C. G. HAWLEY.

COMBINED DRIVING AND REVERSING MECHANISM.

APPLICATION FILED MAY 21, 1904.

911,978.

Patented Feb. 9, 1909.

3 SHEETS—SHEET 1.

Fig. 1.

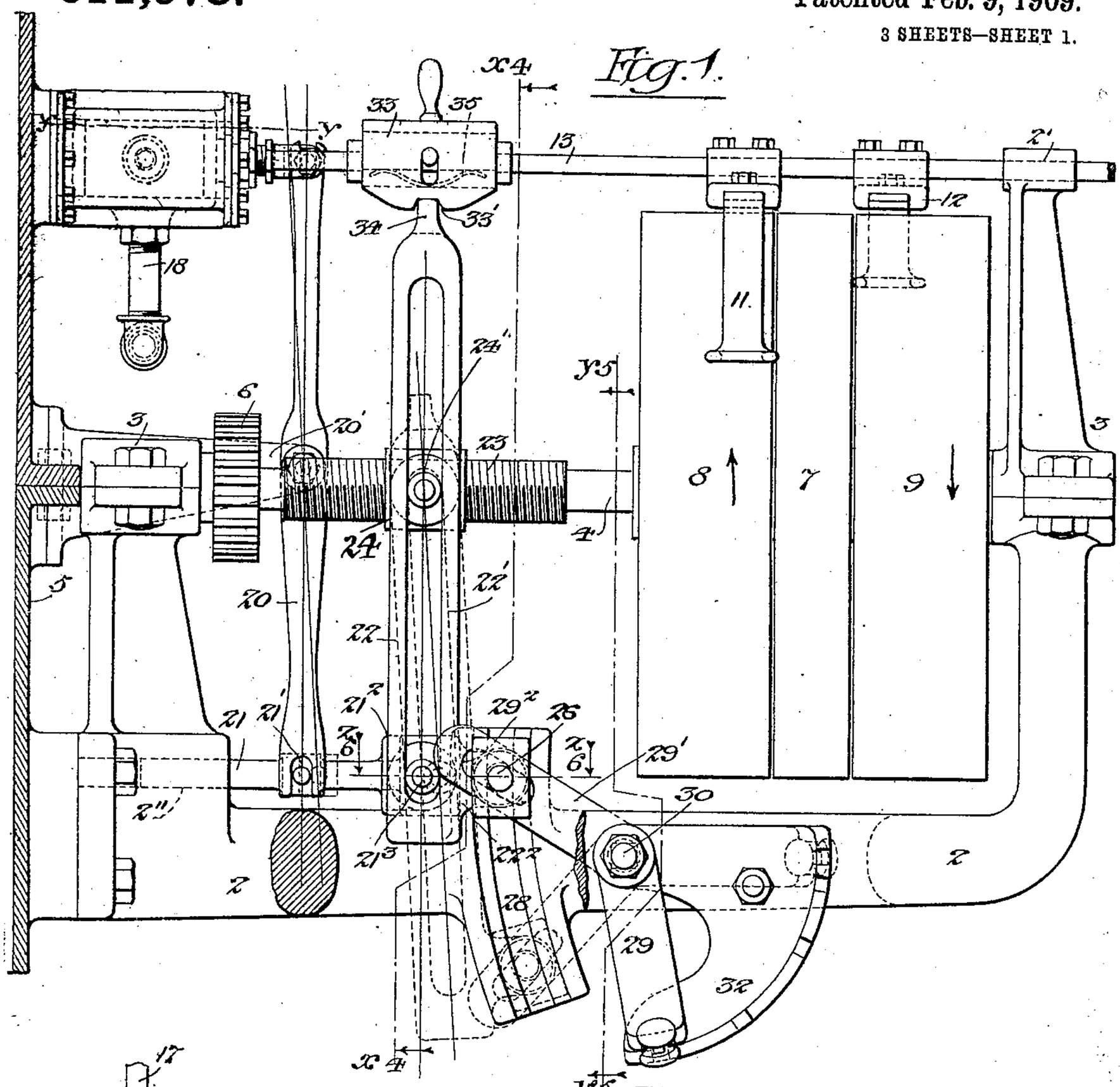


Fig. 2.

Witnesses

Louis W. Schlichtmann

John R. Lefevre.

Inventor:

Charles G. Hawley

C. G. HAWLEY.

COMBINED DRIVING AND REVERSING MECHANISM.

APPLICATION FILED MAY 21, 1904.

911,978.

Patented Feb. 9, 1909.

3 SHEETS—SHEET 2.

Fig. 3.

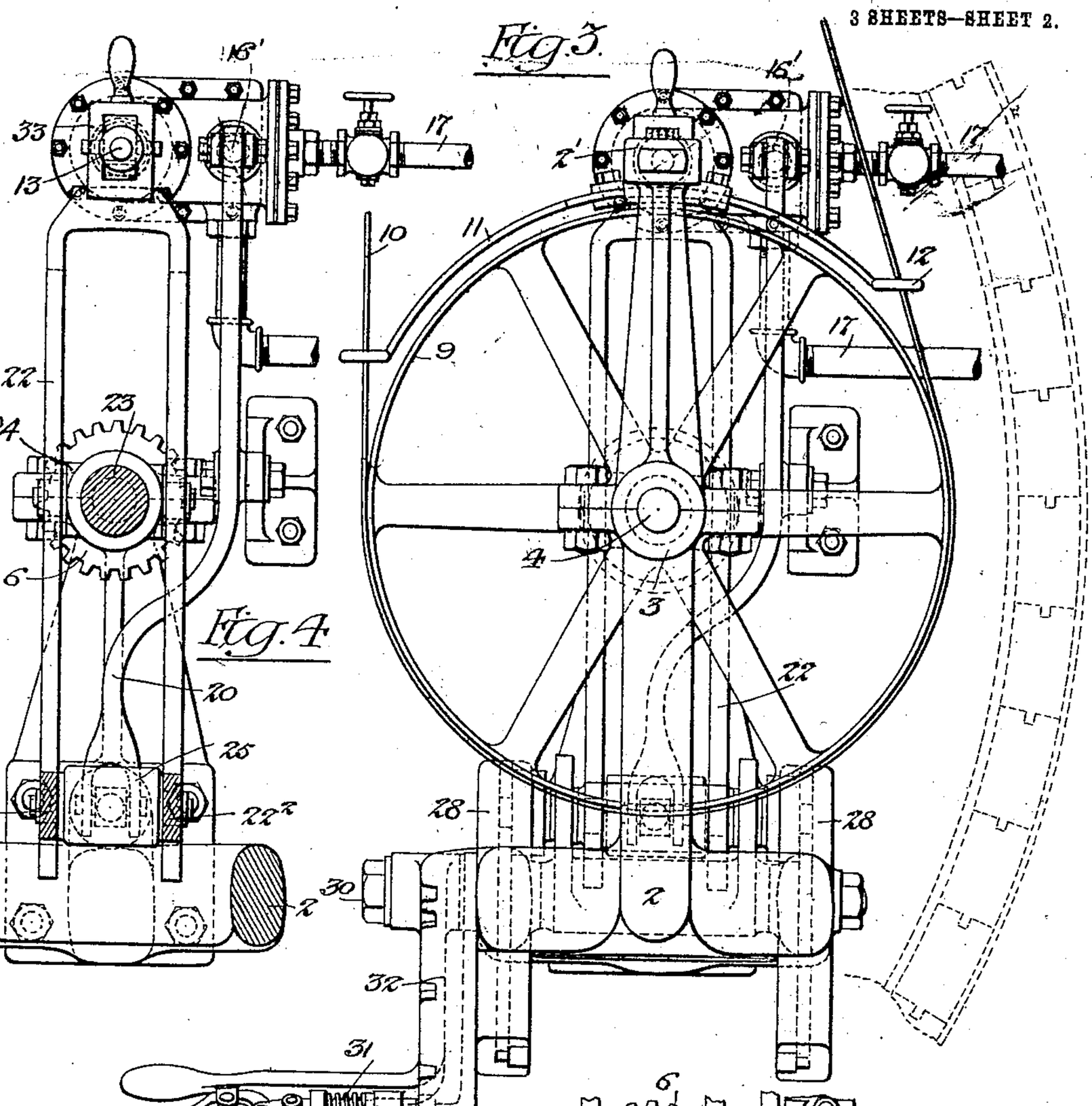


Fig. 4.

Fig. 6.

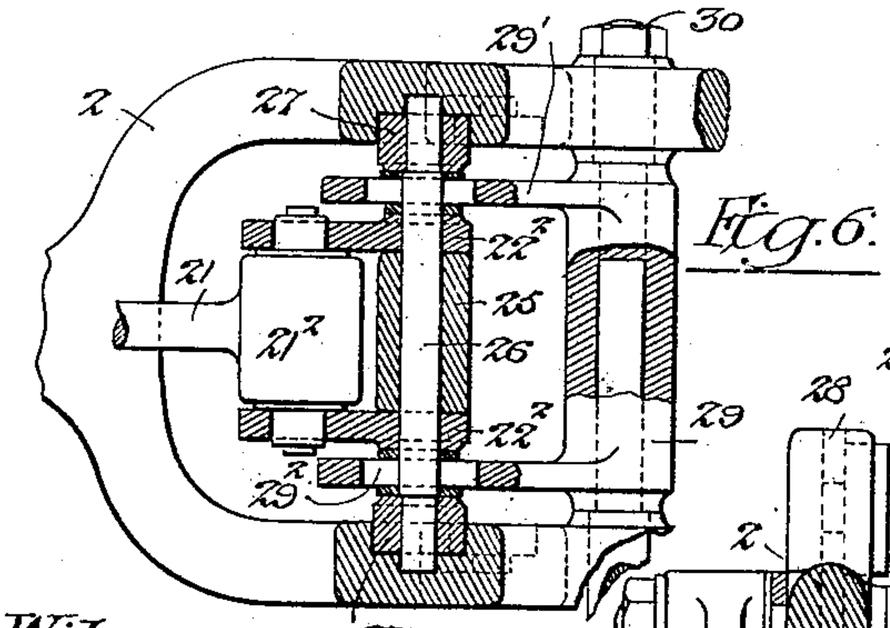
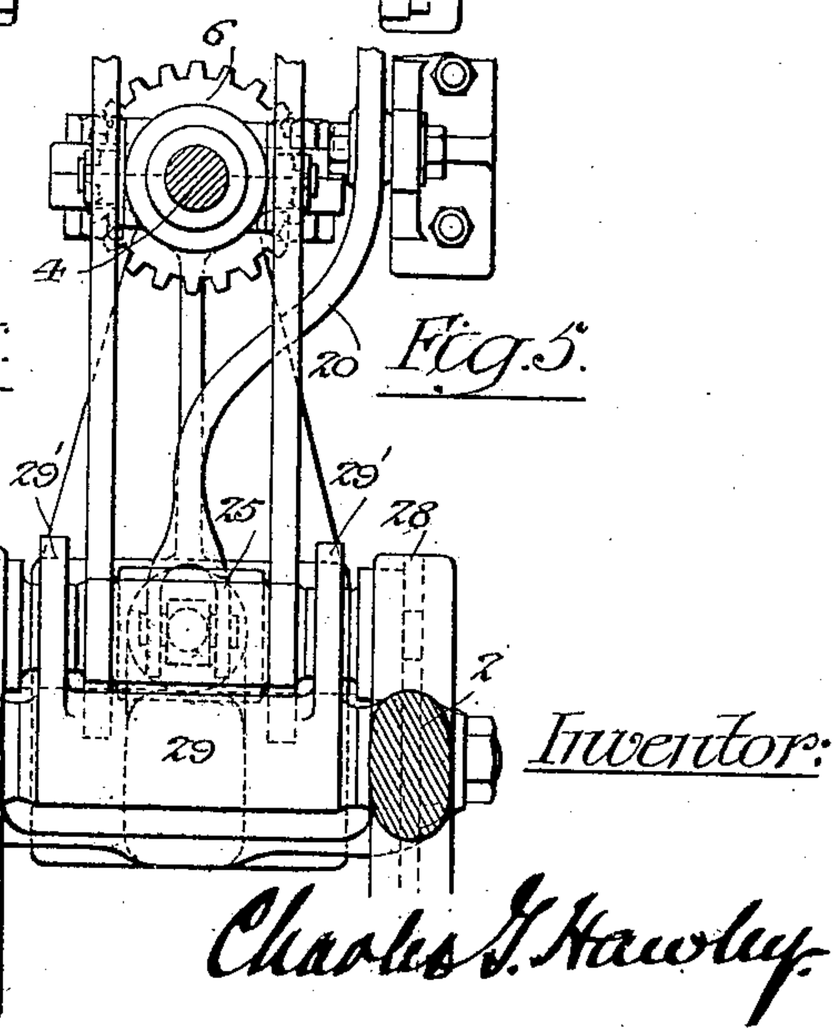


Fig. 5.



Witnesses:-

Louis M. Whitehead

John R. Lefevre.

Inventor:

Charles G. Hawley.

C. G. HAWLEY.

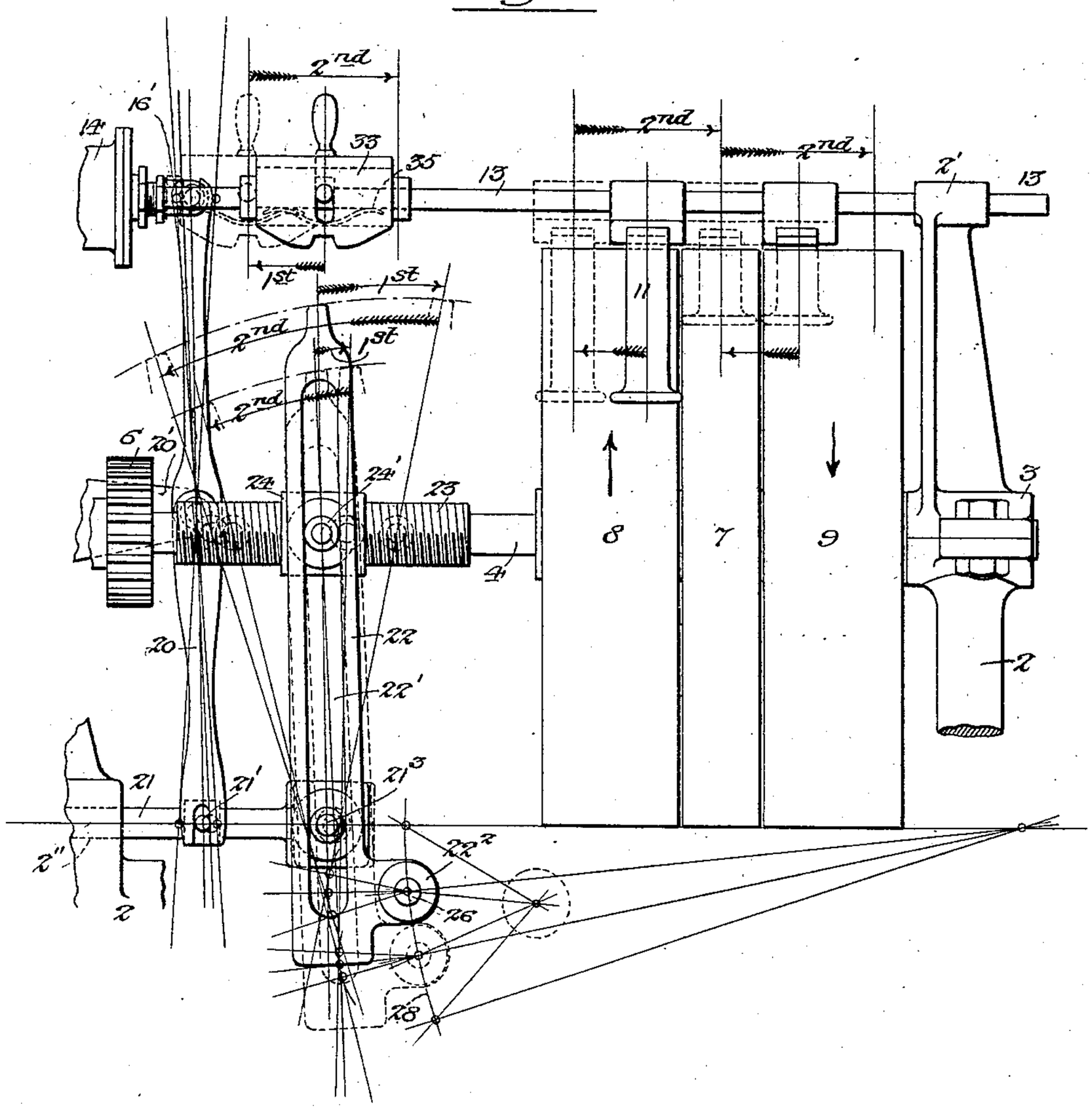
COMBINED DRIVING AND REVERSING MECHANISM.

APPLICATION FILED MAY 21, 1904.

911,978. Patented Feb. 9, 1909.

3 SHEETS—SHEET 3.

Fig. 7.



Witnesses:-

Paul H. Whitehead

John R. Lefevre

Inventor:

Charles G. Hawley.

UNITED STATES PATENT OFFICE.

CHARLES GILBERT HAWLEY, OF CHICAGO, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO CONKLING COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

COMBINED DRIVING AND REVERSING MECHANISM.

No. 911,978. Specification of Letters Patent. Patented Feb. 9, 1909.

Application filed May 21, 1904. Serial No. 209,145.

To all whom it may concern:

Be it known that I, CHARLES GILBERT HAWLEY, of Chicago, county of Cook, and State of Illinois, have invented a certain new, useful, and Improved Combined Driving and Reversing Mechanism, of which the following is a specification.

My invention relates to mechanisms of the class used for alternately driving the working members or elements of machines, such as rotary washers, which are commonly used in laundries.

The object of my invention is to provide a simple and reliable mechanism for driving or rotating a working member, such as the cylinder of a washing machine and which will not only alternate the same accurately as to the degree of travel thereof, but will also operate to automatically cause several diminishing alternations of said member and the stopping thereof at a certain point at any desired time.

The objects and uses of my invention are identical with those which are fully set forth in the applications of Frederick Snow, entitled driving and reversing mechanisms (Ser. No. 209,064) and automatic stop mechanisms (Ser. No. 209,063).

My invention consists generally in a driving shaft coupled or to be coupled to a working element, in combination with oppositely driven pulleys for rotating said driving shaft and driven from a suitable source of power, a shifter for said pulleys whereby the power may be transferred from either thereof to said shaft, a shifting device independently actuated and a shifter timing mechanism actuated by or from said shaft and depending for its action upon the extent of the rotation of said shaft; and, my invention further consists in a mechanism made up in part by said timing mechanism and whereby the normal operation of said mechanism may be stopped and the rotation of the shaft itself caused to operate said shifter; and further, my invention consists in various constructions and combinations of parts all as hereinafter described and particularly pointed out in the claims.

The invention will be more readily understood by reference to the accompanying drawings, forming a part of this specification, and in which:

Figure 1, is a side elevation of a mechanism embodying my invention, a portion of the bracket being broken away on the line x'—x' of Fig. 2. Fig. 2 is a plan view showing the shifter-motor in section on the line y—y of Fig. 1. Fig. 3 is an end view of the mechanism. Fig. 4 is a vertical section on the line x^4, x^4 of Fig. 1. Fig. 5, is a vertical section on the line y^5, y^5 of Fig. 1. Fig. 6 is a horizontal section on the line z^6, z^6 of Fig. 1, and Fig. 7, is a diagrammatic side elevation of the mechanism, illustrating the various positions and movements and the parts thereof.

As shown in the drawings, 2 represents a bracket having bearings 3—3 for the driving shaft, 4. This bracket is usually attached to the body or frame 5, which contains the working element that is to be driven. The working element may be any one of several kinds and is not here shown, but 6 represents the pinion on the driving shaft to be coupled or geared to any suitable working member, such as the large gear on the end of a rotary washer.

7, is a belt pulley that is secured on the driving shaft, 4, and 8 and 9 represent loose pulleys, which are driven in opposite directions by straight and cross belts, 10, in the usual manner.

11 and 12 are belt shippers which, with a longitudinally movable rod, 13, constitute the belt shifter by which either belt may be shifted to the fixed pulley 7, or both belts moved off said pulley, as when it is desired to stop the driving shaft, 4. One end of the rod, 13, is held in the bearing 2′, on the bracket, 2, while the other end is connected to the shifter-motor, which is a device of any character external to the remainder of the mechanism and driven from an independent source. I prefer to use as the motor, a fluid cylinder and piston, 14 and 15, the latter being attached to the end of the shifter rod, 13, which serves as the piston rod for the fluid motor. The fluid motor is equipped with a slide or other valve, 16, which has considerable outside lap, that is, one which over-laps the cylinder ports, so that considerable movement of the valve is required before fluid will be admitted to either end of the cylinder. It will be noted that the valve preferably has considerable inside clearance in order that the exhaust cavity thereof

shall bridge the cylinder ports when the valve is in its middle position.

17, represents the fluid admission pipe and 18 the fluid exhaust pipe, which leads from the exhaust cavity, 19, of the cylinder.

16′ is the valve stem and to this I connect the regular or normal timing mechanism. Said timing mechanism comprises the following parts, to-wit: the valve stem lever, 20, a reciprocating rod, 21, a vertically adjustable movement-measuring lever or link, 22, a screw or worm, 23, a threaded block, 24, and parts for adjustably pivoting the lower end of said link, 22. The lever, 20, is pivoted upon the bracket at 20′ and is joined to the rod, 21, by a slot and pin connection, 21′. The rod, 21, is slidable in a bearing, 2″, in the bracket and has a block-like end, 21^2, provided with side pins or trunnions, 21^3, arranged in the slots, 22′ of the link, 22, a slidable connection thus being provided between the rod, 21, and link, 22. The link, 22, has two sides as shown in Figs. 2 to 6, and the block, 24, is made to fit between them and is also provided with side pins, 24′, that enter the slots, 22, of said link. The link is thus connected to the driving shaft through the medium of the block, 24, and the screw or worm on said shaft. It is obvious that the upper end of the link will have a vibratory movement imparted to it when the shaft, 4, is alternately rotated. The lower end of each side of the link, 22, is provided with a lug, 22^2, see Figs. 1, 2, 6 and 7, and these lugs are joined by cross pieces, 25, which contains a pivot pin, 26. The ends of the pivot pin are provided with rollers, 27, 27 and these are held in the curved or arc-like guides, 28, in the sides of the bracket, 2. The pin, 26, serves to pivot the lower end of the link, 22, upon the fixed or rigid bracket, 2. This pivotal connection would be a permanent one in the case of a mechanism intended to impart given or fixed alternations to a working member, but as in most cases it is desirable to vary the alternations or peripheral travel of the working element, I prefer to arrange the parts of my mechanism so that various conditions and demands may be met and fulfilled. To this end I employ the curved guides, 28, and in conjunction therewith a bell crank, 29, arranged on a horizontal pivot, 30, in bracket, 2, for vertically adjusting the pin or pivot block of the link, 22. The bell crank has two arms, 29′, provided with slots, 29^2, to receive the link pin, 26, as shown in Figs. 1 and 6. The bell crank, 29, is provided with a latch, 31, and a handle, and 32 represents a quadrant fastened or formed upon the bracket, 2, for securing the bell crank or adjusting lever, 29, in any of its positions.

In addition to the mechanism thus far described, I provide means for forcibly and automatically stopping the rotation of the driving shaft, 4, and its connected working element at any time. This automatic stop mechanism utilizes the parts before described and is completed by a notched block, 33, provided on the shifter rod, 13, to operate in connection with a point or lug, 34, on the upper end of the link, 22. The block, 33, is adapted to move vertically to admit the lug 34 to its notch, 33′ and the ends and lower part of the block are beveled to facilitate such entrance. A small spring, 35, shown in dotted lines, normally holds the block down.

The operation of my invention is as follows: The starting positions of the parts are as shown in Fig. 1. The belts at this time are carried upon the pulleys, 8 and 9, and do not contact with the fixed pulley 7. At this time, also, the link, 22, is in its mid position engaged with the shipper block, 33. At the same moment the centers of the pin, 26, and trunnions, 21^3 are in the same horizontal plane and the valve stem lever, 20, is in such position that the fluid motor valve is in its mid position. Now to start the mechanism from these positions it is only necessary to free the bell crank 29, from quadrant, 32, and allow the lower end of the link, 22, to fall. Because of the angular position of the curved guides, 28, this fall of the link will draw the lower end thereof to one side, and thereby shift the rod, 21, sufficiently to operate the lever, 20, and open the fluid motor valve, whereupon the piston of the fluid motor will be moved to throw the shifter and move one of the belts on to the fixed pulley, 7. The drive shaft will thereupon start to rotate and drive the element to which it is coupled. The screw, 23, is fixed to the shaft, 4, and therefore rotates with it and moves the threaded block, 24. The arrangement is such that the first drop of the link very slightly opens the motor valve and the first movement of the link, 22, by the threaded block 24, will close said valve. The continued movement of the link will result in continued movement of the valve so that when the link reaches its extreme of movement, the valve will again be opened, on the opposite side and fluid being admitted to the cylinder the shifter will be thrown in the opposite direction to move the reverse belt on to the fixed pulley, 7. This will reverse the shaft, 4, and hence the screw, 23, and the threaded block, with the link, will be started back. The stroke of the link is illustrated in Fig. 7, and as it approaches its opposite extreme of movement it will, operating as a lever, upon the rod, 21, throw said rod and the lever, 20, to again move the motor valve and cause another movement of the belt shifter. It will be evident that the timing mechanism thus constructed is positively driven by one or the other of the belts, that its movement is independent of any slippage of the belt and absolutely and accurately

measures the peripheral travel of the pinion, 6, and the working element which is geared thereto. When the link is in its lowest position, it has a long leverage upon the rod, 21, and therefore the upper end of the link can be moved only a short distance by the screw before the reversal of the valve will take place. Hence, when the link is in this position the peripheral travel of the pinoin, 6, in either direction will be restricted. As the link is lifted, by means of the bell crank, the leverage thereof upon the rod 21, is shortened and greater movement of the upper end of the link will be required to take up the lap of the motor-valve and open the cylinder ports. This being true and as the link moves only when the shaft, 4, is in rotation, it will be evident that the elevation of the link from one notch of the quadrant to another will result in permitting increased alternations or peripheral travels of the driving pinion, 6. The final stage in the elevation of the link is that wherein the link and rod centers are brought into substantial coincidence, after which, the movement of the link will be without effect upon the lever, 20, and motor valve, aside from causing said valve to assume its middle position. This is the way in which I throw the motor out of action, and at this time the automatic stop mechanism is placed in action. As will be understood, the block, 33, moves with the shifter rod, 13, and will be in one position or the other when the link is raised. Therefore, the shaft, 4, being in rotation, the upper end, 34, of the link will move toward the block and will snap into the notch thereof and continuing to move will throw the shifter and reverse the mechanism. The engagement between the link and the block is not broken, and therefore, the movement of the link being reversed, it will shortly cause another reversal. These frequent reversals will be brought about, not so much by the power of the belts upon the pulley, 7, as by the momentum of the body or member which is coupled to the pinion, 6, and the diminishing effect of such momentum will result in leaving the shifter in its middle position, where both belts will be disengaged from the pulley, 7, leaving the shaft, 4, and all connected parts stationary.

It is obvious that numerous modifications of my invention will readily suggest themselves to one skilled in the art and I therefore do not confine my invention to the specific constructions herein shown and described.

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

1. The mechanism of the class described, comprising a driving shaft, coupled to a working element in combination with means for rotating said shaft in opposite directions, a shifter, a shifter motor, external to the remainder of the mechanism and a timing device interposed between said shaft and said motor, substantially as described.

2. In a mechanism of the class described, a driving shaft coupled to a working element, in combination with means for rotating said shaft in opposite directions, a shifter, a shifter motor external to the remainder of the mechanism and a variable timing mechanism driven by said shaft and interposed between the same and said motor, substantially as and for the purpose specified.

3. In a mechanism of the class described, a driving shaft, coupled to a working element, in combination with means for driving said shaft in opposite directions, a shifter, a motor connected with said shifter, an adjustable pivoted link, means upon said shaft for moving said link and an operating connection between said link and motor, substantially as described.

4. In a mechanism of the class described, a driving shaft, coupled to a working element, in combination with means for driving said shaft in opposite directions, a shifter, a motor connected with said shifter, an adjustable pivoted link, means upon said shaft for moving said link, an operating connection between said link and motor, and means for directly connecting said link and shifter, substantially as described.

5. In a mechanism of the class described, a driving shaft, in combination with means thereon for rotating the shaft in opposite directions, a shifter and shifter motor, said shaft having a screw thread, a threaded block movable thereon, a link engaged with said block, a pivot for the end of said link, means for adjusting said link pivot, a reciprocating rod pivotally connecting an intermediate point on said link with said motor and a catch block upon said shifter for engagement by said link, when in such position that it no longer affects the operation of said motor, substantially as described.

6. In a mechanism of the class described, a driving shaft and means for alternating the same, in combination with a shifter, a fluid actuated motor for actuating said shifter and a worm mechanism driven by said shaft and causing operations of said motor, substantially as described.

7. In a mechanism of the class described, a driving shaft and two direction driving means therefor, in combination with a shifter, a shifter motor, and motor controlling levers coupled to said shaft and actuated by the rotation thereof, substantially as described.

8. In a mechanism of the class described, a driving shaft and two direction driving means therefor, in combination with a shifter, a fluid actuated shifter motor, and a variable movement motor controller, coupled to said shaft and actuated by the rotation thereof, substantially as described.

9. In a mechanism of the class described, a driving shaft and two direction driving means therefor, in combination with a shifter, a shifter motor, and a motor controller actuated by said shaft and also adapted to communicate movement directly from the shaft to the shifter, substantially as described.

10. In a mechanism of the class described, a driving shaft in combination with means for rotating the same in opposite directions, a thread or worm fixed on said shaft, a complementary threaded block longitudinally movable on said worm and having trunnions, a link-like-lever occupying a position transverse to said shaft and worm and engaged with the trunnions of said block, a pivot for the end of said link-like-lever, said pivot being adjustable toward and from said shaft, a shiftable member pivotally engaged with said link-like-lever at a substantially fixed distance from said shaft and a shifting mechanism arranged for actuation by said shiftable member, substantially as described.

11. In a mechanism of the class described a driving shaft, in combination with means for rotating said shaft in opposite directions, a shifter co-acting therewith for reversing the direction of the shaft's rotation, a lever occupying a transverse position with relation to the shaft, means on said shaft for oscillating said lever, a pivot for said lever, a shiftable member engaged with said lever, means for varying the distance between the pivot of the lever and the point of engagement between the lever and the shiftable member, a shifter motor and means connecting the shifter motor with said shiftable member, as and for the purpose specified.

12. In a mechanism of the class described, a driving shaft, in combination with means for rotating the same in opposite directions, a shifter for reversing the operation of said means to alternately reverse the shaft, a lever, means on said shaft for oscillating said lever, said means being adjustably pivoted to said lever, permitting the lever to be moved in a direction transverse to the axis of the shaft, a pivot for one end of said lever, means for moving said pivot toward and from said shaft to shift the lever with relation thereto, a shiftable member engaged with said lever at a substantially fixed distance from said shaft, a shifter motor for actuating said shifter, controlling means operatively connecting said motor with said shiftable member, said lever, shiftable member and motor controlling means being movable to central positions by the means employed for shifting the pivot of said lever, and means upon said shifter for engagement with said lever at such times, said lever and shifter being then adapted to co-act to cause repeated and diminishing reversals and revolutions of said shaft, substantially as described.

In testimony whereof, I have hereunto set my hand this 11th day of May, A. D., 1904, at Chicago, Illinois, in the presence of two witnesses.

CHARLES GILBERT HAWLEY.

Witnesses:
JOHN R. LEFEVRE,
M. R. GANSON.