

July 3, 1945.

C. H. HAYS, JR

2,379,522

OPERATING AND TIMING DEVICES FOR LAUNDERING MACHINES AND THE LIKE

Original Filed Dec. 4, 1939

4 Sheets-Sheet 1

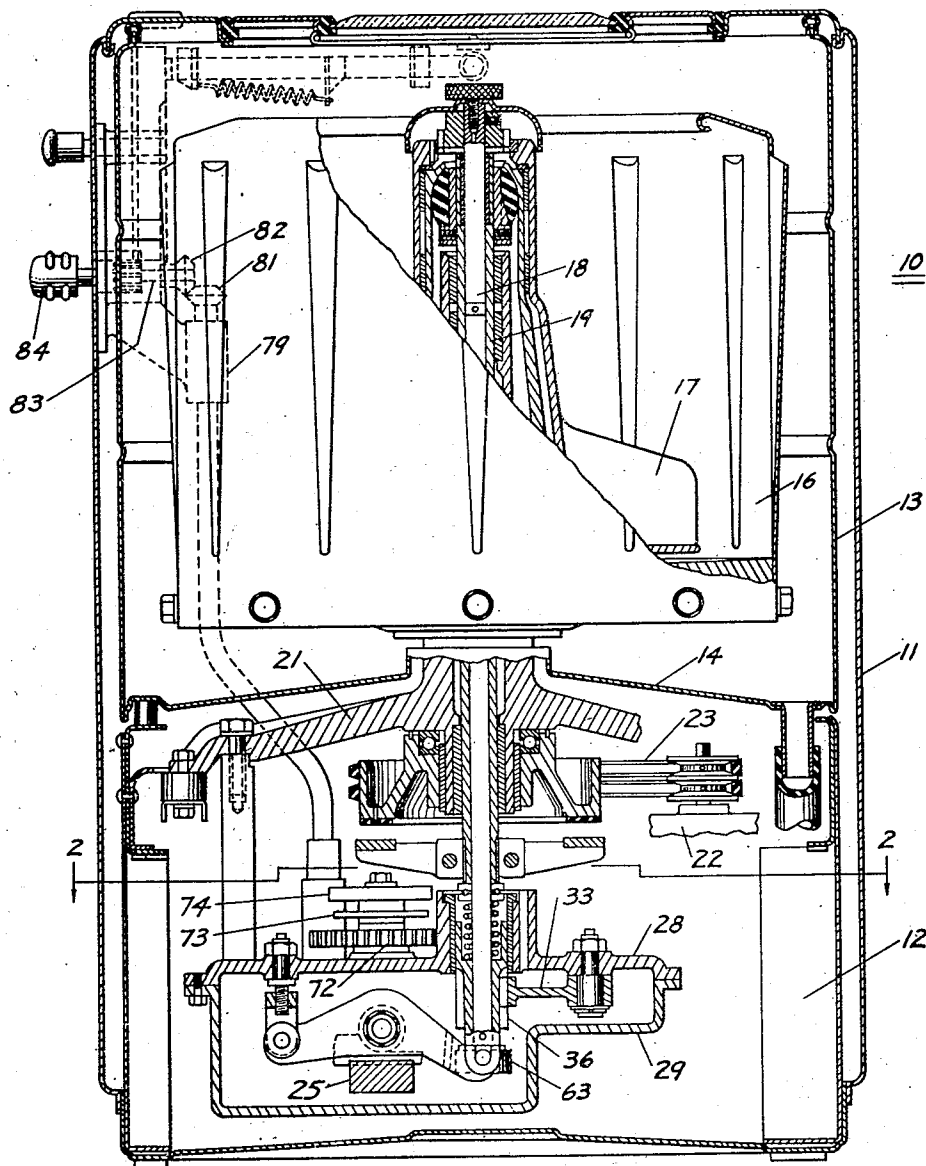


FIG. 1

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4 Sheets-Sheet 2

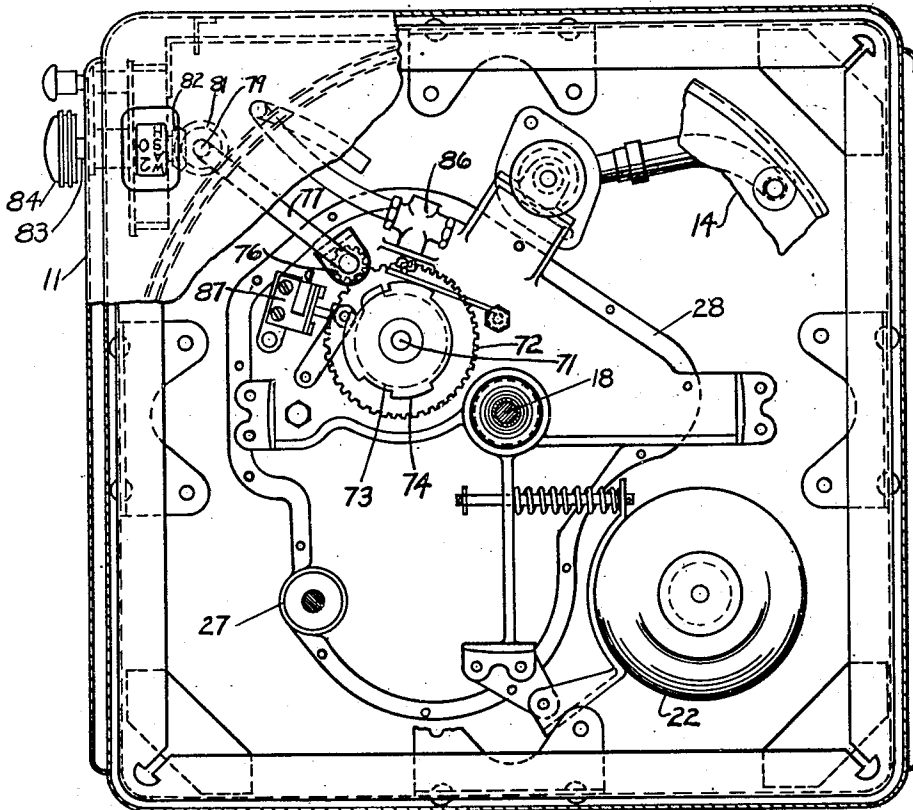


FIG. 2.

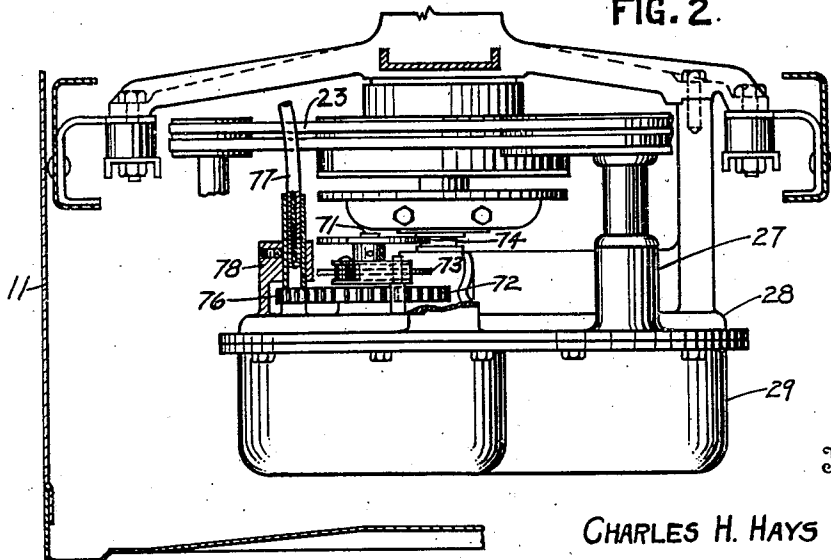


FIG. 3

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July 3, 1945.

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Original Filed Dec. 4, 1939

4 Sheets-Sheet 3

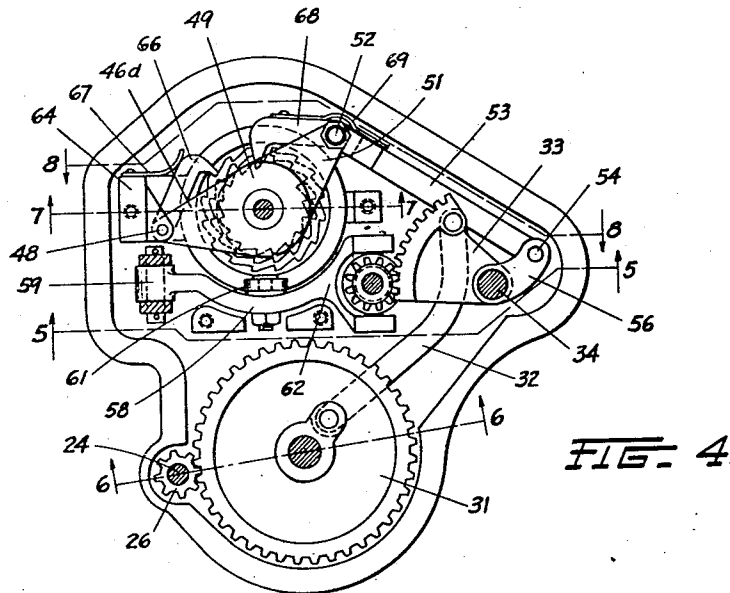


FIG. 4

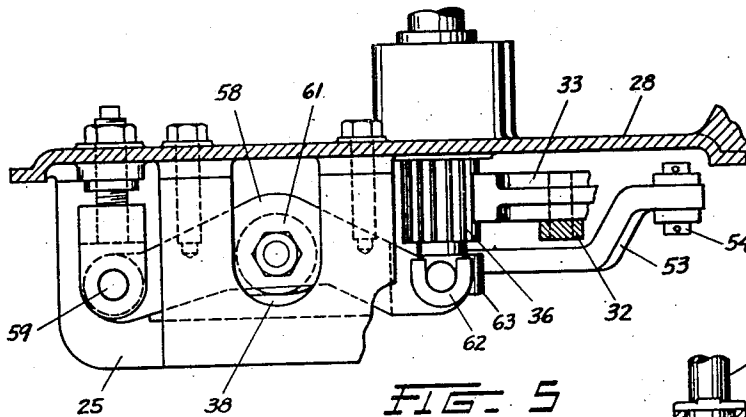


FIG. 5

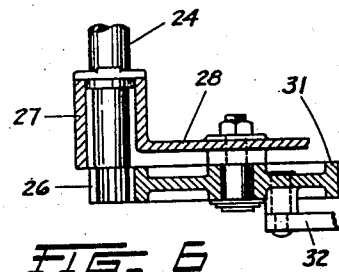


FIG. 6

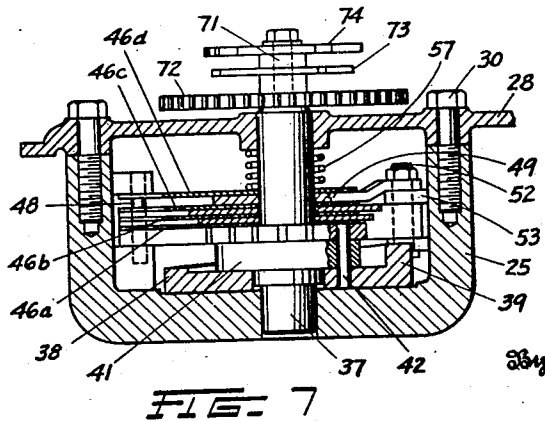


FIG. 7

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2,379,522

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Original Filed Dec. 4, 1939

4 Sheets-Sheet 4

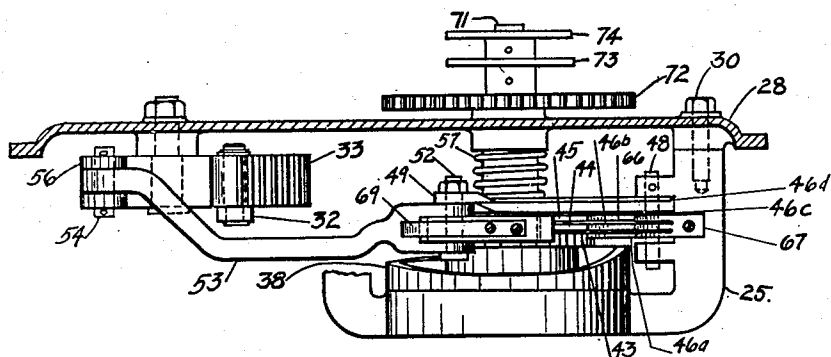


FIG. 8

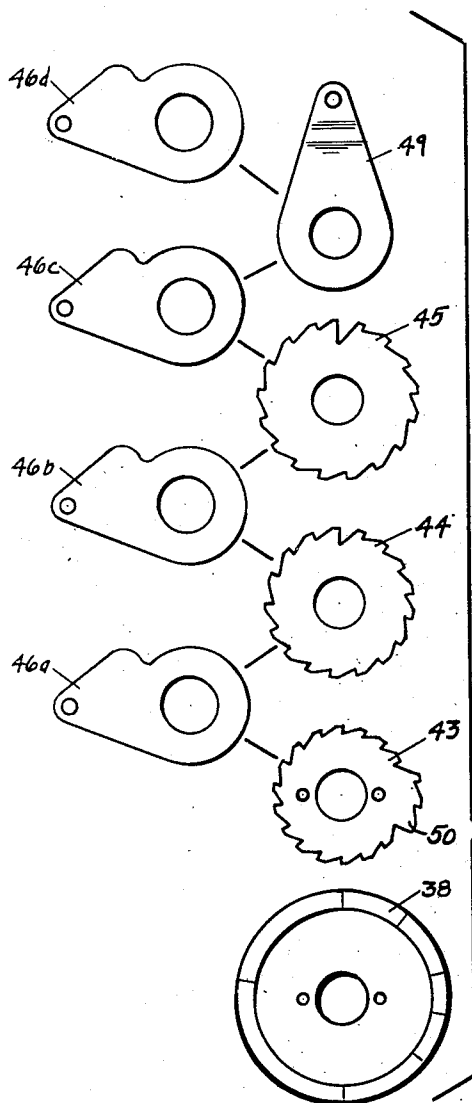
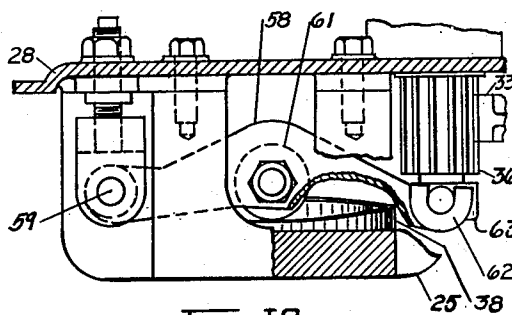


FIG. 10

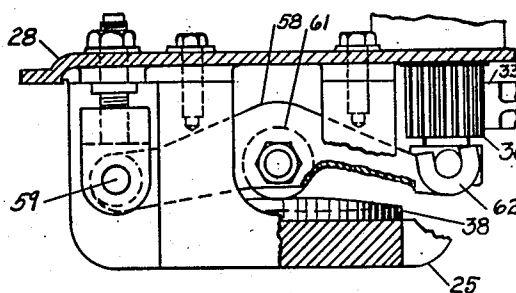


FIG. 11

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UNITED STATES PATENT OFFICE

2,379,522

OPERATING AND TIMING DEVICE FOR
LAUNDERING MACHINES AND THE LIKE

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Original application December 4, 1939, Serial No.
307,397. Divided and this application June 8,
1943, Serial No. 490,058

6 Claims. (Cl. 192—139)

This invention relates to improvements in operating devices for actuating and setting in operation mechanisms by which to perform given work, and is a division of my Patent #2,361,767, dated October 31, 1944, for an improvement in Laundering machines.

The present invention is directed to, and has for an object, the provision of a device that is adaptable to many machines in which a number of operations are required to be performed in timed sequence, and is shown and described in connection with a laundering machine that successively washes, rinses, and dries. It is also an object of the invention to provide a structure that includes adjusting or setting mechanisms which enables varying or changing both sequence and timing of any given set of operations. A further object of the invention is to provide an operative mechanism such that it will function to set in motion operational machine parts, of itself perform operations that may require, the controlled application of a considerable force. Additionally, the device is of such proportions as to be relatively compact, being constructed in a manner to provide for easy assembly, replacement, or repair, and is readily adjustable to alter both timing and operating sequences.

Other objects and advantages of the invention will be more fully understood from a consideration of the following specification, taken in conjunction with the accompanying drawings; and in which

Fig. 1 is a vertical sectional view of a laundering machine in which is embodied one form of the invention;

Fig. 2 is a top plan view, parts being broken away to a point substantially as suggested by the line 2—2 of Fig. 1, and illustrates, in plan, the general relationship of the parts of the invention;

Fig. 3 is a side elevational view of the invention, further showing the relationship of various operable parts;

Fig. 4 is a horizontal sectional view showing those of the parts of the device that are normally enclosed within a casing;

Fig. 5 is an enlarged vertical sectional view taken substantially on the line 5—5 of Fig. 4, and shows certain of the details of timing and work producing parts;

Fig. 6 is a vertical sectional view, taken substantially on the line 6—6 of Fig. 4, showing the reduction gear drive for the device;

Fig. 7 is a vertical sectional view taken substantially on the line 7—7 of Fig. 4, and shows

the timing parts and the operating mechanism therefor;

Fig. 8 is a further vertical sectional view of the drive mechanism for the timing parts, being taken substantially on the line 8—8 of Fig. 4;

Fig. 9 is an exploded view, in plan, of the timing ratchets, friction plates and cam;

Fig. 10 illustrates one position assumed by an arm associated with, and actuated by, the cam shown in Fig. 8; and

Fig. 11 is a view similar to Fig. 10 showing the other position of the arm in response to rotation of the cam.

Referring more particularly to the drawings, the reference numeral 10 is employed to generally designate a laundering machine adapted to perform the operations of washing, rinsing, and drying, and with which the present invention is associated to require the performance of these operations in timed sequence. The machine includes a casing 11, within the lower portion 12 of which is located a drive mechanism and timing device, such mechanism being enclosed from above by a member 14 from which extends upwardly a substantially circular splash ring 13. Within the splash ring 13 is located a material receiving receptacle 16. This receptacle is fitted with an agitator 17, the agitator mounting and connection with a drive shaft 18, together with the mounting of the receptacle and its drive member 19, forming no part of the present invention.

Beneath the member 14, a frame 21 supports a motor 22 which, through a suitable belt drive 23, rotates shaft 24 and gear 26. An enclosure is provided for certain of the operating parts of the mechanism. This enclosure includes a plate 28 from which is suspended a frame member 25 in any suitable manner, as by bolts 30. An upstanding portion 27 of this plate is apertured and shaft 24 projects therethrough, the lower end of the shaft beneath the plate being fitted with gear 26 (see Fig. 6). A pan 29, when attached by suitable bolts to the plate 28, completes the enclosure. Also contained within the enclosure is a gear 31 that meshes with gear 26. This gear is mounted for rotation on a pivot member carried by the plate 28, substantially as illustrated in the drawings. One end of a drive arm 32 is joined to gear 31 substantially as illustrated. The other end of arm 32 is pivotally joined to a gear segment 33 that is mounted on a pin 34. This gear segment is caused to reciprocate by movement of arm 32. Gear segment 33

meshes with a pinion 36 that is secured to the lower end of the agitator drive shaft 18, and the reciprocating motion imparted through gear segment 33 serves to oscillate the agitator 17 in the receptacle 16 during a washing operation of the machine.

Within the enclosure is a shaft 37 which derives its bearing support from the base of frame member 25 and plate 28. A cam member 38, that includes a cam surfaced rim 39, is apertured to fit the shaft 37, an annular flange 41 of the shaft being joined to the cam in any suitable manner, as by pins 42. Also secured on the shaft 37 by pins 42, is ratchet wheel 43. Above this wheel are further wheels 44 and 45. The shaft 37 carries friction plates 46a and 46b interposed between wheels 43, 44, and wheels 44, 45. These plates are each formed with end portions 47 and prevented rotation with the shaft 37 by anchoring their end portions with a pin 48. Above the topmost wheel 45 is a further plate 46c that is also secured by the pin 48 and, again, above the plate 46c, is a guide plate 49, having a portion 51 thereof joined through a pivot 52 to one end of a link 53. The other end of link 53 is joined through a pivot 54 to an extension 56 of the gear segment 33. A further friction plate 46d is located above the guide plate 49. The friction plates, gears, and guide plates are held in their proper relationship by means of a spring 57 that encircles shaft 37 and is located between plate 28 and the topmost friction plate 46d.

Adjustably suspended from the plate 28 is a pivot bearing 59 with which one end of an arm 58 is associated. This arm has an intermediate curved portion that conforms to, and may thus be in immediate proximity with a portion of the cam 38. Centrally of the curved portion of this arm is mounted a roller 64 that rests on the cam surface 39. The free end 62 of the arm 58 is in the form of a yoke which supports a thrust bearing 63 located on the lower end of shaft 18 beneath pinion gear 36. In the present illustration, pinion gear 36, keyed on shaft 18, is of such length as to be movable axially with the shaft through movement of arm 58 without becoming disengaged from gear segment 33.

The pin 48, which anchors friction plates 46a, 46b, 46c, and 46d, is carried by a bracket-like portion 64 attached to, or formed integral with the frame member 25. This pin also pivotally mounts three similar ratchet dogs 66. These dogs are in superposed position and are so disposed that the lowermost dog engages the teeth of wheel 43; the intermediate dog, teeth of wheel 44; and the topmost dog, teeth of wheel 45. The three dogs are yieldingly held in engagement with the teeth of the ratchet wheels by a strap spring 67 that may be attached to the member 25 and serve to limit rotation of the gears to one direction. One end of a pawl 68 is pivotally mounted on link 53 by pin 52. This pivot, as mentioned, is also engaged with the guide plate 49. A suitable spring 69 urges the free end of the pawl into position for engagement with the teeth of any or all three of the wheels 43, 44, and 45. From the foregoing it is evident that plate 28 directly, and through the frame member 25, provides the entire support for the operating parts so far described, and that the plate in turn is so designed and mounted as to be capable of sustaining the weight, twist, or lifting forces involved in the operation of the mechanism.

An extension 71 of the shaft 37 projects above

the plate 28 and, as disclosed, mounts a gear 72 and cam plates 73 and 74. The gear 72 meshes with a pinion gear 76 which is joined to one end of a flexible shaft 77. A bracket mounted housing 78 rigidly supports the shaft 77 and gear 76. The flexible shaft 77 extends upwardly between the casing 11 and the splash ring 13 and is supported at its upper end in a suitable bearing 79. This end of the shaft mounts a beveled gear 81 that meshes with a corresponding gear 82, mounted on a shaft 83. Shaft 83 projects through the casing 11 and is fitted with a knob 84. It is evident from the foregoing that rotation of knob 84 rotates shaft 37, cam 38, and wheel 43, wheels 44 and 45 being freely rotatable with respect to this shaft. Cam plates 73 and 74, being keyed to the extension 71, are also rotatable by the knob 84. These cam plates, in the present disclosure, are operably connected one with a valve 86, and the other, an electric switch 87. Valve 86 controls the flow of liquid into the receptacle 16, whereas switch 87 controls operation of the motor 22.

Having described the structural parts of a device by which to set in motion certain mechanisms, as well as perform certain operations in connection with a laundering machine, the general operation of the device is as follows:

The knob 84 may be rotated, for example, to a position such that cam plate 74 will actuate valve 86 and fill the receptacle 16 with liquid. Following this, washable material is placed in the receptacle and the knob 84 rotated to again actuate cam plate 74, closing valve 86 and actuating cam plate 73, thus closing switch 87 and starting motor 22. It will be understood that at this point cam plate 38 and wheel 43 are set for the washing operation; namely, oscillation of shaft 18 and agitator 17. Through the drive 23, shaft 24 and pinion gear 26 are rotated. Rotation of pinion 26 rotates gear 31 and, through arm 32, oscillates gear segment 33, which, of course, through gear 36, oscillates shaft 18. Since segment 33 includes an extension 56, link 53, joined to this segment, will reciprocate and such motion moves the pawl 68 through a path that is prescribed by the guide plate 49.

At this point, the purpose of ratchet wheels, 43, 44, 45, and cam 38 is set out. The topmost wheel 45 is of a suitable diameter and has cut into its periphery a number of teeth of equal depth and spacing. However, one of the teeth is of considerably greater depth than the others. Wheel 44 is of slightly lesser diameter and has cut into its periphery the same number of teeth, depth and spacing as wheel 45, with the exception of one tooth that is cut deeper than the others. Similarly, wheel 43 is of a still lesser diameter and has cut into its periphery the same number of teeth as wheels 44 and 45. The deep tooth of wheel 45 is such as to permit engagement of the pawl 68 with the teeth of wheel 43, but this, however, can only take place at such time as the deep tooth of wheel 44 aligns with the deep tooth of wheel 45. From the foregoing it is evident that with one complete revolution of wheel 45, the pawl 68 will advance wheel 44 one tooth, and when a sufficient number of revolutions of wheel 45 have taken place to complete one revolution of wheel 44, the pawl will be capable of engaging wheel 43 and advance this wheel one tooth. Wheel 43, being joined to cam 38, thus causes the cam to rotate and its surface 39 to effect an upward or downward pivotal move-

ment of the arm 58 and the consequent raising or lowering of shaft 18. A complete revolution of wheel 43 is intended to constitute the operating cycle of the laundering machine and to reset the pawl 68 to again first act upon wheel 45, wheel 43 is formed with at least one tooth 50 so extended as to be flush with the outer diameter of wheel 45. Several such teeth will cause the cam 38 to be directly driven by the pawl 68 and thus, through a part of a given cycle, the cam rotates more rapidly.

In the present description of the operation, the shaft 18 is in its lowermost position in order that the gear on its upper end will engage the ring gear of agitator 17 and cause said agitator to oscillate. The agitator will continue oscillation until such time as a high area of the cam surface 39 moves from beneath roller 61. This causes the arm 58 to move the shaft 18 upwardly to become disengaged from the agitator. In the present showing of the invention in connection with a laundering machine, the arm 58 not only raises sleeve 19 which, being engaged with one of the two mounting means for the receptacle 16, raises said receptacle from off its stationary support and takes the entire load thereof. At the conclusion of this vertical movement, the sleeve 19, through a clutch structure described in the parent application, is caused to rotate. This rotation takes place only as long as the roller 61 remains on the high surface of the cam 38, the length of time of such operation being determined by the period required to rotate wheels 45 and 44 sufficiently to rotate cam 38 to present a low surface to the roller. It will be kept in mind that since the cam 38 is keyed to shaft 37, the extension 71 of this shaft will also rotate, as will cam plates 73 and 74 and, consequently, whatever the determined timing arrangement may be, these cams will actuate the water valve 86 and switch 87 in sequence with the determined period of oscillation of the agitator 17 and rotation of the receptacle 16.

From the foregoing it will be understood that the present invention is capable of actuating switch and valve mechanisms in predetermined timed sequence and is also capable of performing, of itself, useful operations even though such operations may require the controlled application of considerable force. This is clearly illustrated in the structure of the cam 38 and arm 58, by means of which not only the agitator is rendered operable, but the receptacle, and contents of washing liquid and material, is caused to be elevated and maintained in such position during high speed rotation thereof. Additionally, it is clear that by the simple expedient of replacing cam 38 with one having a different camming surface, the period of operation of certain parts may be altered. In this connection, it will also be apparent that by replacing wheels 43, 44, and 45 with wheels having a greater or lesser number of teeth, the complete cycle of operation of any given device may also be altered. Furthermore, without changing either the camming surface 39 or replacing wheels 43, 44, and 45, the time period in which one or more of the sequential operations take place may be altered by rotating knob 84, since this knob serves as a manual means at any time to advance or bring to a close one operation and commence another.

Although I have shown and described only one form of my invention, it will be clearly apparent to those skilled in the art that variations of the structure, enabling its application to means other

than that with which it is presently disclosed, are contemplated insofar as they are within the spirit and scope of the invention as set out in the annexed claims.

Having thus set forth my invention what I claim as new and for which I desire protection by Letters Patent is:

1. A drive mechanism comprising a reduction ratchet wheel group, a drive member engageable with and operable to rotate each of the wheels of said group, cam means directly associated and rotatable with one of the wheels of said group, means providing a predetermined sequence of engagement and operation of said drive member with each of the wheels of said group, and means carried by the wheel associated with said cam means and operable to by-pass the reduction drive of a part of said group and render said cam means directly responsive to said drive member.

2. A reduction drive mechanism comprising a ratchet group mounted on a common shaft and having relatively rotatable wheels, a cam member adapted to rotate with the slow speed wheel of said group, said member including a track having high and low areas adapted to have contact with and actuate an operative element, a drive member having intermittent and successive operative engagement with all of said wheels in a manner to rotate said cam member at a predetermined frequency, and means rendering said cam member directly responsive to said drive member during a part of the cycle of operation of said group whereby to accelerate rotation of said cam member and movement of an operative element in contact with the track thereof.

3. A drive mechanism comprising a reduction ratchet wheel group, the wheels of said group being mounted on a common shaft, one of said wheels being fixed and the other wheels being freely rotatable with respect to said shaft, a cam member fixed to said shaft, a drive member having intermittent operative engagement with all of said wheels in predetermined sequence, and means operable independently of said drive member for rotating said cam member in a direction to decrease the period of time in which said cam member may complete a cycle of rotation through operation of said wheel group.

4. A reduction drive mechanism comprising a ratchet wheel group mounted on a common shaft, a cam member on said shaft including a track having high and low areas adapted to have contact with and actuate an operative element, rotatable with a slow speed wheel of said group, a drive member, the other wheels of said group being continuously operable by said drive member in an intermittent manner, and means on said other wheels for periodically effecting operative engagement of said drive member with said slow speed wheel.

5. A reduction drive mechanism comprising a ratchet wheel group mounted on a common shaft, a cam member on said shaft including a track having high and low areas adapted to have contact with and actuate an operative element, a slow speed wheel of said group and said cam member being fixed to said shaft, a drive member adapted to operatively engage said slow speed wheel, the other wheels of said group being continuously operable by said drive member in an intermittent manner, and means on said other wheels for periodically effecting operative engagement of said drive member with said slow speed wheel.

6. A drive mechanism comprising a reduction ratchet wheel group, a drive member engageable with and operable to rotate each of the wheels of said group, cam means so associated with one of the wheels of said group as to be rotatable therewith, means providing a predetermined sequence of engagement and operation of said drive

member with each of the wheels of said group, and means carried by the wheel associated with said cam means and operable to by-pass the reduction drive of a part of said group and render said cam means directly responsive to said drive member.

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