J. E. GLEASON & E. W. BULLOCK.

REVERSING CLUTCH MECHANISM.

APPLICATION FILED DEC. 12, 1917.

1,269,701.

Patented June 18, 1918.

3 SHEETS—SHEET 1.

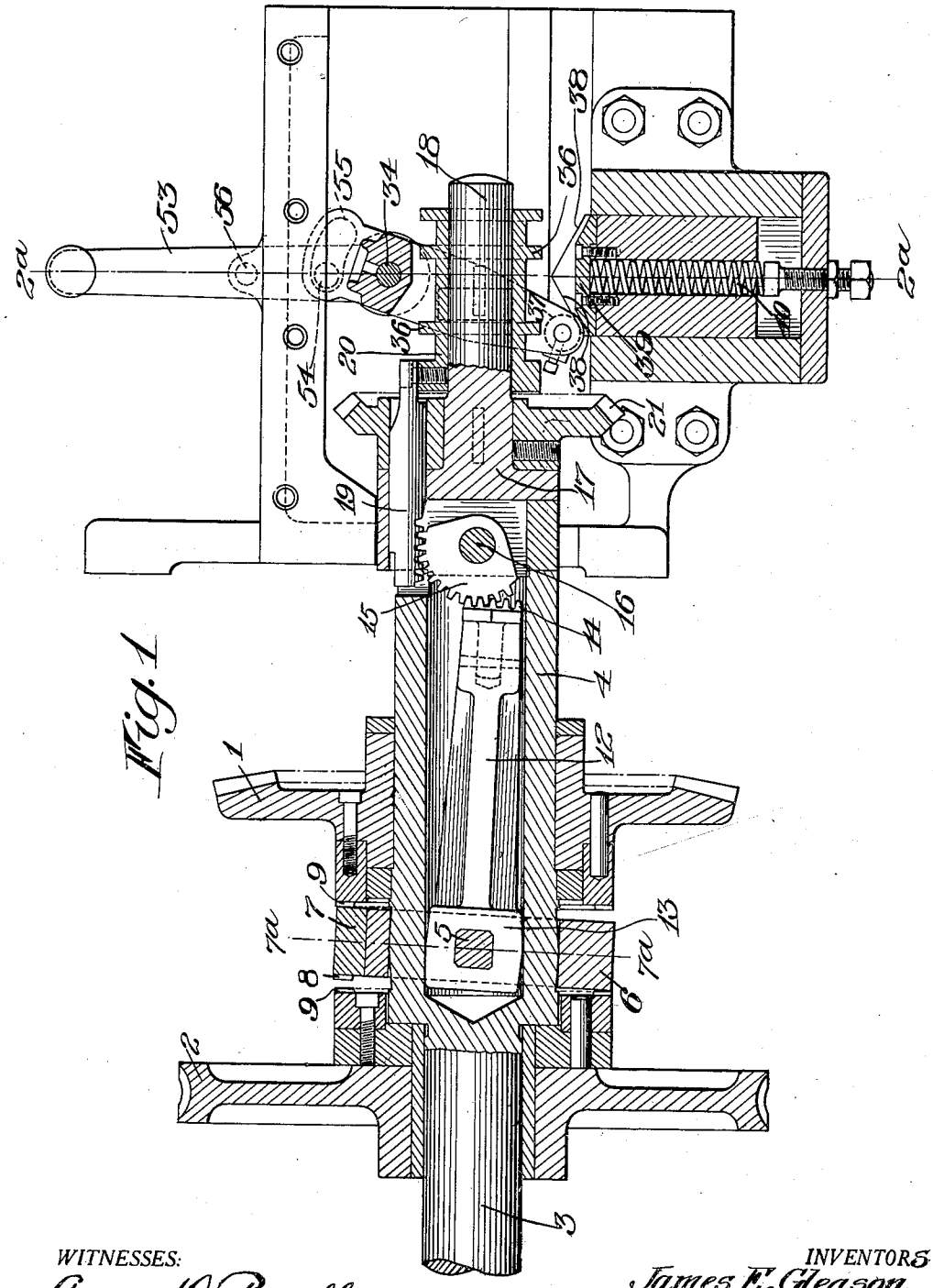


Fig. 1

WITNESSES:

George D Powell

M. Madeline Miller

INVENTORS

James E. Gleason

Edward W. Bullock

by Dyer, Tibbitt & Dyer

their ATTORNEYS.

J. E. GLEASON & E. W. BULLOCK.

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3 SHEETS—SHEET 2.

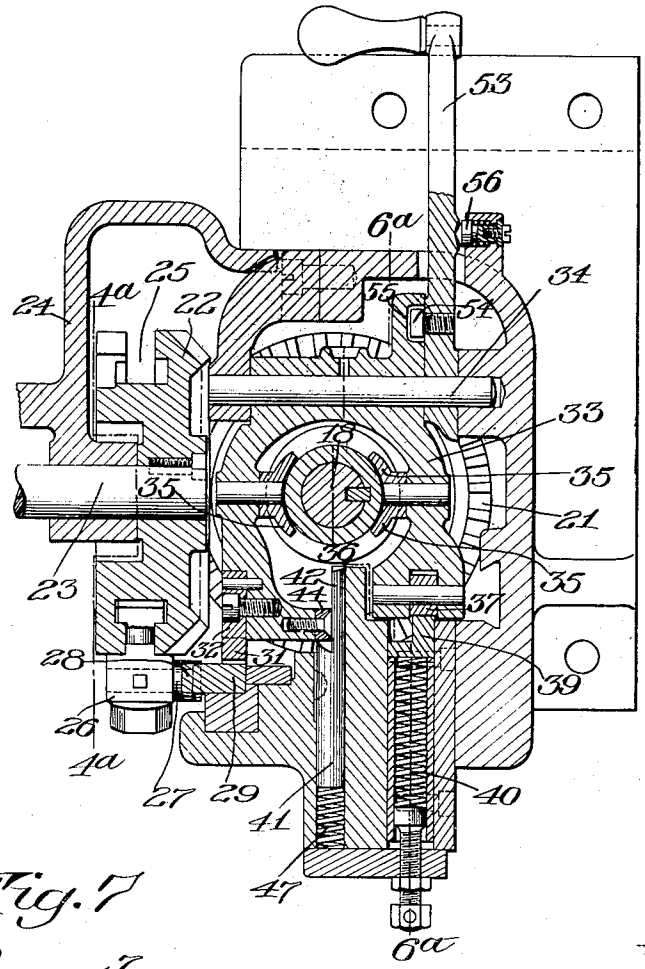


Fig. 2

Fig. 7

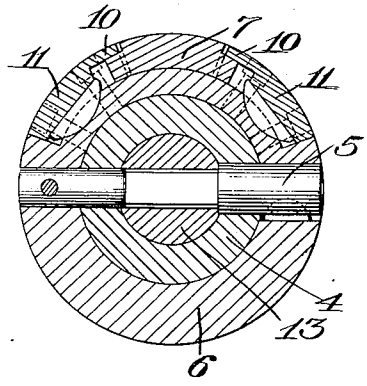
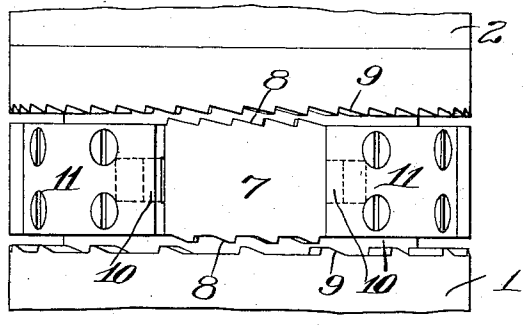


Fig. 8



WITNESSES:

George L. Powell

M. Madeline Miller.

INVENTORS

James E. Gleason

Edward W. Bullock

by Cushman & Co.

their ATTORNEYS.

J. E. GLEASON & E. W. BULLOCK.

REVERSING CLUTCH MECHANISM.

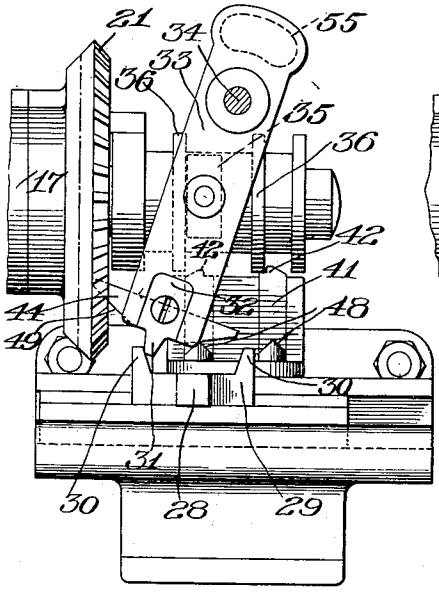
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Fig. 3



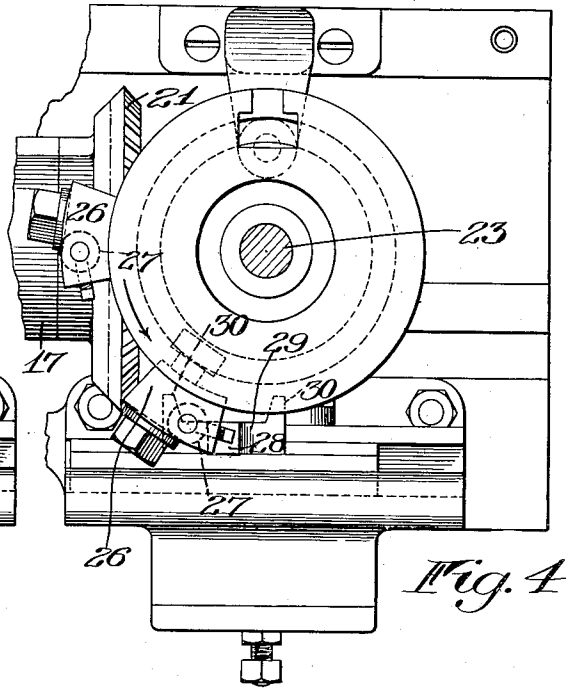


Fig. 4

Fig. 5

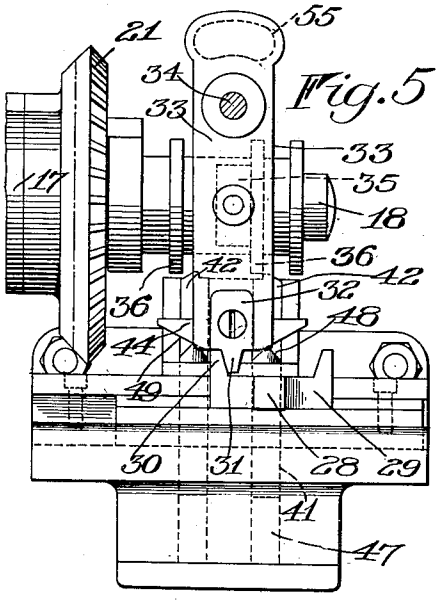
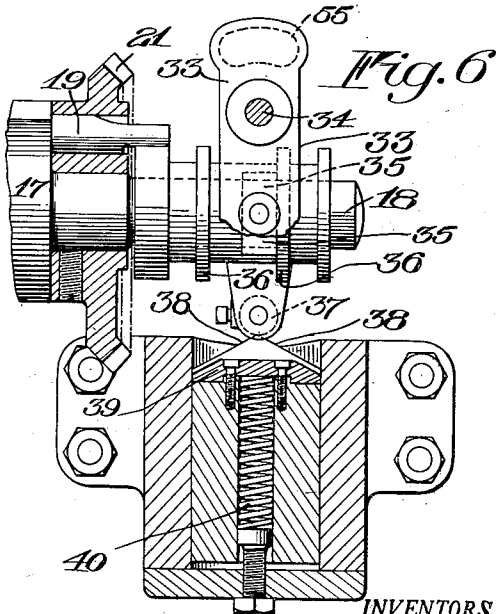


Fig. 6



WITNESSES:

George L. Powell

M. Madeline Miller

INVENTORS

James E. Gleason

Edward W. Bullock

by Church & Church

their ATTORNEYS.

UNITED STATES PATENT OFFICE.

JAMES E. GLEASON AND EDWARD W. BULLOCK, OF ROCHESTER, NEW YORK, ASSIGNORS TO GLEASON WORKS, OF ROCHESTER, NEW YORK, A CORPORATION OF NEW YORK.

REVERSING CLUTCH MECHANISM.

1,269,701. Specification of Letters Patent. Patented June 18, 1918.

Application filed December 12, 1917. Serial No. 206,830.

To all whom it may concern:

Be it known that we, JAMES E. GLEASON and EDWARD W. BULLOCK, both of Rochester, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Reversing Clutch Mechanisms; and we do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, and to the reference characters marked thereon.

The invention relates to clutch mechanisms and the purpose is to provide an efficient and practical form of clutch which will withstand the hard usage of normal operating conditions and require little attention or repair. More particularly the invention is intended to afford a quickly and positively operating clutch for a reversing mechanism, and to overcome the usual tendency of a clutch, when under a load, to stick to its supporting member, making it continuously more difficult to move the clutch for reversing. To these and other ends the invention consists in certain improvements and combinations of parts, all as will be hereinafter more fully described, the novel features being pointed out in the claims at the end of the specification.

In the drawings:

Figure 1 is a longitudinal sectional view showing the application of the invention in its preferred form to a reversing mechanism;

Fig. 2 is a vertical sectional view on the line 2^a—2^a of Fig. 1;

Fig. 3 is a side elevation of a portion of the mechanism which controls the reversing operation;

Fig. 4 is a sectional view on line 4^a—4^a of Fig. 2;

Fig. 5 is a view similar to Fig. 3 and showing the parts in the position assumed at the beginning of a reversing operation;

Fig. 6 is a sectional view on line 6^a—6^a of Fig. 2;

Fig. 7 is a sectional view on line 7^a—7^a of Fig. 1; and

Fig. 8 is a plan view of the clutch device and coöperating driving members.

Similar reference characters throughout the several views indicate the same parts.

In the structure shown, which is illustrated by way of example only, 1 and 2 designate a pair of driving gear members which move continuously in opposite directions and serve to transmit their motion alternately to a driven member or shaft 3 in a manner which will be described presently. For the purpose of describing the invention, it is unnecessary to show any particular means for operating the gear members above mentioned, as it can be understood that the mechanism is applicable to any machinery where it is desired to intermittently reverse the movement of an intermittently operated element and any convenient means may be adopted for imparting the required motion and speed to the driving gear members. Furthermore, the clutch device of the invention is not necessarily to be confined in its broad application to a reversing mechanism, but has other advantageous uses where it is desirable to frequently shift a clutch element.

The driven shaft 3 includes a central hollow portion 4, and journaled therein is an arbor 5 which is pivotally mounted in the shaft and forms a support for the clutch device. The latter includes an annular element or ring 6 which is fixed on the arbor 5 and adapted to rock or swing therewith. The ring 6 carries a clutch member in the form of a plate 7 which has oppositely projecting teeth 8 at opposite edges, and is slidable upon the ring 6 to permit it to readily engage the teeth 9 formed on the gear members. This slight lost motion of the member 7 prevents likelihood of breaking the clutch teeth when the clutch device is shifted from one gear member to the other. The clutch member 7 is held in place by suitable overhanging portions 10 formed upon securing plates 11 and engaging the ends of the clutch member. There is sufficient clearance between the latter and the flanges 10 to permit the required slidable movement as the clutch is brought into engagement with one of the gear members.

The clutch device swings with the arbor 5 into alternate engagement with the gear members and to this end the arbor 5 carries a relatively long arm 12 which has a block 13 fixed on the arbor 5. The arm 12 extends through the hollow portion 4 of the shaft and is of such a length as to give considerable leverage when power is applied to the free end of the arm. By moving the arm 12 in opposite directions, the clutch

device is likewise shifted in opposite directions about the axis of the arbor 5 and in this way the driven shaft is moved in opposite directions through its connection by the clutch device with the oppositely moving gear members. The arm 12 is automatically operated at predetermined intervals, first in one direction and then in the other, by means coöperating automatically with its free end.

The arm 12 is provided with a series of gear teeth 14, preferably formed on a removable plate that is attached to the arm, and engaging with the teeth 14 is an operating gear segment 15, which is carried by a pin 16 journaled in the shaft 3. The shaft 4 carries a support 17, fixed thereon, and provided with a journal 18. The gear segment 15 is oscillated by a rack bar 19 which is slidable in the support 17 and is fixedly connected to a sleeve 20, slidable on the journal 18 and movable intermittently thereon in opposite directions.

To this end, the support 17 has fixed thereon a bevel gear 21, which engages and drives a bevel gear 22, see Fig. 2. The gear 22 is fixed on an arbor 23 journaled in the housing 24. The gear 22 is provided with a guideway 25 and adjustably arranged in said guideway are two stops, in the form of blocks 26 provided with rollers 27, which alternately engage a projection 28 on a slide 29 and impart an intermittent reciprocating movement to the latter. Referring to Figs. 3 to 5 inclusive the slide 29 carries upstanding portions 30 which coöperate with an abutment 31 on a plate 32, attached to a swinging frame 33. The frame 33 is pivoted on a spindle 34 and carries shoes 35, which engage between flanges 36 on the aforesaid sleeve 20, and thus impart the necessary opposite movements to the sleeve.

It is desirable that the shifting of the clutch take place instantly, and to this end the movement of the frame 33 is started by the continuously moving parts already described, while its final movement is effected by a spring actuator. To this end, the frame 33 carries a roller 37, Figs. 2 and 6, which coöperates with oppositely inclined surfaces 38 formed on an actuator or plunger 39 moved upwardly by a spring 40. As the gear 22 and the adjustable blocks 26 rotate, the slide 29 is moved, causing a corresponding swinging movement of the frame 33 until the latter passes just beyond the vertical position, as shown in Fig. 5. By this time, the roller 37 will have passed over the highest point of the plunger 39, and the spring 40 comes into action and through the inclined surface 38, swings the frame 33 quickly to its extreme position. This movement produces a corresponding shifting of the sleeve 20 and rack bar 19, which operates the clutch device in the manner already described. It will be understood that as soon as one of the blocks 26 engages the projection 28, movement of the gear 22 is reversed through the gear 21 on the driven shaft, and thereupon the gear 22 moves in the opposite direction until the other block 26 engages and moves the slide 29 back to its initial position, and this operation continues while the driving gears are in motion.

In order to retain the clutch device in its adjusted position at any given time, we employ locking members which coöperate with the sleeve 20, and prevent its reverse movement except at the predetermined controlling point. These locking members are preferably in the form of plungers 41, Figs. 2 and 3, provided with shoulders or projecting portions 42 adapted to extend into the path of the flanges 36 on the sleeve. Referring to Fig. 3, it will be seen that one of the locking plungers is retracted while the other one is engaged with the right hand flange 36, so as to prevent movement of the clutch device. The locking plungers are actuated by springs 47, Fig. 2, and also have shoulders 48 which lie in the path of the inclined faces 49 on the aforementioned plate 32. Thus, as the frame 33 swings from the position shown in Fig. 3, the inclined surface 49 at the right of the figure engages the shoulder 48 on the uppermost locking plunger, and retracts it previously to any actual movement of the sleeve 20. The latter is thus released, and under the impulse of the spring controlled plunger 39, moves to the right, whereupon the other locking plunger is released and engages the flange 36 at the left of the figure.

In case it is desired to effect a manual shifting of the clutch device, the frame 33 can be swung on its axis by hand, and to this end we provide a hand lever 53, journaled on the spindle 34 and carrying a projection 54 engaging a recess 55 in the frame. The hand lever 53 is held in its normal position by a spring pin 56, and can be shifted at will to effect movement of the sleeve 20 and of the clutch device.

The structure described possesses great advantage from the fact of the extreme power that is rendered available for moving the clutch device. It will be observed that the latter is constantly in motion in one direction or the other, and consequently its shifting must overcome a considerable amount of friction. This is successfully accomplished by arranging the clutch device so as to place its shifting operation under the control of a powerful lever which insures moving the clutch device against any normal friction or tendency to stick. The arrangement also permits of effecting the clutch shifting operation with considerable

rapidity, thus making it practicable for continuously operating reversing mechanisms in a great variety of machines.

We claim as our invention:

1. The combination with a pair of rotatable gear members, of a rotatable shaft, and a clutch device carried by the shaft and having swinging movement in opposite directions to engage alternately with said gear members.

2. The combination with a pair of rotatable gear members, of a rotatable shaft, a clutch device carried by the shaft and having swinging movement in opposite directions to engage alternately with said gear members, a relatively long arm carried by the clutch device, and means coöperating with the free end of the arm for moving the clutch device.

3. The combination with a pair of rotatable gear members, of a rotatable shaft, a clutch device carried by the shaft and having swinging movement in opposite directions to engage alternately with said gear members, a relatively long arm carried by the clutch device and provided with gear teeth at its free end, and an operating segment in engagement with said gear teeth.

4. The combination with a pair of oppositely rotating driving members, of a driven member, and a pivoted clutch device carried by the driven member and which is automatically swung about its axis intermittently to alternately engage the driving members.

5. The combination with a pair of oppositely rotating driving members, of a driven member, a pivoted clutch device carried by the driven member, a relatively long arm carried by the clutch device, and means cooperating with the free end of the arm acting automatically to move said arm and swing the clutch device intermittently to alternately engage said driving members.

6. The combination with a pair of oppositely rotating driving members, of a driven member, a pivoted clutch device carried by the driven member, a relatively long arm carried by the clutch device and provided with gear teeth at its free end, an operating segment engaging said gear teeth, and automatic means acting intermittently to move said segment in opposite directions.

7. The combination with a pair of oppositely rotating driving members, of a driven member, a clutch device carried by the driven member and comprising an annular element pivoted between said driving members so as to swing into engagement with either one and having oppositely directed teeth at its sides for alternate engagement with coöperating teeth on the driving members.

8. The combination with a pair of oppositely rotating driving members, of a driven member, a clutch device carried by the driven member and comprising an annular element pivoted between said driving members so as to swing into engagement with either one and having oppositely directed teeth at its sides for alternate engagement with coöperating teeth on the driving members, a relatively long arm carried by the clutch device, and automatic means coöperating with the free end of said arm for intermittently swinging it in opposite directions.

9. The combination with a pair of oppositely rotating driving members, of a driven member, a clutch device carried by the driven member and comprising an annular element pivoted between said driving members so as to swing into engagement with either one and having oppositely directed teeth at its sides for alternate engagement with coöperating teeth on the driving members, a relatively long arm carried by said clutch device having gear teeth at its free end, and an operating segment engaging said gear teeth and automatically movable in opposite directions intermittently.

10. The combination with a pair of rotatable gear members having clutch teeth on their adjacent sides, of a rotatable shaft, and a clutch device carried by said shaft having movement to alternately engage the gear members and provided with a movably mounted clutch member having oppositely directed clutch teeth on its edges.

11. The combination with a pair of rotatable gear members having clutch teeth on their adjacent sides, of a rotatable shaft, a pivoted clutch device carried by said shaft having swinging movement in opposite directions and provided with a slidably mounted clutch element having oppositely directed clutch teeth on its edges.

JAMES E. GLEASON.
EDWARD W. BULLOCK.