Feb. 10, 1942. J. W. CHAMBERLIN 2,272,510

CLEANING MACHINE

Filed Sept. 26, 1938 4 Sheets-Sheet 1

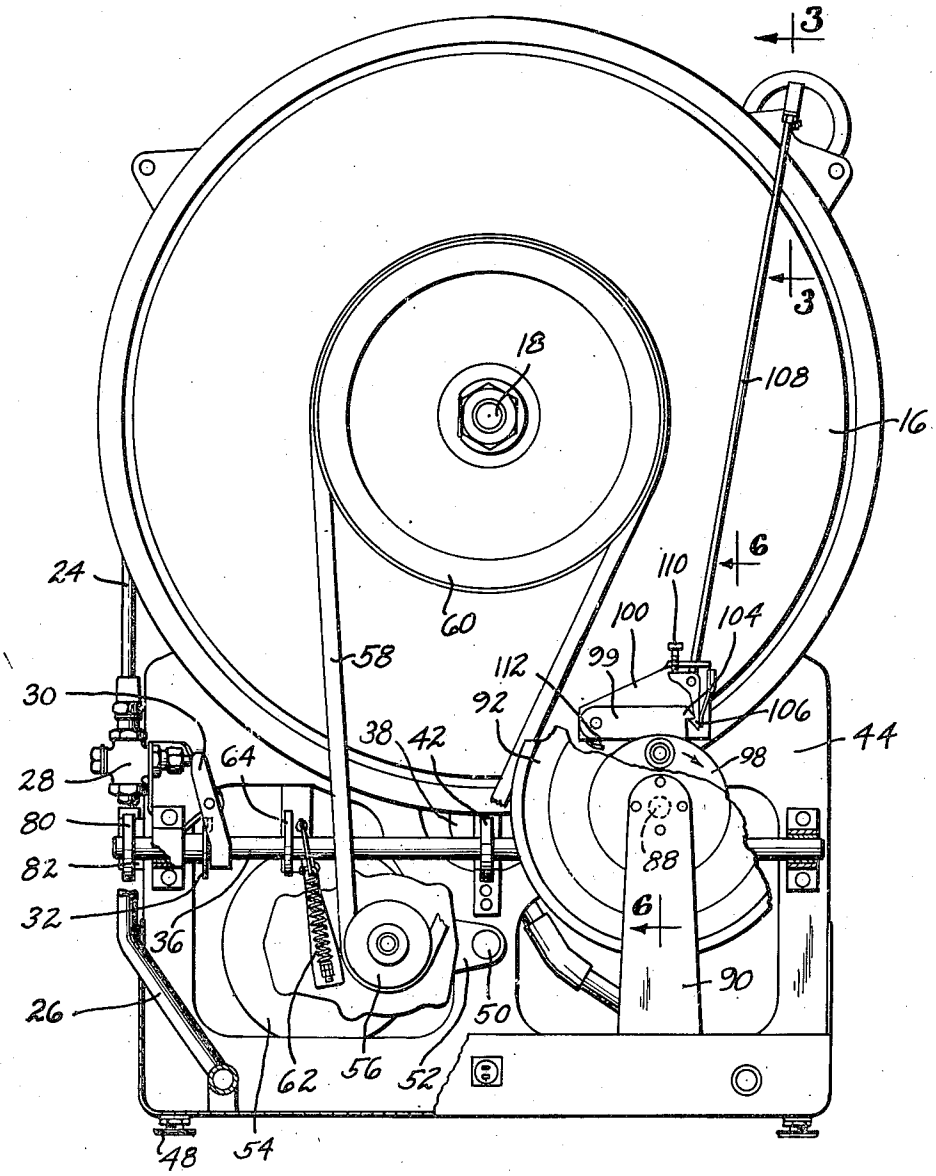


Fig. 1

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CLEANING MACHINE

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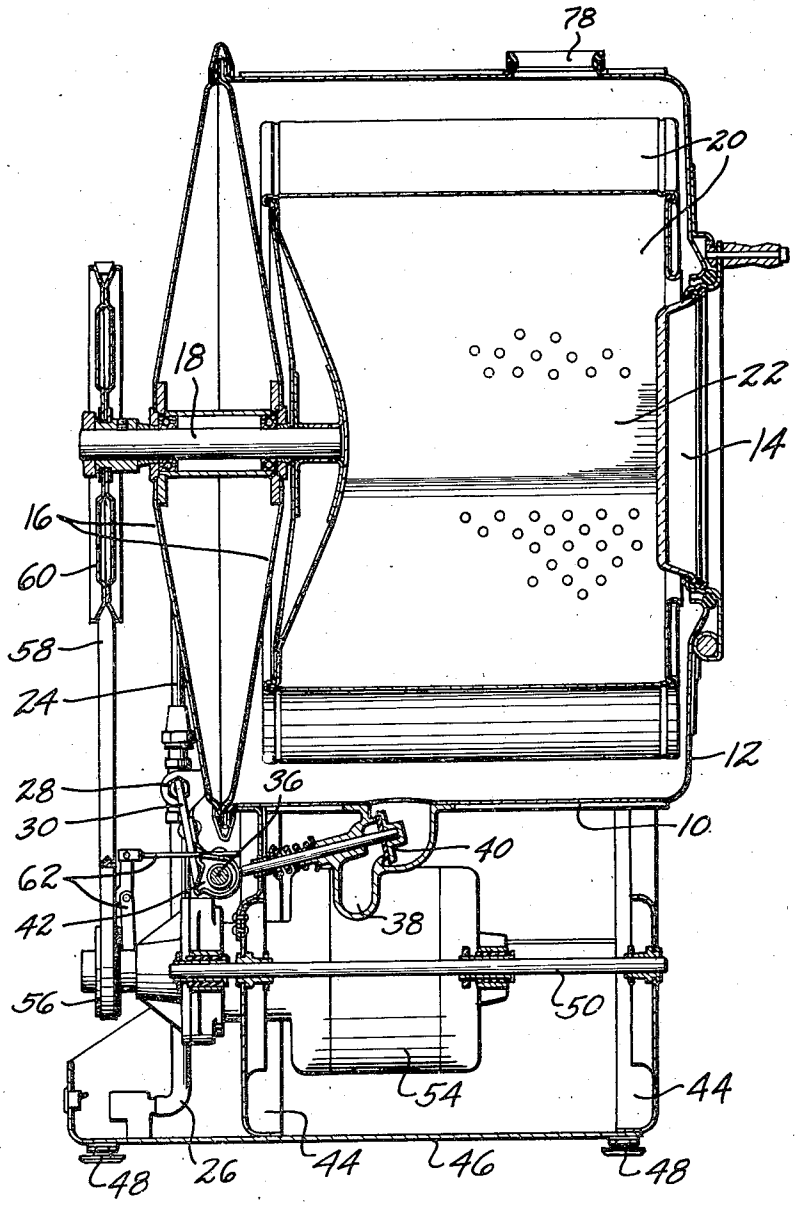


Fig. 2

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CLEANING MACHINE

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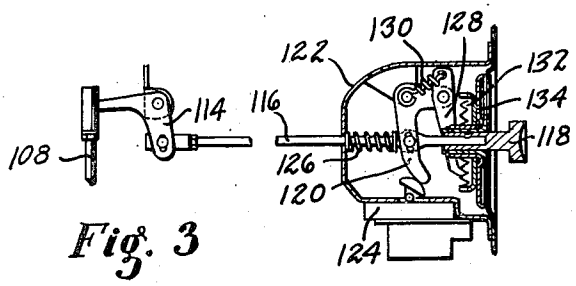


Fig. 3

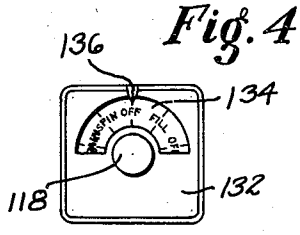


Fig. 4

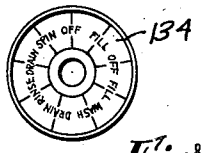


Fig. 5

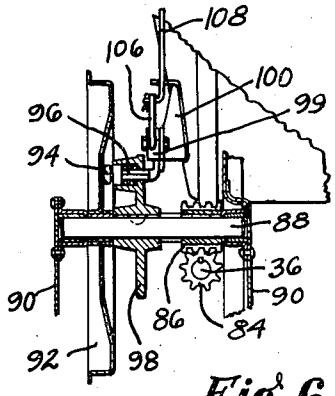


Fig. 6

Fig. 9.

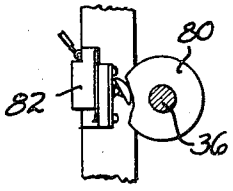


Fig. 7.

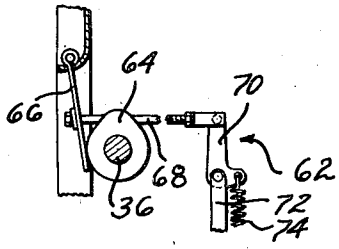


Fig. 10

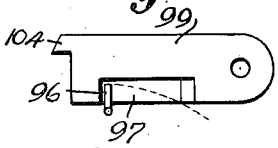
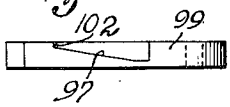


Fig. 8.



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CLEANING MACHINE

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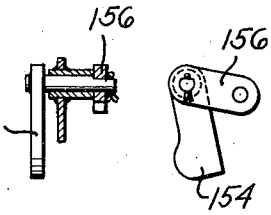


Fig. 13

Fig. 14

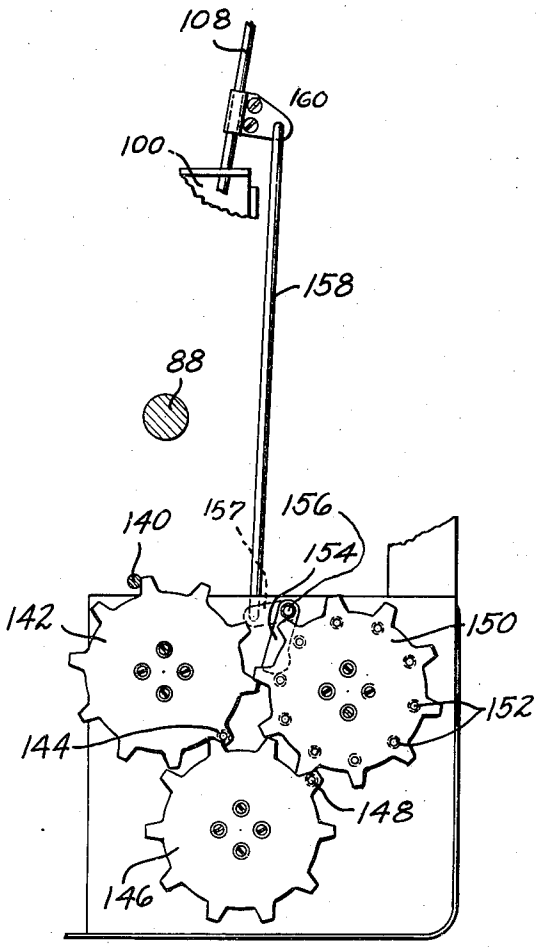


Fig. 12

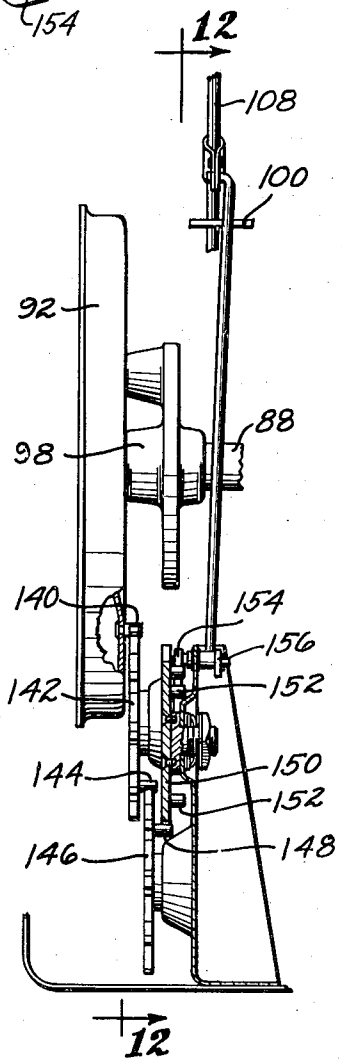


Fig. 11

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Patented Feb. 10, 1942

2,272,510

UNITED STATES PATENT OFFICE

2,272,510

CLEANING MACHINE

John W. Chamberlin, South Bend, Ind., assignor, by mesne assignments, to American Machine and Metals, Inc., New York, N. Y., a corporation of Delaware

Application September 26, 1938, Serial No. 231,652

5 Claims. (Cl. 74—1)

This invention relates to cleaning machines, and is illustrated as embodied in a machine for washing and drying clothes and similar materials.

An object of the invention is to provide a simple and effective machine with a manual control permitting an operator to advance it at will step by step through its cycle of operations. In the machine illustrated, the control as it advances to different positions actuates inlet and drain valves, and shifts a transmission to give different effective speeds, to cause the machine to operate progressively through the successive stages of a complete washing and rinsing and drying cycle.

The above and other objects and features of the invention, including various novel mechanical arrangements and advantageous combinations of the parts, will be apparent from the following description of the illustrative embodiment shown in the accompanying drawings, in which:

Figure 1 is a rear elevation, partly broken away to show some of the control mechanism, of a machine chassis (i. e. of a machine which is substantially complete except for the cabinet in which it is housed);

Figure 2 is a vertical central section through the chassis;

Figure 3 is a partial section on the line 3—3 of Figure 1, showing some of the manually operated parts of the control mechanism;

Figure 4 is an elevation looking from right to left in Figure 3;

Figure 5 is an elevation of the dial of the control mechanism;

Figure 6 is a section through the lower part of the control mechanism, substantially on the line 6—6 of Figure 1;

Figures 7 and 8 are respectively a side elevation and bottom plan views of a latch forming part of a one-revolution clutch used in the control mechanism;

Figures 9 and 10 are detail sectional views showing the cam actuation respectively of the motor control switch and of a shift device for a two-speed transmission;

Figures 11 and 12 are sectional views of an attachment for causing the machine to operate automatically; and

Figures 13 and 14 are details of parts of the attachment shown in Figures 11 and 12.

The illustrated machine chassis is constructed generally in accordance with the disclosure of application No. 129,429 filed March 6, 1937, by Rex Earl Bassett, Jr., and John W. Chamberlin, modified as described in application No. 129,412, filed March 6, 1937, by Adiel Y. Dodge.

It comprises a tub consisting of a cylindrical peripheral wall 10 having a front wall 12 (shown integral therewith) formed with an opening for introducing and removing the clothes, and which is provided with a suitable glazed door 14, and having a rear wall formed of two generally conical disks 16, arranged face to face and peripherally clamped together and to a flange at the edge of the cylindrical wall 10.

The disks 16 are centrally provided with bearings for a shaft 18 having mounted on its end within the tub a perforated drum or container 20, provided with internal ribs or baffles 22 to aid the washing action, and which has in its front wall an opening registering with the door 14.

Water is supplied to the tub by a conduit 24 having a nozzle (not shown) opening into the tub between the door 14 and the edge of the opening in the front wall of the container 20. The supply of water to conduit 24, from suitable manually-controlled hot and cold water lines connected to an inlet conduit 26, is controlled by an inlet valve 28 operated by a lever or the like 30 rocked by a cam 32 on a control shaft 36 extending across the back of the machine.

The tub is provided with a drain 38 controlled by a spring-closed drain valve 40 opened by a cam 42 on the control shaft 36.

The above-described tub is shown secured in two stamped steel saddles 44 secured to a stamped steel base 46 having adjustable feet 48. The saddles 44 also support a shaft 50, on which are pivoted arms 52 rigid with an assembly 54 consisting of an electric motor and a two-speed transmission, as fully described in the above-identified Bassett and Chamberlin and Dodge applications.

The transmission of the unit 54 drives a small pulley 56 engaged by a belt 58 driving a large pulley 60 on the shaft 18. The transmission is controlled by means such as a shift device 62 actuated by a cam 64 on the control shaft 36, as appears in Figure 10. The shift device 62 comprises a pivoted lever 66 engaged by the cam 64 and connected by a link 68 to a bell crank 70 mounted on the end of a shift lever 72. A spring 74 normally causes levers 70 and 72 to move together to change speeds, but can yield to prevent damage if necessary.

The transmission has a low speed, driving the container 20 at approximating 60 R. P. M. for

a 20-inch diameter drum, such that when there is water in the tub there is a very effective washing action, and such that when the water is drained out of the tub the same speed will cause even distribution of the clothes about the periphery of the drum 20. As explained in the above-mentioned Bassett and Chamberlin application, this speed (in R. P. M.) may be in the range between the quantities determined by the formulas

$$\sqrt{\frac{2500}{\text{drum radius in feet}}}$$

and

$$\sqrt{\frac{3000}{\text{drum radius in feet}}}$$

The transmission also has a much higher speed, for centrifugally drying the clothes.

The top of the tub 10 has an opening 78 closed by a suitable door (not shown) for introducing soap.

The control shaft 36 also has a cam 80 for operating a spring-opened switch 82 for the motor of the drive unit 54.

The shaft 36, with the cams mounted thereon, forms part of a novel control for the machine, the shaft being provided with a worm gear 84 (Figure 6) driven by a worm 86 on a short drive shaft 88 journaled in bearings carried by stationary brackets 90 mounted on the base of the machine. A driven pulley 92 is loosely sleeved on the shaft 88, and engages the belt 58 to be driven thereby whenever the motor is running.

The pulley 92 is provided on one side with a lug 94 adapted to engage a spring-pressed drive pin or plunger 96 carried by a driven clutch member 98 keyed to the shaft 88. The lug 94 and the plunger 96 form the engaging members of a one-revolution clutch through which the shaft 88 is driven by the pulley 92. The ratio of the gears 84 and 86 is such that one revolution of the shaft 88 turns the shaft 36 through one-ninth of a revolution.

The plunger 96 has the end opposite the pulley 92 turned upwardly and, at the end of each revolution of the shaft 88, camming against a wedge surface 97 on the back of a trigger arm 99 pivoted on a fixed bracket 100 (Figure 1), thereby withdrawing the plunger 96 from engagement with the lug 94, against the resistance of the plunger spring, and disconnecting the shaft 88 from the pulley 92. The wedge surface 97 terminates in a shoulder 102 against which the plunger 96 seats, to determine the angular position of the shaft 88 at the end of each revolution. It will be seen from Figure 1 that the end of the trigger arm 99 adjacent the shoulder 102 is closer to the shaft 88 than is the end thereof adjacent the opposite end of wedge surface 97. The upturned end of plunger 96 may therefore clear the arm 99 radially until it moves into engagement with the wedge surface 97.

The trigger arm 99 is formed with a projection 104 normally engaged by a latch 106 pivoted on the lower end of an operating rod 108. When the rod 108 is raised, it first lifts the trigger arm 99 to release the plunger 96, which is then picked up by the lug 94 on the next revolution of the pulley 92.

Further raising the rod 108 causes the latch 106 to be rocked, by engagement with an adjustable set-screw 110 carried by the bracket 100, to release the trigger arm 99 and permit it to fall by gravity against a stop 112 on the bracket 100, ready to engage the plunger 96 at the end of one revolution of the pulley 92, whether or not the rod 108 has been lowered in the meantime. The lower end of rod 108 is guided by loosely passing it through an opening in an upper flange in the bracket 100.

The upper end of the rod 108 is connected, by means shown as a ball-and-socket universal joint, to a bellcrank lever 114 having a pin-and-slot operative connection with an operating plunger 116 which passes through an opening in the front of the cabinet of the machine, the front end of the plunger being permanently secured in a socket in an operating handle 118.

The plunger 116 is also pivotally connected to a bell-crank lever 120 mounted on a pivot at the top of a fixed control housing 122. The bellcrank lever 120 engages, and when swung to the left in Figure 3 closes, a spring switch 124 for the electric motor of the machine. A spring 126 resists movement of the plunger 116 to the left, to raise the rod 108 and cause one revolution of shaft 88, and returns the plunger 116 to its initial position as soon as the operator releases it.

The bellcrank lever 120 has pivoted thereto a pawl 128, urged by a spring 130 against teeth on a crown gear or ratchet 132 secured on the hub of a dial disk 134. Each operation of the plunger 116 turns the dial 134 angularly a distance corresponding to one operation of the pawl 128. The dial 134 is arranged behind a suitable opening in the front of the control casing 122 (see Figure 4), and moves past an indicator pointer 136. The dial is graduated as shown in Figure 5 to show the successive operations of a washing-drying cycle.

Figures 11–14 show an attachment for operating the rod 108 automatically. In the arrangement illustrated, the pulley 92 carries a pin 140 forming one part of a Geneva gear, and which engages at each revolution one tooth of a gear 142. The gear 142 in turn carries a pin 144 acting similarly on the teeth of a gear 146, which in turn has a pin 148 acting on the teeth of a gear 150. In effect, there are three successive Geneva gears, so that continued rotation of the pulley 92 at relatively long intervals advances the gear 150 by one tooth.

The gear 150 is provided with an annular series of thrust pins 152, successively engaging a cam surface on a lever 154 to rock a short shaft 156 mounted in a fixed bearing, thereby to swing upwardly a lever 157 connected by a thrust link 158 to a bracket 160 clamped on the rod 108. Thus periodically the rod 108 is raised automatically to trip the one-revolution clutch and to advance the dial 134 to correspond.

In operation, the first time the plunger 116 is operated, the closing of switch 124 starts the motor, and before the plunger can be released to open the switch 124 the cam 80 has turned far enough to close the switch 82 which is in parallel with the switch 124. Thereafter the motor will run until the switch 82 is opened again at the end of the cycle, regardless of the opening and closing of the switch 124 as plunger 116 is operated.

The first and each succeeding time the plunger 116 is operated, shaft 88 turns one revolution, and shaft 36 turns one-ninth of a revolution. Shaft 36 turns one revolution for each complete cycle of the machine.

Each time the shaft 36 stops, the cams 42, 64, and 32 are in the positions for the corresponding

step of the washing-drying cycle. Thus all the operator has to do is to watch the operation of the machine and operate the plunger 116 at the proper times.

If the attachment of Figures 11–14 is used, the machine will carry on automatically, after the first operation of plunger 116, until the end of its cycle, and will then stop automatically with the inlet valve closed, the drain valve open, and the transmission in low, ready for the next use of the machine.

While a particular machine has been described in detail, it is not my intention to limit the scope of the invention to that particular machine, or otherwise than by the terms of the appended claims.

I claim:

1. In a machine having driving means and adapted for sequential operation the combination comprising two drive members connected by a one-revolution clutch and one of which comprises a drive pulley and the other of which has a reduction worm driven thereby, and a control shaft advanced slowly and intermittently by the worm and which has means for governing the sequential operation of said machine.

2. In a machine having driving means and adapted for sequential operation the combination comprising two drive members connected by a one-revolution clutch and one of which comprises a drive pulley and the other of which has a reduction worm driven thereby, a control shaft advanced slowly and intermittently by the worm and which has means for governing the sequential operation of said machine, and manually operable means for tripping the one-revolution clutch.

3. In a machine having driving means and adapted for sequential operation, the combination of control means comprising a drive member driven by said driving means, a driven member adjacent the drive member, clutch means for drivably connecting said members, means for releasing said clutch means at the end of one revolution, means for tripping said last named means whereby the clutch means may re-engage, and means driven by said driven member for controlling the sequential operation of the machine.

4. In a machine having driving means and adapted for sequential operation, the combination comprising a drive member driven by said driving means, a driven member adjacent the drive member, one revolution clutch means for drivably connecting said members, a trigger member to release said clutch means at the end of one revolution, control means driven by the driven member for governing the sequential operation of the machine, and means driven by the driving member for periodically tripping said trigger member to allow the clutch means to connect the driving and driven members for one revolution.

5. In a machine having driving means and adapted for sequential operation, the combination comprising a drive member driven by said driving means, a driven member adjacent the drive member, one revolution clutch means for drivably connecting said members, a trigger member to release said clutch means at the end of one revolution, control means driven by the driven member for governing the sequential operation of the machine, and a Geneva gear train driven by the driving member and connected to the trigger member for periodically tripping the trigger member to allow the clutch means to connect the driving and driven members for one revolution.

JOHN W. CHAMBERLIN.