(No Model.) 4 Sheets—Sheet 1.

G. C. ROBERTS.

REVERSING GEAR.

No. 436,193. Patented Sept. 9, 1890.

Fig 2.

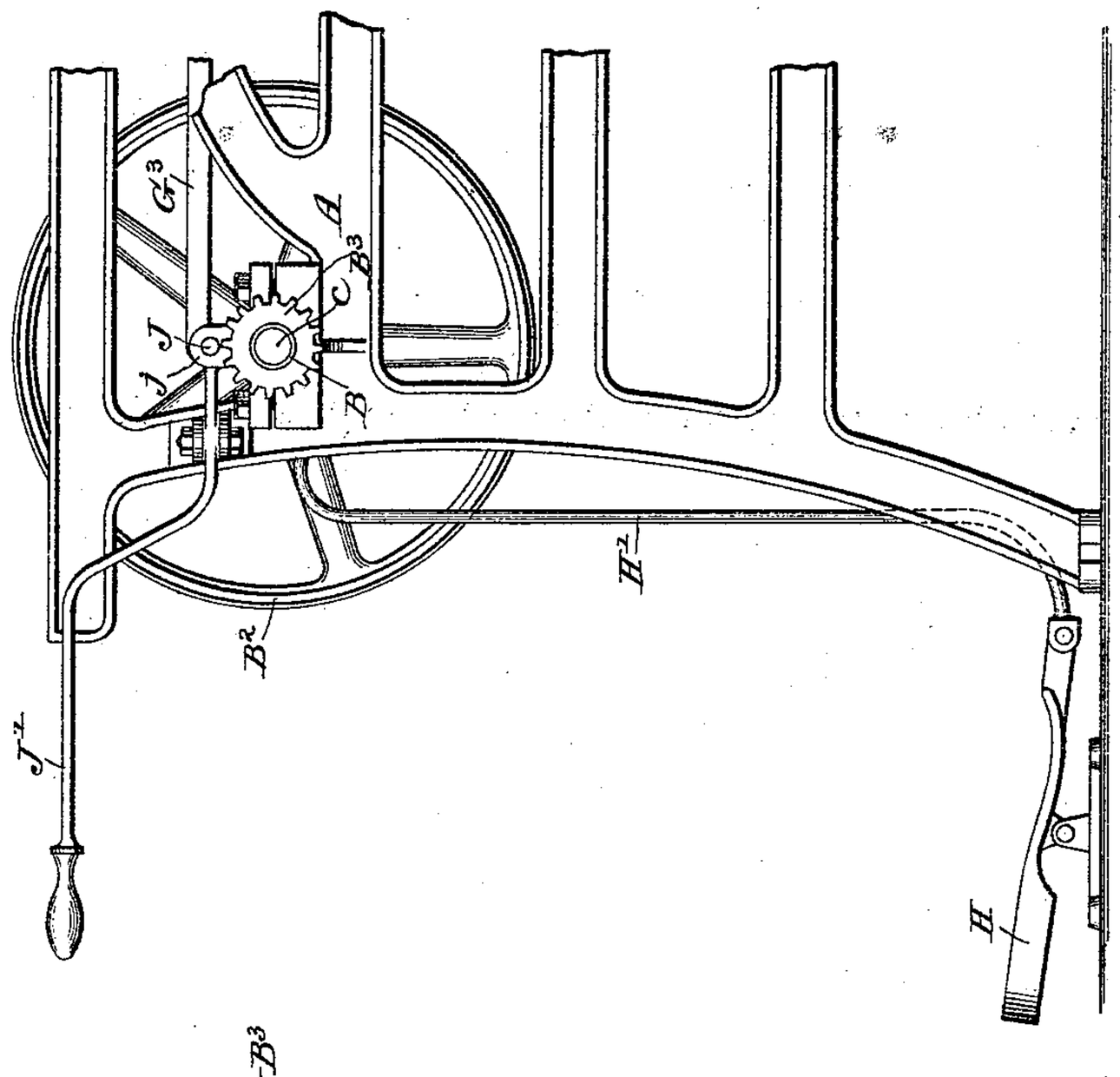

Fig 1.

Witnesses
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4 Sheets—Sheet 2.

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REVERSING GEAR.

No. 436,193. **Patented Sept. 9, 1890.**

Fig 8.

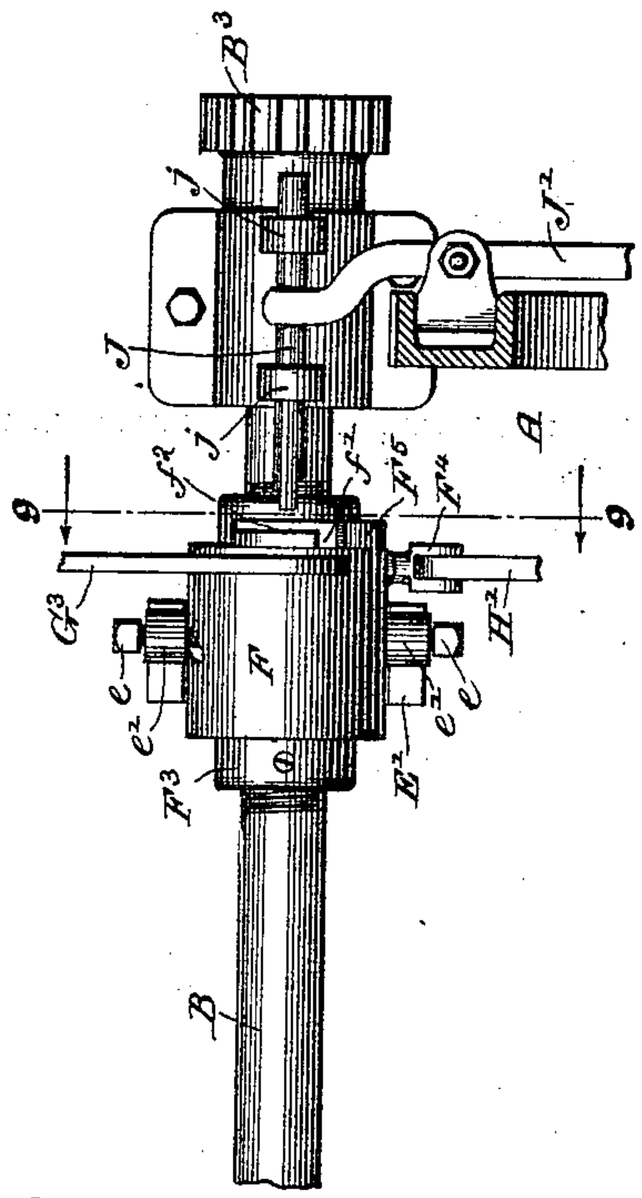


Fig 9.

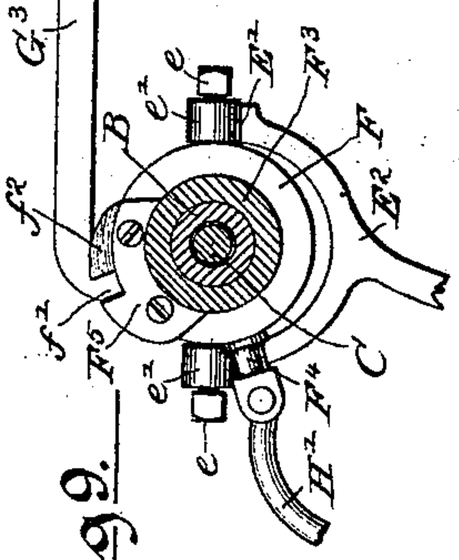
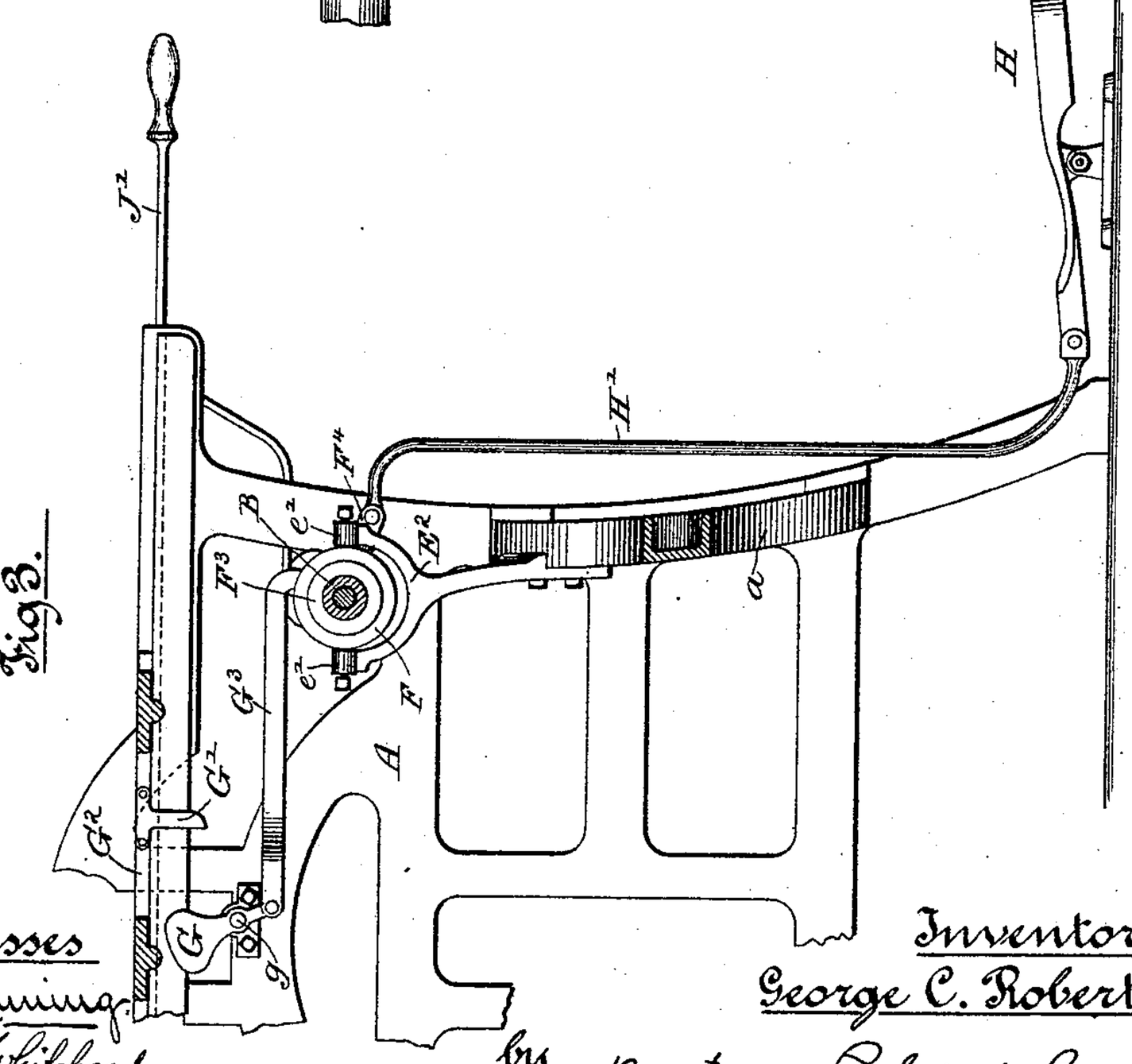


Fig 3.



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4 Sheets—Sheet 3.

G. C. ROBERTS.

REVERSING GEAR.

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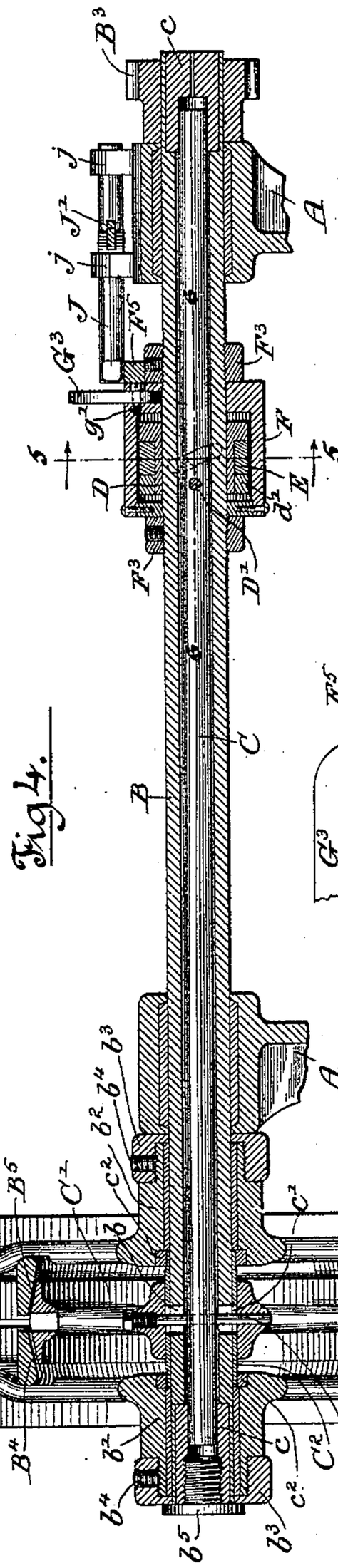

Fig 4.

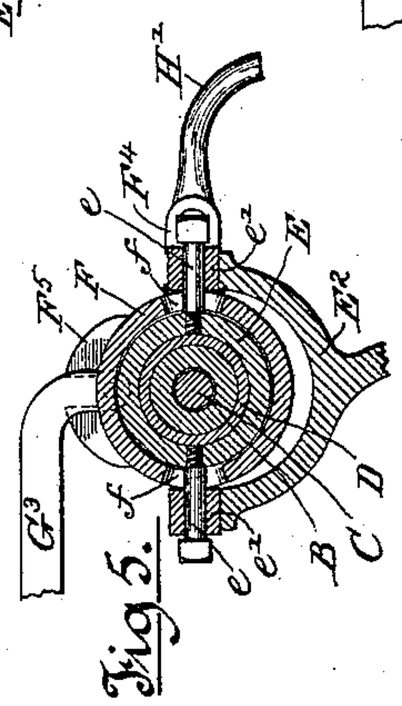

Fig 5.

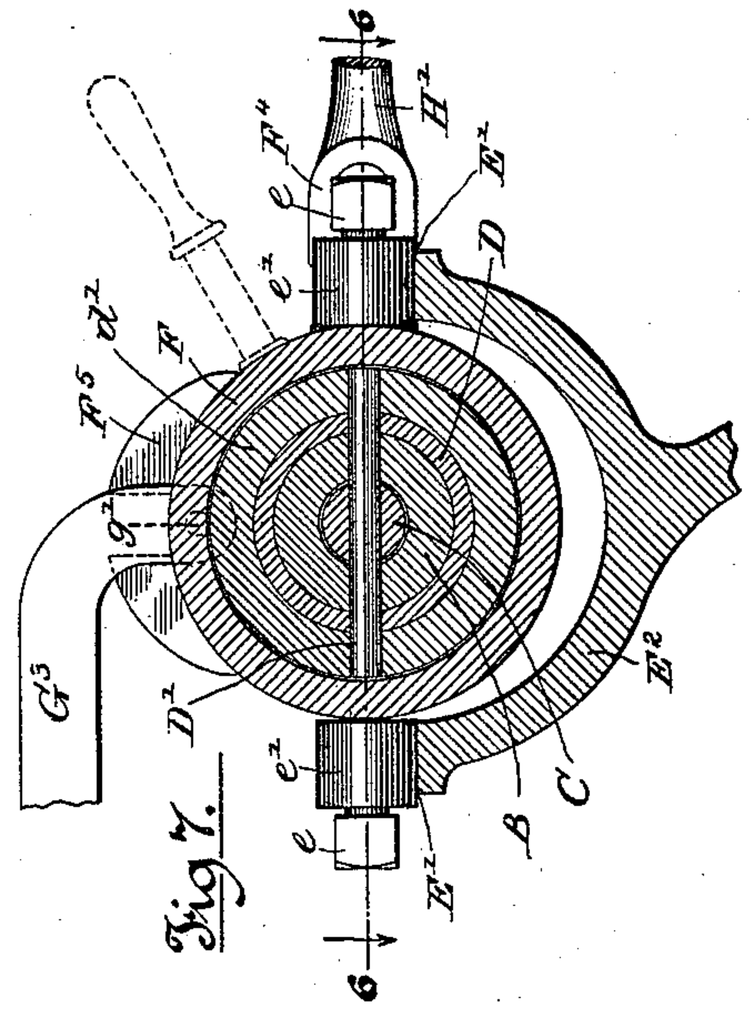

Fig 7.

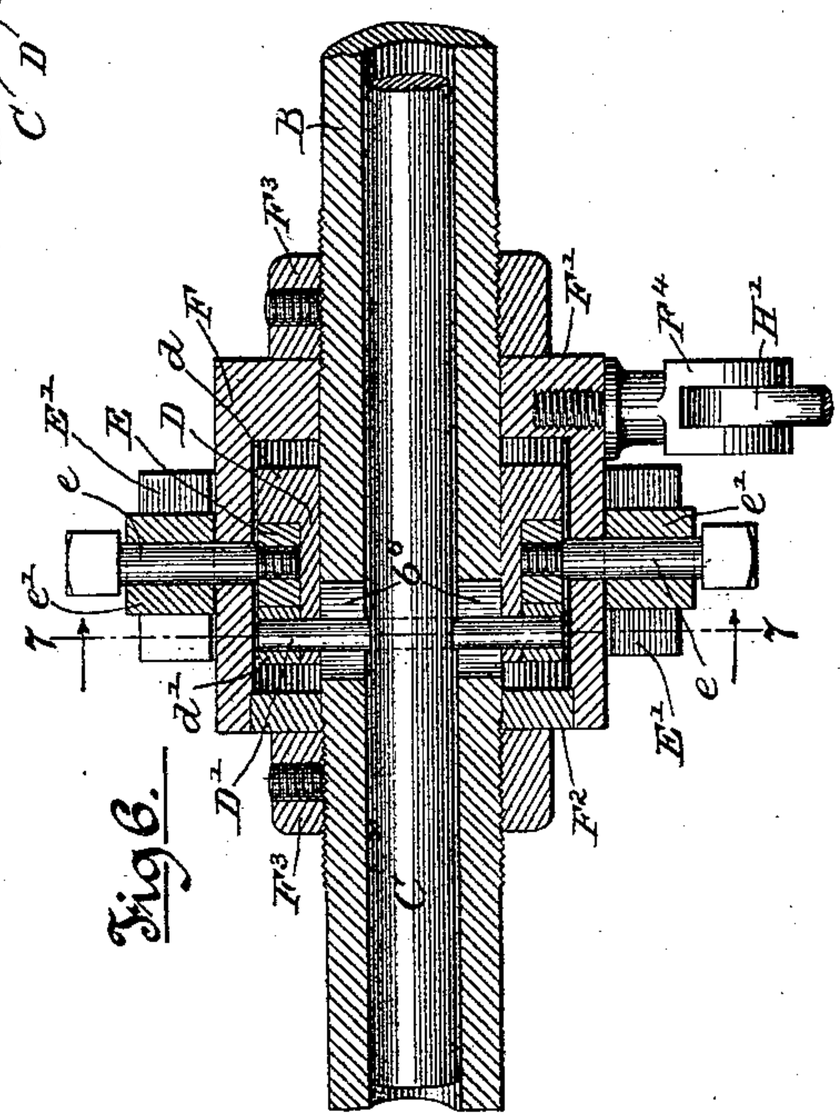

Fig 6.

Witnesses

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(No Model.) 4 Sheets—Sheet 4.

G. C. ROBERTS.

REVERSING GEAR.

No. 436,193. Patented Sept. 9, 1890.

Fig 10.

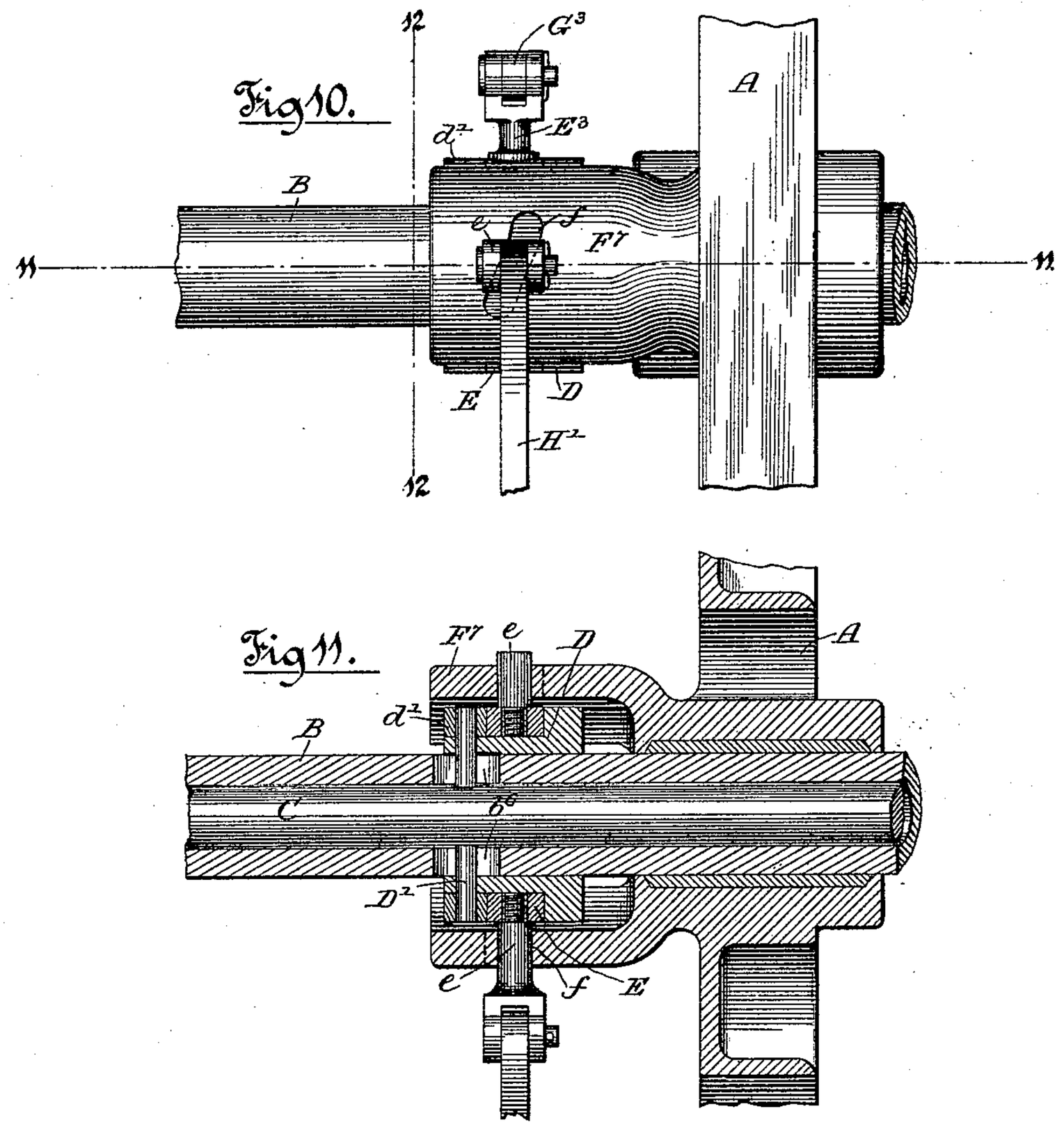
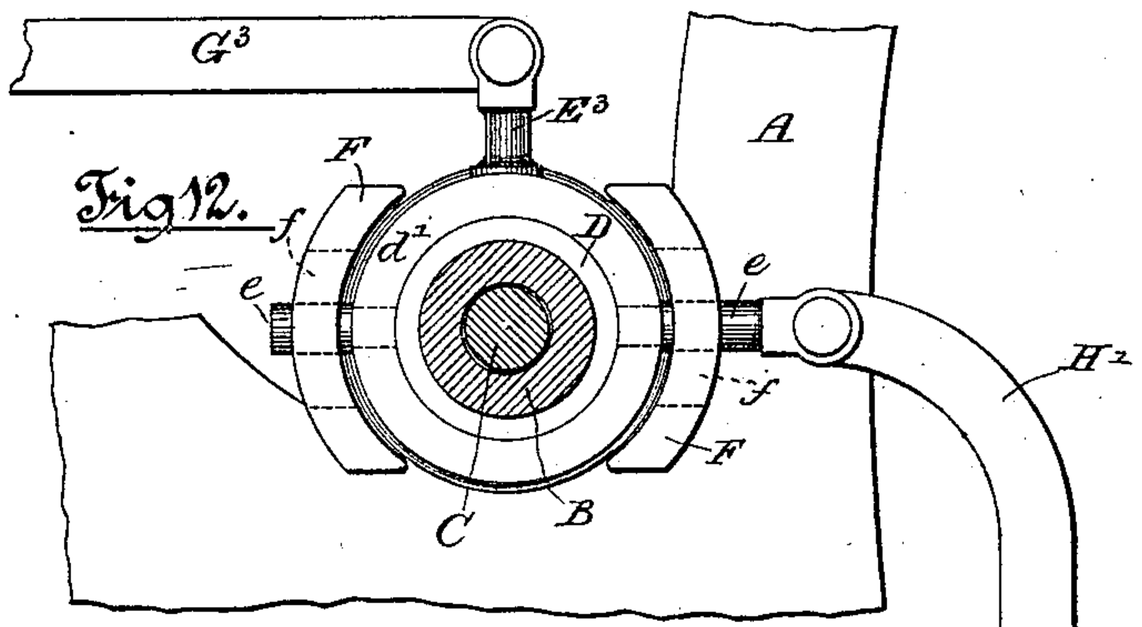


Fig 11.

Fig 12.



Witnesses
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UNITED STATES PATENT OFFICE.

GEORGE C. ROBERTS, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE TROY LAUNDRY MACHINERY COMPANY, OF TROY, NEW YORK.

REVERSING-GEAR.

SPECIFICATION forming part of Letters Patent No. 436,193, dated September 9, 1890.

Application filed August 1, 1889. Renewed July 2, 1890. Serial No. 357,483. (No model.)

To all whom it may concern:

Be it known that I, GEORGE C. ROBERTS, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Reversing-Gears; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in reversing-gears adapted more especially for use upon ironing-machines of that class which embrace a reciprocating ironing board or table and a rotating heated ironing-roller acting upon the article placed upon the board or table as the latter is reciprocated, but which may be employed in other cases where it is desired to obtain a regular reciprocating motion from a revolving drive-shaft.

The invention consists in the matters hereinafter described, and pointed out in the appended claims.

In the accompanying drawings, illustrating my invention, Figure 1 is a front end view of a machine embodying my invention. Fig. 2 is a view in side elevation of a portion of the same. Fig. 3 is a central vertical section on the line 3 3 of Fig. 1. Fig. 4 is an enlarged longitudinal section of the driving-shaft of the machine, illustrating the actuating-clutch thereof. Fig. 5 is a section taken on the line 5 5 of Fig. 4. Fig. 6 is an enlarged detail horizontal section taken axially through the clutch-actuating devices upon line 6 6 of Figs. 4 and 7. Fig. 7 is an enlarged detail section taken upon line 7 7 of Fig. 6. Fig. 8 is a detail plan view of the clutch mechanism for stopping the movement of the reciprocating part of the machine. Fig. 9 is a section of the same, taken upon line 9 9 of Fig. 8. Fig. 10 is a side view of a modified form of the clutch mechanism. Fig. 11 is a vertical longitudinal section of the same. Fig. 12 is a cross-section of the same, taken upon line 12 12 of Fig. 10.

As illustrated in said drawings, the main frame of the machine consists of two parallel side frame-plates A A, which are connected with each other at the ends of the machine by means of cross-girts *a a*.

B is the main or drive shaft of the machine, which shaft is mounted in the frame-plates A A. Said shaft B is provided at one end with loose belt-pulleys B′ and B^2, which are constantly driven in opposite directions by suitably-arranged belts, said belts, when both pulleys are driven from a single counter-shaft, usually being arranged with one belt crossed and the other belt straight in a familiar manner. At its end opposite the pulleys B′ B^2 the driving-shaft B is provided with a gear-pinion B^3, which intermeshes with suitable gear-wheels and through the intermediacy of which the ironing board or table in an ironing-machine or other reciprocating part in other machines is given reciprocatory motion and the roller rotated. The said shaft B is hollow or tubular, and within the same is located a longitudinal sliding rod C, which is desirably made of less diameter than the interior of the shaft and fitted to slide at its ends within bearing-apertures in separate plugs *c c*, inserted in the ends of the said shaft B.

C′ is a friction-pulley located between the hubs of the loose pulleys B′ B^2 upon the shaft B, said pulley C′ being immediately supported upon a sleeve C^2, which fits upon the said shaft B. The said pulley C′ is connected with the rod C by means of a transversely-arranged pin C^3, inserted through the hub of said pulley C′ and through the said rod and passing through longitudinal slots *b* and *c′* in the shaft B and sleeve C^2, as clearly shown in Fig. 4. The periphery of the said pulley C′ is oppositely beveled or formed in the shape of a double cone, and the pulleys B′ B^2 are provided with conical bearing-rings B^4 B^5, adapted to fit against the conical bearing-surfaces of the said pulley C′. Said friction-pulley and the bearing-rings B^4 and B^5 are so disposed that the pulley will be in bearing with only one of said rings at the same time, and may be brought into contact with either of the rings by a movement of said pulley endwise with reference to the shaft B and sleeve C^2. By moving longitudinally the said rod C, to which said friction-pulley C′ is connected by means of the rod C^3, said friction-pulley may be engaged with either of the pul-

leys B′ and B², and rotary motion thereby given to the shaft B in either direction, as desired. The means employed for moving said rod C will be hereinafter described. The said sleeve C² is provided at its opposite ends with rings or collars c^2, secured by screw-threads or otherwise upon the ends of the sleeve and forming shoulders against which the inner ends of the hubs b' b^2 bear. The said sleeve C² holds the pulleys B′ B² from movement toward each other upon the shaft, or, in other words, keeps said pulleys at a desired distance apart, and the collars c^2 c^2 are adjustable upon said sleeve by means of their screw-threaded connection therewith, so that said collars may be moved inwardly or outwardly to increase or decrease the distance apart of the said pulleys B′ B², as may be necessary, for accurately adjusting said pulleys B′ B² with reference to the friction-pulley C′. Suitable set-screws will usually be provided in the collars c^2 c^2 to hold the latter from turning upon the sleeve C² after said collars have been properly adjusted.

b^3 b^3 are thimbles secured by screw-threaded connections upon the outer ends of the said hubs b' b^2 and provided with inwardly-extending flanges forming the bearings for the ends of the hubs. Said thimbles b^3 b^3 form a part of the hubs and may be adjusted inwardly or outwardly to take up any wear in the bearing-surfaces thereof and to hold the hubs closely in contact with the ends of the sleeve C², it being obvious that there is considerable wear upon the said thimbles thus forming the outer ends of said pulley-hubs, owing to the endwise pressure produced by the lateral pressure of the friction-pulley against the belt-pulleys. Set-screws b^4 b^4 in the thimbles b^3 b^3 serve to hold the latter from turning when adjusted.

An important advantage arising from the use of the separate sleeve C² is that said sleeve serves to retain the pulleys at the proper distance apart without the necessity of employing any collars or shoulders upon the shaft itself for this purpose. The said pulleys are held in contact with the ends of the said sleeve by means of the shaft-bearing at the inner side thereof and at the outer end of the shaft by means of a cap b^5, secured to the end of the said shaft B by means of a screw-plug upon the cap entering the plug c of the shaft, as clearly shown in Fig. 4 of the drawings.

The devices for automatically actuating the rod C are made as follows: D is a sleeve mounted to slide longitudinally upon the shaft B at a point inside of the frame and connected with the rod C by means of a pin D′, which passes through opposite longitudinal slots b^6 b^6, Fig. 6, in said shaft. Said sleeve D is provided at one end with an integral flange d and at its opposite end with a collar d', which collar is secured to the sleeve by the pin D′, which passes through both the sleeve and the ring. Within the annular space or groove formed by and between the flange d and collar d' is placed a ring E, which is adapted to turn freely within said groove. Secured in opposite sides of said ring E are two radially-arranged pins e e, the outer ends of which carry rollers e' e', Figs. 1, 3, 6, and 7, which rollers rest in contact with two flat horizontal stationary bearing-pieces E′ E′, herein shown as sustained immovably by means of a forked arm E², which is rigidly attached at its lower end to the cross-girt a of the frame. The rollers e' e' serve merely to lessen the frictional resistance to the movements of the parts and are not essential to the operation of the device. Mounted upon the said shaft B and surrounding the sleeve D is a cylindric shell or casing F, which is provided with flat ends F′ F², having smooth centrally-arranged bearing-apertures, which immediately engage the said shaft and by which the cylindric shell is sustained concentrically upon the shaft. Said shell is provided in its opposite sides with two cam-slots f f, through which pass the pins e e of the ring E. The said shell F, while adapted to turn freely on the shaft, is held from endwise movement thereon by means of two collars F³ F³, secured to the shaft at the ends of the shell and bearing against the latter, said collars F³ F³ being herein shown as adjustably secured to the shaft by screw-threaded connections and held from turning by set-screws. The said cam-slots f f in the shell F are obliquely or spirally disposed, and are so arranged that when the shell F is turned or rotated upon the shaft the said cam-slots will move the pins e e toward one end or the other of the shaft, according to the direction in which the shell is turned. Such motion of the pins e e will obviously be transmitted to the rod C through the medium of the sleeve D, ring E, and pin D′, so that by turning or oscillating the said shell upon the shaft endwise movement is given to the said rod C.

The purpose of the bearing-pieces E′ E′, which engage the rollers e' e' of the pins e e in the manner described, is to hold said pins from moving or swinging with the shell when the latter is turned about the shaft, and thereby insuring movement of the said pins and connected parts by the action of the cam-slots in the manner above described.

From the construction above set forth it is entirely obvious that contact of the friction-pulley C′ with either of the driving-pulleys may be effected by partially rotating the said shell F upon the shaft B, so that by turning said shell either by hand or automatically the direction of rotation of the shaft may be reversed as desired. I have illustrated automatic means so arranged that the direction of motion of the shaft will be reversed by a reciprocating part of the machine in connection with which it is used when said part reaches the limit of its movement in either direction.

Upon the frame-plate A a swinging lever G is suitably located, which is arranged to

swing in either direction from a vertical position, and the upper end of which is arranged for contact with two stops or projections G′ G′ (one of which is shown in Fig. 3) upon the reciprocating part G^2. To the lower end of said lever G, beneath its pivot *g*, is attached a horizontal connecting-bar G^3, the opposite end of which extends to and is pivotally connected with the top of the shell F. In the particular construction illustrated, Fig. 4, the end of the said connecting-bar G^3 adjacent to the said shell F is bent downwardly and inserted in a recess in the shell and pivotally secured therein by means of a pivot-screw *g′*. In the operation of this device the upper end of the lever G is encountered and moved by the projections G′ on the reciprocating part G^2 of the machine, and the shell F is moved or turned about the shaft B, (by reason of its connection with said lever G,) so as to move the rod C endwise and shift the friction-pulley from one to the other of the driving-pulleys in a manner readily understood, thereby accomplishing the automatic reversal of the direction of movement of the driving-gear. To enable the said shell F to be turned for actuating the reversing-gear by the operator in a convenient manner, a foot-lever H is provided near the base of the machine, which foot lever is connected with a projecting lug or arm F^4 upon the said shell F by means of a rigid connecting-bar H′. The lever G being free to move at all times, excepting when in actual contact with the said reciprocating part of the machine, the shell F may be rotated to actuate the reversing-gear at any point in the movement of the carriage. The operator, having his foot upon the foot-lever H, therefore has the driving mechanism under perfect control, and may stop, start, or reverse the same at any moment.

To stop the machine, it is obviously necessary to place the friction-pulley C′ at its intermediate position free from both driving-pulleys, and this is accomplished by giving partial rotation to the shell F and stopping the same at an intermediate point in its throw. This may be accomplished by the use of the foot-lever H; but inasmuch as a slight shifting of the foot-lever would subsequently start the machine, and as such shifting of the foot-lever might occur by accident, I have provided a separate locking device adapted to engage the shell F and hold it in its intermediate position. Said locking device is more clearly shown in Figs. 4, 8, and 9, and consists of a longitudinally-sliding detent J, mounted in guides *j j* upon an adjacent part of the machine-frame and actuated by a hand-lever J′, which is pivoted to the machine-frame and engages said detent in the manner illustrated. Said detent J is arranged parallel with the shaft B and slides endwise toward and from the shell F. Upon the said shell is formed a projecting lug F^5, having a notch *f′*, adapted to receive the end of the detent J, said notch being so arranged that the detent may engage therewith when the shell F is in its intermediate position. By grasping the hand-lever J′ and pressing the detent against the face of the lug F^5 during the backward or forward movement of the said reciprocating part the detent will enter the notch as soon as the shell reaches its intermediate position, and the reciprocating part will be stopped at either the forward or rearward limit of its movement. In order, however, to enable the detent to act without the same being constantly pressed against the end of the shell, I preferably cut away the lug F^5 at one side of the notch partially through the thickness of the lug, as clearly shown and as indicated by the letter f^2, Figs. 8 and 9. When the lug is thus formed, the detent J may be advanced against the cut-away part f^2 of the lug during the time the part is moving in one direction, and the detent will arrest the shell in its intermediate position as soon as the said shell is moved at the termination of the backward or forward movement of the said part.

In practice I desirably cut away that part of the lug which is opposite the detent when the part is moving forwardly or toward the operator, and the attendant therefore will not usually attempt to stop the machine by the use of the detent when the part is moving backwardly. At any time during the forward movement of the part, however, the detent may be thrown against the lug F^5, and when the part reaches the forward limit of its movement the rotation of the shell F will be arrested at a point suitable for stopping the machine. The stopping device will usually be arranged in this manner, for the reason that it is commonly desired to stop the part when the same is at the forward limit of its movement. After the movement of the shell has been arrested by the use of the detent in the manner last described the detent is of course only partially advanced and is not fully engaged with the notch, so that it may be possible to start the reciprocating part in one direction by the use of the foot-lever. If, however, the hand-lever J′ is moved so as to thrust the detent J fully into the notch after the machine has been stopped, the shell will be securely locked from movement and the machine cannot be started without first withdrawing the detent from the notch.

Actuating devices for the clutch mechanism embodying the same features of construction and operation as the particular one shown may be constructed in a number of different mechanical forms, and I do not therefore desire to be restricted to the particular features herein illustrated, except as the latter may be made the subject of specific claims herein—as, for instance, in connection with a sleeve D and ring E, mounted thereon and provided with radial pins, a metal part or shell having cam-slots to engage said pins may be attached immovably to the frame, and

said ring and the pins thereon may be turned or rotated to accomplish the endwise movement of the rod, which is attached to said sleeve D. A construction of this kind is shown in the drawings, Figs. 10 to 12. As shown in said figures, the shaft B, rod C, sleeve D, ring E, and radial pins *e e* are made in the same manner before described.

In place of the shell F two cylindric segments F^7 F^7 are attached to the shaft-bearing concentric with the shaft, and in said segments are placed the oblique slots *f f*, which engage the pins *e e*. If in this construction the ring E is turned, by power applied to one of the pins *e e* or otherwise, the rod C will be moved endwise, and the friction-pulley thereby shifted. In said Figs. 10, 11, and 12 the connecting-rod H′ of the foot-lever H is shown as pivoted to the outer end of one of the radial pins *e*, while the connecting-bar G^3 is pivoted to an upwardly-extending arm E^3 of said ring E. In this construction of course the said ring is moved endwise of the shaft when said ring is turned, so that it becomes necessary to so make the joints of said connecting-rod H′ and connecting-bar G^3 as to allow such movement of the ring without binding said joints.

The main feature of this part of the invention is obviously embraced in a construction comprising a revolving sleeve and ring corresponding with the sleeve D and ring E, hereinbefore described, connected with the longitudinal rod by which the clutch is actuated, radial pins in the ring, and a concentrically-arranged cylindric shell or equivalent cylindric segments provided with cam-slots engaged by the pins, so that by turning either the ring or the shell the rod may be moved endwise, and the first of the appended claims is intended to cover, broadly, a construction embracing these general features. It will of course be seen that an operative device may be made without the use of automatic actuating devices or a foot-lever for turning the shifting part of the clutch, (namely, the ring E or shell F,) a simple hand-lever attached to the shell, as indicated in dotted lines in Fig. 7, or to one of the pins *e*, as indicated in Fig. 12, obviously affording a means by which said shifting part may be moved at desired times.

I claim as my invention—

1. The combination, with a drive-shaft, of a reversing mechanism comprising two belt-pulleys loosely mounted upon the shaft and provided with annular friction-surfaces, a friction-pulley adapted to engage either of said belt-pulleys, a rod connected with said friction-pulley and extending through the said shaft, a grooved sleeve mounted to slide upon the said shaft and connected with the said rod, a ring encircling the said sleeve, radial pins secured in said ring, and a cylindric shell arranged concentric with the shaft and provided with cam-slots engaging said pins, one of two of the parts named—to wit, the said ring or shell—being capable of oscillatory movement, whereby said ring may be moved endwise of the shaft by the action of the pins in the cam-slots, substantially as described.

2. The combination, with a drive-shaft, of a reversing mechanism comprising two belt-pulleys loosely mounted upon the shaft and provided with annular friction-surfaces, a friction-pulley adapted to engage either of said belt-pulleys, a rod connected with said friction-pulley and extending through the said shaft, a grooved sleeve mounted to slide upon the said shaft and connected with the said rod, a ring encircling said sleeve, radial pins secured in said ring, stationary bearing-surfaces parallel with the shaft engaging said pins, an oscillating cylindric shell mounted concentric with the shaft and provided with cam-slots engaging said pins, and a reciprocating part having stops adapted to act upon said shell to give oscillatory motion to the same, substantially as described.

3. The combination, with a drive-shaft, of a reversing mechanism comprising two belt-pulleys loosely mounted upon the shaft and provided with annular friction-surfaces, a friction-pulley adapted to engage either of said belt-pulleys, a rod extending through the shaft connected with said friction-pulley, a clutch-actuating device consisting of a grooved sleeve mounted to slide longitudinally upon the shaft and connected with said rod, a ring encircling said sleeve, radial pins in said ring, and an oscillating cylindric shell mounted concentric with the shaft and provided with slots for engaging said pins, a swinging lever upon the machine-frame connected with the rotatable part of said clutch-actuating device, and a reciprocating part having stops adapted to engage said lever at each limit of the movement of the said reciprocating part, substantially as described.

4. The combination, with a drive-shaft, of a reversing mechanism comprising two belt-pulleys loosely mounted upon the shaft and provided with annular friction-surfaces, a friction-pulley adapted to engage either of said belt-pulleys, a rod extending through the shaft connected with said friction-wheel, a grooved sleeve mounted to slide upon the shaft and connected with said rod, a ring encircling said sleeve, radial pins in said ring, stationary bearing-pieces parallel with the shaft engaging said pins, an oscillating cylindric shell mounted concentric with the shaft and provided with slots engaging said pins, a swinging lever upon the machine-frame connected with the said shell, a reciprocating part having stops adapted to engage said lever, and a foot-lever connected with said shell, substantially as described.

5. The combination, with a drive-shaft, of a reversing mechanism comprising two belt-pulleys loosely mounted upon the shaft and provided with annular friction-surfaces, a friction-pulley adapted to engage either of said belt-pulleys, a rod extending through the

shaft connected with said friction-wheel, a grooved sleeve mounted to slide upon the shaft and connected with said rod, a ring encircling said sleeve, radial pins in said ring, stationary bearing-pieces parallel with the shaft engaging said pins, an oscillating cylindric shell mounted concentric with the shaft and provided with slots engaging said pins, a swinging lever upon the machine-frame connected with the said shell, a reciprocating part having stops adapted to engage said lever, and a detent for locking the said shell from movement, said shell being provided with a notch to engage said detent, substantially as described.

6. The combination, with a drive-shaft, of a reversing mechanism comprising two belt-pulleys loosely mounted upon the shaft and provided with annular friction-surfaces, a friction-pulley adapted to engage either of said belt-pulleys, a rod extending through the shaft connected with said friction-wheel, a grooved sleeve mounted to slide upon the shaft and connected with said rod, a ring encircling said sleeve, radial pins in said ring, stationary bearing-pieces parallel with the shaft engaging said pins, an oscillating cylindric shell mounted concentric with the shaft and provided with slots engaging said pins, a swinging lever upon the machine-frame connected with the said shell, a reciprocating part having stops adapted to engage said lever, a detent for locking said shell from movement, the said shell being provided with a notch to receive the detent, and a recess at one side of and adjacent to the notch whereby the detent may be advanced to stop the machine when the shell is not in motion, substantially as described.

7. The combination, with a drive-shaft, of a reversing mechanism comprising two belt-pulleys loosely mounted upon the shaft and provided with annular friction-surfaces, a friction-pulley adapted to engage either of the said belt-pulleys, a rod extending through the shaft connected with said friction-wheel, a grooved sleeve mounted to slide upon the shaft and connected with said rod, a ring encircling said sleeve, radial pins in said ring, stationary bearing-pieces parallel with the shaft engaging said pins, an oscillating cylindric shell mounted concentric with the shaft and provided with slots engaging said pins, a swinging lever upon the machine-frame connected with the said shell, a reciprocating part having stops adapted to engage said lever, a sliding detent arranged parallel with the shaft, and a pivoted hand-lever connected with the said detent, said shell being provided upon its end wall with a notch adapted to engage the end of said detent, substantially as described.

In testimony that I claim the foregoing as my invention I affix my signature in presence of two witnesses.

GEORGE C. ROBERTS.

Witnesses:
C. CLARENCE POOLE,
HARRY COBB KENNEDY.