

March 26, 1929.

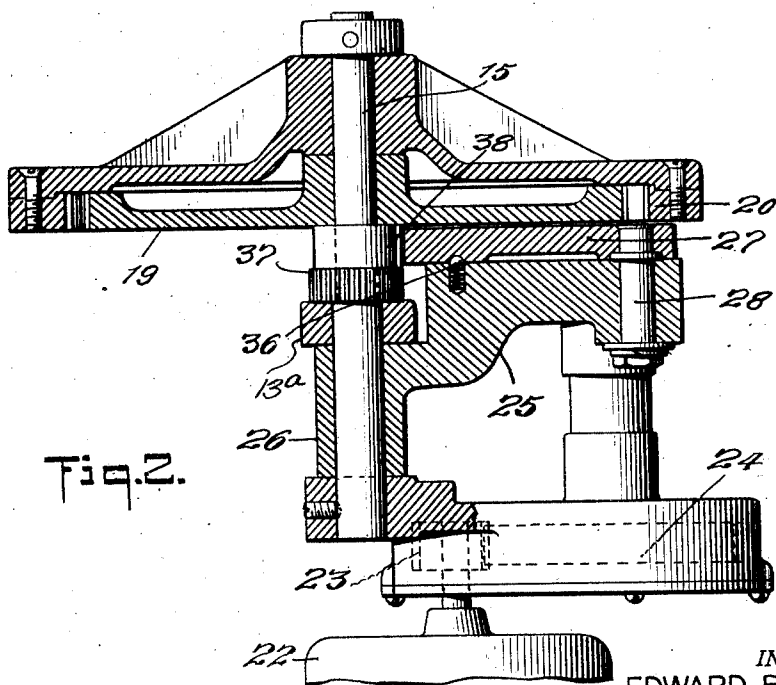
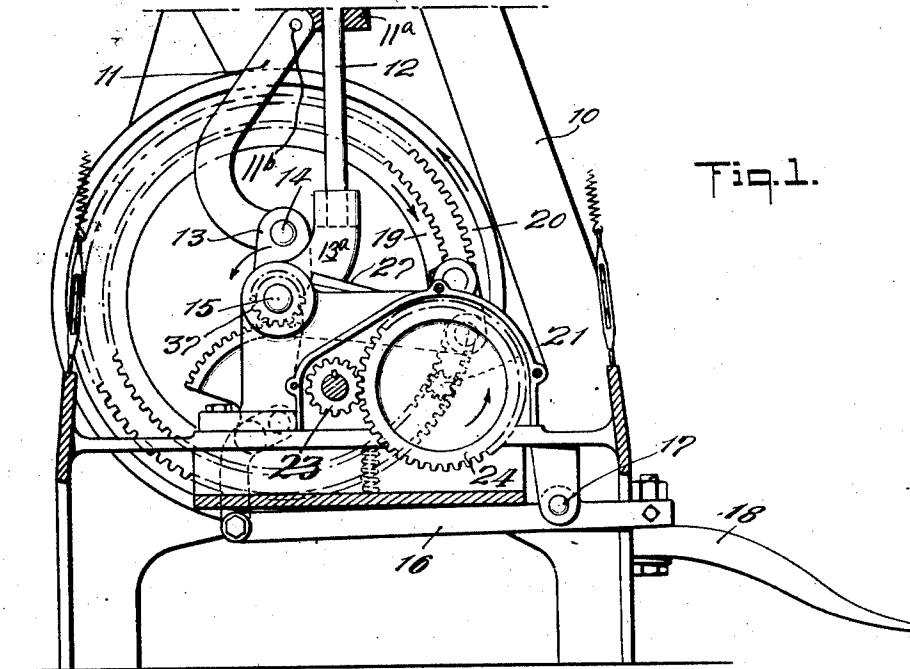
E. B. ROBY

1,706,901

DRIVING MECHANISM

Filed Sept. 4, 1926

3 Sheets-Sheet 1



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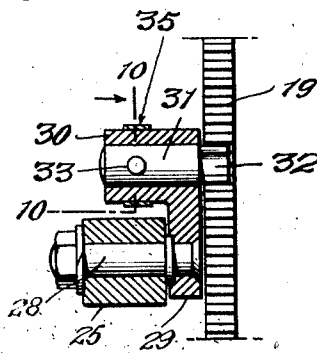
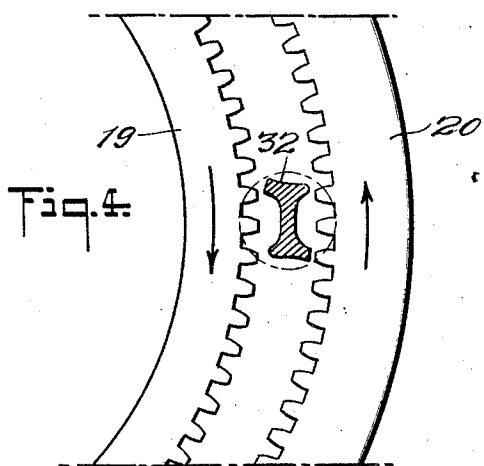
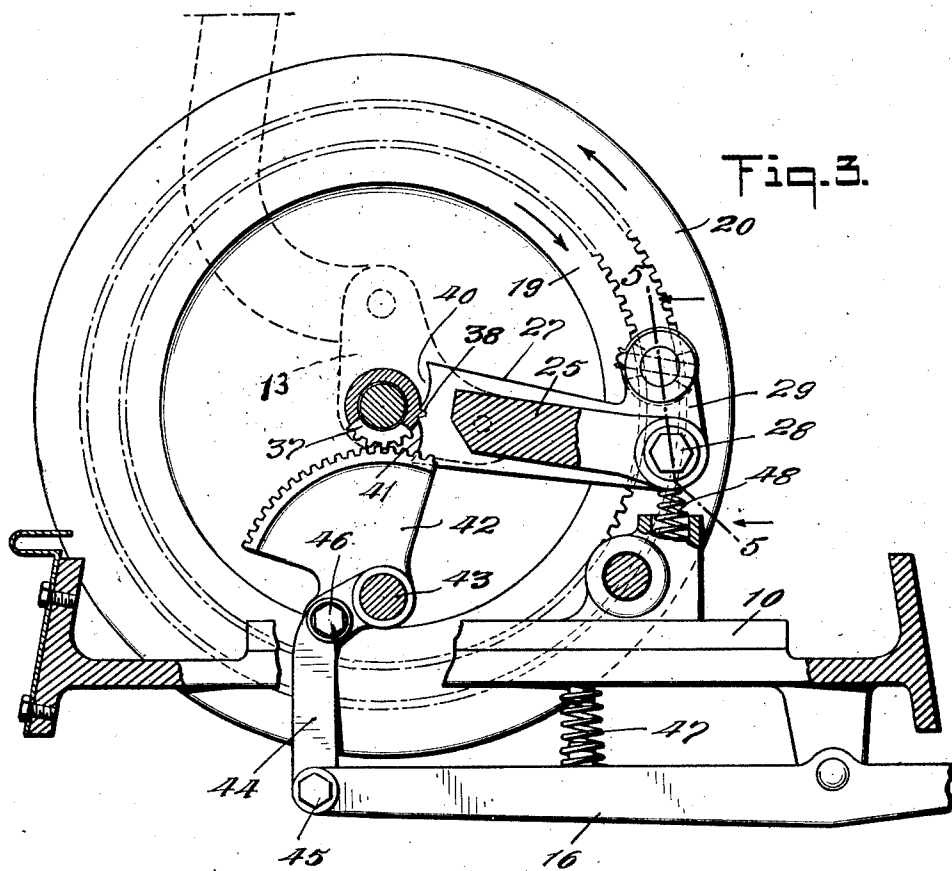
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DRIVING MECHANISM

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3 Sheets-Sheet 2



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DRIVING MECHANISM

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3 Sheets-Sheet 3

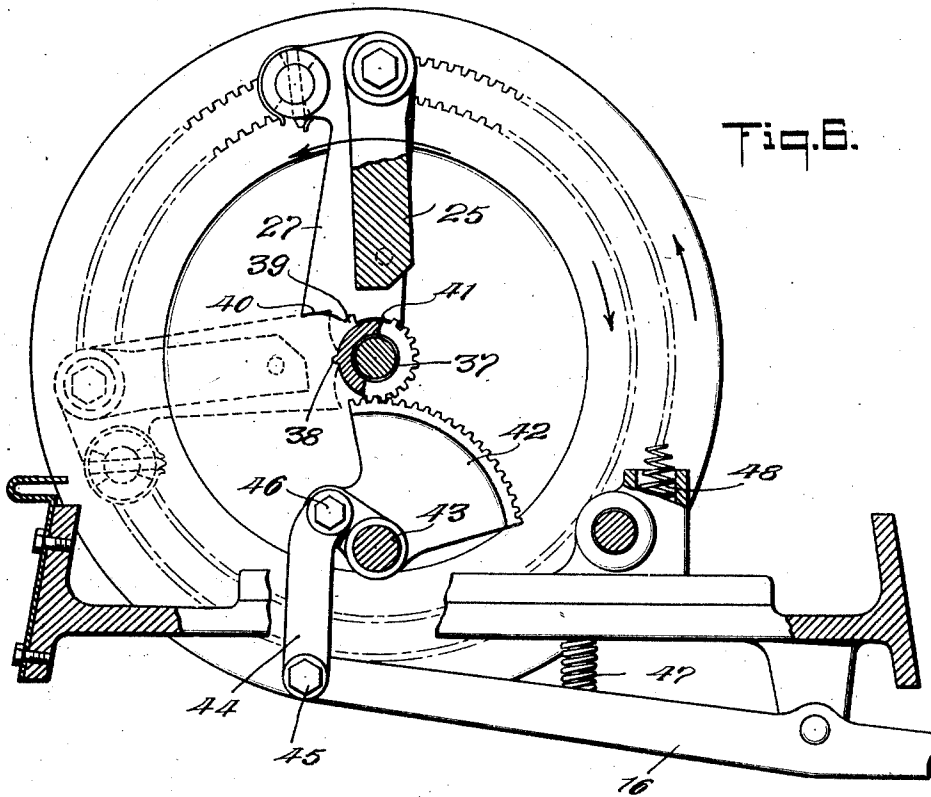


Fig. 6.

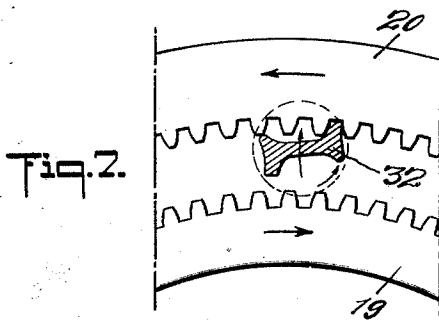


Fig. 7.

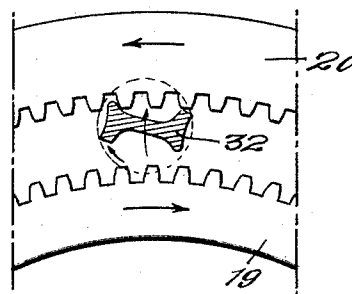


Fig. 8.

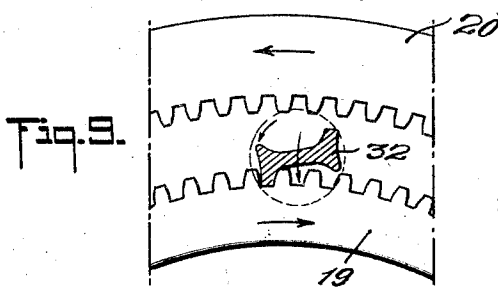


Fig. 9.

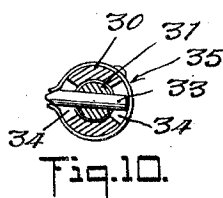


Fig. 10.

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UNITED STATES PATENT OFFICE.

EDWARD B. ROBY, OF TROY, NEW YORK, ASSIGNOR TO S. AND R. FOLDING MACHINE COMPANY, INC., OF GREEN ISLAND, NEW YORK, A CORPORATION OF NEW YORK.

DRIVING MECHANISM.

Application filed September 4, 1926. Serial No. 133,544.

The present invention broadly relates to a driving mechanism adapted to impart an oscillating or rotating motion to a lever or a crank and in particular it relates to a mechanism of the type shown in my prior application, Serial No. 53,246, filed August 29, 1925, in which the motion of the lever or crank is controlled by manipulations of a foot lever.

The invention deals with a driving mechanism for machines, which includes two rotating members continuously power driven in opposite directions, to which rotating members a lever or crank is adapted to be operatively connected or disconnected by manipulations of a foot lever under the control of the operator of the machine. When the lever or crank is operatively connected with one of the said rotating members it is caused to be rotated in one direction, and when it is operatively connected with the other of said rotating members it is caused to be rotated in the opposite direction.

The object of the present invention is to simplify and render more effective the mechanism. Briefly stated, the present invention consists in the employment of a different, more simple and effective means for engaging the lever or the crank to the oppositely rotating members, which serve to drive it.

The invention will be more fully understood from a consideration of the following description of the accompanying drawing forming a part of this specification and in which

Figure 1 shows in side elevation a part of a machine provided with the driving mechanism of the invention.

Figure 2 is a plan sectional view through the center of the driving mechanism.

Figure 3 is an enlarged elevational view partly in section of the driving mechanism.

Figure 4 is an enlarged view in elevation illustrating the means for operatively engaging or disengaging the lever or crank to be operated to the oppositely rotating members.

Figure 5 is a sectional view on the line 5—5 of Figure 3.

Figure 6 is a view similar to Figure 3 showing the mechanism in operation.

Figures 7, 8 and 9 are views similar to Figure 4, but showing the engaging means in different position.

And Figure 10 is a sectional view on the line 10—10 of Figure 5.

Referring now to the drawings in which like reference numerals indicate like parts throughout the various views, the numeral, 10, indicates the frame of a machine equipped with the driving mechanism of the present invention. Motion is communicated to the operating elements of the machine through a member, 11, in the nature of a connecting rod. This member is adapted to impart reciprocating motion to a piston 11^a to which it is connected by a pivot shaft 11^b, the piston being mounted for movement on a vertical rod, 12, mounted in the frame of the machine and is also adapted to impart rocking motion to other parts of the machine (not shown). The member, 11, is pivoted to a lever, 13, at 14, and is actuated by said lever. The lever, 13, is mounted on a shaft, 15, which extends horizontally through the machine and has a bearing 13^a which also serves as a support for rod 12, as shown in Figure 1. A lever, 16, is also pivoted to the lower part of the frame of the machine at 17 and has a foot piece, 18, for the operator of the machine. When the foot of the operator is taken off the foot piece, the lever, 13, assumes the vertical position shown in Figure 1, but when the operator of the machine depresses the foot piece, 18, the lever, 13, is rotated counter-clockwise, as seen in Figure 1, through an angle of 180° and to a position diametrically opposite to that shown in Figure 1. As long as the operator of the machine keeps depressed the foot piece 18, the lever, 13, stays in this position, but as soon as he lets up on the foot piece, the lever, 13, swings back through the same angle to its original position shown in Figure 1. The means whereby the above motion of the lever, 13, is obtained forms the subject matter of the present invention.

Mounted on the shaft, 15, are two oppositely rotating members shown in the form of an ordinary gear, 19, and an annular gear, 20, which are arranged concentrically and spaced apart. These gears are continuously rotated at a uniform speed in opposite directions as by means of a small pinion, 21, disposed between them, as shown in dotted lines in Figure 1, and driven by a motor, 22, through reducing gears, 23 and 24. Pivotaly mounted on the shaft, 15, is a crank arm, 25, having an elongated bearing, 26, encircling said shaft. The lever, 13, is rigidly secured to the crank arm, 25, so that rotation of the latter produces

rotation of the former. The lever 13 and arm 25 are preferably of unitary construction and the two in fact form a bell-crank lever pivoted on shaft 15. The crank arm is adapted to be operatively connected with either the gear, 19, or the gear, 20, so that it may be oscillated back and forth thereby to cause oscillations of the lever, 13. The means whereby the crank arm is operatively connected to one or the other of the gears when the operator of the machine manipulates the foot lever, 16, is the main novel feature of the present invention over that shown in my prior application, Serial No. 53,246, filed August 29, 1925, referred to above.

In order to operatively connect the crank arm, 25, to the gear, 19, or to the gear, 20, I employ an escapement lever, 27, which is pivoted near the end of the crank arm, 25, by means of a short shaft, 28. The escapement lever has a short arm, 29, best seen in Figure 3, said short arm having a bearing, 30, for a horizontal shaft, 31, which is provided with a tooth, 32, disposed between the gears, 19 and 20. The shaft, 31, is loosely mounted in the bearing, 30, and may oscillate therein. The amount of oscillation, however, is limited by a pin, 33, best shown in Figure 10, which extends transversely through the shaft, 30, and into slots, 34, formed in the short bearing 30. These slots permit the shaft to be oscillated through a certain angle. The shaft, 31, is yieldingly maintained in the position shown in Figure 10 by means of a spring, 35, encircling the bearing, 30, which spring co-operates with the pin, 33, to maintain it centrally disposed in the slots, 34, as shown in that figure. As thus disposed, the tooth, 32, is in its neutral position shown in Figure 4 and the crank arm is maintained stationary in the substantially horizontal position shown in Figures 1 and 3.

As best seen in Figure 2, a spring pressed ball, 36, is sunk in a well in the crank arm, 25. This spring pressed ball serves to maintain the escapement lever, 27, in a definite position with respect to the crank arm, but does permit it to be rotated around the shaft, 28, as a pivot.

The escapement lever is caused to be oscillated around the shaft, 28, as a pivot when the operator of the machine depresses the foot piece, 18, and when so oscillated the escapement tooth, 32, is urged to engagement with the annular gear, 20, in the manner shown in Figure 7. The escapement lever, the crank arm, and the lever, 13, are consequently rotated counter-clockwise as seen in Figure 3 by the annular gear, until the lever, 13, assumes a position diametrically opposite that shown in Figure 1, at which position the escapement lever is rocked on its pivot, 28, to disengage the tooth, 32, from the annular gear and to move it back into its neutral position as shown in Figures 4 and 8. The

tooth will remain in the neutral position as long as the foot piece, 18, is kept lowered by the foot of the operator. As soon as the operator takes his foot off the foot piece, however, the escapement lever, 27, is rocked on its pivot, 28, in such a direction as to move the tooth, 32, into engagement with the gear, 19, as shown in Figure 9. The escapement lever, the crank arm, and the lever, 13, are then moved back by the gear, 19, to the position shown in Figure 1, and when they have reached this position the escapement lever is rocked with respect to the crank arm in such manner as to disengage the tooth, 32, from the gear, 19, said tooth again assuming the neutral position where it will remain until the operator again depresses the foot piece.

On the shaft, 15, of the mechanism a gear, 37, is loosely mounted. This gear is of somewhat peculiar design and is best shown in Figure 2. One-half the gear has teeth extending entirely around its circumference and forms an ordinary pinion, the other half of the gear has only a single tooth, 38, on its circumference, the rest of the circumference of this part of the gear being in the form of a smooth cylinder with a radius equal to the radius of the pitch line of the teeth. The single tooth, 38, fits in a notch, 39, at the end of the escapement lever, 27, as will be seen from Figure 3. When the tooth, 38, is in the notch on the lever the escapement tooth, 32, is in the neutral position shown in Figure 4. The end of the lever, 27, is also formed with two curved portions, 40 and 41, which have radii equal to that of the pitch line of the escapement gear, 37, but the centers of the curves are offset from the center of the gear. The escapement gear, 37, is adapted to be rotated through an angle of 180° so that the tooth, 38, will assume a position diametrically opposite to that shown in Figure 3, which position of the tooth is shown in Figure 6. The rotation of the gear is caused by the operator of the machine through the foot lever, 16.

The teeth of the gear, 37, which extend entirely around its circumference mesh with the teeth of a gear segment, 42, which is mounted on a horizontal shaft, 43. The gear segment is adapted to be oscillated by the foot lever, 16, through a link, 44, one end of which is pivoted to the lever, 16, at 45, the other end of which is pivoted to the gear segment at 46. The foot piece, 18, is biased to its elevated position shown in Figure 1 by means of a coil spring, 47. In this position the gear segment, 42, has rotated the pinion, 37, into the position shown in Figure 3, at which position the escapement tooth, 32, is in the neutral position shown in Figure 4 and the lever, 13, is in the vertical position shown in Figure 1.

In the operation and use of the above mechanism, when the operator of the machine steps

on the foot piece, 18, the gear segment, 42, immediately rotates the escapement gear, 37, through an angle of 180° to the position shown in Figure 6. The tooth, 38, on the escapement gear rocks the escapement lever, 27, clockwise, as seen in Figure 3, around the pivot, 28, and the curved surface, 41, of the lever bears against the cylindrical part of the gear. This rocking of the escapement lever causes the escapement tooth, 32, to engage with the teeth of the annular gear, 20, so that the escapement lever, the crank arm, and the lever, 13, are rotated as a unit counterclockwise around the shaft, 15. As it rotates, the curved portion, 41, of the escapement lever slides over the cylindrical part of the escapement gear, 37, and is thus maintained in a fixed angular position with respect to the crank arm so that the tooth, 32, is held in engagement with the annular wheel, 20. When, however, a rotation of 180° has obtained, the notch, 39, in the escapement lever strikes the tooth, 38, as indicated by the lines in Figure 6, so that the escapement lever, 27, is rocked back on its pivot, 28, to disengage the tooth, 32, from the annular wheel as indicated in Figure 8 and to move the tooth to its neutral position. The rotating parts, that is, the escapement lever, the crank arm, and the lever, 13, now come to rest in the position shown in dotted lines in Figure 6 and will remain in that position as long as the operator of the machine keeps the foot piece, 18, depressed. When, however, the operator lets up on the foot piece, the spring, 47, urges the foot lever, 16, in such manner as to rotate the gear segment, 42, counterclockwise, as seen in Figure 6, and to lift the foot piece, 18, to its elevated position shown in Figure 1. When the gear segment is thus rotated, the escapement gear, 37, is rotated back from the position shown in Figure 6 to the position shown in Figure 3, and when thus rotated the tooth, 38, rocks the escapement lever, 27, around the pivot, 28, so as to cause the curved portion, 41, of the lever to bear against the cylindrical portion of the escapement gear and to urge the tooth, 32, into engagement with the rotating gear, 19, in the manner shown in Figure 9. The gear, 19, consequently, rotates the escapement lever, the crank arm, and the lever, 13, as a unit back to their original positions shown in Figures 1 and 3. When the escapement lever has reached this position, the notch, 39, at its end strikes the tooth, 38, causing said lever to be rocked around the pivot, 28, to disengage the tooth, 32, from engagement with the gear, 19, and to move it to its neutral position where it will remain until the foot lever is again depressed. The rotating parts consequently come to a stop in their original position, shown in Figures 1 and 3. In order to insure an accurate functioning of the mechanism, spring bumpers, 48, may, if desired, be employed, which will

stop the motion of the parts at the exact position desired and will absorb the shock due to the sudden stopping of the moving parts.

The spring, 35, which encircles the bearing, 30, insures a quick and rapid disengagement of the escapement tooth from the gears and return to neutral position when the lever, 27, is rocked on its pivot in the manner above described. The spring also serves to retain the tooth in its neutral position and prevents it from engaging in the teeth of the gears, 19 and 20, except when the escapement lever is rocked on its pivot, 28. The spring pressed ball, 36, insures the accurate positioning of the escapement lever with respect to the crank arm so that at the positions of rest these elements bear a fixed relation to one another. The engagement of the crank arm and the escapement through the spring pressed ball, however, is purely a frictional one which does not prevent the rocking of the escapement lever about the shaft, 28, as above described.

Many variations and alterations may be made in the mechanism specifically described above and I desire, therefore, to be limited only by the state of the prior art and the scope of the appended claims.

I claim:

1. A driving mechanism comprising rotary members continuously power-driven in opposite directions and concentrically disposed in spaced relation, a crank arm, a lever pivoted to said crank arm, means associated with the lever for engaging with either of the rotary members, and means for rocking the lever on its pivot.

2. A driving mechanism comprising a rotary member continuously power-driven, a crank arm, a lever pivoted to said crank arm, means associated with the lever for engaging with the rotary member and means for rocking the lever on its pivot to cause engagement of said lever with the rotary member whereby the lever and the crank arm are driven by the rotary member and to cause disengagement of said lever from the rotary member after a predetermined amount of rotation of the latter whereby the lever and the crank arm come to rest.

3. A driving mechanism comprising a shaft, a rotary member continuously power-driven disposed on said shaft, a crank arm on the shaft, a lever pivoted to said crank arm, the end of the lever having a notch and a concave curved portion, means associated with the lever for engaging with the rotary member, a rocking member for the lever mounted on the shaft, said rocking member having a tooth adapted to engage in the notch of the lever and a convex curved portion with a radius substantially equal to that of the concave curved portion of the lever, and means for imparting a rotary motion to said rocking member.

4. A driving mechanism comprising a

shaft, rotary members continuously power-driven in opposite directions and concentrically disposed in spaced relation on said shaft, the outer of said members having an inward engaging face and the inner of said members having an outward engaging face, a crank arm on the shaft, a lever pivoted to said crank arm, a tooth associated with the lever and disposed between the rotary members, and means for rocking the lever on its pivot.

5. A driving mechanism comprising a shaft, rotary members continuously power-driven in opposite directions and concentrically disposed in spaced relation on said shaft, the outer of said members having an inward engaging face and the inner of said members having an outward engaging face, a crank arm on the shaft, a lever pivoted to the crank arm, said lever having a long arm and a short arm, a bearing on the short arm, a shaft within the bearing, a tooth on the shaft disposed between the rotary members, resilient means for biasing the shaft so that the tooth assumes a neutral position between the rotary members, and means for actuating the long arm of said lever and for rocking said lever on its pivot.

6. A driving mechanism comprising a shaft, rotary members continuously power-driven in opposite directions and concentrically disposed in spaced relation on said shaft,

a crank arm on the shaft a lever pivoted to said crank arm, means associated with the lever for engaging with either of the rotating members, means for maintaining said lever in such position with respect to the crank arm that the engaging means is in its neutral position and out of engagement with both rotary members, and means for rocking said lever on its pivot.

7. A driving mechanism comprising a shaft, rotary members continuously power-driven in opposite directions and concentrically disposed in spaced relation on said shaft, a crank arm on the shaft, a lever pivoted to said crank arm, the end of the lever having concave curved portions of like radii and a notch centrally disposed between said curved portions, means associated with the lever for engaging with either of the rotary members, a rocking member for the lever mounted on the shaft, said rocking member having a tooth adapted to engage in the notch of the lever and a convex curved portion with a radius substantially equal to the radii of the concave curved portions of the lever, and means for imparting a rotary motion to said rocking member.

In testimony whereof, I have signed my name to this specification this 30th day of August, 1926.

EDWARD B. ROBY.