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1,518,879

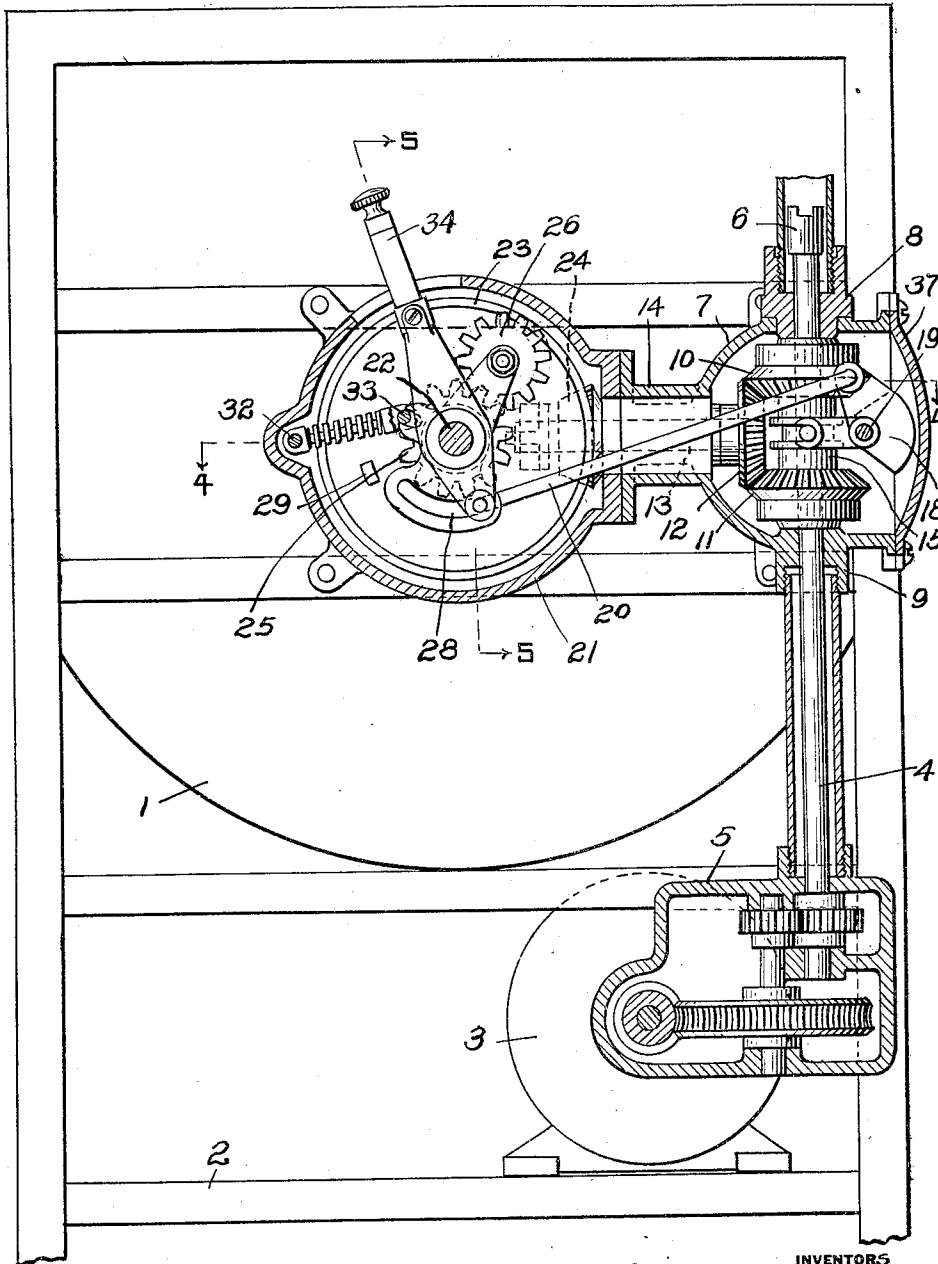
J. R. SPENCER ET AL

REVERSING MECHANISM FOR WASHING MACHINES

Filed April 13, 1920

3 Sheets-Sheet 1

FIG.1.



WITNESSES

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FIG. 2.

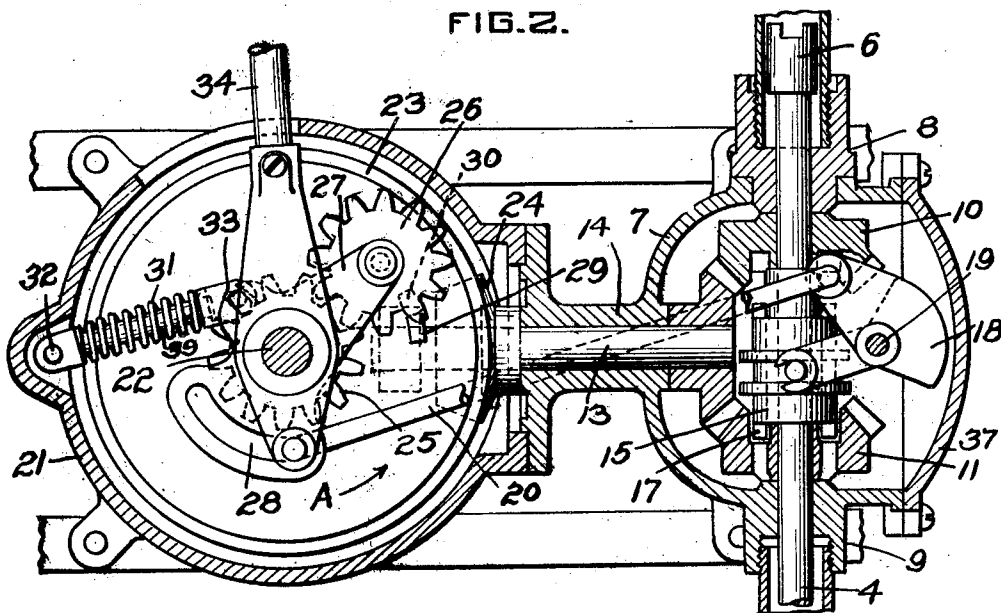
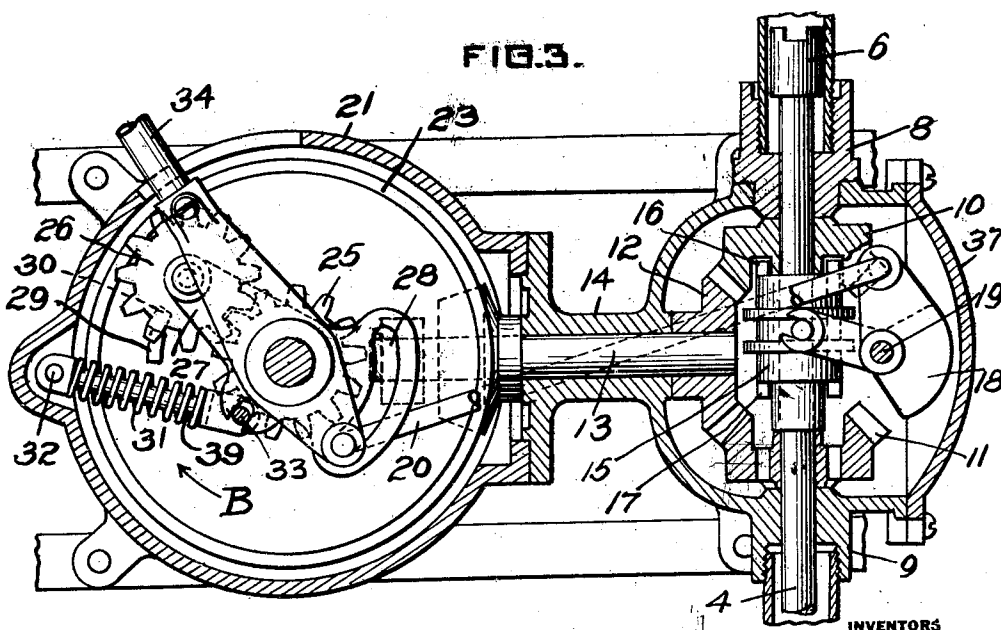


FIG. 3.



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3 Sheets-Sheet 3

FIG. 4.

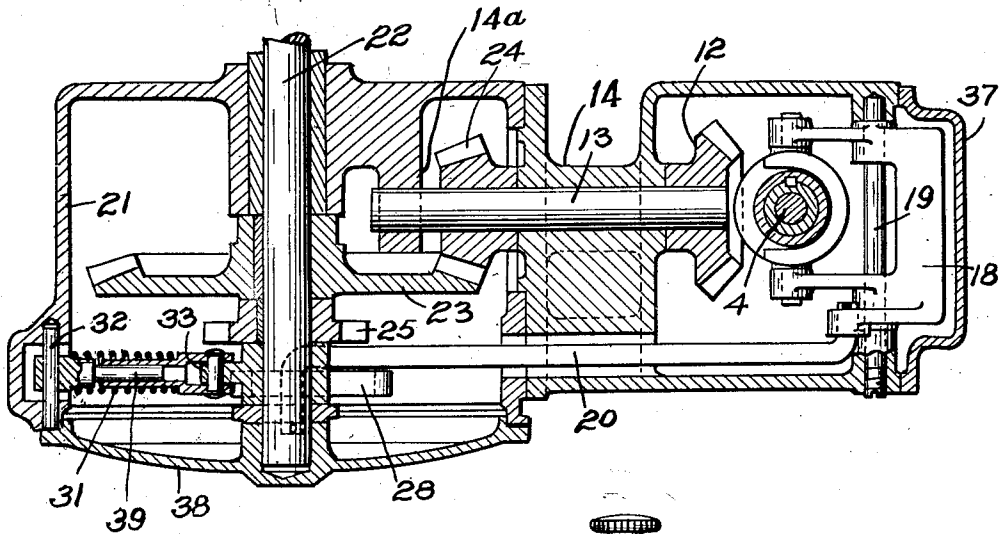
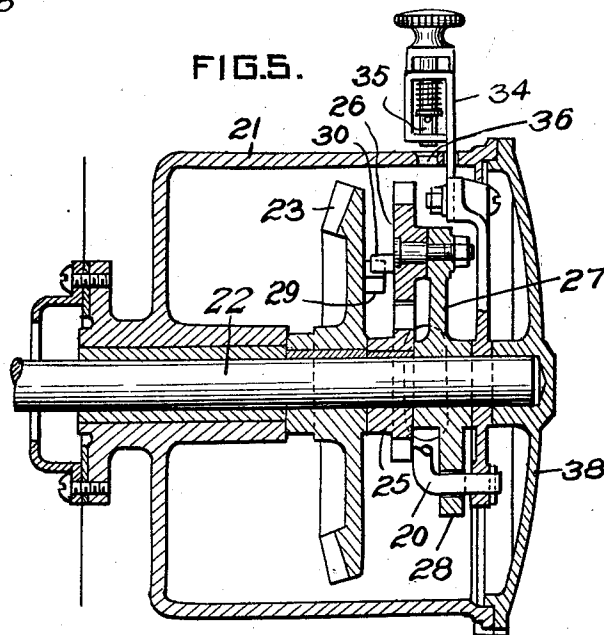


FIG.5.



WITNESSES

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UNITED STATES PATENT OFFICE.

JOHN R. SPENCER AND JAY J. HOGAN, OF ERIE, PENNSYLVANIA, ASSIGNORS TO HOGAN-SPENCER-WHITLEY COMPANY, A CORPORATION OF PENNSYLVANIA.

REVERSING MECHANISM FOR WASHING MACHINES.

Application filed April 13, 1920. Serial No. 373,646.

To all whom it may concern:

Be it known that we, JOHN R. SPENCER and JAY J. HOGAN, citizens of the United States, and residents of Erie, in the county of Erie and State of Pennsylvania, have made a new and useful Improvement in Reversing Mechanism for Washing Machines, of which the following is a specification.

Our invention relates to washing machines of the reversing cylinder type and consists of a novel, cylinder driving and reversing mechanism.

In machines of this type, it is desired that a cylinder, containing the articles to be washed, be rotated several times in one direction and then rotated an equal number of times in the opposite direction, this reversal being repeated as long as the articles remain in the cylinder. The object of this invention is to provide mechanism for automatically reversing the direction of rotation of the cylinder periodically. In a co-pending application, Serial No. 359,050, applicant Spencer has described a reversing mechanism in which a stop on the main cylinder driving gear cooperates with a timing gear having a lug mounted thereon to actuate a reversible clutch to alternately drive the machine cylinder in opposite directions. The present invention is an improvement on the mechanism referred to and in which the moving parts are made more accessible for repair and other attention, vibrations are eliminated by separating and spacing the respective moving parts from each other and providing a suitable connection between them and in which an improved locking arrangement of the timing gears is attained.

In the accompanying drawings, Figure 1 is in part a side view of a washing machine of the type referred to and in part a section thru its driving and reversing mechanism when same is in a neutral position; Fig. 2 is an enlarged view and section of the reversing mechanism when same is in one extreme position; Fig. 3 is a similar view and section showing the opposite extreme position; Fig. 4 is a section on line 4-4 of Fig. 1 and Fig. 5 is a section on line 5-5 of Fig. 1.

The body 1 of the machine contains a cylinder (not shown) and is supported upon a frame 2. Mounted on frame 2 is a motor

3 which drives a vertical shaft 4 thru reduction gearing in gear box 5. The upper end 6 of shaft 4 is adapted to drive a wringer (not shown). Shaft 4, between its driven end and end 6, passes thru a gear case 7, mounted on the frame in the usual manner, and is journaled in suitable bearings 8 and 9 in the side thereof. Loosely mounted on shaft 4 between bearings 8 and 9 are bevel drive pinions 10 and 11 meshed with a bevel gear 12 mounted on shaft 13 which runs transversely of shaft 4 and is journaled in bearing 14 in case 7 and bearing 14^a in housing 21. Splined to shaft 4 is a clutch member 15 having jaws 16 at one end adapted to engage pinion 10, when the clutch is moved up, and jaws 17 at the opposite end adapted to engage pinion 11 when the clutch is moved down. When the clutch is in intermediate pinions 10 and 11 it is in neutral position as its jaws do not engage either pinion. Obviously, alternate engagement of the respective pinions will drive shaft 13 in opposite directions.

When the machine is in operation, clutch 15 is shifted alternately from a position engaging pinion 10 to a position engaging pinion 11 by a bell crank 18 which is pivoted to case 7 at 19 and which is actuated thru connecting rod 20 by a reversing mechanism within housing 21. As shown, the housing 21 is mounted on the frame in the usual manner.

The machine cylinder is driven thru a suitable connection with shaft 22 which is rotated by a main gear 23 secured thereon and meshed with gear 24 on shaft 13. Rotatable with gear 23 is a concentric, sun, timing gear 25 meshing with a planet timing gear 26. The latter is rotatably mounted on one end of an arm 27 which is pivoted between its ends on shaft 22. The opposite end of arm 27 is enlarged and provided with an arcuate slot 28 which receives the out-turned end of connecting rod 20.

The movement of arm 27 to either extreme position shown in Figs. 2 and 3 actuates bell crank 18 to reverse clutch 15 and consequently the direction of rotation of gears 12, 24 and 23. This movement of arm 27 is attained by the cooperation of sun gear 25, planet gear 26 and main gear 23. The adjacent faces of gears 23 and 26 are provided with a stop 29 and lug 30 respectively. Sun gear 25 has a different number of teeth than

planet gear 26 which insures a variation in the relative positions of stop 29 and lug 30 with every revolution of the main gear. In the preferred construction, the number of these teeth are thirteen and twelve respectively.

A compression spring 31 is coiled about a telescopic core 39 which is engaged by a pin 32 in housing 21 and a jaw 33 on arm 27. Movement of arm 27 to bring jaw 33 to the horizontal line thru pin 32, compresses spring 31. Movement of arm 27 from this point permits the energy in spring 31 to continue the movement of arm 27 as far as slot 28 and rod 20 will permit which results in clutch 15 engaging one of the drive pinions.

Arm 27 may be controlled manually by a handle 34 mounted on shaft 22, secured at its lower end to rod 20 and provided at its upper end with a locking pin 35 adapted to be inserted in hole 36 in case 21 to hold the mechanism in neutral position or to be secured in position shown in Fig. 5 to prevent undesired engagement with hole 36 when shifted during normal operation of the machine.

Operation.—Suppose the machine cylinder is rotated in the direction of arrow A in Fig. 2 and stop 29 is in contact with lug 30. Arm 27 is then locked to gear 23 and is rotated by it to bring jaw 33 just across a line between pin 32 and shaft 22 whence rotation of the arm is continued by the combined action of gear 23 and spring 31 until the left hand end of slot 28 contacts with rod 20, disengaging clutch 15 from pinion 11. Spring 31 will then actuate arm 27 to the position shown in Fig. 3, engaging clutch 15 and pinion 10. Main gear 23 will now be rotated in the direction of arrow B in Fig. 3 and when stop 29 has made one revolution lug 30 will have made a revolution and the pitch of one tooth farther which will suffice to clear it from contact with stop 29.

At approximately the end of the eighth revolution of gear 23 and stop 29, the latter engages lug 30 as shown in Fig. 3 and arm 27 is locked to the main gear and rotated in the direction of arrow B until the reversing mechanism is again actuated by spring 31, and gear 23 is reversed.

The reversing clutch and driving pinions are enclosed in case 7 and may be opened to inspection by removal of cover 37. The main gear, timing gears and reversing means are enclosed in housing 21 and may be opened to inspection by removal of cover 38. These containing chambers are bolted together and form a rigid structure altho we can space their contents as desired by use of rod 20. The line of pressure of stop 29 on lug 30 passes thru the axis of planet gear 26 which receives the shock of contact without materially increasing the pressure on the meshed teeth of the sun and planet gears. Spring 31

affords a light, positive and easy acting device for storing energy during a portion of the movement of arm 27 and for applying that energy to the arm during the remainder of the latter's movement. Both containing chambers are adapted to be packed with lubricant. These and other advantages of the present construction will readily appear to those familiar with the washing machine art.

We claim:—

1. In a washing machine, a drive shaft, driving pinions loosely mounted thereon, an intermediate gear meshed with said pinions, a clutch adapted to lock either one of said pinions with said shaft, a clutch shifting bell crank, a case enclosing said pinions, gear, clutch and bell crank, a main shaft geared to said intermediate gear, timing gears mounted on said main shaft and cooperating to mutually interlock periodically, a reversible arm adapted to be moved to a central position when said timing gears interlock, an element adapted to move said arm from said position, a housing enclosing said timing gears, arm and element, and a rod entering said case and housing and connecting said arm with said bell crank.

2. In a reversing mechanism for a washing machine, a main gear, a sun gear rotatable with said main gear, a planet gear meshing with said sun gear, a pivoted arm mounting said planet gear, a lug on said planet gear, a stop on said main gear adapted to engage said lug so as to lock said arm with said main gear, the line of travel of said stop on said lug intersecting the axis of said planet gear.

3. The combination with the main shaft and gear of a washing machine, of a shaft provided with loosely mounted gears geared to said main gear, a clutch device for locking said loosely mounted gears alternately to their shaft, a spring adapted to expand from a compressed, central, neutral position and shift said clutch device, a driving timing gear and a driven timing gear meshed therewith for determining the number of revolutions of said main gear before reversal, and means on said main gear and one of said timing gears for compressing said spring and moving it to neutral position.

4. In a washing machine, a drive shaft, drive pinions loosely mounted thereon, a shiftable clutch for locking said pinions alternately to said shaft, a main gear case, a shaft journaled therein, a gear on said latter shaft, an oscillatable member pivoted on said latter shaft, a spring connected at one end to said member and at the other end to said case, means including said spring, a gear driven by said last-mentioned shaft, a stop carried thereby and a stop carried by the main gear for swinging said member to actuate said clutch.

5. In a washing machine, a frame, a case mounted upon the frame, a drive shaft journaled in the case, drive pinions loosely mounted on said shaft, a shiftable clutch for locking said pinions alternately to said shaft, a housing secured to said frame and said case, a main shaft journaled in said housing, a reversible arm, means adapted to lock said arm periodically to said main shaft and mounted on said main shaft, and means connecting said arm with said clutch so that reversal of said arm reverses said clutch; said case and housing being removable from said frame either separately or as a unit.

6. In a washing machine, a drive shaft, drive pinions loosely mounted thereon, an intermediate gear meshed with said pinions and adapted to be alternately driven thereby, a clutch adapted to lock either one of said pinions to said shaft, a clutch shifting bell crank, a case enclosing said pinions, gear, clutch and bell crank, a main shaft geared to said intermediate gear, a reversible arm, timing gears mounted on said main shaft and cooperating to move said arm to a central position, an element adapted to move said arm from said position, a housing enclosing said timing gears, arm and element, and a second arm entering said case and housing and connecting said first arm with said bell crank.

7. In a washing machine, a drive shaft, drive pinions loosely mounted thereon, a shiftable clutch, a bell crank, an intermediate shaft, a pinion mounted thereon, a gear secured to said intermediate shaft and meshing with said drive pinions, a main shaft, a main driven gear secured thereon and adapted to be driven by said intermediate shaft pinion, a sun gear rotatable with said main gear, a reversible member pivoted on said main shaft, a planet gear on said member driven by said sun gear, a lug on said planet gear, a stop on said main gear, a rod secured to said bell crank and provided with lost motion connection to said member, a spring engaging said member subjected to compression by a movement of said member occasioned by contact of said lug and stop.

8. In a washing machine, a drive shaft, drive pinions loosely mounted thereon, a shiftable clutch for locking said pinions alternately to said shaft, a bell crank for shifting said clutch, an intermediate shaft, a pinion mounted thereon, a gear secured to said intermediate shaft and meshing with said drive pinions, a main shaft, a gear secured to said main shaft and adapted to be driven by said intermediate shaft pinion, a reversible member pivoted on said main shaft, a gear rotatable with said main shaft gear, a gear on said member driven by said last mentioned gear, a lug on said member

gear, a stop on said main shaft gear adapted to contact intermittently with said lug whereby said member is periodically swung about said main shaft in opposite directions and a rod connecting said member with said bell crank.

9. In a washing machine, a frame, a housing secured to said frame, a separately formed case secured to said housing, reversible gears in said case and means governing the reversal of said gears within said housing, said case and housing being removable from said frame either separately or as a unit.

10. In a washing machine, a frame, a case secured to said frame, a drive shaft journaled in said case, drive pinions loosely mounted on said shaft, a shiftable clutch for locking said pinions alternately to said shaft, a separately formed housing secured to said frame and to said case, means within said housing governing the shifting of said clutch, said case and housing being removable from said frame either separately or as a unit.

11. In an apparatus of the character described, a main gear case, a reversible cylinder drive shaft journaled therein, and a reverse actuating mechanism including a member pivoted on said shaft within said case, and means located within said case and actuated by said shaft for shifting said pivoted member, in combination with a reversing mechanism, a control lever actuated by said member, for actuating said reversing mechanism, and a spring for continuing motion of said lever initiated by said member.

12. In combination in a washing machine, a frame, a case secured to the frame, reversing gears mounted in said case, a separate housing secured to said frame and to said case, and having an opening therein for the reception of a gear carried by said casing, means located within the casing and driven by said reversing gears for controlling the operation of said reversing gears, said case, and said housing being removable from the frame either separately or as a unit.

13. In a washing machine, a frame, a reversing mechanism comprising a housing, a drive shaft extending into said housing, reversing gears rotatively mounted in said housing, a driven shaft journaled in and projecting beyond the housing, a pinion mounted on said driven shaft and meshing with said reversing gears, a clutch for controlling the operation of said reversing gears and a pinion rigidly mounted on the projecting end of said driven shaft, a separately formed casing having an opening formed therein for the reception of said last-mentioned pinion, means located within said casing and driven by the driven shaft for controlling the operation of said clutch, said casing and said housing being removable

from said frame either separately or as a unit.

14. In combination with a reversing mechanism, a driven shaft, a gear rigidly mounted thereon, a swing arm, a gear rotatively mounted thereon and meshing with said first gear, a stop on said second gear, a stop movable with said shaft and so located that it periodically intersects the path of travel of said first stop, and contacts therewith to move the second gear with the shaft, said stops being so located that when contact is accomplished the line of the force transmitted by the contacting stops passes through the axis of the second gear and thereby reduces the shock on the intermeshing teeth to a minimum.

15. A reversing mechanism comprising a reversing clutch, a driven shaft driven in one direction and then in the other by the

operation of said clutch, a sun gear rotatable with said shaft, a member pivoted to swing about the axis of said sun gear, a planet gear journaled on said member and meshing with said sun gear, a stop rotatable with said driven shaft, a lug carried by the planet gear and adapted to be periodically engaged by said stop, a pivoted lever for manually shifting said clutch, a lost-motion connection between said lever and said member, and a snap spring engaging said member and adapted to continue the movement thereof initiated by contact of said stop with said lug.

In testimony whereof, we have hereunto subscribed our names this 10th day of April, 1920.

JOHN R. SPENCER.
JAY J. HOGAN.