a suitably apertured portion of the flanged member 23 and is pivotally mounted therein. The outer end of the remaining arm 31*b* of the bell crank 31 is formed into a ring. A plunger 32, urged inwardly by a helical compression spring 33, is slidably retained in a radially disposed aperture in the flanged member 23 and the housing 24, the inner end of the plunger 32 pressing against the outer periphery of the sleeve 30 and the outer end of the spring 33 being retained in the aperture by means of a plug 34 secured in the outer end portion of the aperture.

The gear 21 carries a depending hub 21*a* from which a pin 35 extends radially outwardly. A lever 36 is pivotally mounted on the lower portion 10*a* of the gear case at a point a substantial distance from the shaft 22 by means of a screw 37 to permit swinging thereof in a horizontal plane. The free end of the lever 36 is disposed near the hub 21*a* so as to be in the path of the pin 35 and to be deflected when struck by the pin 35.

A mutilated gear 38, having teeth at all parts of its periphery except for two diametrically opposite short portions thereof, is mounted on a vertical shaft 39, the lower end of which is journaled in a suitable recess in the lower portion 10*a* of the gear case and the upper portion of the shaft extends upwardly through an apertured boss in the upper portion 10*b* of the case. A sleeve 39*a* encircling the shaft 39 extends from the upper side of the gear 38 to the upper portion 10*b* of the case to prevent vertical displacement of the shaft and gear.

The mutilated gear 38 has a hub 38*a* on the lower side thereof from which a pin 40 extends radially outwardly. A bar 41 pivotally connected at one end thereof to the outer portion of the lever 36 extends through a guide 42, which is secured to the lower portion 10*a* of the gear case, and thence adjacent the path of the outer end of the pin 40. A washer 43 is mounted on and secured to the medial portion of the bar 41 and a helical compression spring 44, encircling the bar 41, is retained in compression between the washer 43 and the guide 42. Near the outer end thereof the bar is engaged on the side farthest from the mutilated gear 38 by a guide 45 which acts to prevent swinging of the bar away from the mutilated gear beyond a position wherein the end of the pin 40 may make contact with the side of the bar when the mutilated gear is in such a position that the pin extends toward the bar. A stop 46 is positioned to be abutted by the end of the bar to limit movement of the bar in a direction away from the guide 42. The outer portion of the bar 41 is notched on the side toward the mutilated gear 38 as at 41*a*.

A boss 47 on the upper side of the upper portion 10*b* of the case and encircling the shaft 39 has a shallow V-shaped notch in the upper side thereof. The shaft 39 from the upper end thereof down to the level of the bottom of the V-shaped notch in the boss 47 has diametrically opposite sides cut away to provide parallel flat surfaces. A sleeve 48, having a flange 48*a* at the lower end thereof, is mounted on the shaft 39 in vertically slidable but non-rotatable relation thereto immediately above the notched boss 47. The lower side of the flange is cut away to provide a shallow V shape adapted to nest into the V-shaped notch in the boss 47. An arm 49, having a suitable opening therethrough, is mounted on the uppermost portion of the shaft 39 and is secured thereon by means of a pin 50. A helical compression spring 51, encircling the shaft 39 and the sleeve 48, is retained in compression between the arm 49 and the flange 48*a* to urge the V-shaped lower side of the flange 48*a* into engagement with the V-shaped notch in the boss 47.

The outer end of the arm 49 is apertured to pivotally receive an angularly bent end portion of a rod 52. The unbent end of the rod 52 is provided with external screw threads which are engaged in internal screw threads in a longitudinal aperture in one end of a tubular member 53. The tubular member 53 has diametrically located longitudinal slots 54 through the medial portion of the wall thereof. One end portion of a rod 55 extends through the slots 54 and is retained in this position by means of washers 56 mounted on the rod 55 adjacent the respective sides of the tubular member 53 and restrained from movement away from each other by means of cotter keys extending through suitable transverse apertures in the rod 55. Two helical compression springs 58, located within the interior of the tubular member 53 bear respectively against diametrically opposite sides of the rod 55. The springs 58 are retained at their outer ends by cotter keys 59 which respectively extend through diametrically located apertures in the wall of the tubular member.

The outer end of the rod 55 is provided with external screw threads on which a lock nut 60 and the internally screw threaded shank portion 61*a* of a clamping member 61 are mounted. The clamping member consists of the shank portion 61*a* and a portion 61*b* extending outwardly therefrom, the portion 61*b* being formed into a wide hook as shown in Figs. 1 and 2, which in cooperation with the outer end of the rod 55 are adapted for use in gripping a rod as indicated in Figs. 1 and 2.

A small chain 62 is connected at one end to the outermost one of the cotter keys 59 and at the other end to the ring 31*c* of the bell crank 31.

Operation

In use, as with a washing machine W, the

case of my invention is secured to a portion of the machine, as, for example, the leg L thereof, as shown in Figs. 1 and 2, by bolts, screws, or other suitable means. The pulley 12 of my device is connected to a pulley on the shaft of the motor M, which drives the machine, by means of a suitable belt. In machines wherein a lever, such as the operating lever A, for operating a clutch or otherwise starting and stopping the machine, is arranged to rotate an operating shaft, such as the shaft B, through a small angle in each direction, the clamping device comprising the hooked member 61 and the threaded rod 55 is adjusted to tightly grip the operating shaft as shown in Figs. 1, 2 and 8.

Assuming that the washing machine is in operation, when the shaft and pulley of the motor M revolves, rotation will be imparted to the pulley 12, the shaft 11 and the worm 13 of my invention. The shaft 22, because of the speed reduction gearing connecting it to the worm 13, will obviously revolve at a very low speed.

With the washing machine in operation, the tubular member 53, the rod 52, the arm 49, and the shaft 39 will be in the positions indicated in Figs. 1 and 2, the V-shaped lower side of the flange 48*a* will be nested in the V-shaped notch in the boss 47, the mutilated gear 38, the pin 40, the bar 41 and the lever 36 will be in the positions indicated in Fig. 3, and the shaft 22 and bell crank 31 will be in the positions shown in Fig. 6.

After a period of time has elapsed, the shaft 22 will have rotated through an angle sufficient to bring the pin 35 into contact with the end of the lever 36 and further rotation will result in the lever 36 being swung to the right, as viewed in Fig. 3. As this occurs the bar 41 will be drawn through the guide 42 against the pressure of the spring 44. As the notched portion 41*a* of the bar 41 passes the pin 40, the spring 44, due to its tendency to straighten out, will force the bar 41 toward the pin 40 until the portion of the bar having reduced width strikes the end of the pin 40.

As rotation of the shaft 22 continues a point is reached where the pin 35 slips from the end of the lever 36 and this permits the spring 44 to suddenly move the lever 36 and the bar 41 to the left as viewed in Fig. 3. As this movement of the bar 41 progresses the shoulder portion thereof at the notch 41*a* engages the pin 40 and moves the same to cause clockwise rotation of the mutilated gear 38 to a point where the teeth thereof will be engaged by the teeth of the relatively rapidly revolving gear 17. The pin 40, as the mutilated gear 38 revolves, will leave contact with the shoulder of the bar 41 and the gear 17 will rotate the mutilated gear 38 through an angle of 180 degrees whereat the gear 17 leaves engagement with the mutilated gear 38 because of the teeth omitted thereon. As the gear 38 and the shaft 39 upon which it is mounted rotate through an angle of 180 degrees the flanged member 48 rotates therewith and first is wedged upwardly against the pressure of the spring 51 and then is permitted to be forced, by the spring 51, downwardly into the V-shaped notch in the boss 47 to nest therein in a new position 180 degrees from its initial position. In either of its two positions the flanged member 48 tends to hold the mutilated gear 39 in a position wherein its toothless portion is adjacent the gear 17.

In starting the washing machine W, the lever A was moved inwardly toward the right as viewed in Fig. 1, thus swinging the rod 55 toward the shaft 39 of the timing mechanism and partially compressing the one of the springs 58 nearest the rod 52. As the shaft 39 rotates through 180 degrees the arm 49, the rod 52, and the tubular member 53 first move in a direction toward the shaft B and then away from the shaft B. As the tubular member 53 moves, the spring 58 nearest the rod 52 is compressed to a greater extent until the pressure exerted thereby overcomes the resistance of the shaft B to movement, whereupon the shaft B is rocked to stop the washing machine and to swing the lever A outwardly to the left. As the arm 49 and the rod 52 move away from the shaft B the outermost one of the springs 58 is partially compressed. As the rod 52 and the tubular member 53 reach their outermost position, the chain 62 will be pulled thereby to move the ring 31*c* of the bell crank 31 away from the housing 24 and to thereby raise the forked portion of the bell crank, the sleeve 30 and the shaft 22 to raise the gear 21 out of mesh with the pinion 20. The spring pressed plunger 32, bearing against the side of the sleeve 30 will act to retain the parts in their raised position after the tension on the chain 62 has been removed.

To again start the washing machine the lever A is swung outwardly to the right. As this is done the lower end of the rod 55 is swung toward the shaft 39, partially compressing the one of the springs 58 nearest the rod 52. As the spring is compressed it acquires sufficient pressure to overcome the holding ability of the flanged member 48 and the V-shaped notch in the boss 47, and to move the arm 49 in a direction away from the shaft B to rotate the shaft 39. As the shaft 39 is rotated, the mutilated gear 38, attached thereto, is rotated until the toothed portions of the gear are engaged by the teeth of the gear 17. The gear 17 will then rotate the mutilated gear 38, the shaft 39, the pin 40, and the arm 49 to the positions in which they are shown in Figs. 1, 2 and 3, whereupon an untoothed portion of the mutilated gear 38 will move opposite the gear 17 and rotation of the mutilated gear will stop. In the last 90 degrees

of rotation the arm 49, the rod 52, and the tubular member 53 will be driven toward the rod 55 to partially compress the one of the springs 58 nearest the rod 52. The last part of the movement of the mutilated gear 38 will cause pin 40 to strike bar 41 and cam the same against the tension of spring 44 to the position shown in Fig. 3.

After placing the washing machine in operation, as described above, the timing mechanism may be set in operation. The knob 27 is turned to position the pointer 28 over the portion of the dial 26 corresponding to the lapse of time desired before the washing machine will be stopped, the numbers on the dial being proportional to the length of time. The knob is then pushed downwardly to lower the gear 21 into mesh with the pinion 20. It is obvious that the larger the number on the dial over which the pointer is set the greater will be the angle through which the pin 35 must travel before it will engage the lever 36 and hence the longer will be the period of time which will elapse before the washing machine will be stopped.

Although my invention has been described as associated with a washing machine, to stop the same after it has been in operation for a predetermined period of time, it is obvious that it is adapted for use in connection with many other types of machinery and that it may be used for either starting or stopping a machine after a predetermined period of time.

It is apparent that I have invented a novel, efficient, simple and inexpensive timing mechanism which may be used to stop or start a machine after a predetermined period of time, wherein convenient and simple means is provided for adjusting the length of the period of time, and which may be easily attached to a machine.

It will, of course, be understood that various changes may be made in the form, details, proportions and arrangement of the parts, without departing from the scope of my invention, which, generally stated, consists in a device capable of carrying out the objects above set forth and in the novel parts and combinations of parts disclosed and defined in the appended claims.

What is claimed is:—

1. A timing mechanism for a power driven machine having a control member for starting and stopping thereof, comprising mechanical transmission means including a gear, means for driving said transmission means, a mutilated gear having teeth disposed along a portion of its periphery, means actuated by said transmission means after said transmission means have operated for a set length of time for meshing the toothed portion of said mutilated gear with the teeth of said first mentioned gear to cause rotation of said mutilated gear through a portion of a revolution, and means for actuating said control member as said mutilated gear is rotated.

2. A timing mechanism for a power driven machine having a control member for starting and stopping thereof, comprising a normal gear and a mutilated gear, means for driving said normal gear, said mutilated gear having no teeth at each of a pair of diametrically opposite portions of its periphery, means operated by said driving means after said driving means has been in operation for a predetermined period of time for bringing the teeth of said mutilated gear into mesh with said normal gear, and actuating connections between said mutilated gear and said control member whereby rotation of said mutilated gear will result in actuation of said control member.

3. A timing mechanism for a power driven machine having a control member for starting and stopping thereof, comprising a speed reducing gear train, a source of power driving said train, a mutilated gear having teeth through a portion of its periphery, means connecting said mutilated gear to said control member and means actuated by the slowest moving gear of said train for meshing the teeth of said mutilated gear with the teeth of one gear of said train to cause rotation of said muilated gear through a portion of a revolution whereby said control member will be actuated.

4. A timing mechanism for a power driven machine having a control member for starting and stopping thereof, comprising speed reducing mechanical transmission means including two normal gears, means for driving said transmission means, a mutilated gear having teeth disposed along portions of its periphery, said mutilated gear being situated for engagement with one of said normal gears, a toothless portion of said mutilated gear normally being disposed at the side thereof adjacent said normal gear, a pin carried by the remaining one of said normal gears, a lever pivoted adjacent said pin carrying normal gear and normally extending into the path of said pin, a bar pivotally connected to said lever and extending adjacent said mutilated gear, the outer end portion of said bar being cut away on the side toward said mutilated gear to leave a shoulder, resilient means for urging said bar in a direction toward its outer end and toward said mutilated gear, a stop limiting outward longitudinal movement of said bar, a pin carried by said mutilated gear and into the path of which the shoulder of said bar is urged, and means connecting said mutilated gear to said control member, whereby after said driving means has been in operation for a predetermined period of time, the pin carried by the last mentioned one of said normal gears will engage said lever and draw said bar inwardly until said pin slips from said lever whereupon said

resilient means will urge said bar outwardly, said shoulder engaging the pin carried by said mutilated gear to rotate said mutilated gear to bring the toothed portion thereof into engagement with said first mentioned normal gear whereby said mutilated gear will be rotated through a portion of a revolution to result in actuation of said control member.

5. A timing mechanism for a power driven machine having a control member for starting and stopping thereof, comprising speed reducing mechanical transmission means including two normal gears, means for driving said transmission means, a mutilated gear having teeth disposed along portions of its periphery, said mutilated gear being situated for engagement with one of said normal gears, a toothless portion of said mutilated gear normally being disposed at the side thereof adjacent said normal gear, a pin carried by said mutilated gear, a pin carried by the remaining one of said normal gears, a lever pivoted adjacent said pin carrying normal gear and normally extending into the path of said last mentioned pin, a bar pivotally connected to said lever and extending adjacent said mutilated gear, the outer end portion of said bar being cut away on the side toward said mutilated gear to leave a shoulder, an apertured guide plate through which said bar extends at an angle, a helical compression spring encircling said bar and reacting between said guide and a portion of said bar more closely disposed to said mutilated gear than said guide, the side of said spring farthest from the shouldered side of said bar being normally compressed more than the other side of said spring so as to urge said bar toward the pin carried by said mutilated gear, and means connecting said mutilated gear to said control member.

6. A timing mechanism for a power driven machine having a control member for starting and stopping thereof, comprising a speed reducing gear train, a source of power driving said train, a mutilated gear having teeth throughout a portion of its periphery, means connecting said mutilated gear to said control member, means actuated by the slowest moving gear of said train for meshing the teeth of said mutilated gear with the teeth of one gear of said train to cause rotation of said mutilated gear through a portion of a revolution whereby said control member will be actuated, a longitudinally shiftable shaft, said slowest moving gear being mounted on said shaft, and means connected with said mutilated gear whereby rotation thereof will effect shifting of said shaft and the gear carried thereby to remove said slowest moving gear from mesh with the remaining gears of said gear train.

7. A timing mechanism for a power driven machine having a control member for starting and stopping thereof, comprising a speed reducing gear train, a source of power driving said train, a mutilated gear having teeth throughout a portion of its periphery, means connecting said mutilated gear to said control member, means actuated by the slowest moving gear of said train for meshing a toothed portion of said mutilated gear with the teeth of one gear of said train to cause rotation of said mutilated gear through a portion of a revolution whereby said control member will be actuated, a longitudinally shiftable shaft, said slowest moving gear being mounted on said shaft, a shifting collar mounted on said shaft, a shifting fork engaging said collar, a bell crank carrying said shifting fork, and means connecting said bell crank to said mutilated gear whereby rotation of said mutilated gear will result in said slowest moving gear being shifted out of mesh with the remaining gears of said train.

8. A timing mechanism for a power driven machine having a control member for starting and stopping thereof, comprising a speed reducing gear train, a source of power driving said train, a mutilated gear having teeth throughout a portion of its periphery, means connecting said mutilated gear to said control member, means actuated by the slowest moving gear of said train for meshing a toothed portion of said mutilated gear with the teeth of one gear of said train to cause rotation of said mutilated gear through a portion of a revolution whereby said control member will be actuated, a longitudinally shiftable shaft, said slowest moving gear being mounted on said shaft, a collar secured to said shaft, a sleeve revolubly mounted on said shaft in abutment at one end thereof with said collar and disposed between said collar and said slowest moving gear, a shifting fork engaging the remaining end of said sleeve, a bell crank carrying said shifting fork on one arm thereof, and means connecting the remaining arm of said bell crank to said mutilated gear whereby, when said mutilated gear has rotated through a portion of a revolution, said slowest moving gear will be shifted out of mesh with the gear of said train with which it is normally meshed.

In testimony whereof I affix my signature.

OSCAR T. ANDERSON.