G. W. BERTHOLD.

AUTOMATIC REVERSING MECHANISM.

APPLICATION FILED APR. 3, 1919.

1,424,797.

Patented Aug. 8, 1922.

3 SHEETS—SHEET 1.

Fig. 1.

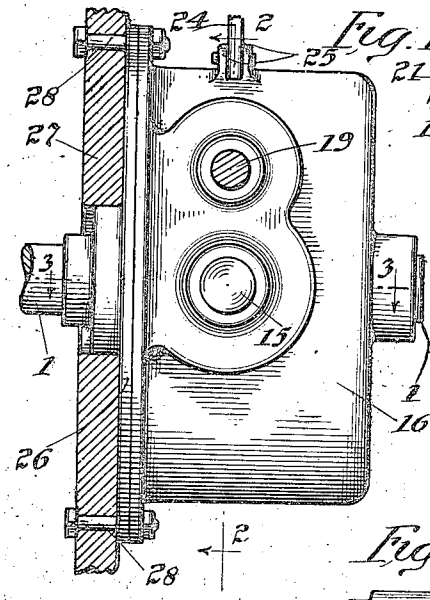


Fig. 2.

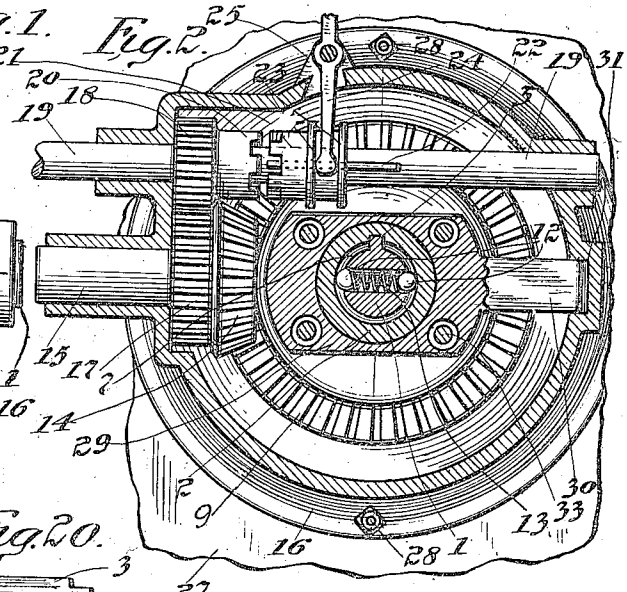


Fig. 2a.

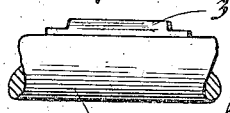


Fig. 4.

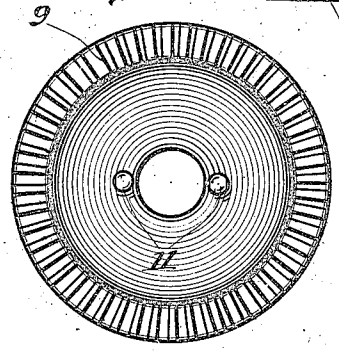


Fig. 3.

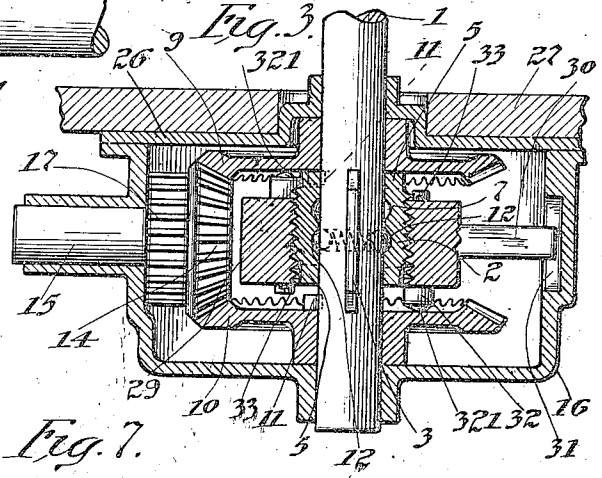


Fig. 5.

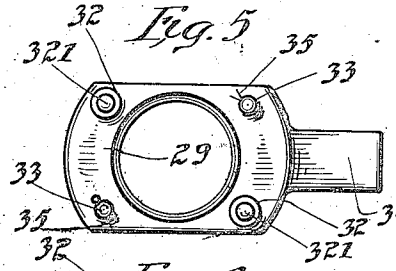


Fig. 7.

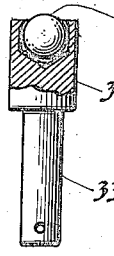


Fig. 8.

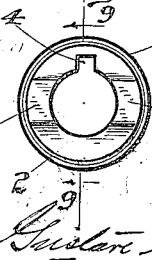


Fig. 9.

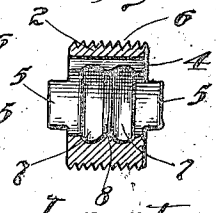
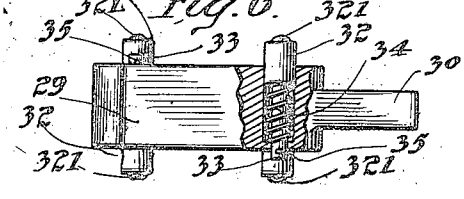


Fig. 6.



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3 SHEETS—SHEET 2.

Fig. 10.

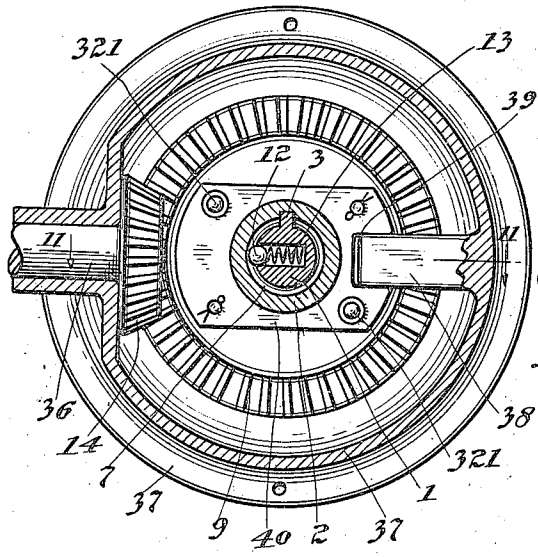


Fig. 11.

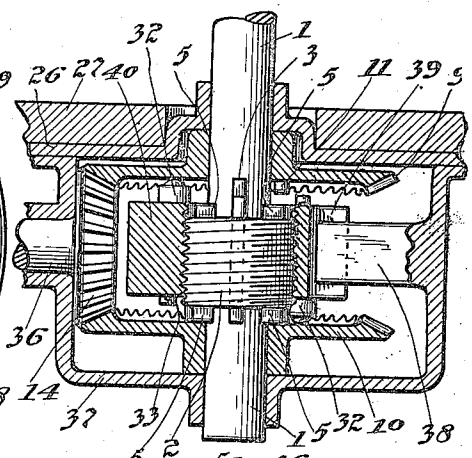


Fig. 14.

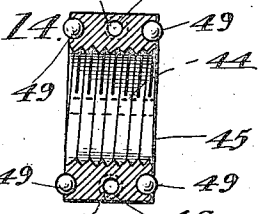


Fig. 12.

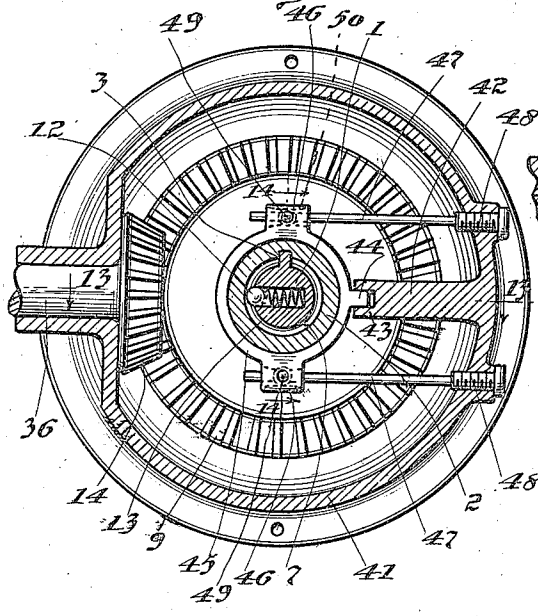
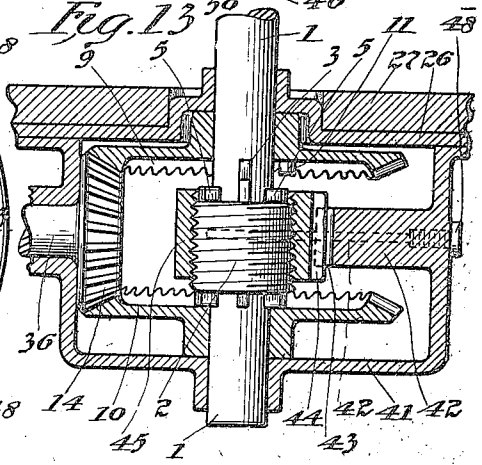


Fig. 13.



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3 SHEETS—SHEET 3.

Fig. 15.

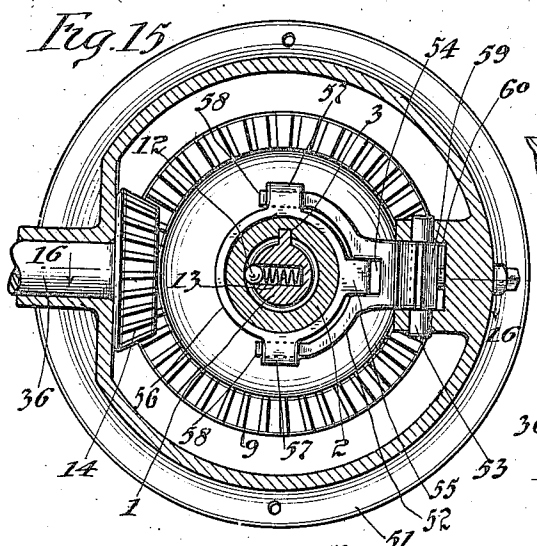


Fig. 16.

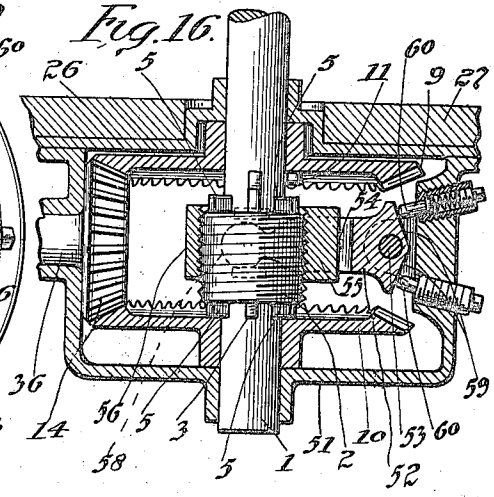


Fig. 17.

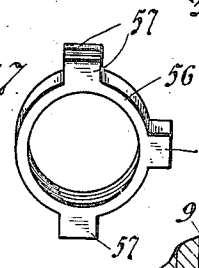


Fig. 18.

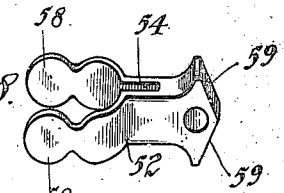
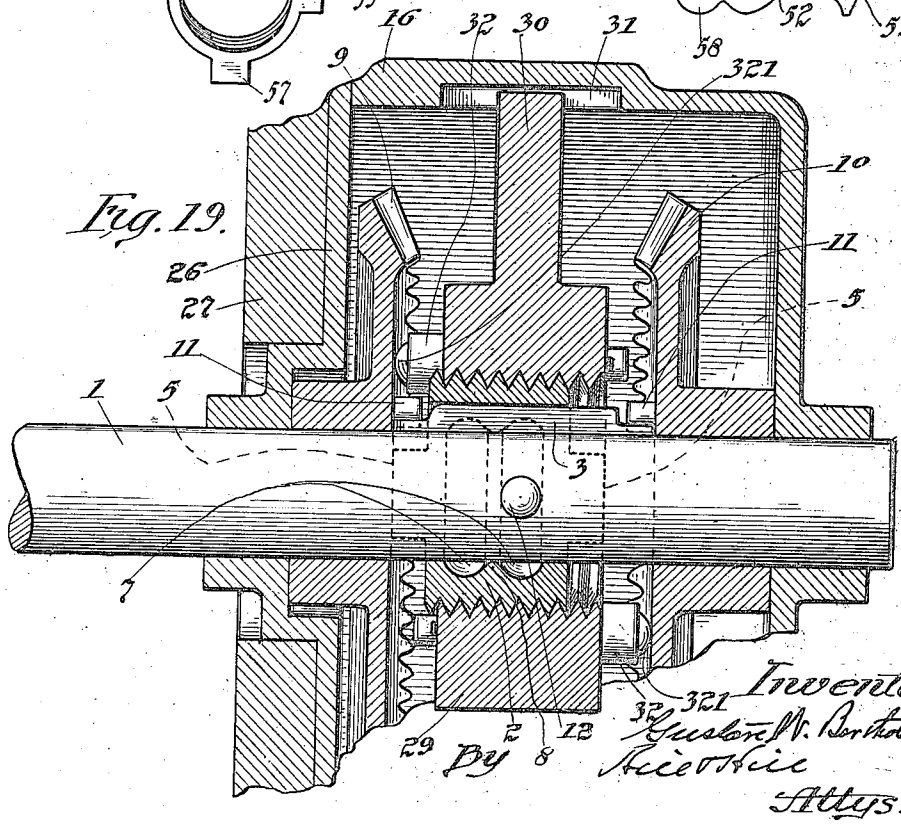


Fig. 19.



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UNITED STATES PATENT OFFICE.

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AUTOMATIC REVERSING MECHANISM.

1,424,797. Specification of Letters Patent. Patented Aug. 8, 1922.

Application filed April 3, 1919. Serial No. 287,220.

To all whom it may concern:

Be it known that I, GUSTAVE W. BERTHOLD, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Automatic Reversing Mechanism, of which the following is a description.

My invention relates to improvements in automatic reversing mechanisms, and more particularly to such mechanisms as are applied to power-driven washing-machines and the like, wherein the rotation of the driven shaft carrying the rotary clothes washer is intermittently changed from one direction to the other.

The object of my invention is to provide a device of the character described, that will be comparatively simple in construction and operation, reliable in its operation, and durable in use. To this end my invention consists in the novel construction, arrangement and combination of parts shown and described, and more particularly pointed out in the claims.

In the drawings, wherein like reference characters indicate like or corresponding parts,—

Figure 1 is a side elevation of my improved reversing mechanism showing in section a portion of a wash tub wall to which the mechanism is attached;

Fig. 2 is a vertical section taken through the mechanism on line 2—2 of Fig. 1;

Fig. 3 is a plan section taken on line 3—3 of Fig. 1;

Fig. 4 is a detail elevation showing a driving gear employed in the mechanism;

Fig. 5 is a detail elevation showing a non-rotatable member employed in the mechanism;

Fig. 6 is a plan view of said non-rotatable member, a portion thereof being broken away to expose a plunger mounted therein;

Fig. 7 is a detail view showing the construction of said plunger;

Fig. 8 is a detail elevation showing a slidable clutch employed in the mechanism;

Fig. 9 is a vertical section taken through said clutch on line 9—9 of Fig. 8;

Fig. 10 is a vertical section showing a modified form of mechanism;

Fig. 11 is a plan section taken on line 11—11 of Fig. 10;

Fig. 12 is a vertical section showing another form of mechanism;

Fig. 13 is a plan section taken on line 13—13 of Fig. 12;

Fig. 14 is a detail vertical section taken on line 14—14 of Fig. 12, showing the construction of a non-rotatable member;

Fig. 15 is a vertical section showing still another form of mechanism;

Fig. 16 is a plan section taken on line 16—16 of Fig. 15;

Figs. 17 and 18 are detail perspective views showing parts employed in the last named form of mechanism;

Fig. 19 is an enlarged view of a construction similar to that shown in Fig. 3 on another such line;

And Fig. 20 is a detail elevation showing a splined driven shaft employed in the various mechanisms.

The preferred form of construction as shown in Figs. 1, 2 and 3 comprises a driven shaft 1 and a slidable sleeve clutch 2 splined thereto, a spline or key 3 projecting from said shaft being provided for this purpose. Said clutch is provided with a keyway 4, extending teeth 5 at each end thereof, a screw-threaded periphery 6, a pair of annular positioning grooves 7, and a wall 8 between said grooves, as clearly shown in Figs. 3, 8 and 9.

The clutch 2 is adapted to reciprocate between oppositely rotating driving gears 9 and 10, which are loosely mounted on shaft 1 and provided on their faces with opposed pins 11, as shown in Fig. 4, or equivalent members, for alternate engagement with teeth 5 on the ends of said clutch.

Yieldable positioning means for the clutch 2 comprise one or more balls 12 arranged in shaft 1 for cooperation with grooves 7 in the clutch, a coil spring 13 being interposed, in the preferred construction shown, between said balls for exerting an outward pressure thereon, as shown in Figs. 2, 10, 12 and 15.

The gears 9 and 10 are driven in opposite directions by means of a bevel pinion 14 meshing therewith, carried by a stub shaft 15 journaled in a suitable casing 16, said shaft, in the form shown in Figs. 1 and 2,

also carrying a driven spur gear 17 meshing with a driving spur gear 18, which latter is loosely mounted on a driving shaft 19 journaled in said casing and arranged parallel to shaft 15. A tooth clutch 20 is formed integral with or secured to the gear 18 for engagement with a tooth clutch 21 splined to the shaft 19 by means of a spline or key 22, the clutch 21 being provided with a grooved collar 23 for cooperation with a shift lever 24 fulcrumed between lugs 25, which project from the casing 16, as shown in Figs. 1 and 2. By this means the reversing mechanism may be thrown into or out of operation.

The casing 16 is secured to a circular plate 26 and a wash tub or other suitable wall 27 by means of bolts 28, the shaft 1 being journaled in the casing 16 and in said plate, as shown in Fig. 3.

In order to effect a reciprocation of the clutch 2 for alternate engagement with the driving gears 9 and 10, a non-rotatable clutch shifter 29 is internally threaded to mesh with the threaded periphery 6 of the sleeve clutch 2, in the forms shown in Figs. 1, 2, 3 and 19, there being an arm 30 on said shifter projecting into a groove 31 formed in casing 16 for preventing rotation of the shifter. The shifter 29 is provided with resilient means for throwing the clutch 2 in the opposite direction consisting of spring-pressed plungers 32, (Figs. 5, 6, 7), preferably having anti-friction balls 321, or equivalent means, mounted therein in constant contact with one or the other of the inner faces of the gears 9 and 10. In the form shown, the reduced portions 33 of the plungers 32 are surrounded by coil springs 34, and cotter-pins 35 passed through portions 33 are provided for retaining the plungers in position in shifter 29.

In the various modified forms of construction, the bevel pinion 14 is shown on a driving shaft 36, and the shaft 1 is shown with a single spring-pressed ball 12, but the essential difference between these forms and the preferred form resides in the modifications in the clutch shifters employed, which will be described hereinafter.

A casing 37 provided in the modified form, shown in Figs. 10 and 11, is provided with an inwardly extending fixed arm 38, which engages a transverse groove 39 formed in the clutch shifter 40 for preventing rotation thereof. This shifter is otherwise similar to shifter 29, and functions in the same manner.

A casing 41 provided in the modified form, shown in Figs. 12 and 13, is provided with an inwardly extending arm 42 having a bifurcated end 43 for the reception of a projection 44 on the clutch shifter 45. The projection 44 thus confined, prevents the rotation of the shifter, and the perforated lugs 46 projecting from opposite sides thereof are provided to receive the free ends of wire spring arms 47 preferably carried by screws 48, which are rigidly secured in the wall of casing 41. The spring arms 47 perform the same function as springs 34 in the preferred form, and balls 49 inserted in the sides of shifter 45 correspond with the anti-friction balls 321 in the former construction. It will be noted that the holes 50 of the perforated lugs 46 are somewhat larger than the springs 47, and that they diverge outwardly, as indicated by dotted lines in Figs. 12 and 14, in order to permit free action of said spring arms therein.

The construction shown in Figs. 15 and 16 comprises a casing 51 having a forked arm 52 pivotally connected thereto by means of a pivot pin 53, said arm extending inwardly and being provided with a recess 54 for the reception of a projection 55 formed on a clutch shifter 56. In this manner rotation of said shifter is prevented, and in order to provide an operative connection for reciprocating said shifter, diametrically opposed ears 57 are formed thereon to receive the rounded ends 58 of forked arm 52. Inclined contact surfaces 59, or equivalent means, are provided at the other end of arm 52 for cooperation with spring-pressed plungers 60 which constitute, in this form, the necessary resilient means for maintaining the clutch 2 in operative position.

The operation of the mechanism is as follows: Assuming that the bevel gear 9 is rotating in a clockwise direction, as viewed from the left in Fig. 19, and that clutch 2 then engaged with said gear, is provided with a right-hand thread, then the clutch shifter 29 will be drawn toward said gear and said clutch operatively maintained in such position by the retaining force of the ball 12 in the proper groove 7. This action will compress the springs 34 in the plungers 32, and tend to force ball 12 inwardly and up the incline at the right of wall 8. Such action of ball 12 will not be effected, however, until the movement to the left of shifter 29 is sufficient to produce a tension in springs 34 great enough to overcome the retaining force of ball 12, whereupon clutch 2 will snap or jump to the right and engage pins 11 of bevel gear 10, rotating in a direction opposite to the gear 9, and the shifter 29 will rebound toward the opposite position. During this movement, the wall 8 will have forced ball 12 inwardly, against the resistance of the spring 13, and then passing over the wall, will permit the ball to move outwardly into the groove 7 at the left.

It will be noted that the first half of the movement of the clutch 2 must be effected solely by the force of springs 34, which force is opposed by the compression of spring 13. During the last half of this movement, how-

ever, springs 34 and 13 cooperate, since each are expanding or rebounding to their normal condition.

It will be apparent that the next reversing operation is a mere reversal of the operation just described, since gear 10, as viewed from the right, moves in a clockwise direction, and clutch 2 having a right-hand thread will draw shifter 29 toward said gear.

While I have illustrated and described the preferred forms of construction for carrying my invention into effect, it is obvious that there may be other variations and modifications without departing from the spirit of the invention. I therefore do not wish to be limited to the precise details of construction set forth, but desire to avail myself of such variations and modifications as come within the scope of the appended claims.

Having thus described my invention, I claim and desire to secure by Letters Patent is:

1. In a device of the kind described and in combination, a driven shaft, two rotatable members loosely mounted on said shaft, intermediate means between the two members so arranged that when either of said members is rotated the other will be rotated in the opposite direction, a cooperating clutch member slidably mounted upon the shaft positioned between the two members, arranged to alternately engage them, and a cooperating encircling member axially movable on the clutch member so as to be reciprocated thereby and arranged to alternately shift the clutch member into engagement with said rotatable members.

2. In a device of the kind described and in combination, a driven shaft, two members loosely mounted and rotatable upon the shaft, intermediate means between the two members so arranged that when either of said members is rotated the other will be rotated in the opposite direction, a cooperating clutch member slidably mounted upon the shaft positioned between the two members arranged to alternately engage them, and a cooperating member in threaded engagement with the clutch member arranged to alternately shift the clutch member into engagement with the rotatable members.

3. A reversing mechanism comprising a driven shaft, a pair of oppositely rotating members loosely mounted on said shaft, an externally screw threaded clutch splined to said shaft for alternate engagement with said members, yieldable means interposed between said shaft and clutch for retaining the latter in engagement with one of the members, and resilient means controlled by said screw thread for shifting said clutch.

4. A reversing mechanism comprising a driven shaft and a slidable clutch splined thereto, a pair of oppositely rotating driving members arranged on said shaft between which said clutch is adapted to reciprocate for alternate engagement therewith, yieldable means for operatively positioning said clutch on said shaft, a non-rotatable clutch shifter in threaded connection with said clutch, and resillient means cooperating with said shifter for moving said clutch.

5. A reversing mechanism comprising a driven shaft and oppositely rotating driving members loosely mounted thereon, pins on said driving members, a double-acting clutch splined to said shaft and having teeth for alternate engagement with said pins, a spring-pressed ball interposed between said shaft and clutch, the latter having positioning grooves for the reception of said ball, a non-rotatable clutch shifter in threaded connection with the periphery of said clutch, and spring-pressed plungers carried by said non-rotatable clutch shifter for cooperation with the faces of said driving members in shifting said clutch.

6. A reversing mechanism comprising a driven shaft and driving members loosely mounted thereon, a slidable clutch interposed between said members for alternate engagement therewith, means for rotating said clutch with said shaft, spring-pressed balls mounted in said shaft for alternate engagement with adjacent positioning grooves formed in said clutch, a non-rotatable clutch shifter in threaded connection with said clutch, and resilient means for restoring said shifter to the normal position when moved in either direction by said clutch.

7. A reversing mechanism comprising a driven shaft and oppositely rotating driving members mounted thereon, an externally screw threaded clutch splined to said shaft for alternate engagement with said members, means for resisting movement of said clutch when engaged with either member, and resilient clutch shifting means operatively connected with said screw thread for overcoming said resistance to clutch movement.

8. A reversing mechanism comprising a driven shaft and oppositely rotating driving members mounted thereon, a clutch splined to said shaft for alternate engagement with said members, means for resisting movement of said clutch when engaged with either member, a clutch shifter in threaded connection with said clutch, and resilient clutch shifting means cooperating with said shifter in overcoming said resistance.

9. In a reversing mechanism, the combination of a driven shaft and oppositely rotating driving members mounted thereon, a clutch splined to said shaft for alternate engagement with said members, means for resisting movement of said clutch when engaged with either driving member, a non-rotatable clutch shifter in threaded connection with the periphery of said clutch, and

resilient means for resisting longitudinal movement of said shifter.

10. In a reversing mechanism, a shaft rotatable in both directions, in combination with a sleeve longitudinally movable upon the shaft and rotatable therewith, one of said members being provided with a resilient retaining member, and the other with duplicate cooperating retaining members, and means for resiliently forcing the sleeve and shaft longitudinally of each other alternately first in one direction and then in the other, whereby the duplicate retaining members will alternately engage the cooperative retaining member.

11. In a reversing mechanism, a shaft rotatable in both directions, in combination with a sleeve longitudinally movable upon the shaft and rotatable therewith, one of said members being provided with a resilient retaining member normally extending beyond the surface thereof, and the other with duplicate circumferential cooperating grooves separated by a ridge, and means for resiliently forcing the sleeve and shaft longitudinally of each other alternately first in one direction and then in the other.

12. In a reversing mechanism, a shaft rotatable in both directions provided with a resilient retaining means positioned therein, but normally extending beyond the surface of the shaft, in combination with a sleeve longitudinally movable upon the shaft and rotatable therewith, said sleeve provided with cooperating duplicate circumferential grooves separated by a ridge, and means for resiliently pressing the sleeve alternately first in one direction and then in the other, whereby the retaining means in the shaft will alternately engage the duplicate circumferential grooves in the sleeve.

13. In a reversing mechanism, a shaft rotatable in both directions provided with a retaining aperture formed therein, resilient means within the retaining aperture, and a freely rotatable member mounted upon the resilient means and normally extending beyond the surface of the shaft, in combination with a sleeve longitudinally movable upon the shaft and rotatable therewith, said sleeve provided with cooperating duplicate circumferential grooves separated by a ridge, and means for resiliently pressing the sleeve alternately first in one direction and then in the other.

14. In a reversing mechanism, a shaft rotatable in both directions and having an opening extending therethrough in a diagonal direction, a spring mounted in the opening, and a freely rotating ball carried on each end of the spring and normally extending beyond the surface of the shaft, in combination with a sleeve longitudinally movable upon the shaft and rotatable therewith, said sleeve provided with duplicate circumferential grooves separated by a ridge, cooperating with the balls, and means for resiliently pressing the sleeve alternately first in one direction and then in the other, whereby the balls carried by the shaft will alternately engage the duplicate grooves.

15. Reversing mechanism comprising a rotatable shaft provided with a compressible member normally resiliently extending beyond the surface of the shaft, a pair of gears loosely mounted on the shaft spaced from each other and each provided with clutch engaging means on the inner face, and means for rotating the gears in opposite directions, in combination with an externally threaded sleeve slidingly mounted on the shaft and rotatable therewith, said sleeve provided on its interior with a pair of circumferentially extending grooves separated by a ridge and cooperating with a resilient member carried by the shaft, a clutch shifter in threaded engagement with the sleeve, means for preventing the rotation of the shifter on the shaft, and resilient means compressible in each direction cooperating with the shifter, whereby as the compressible member in the shaft mounts the ridge between the grooves, the sleeve will be snapped in the opposite direction to engage the opposite gear, and the shaft will thus be rotated alternately first in one direction and then in the other.

In testimony whereof, I have hereunto signed my name in the presence of two subscribing witnesses.

GUSTAVE W. BERTHOLD.

Witnesses:

BERNICE DELANEY,

CHARLES I. COBB.