

(No Model.)

3 Sheets—Sheet 1.

E. E. ORRELL.

SHUTTLE BOX OPERATING DEVICE FOR LOOMS.

No. 410,850.

Patented Sept. 10, 1889.

Fig. 1.

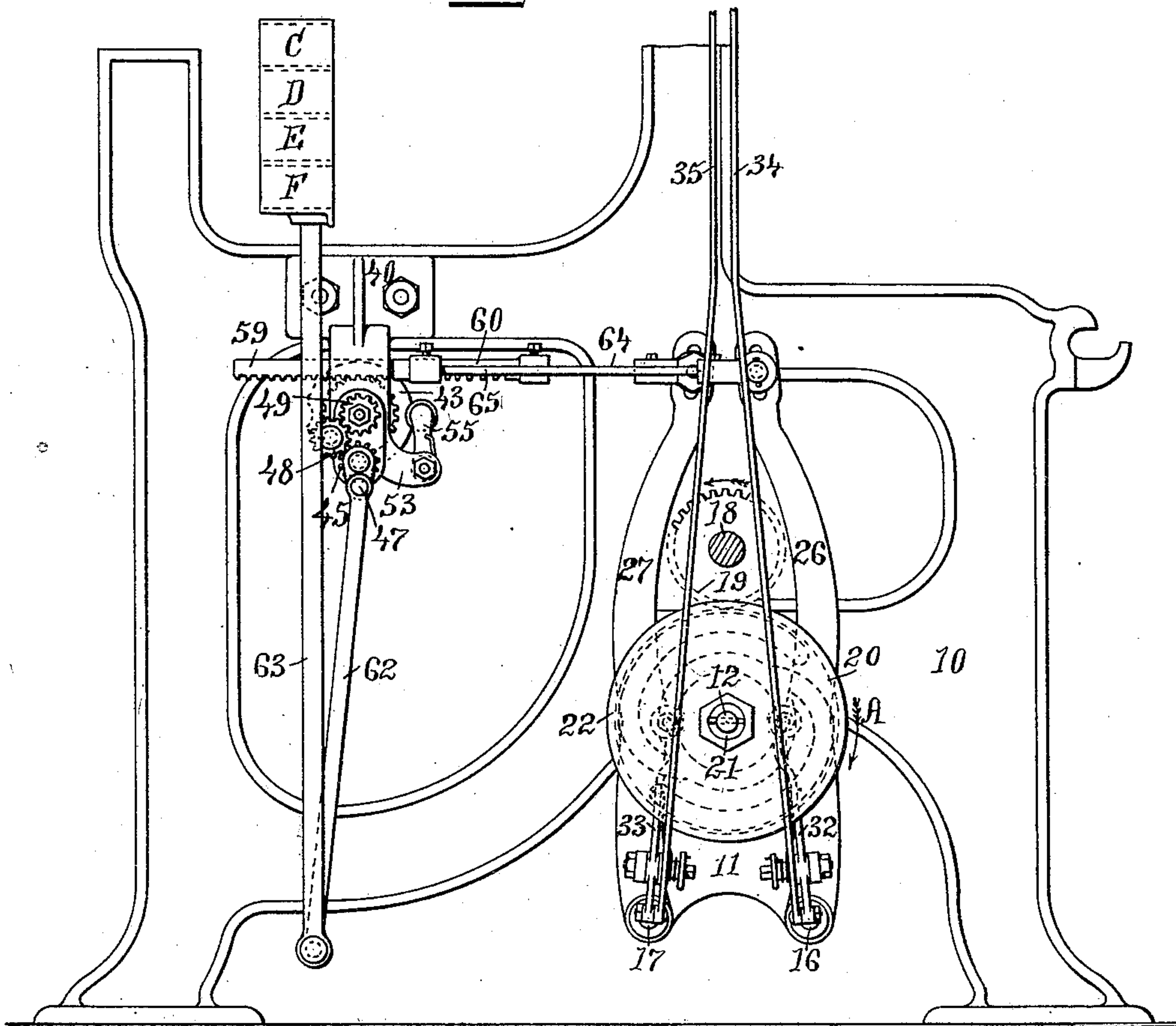


Fig. 2.

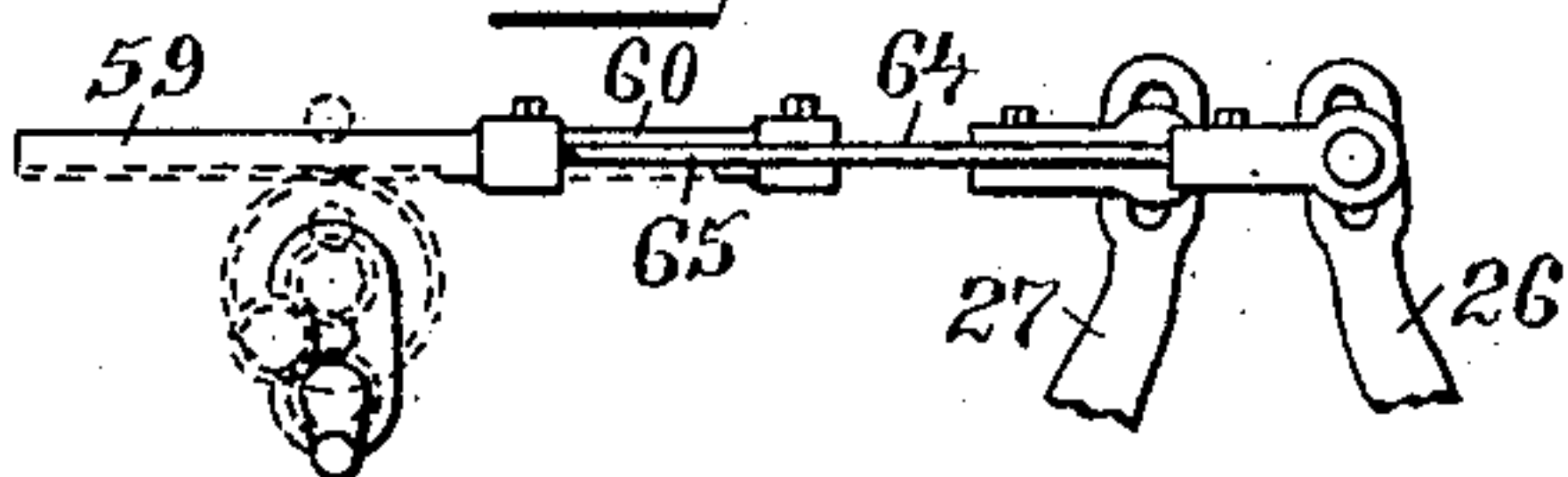


Fig. 4.

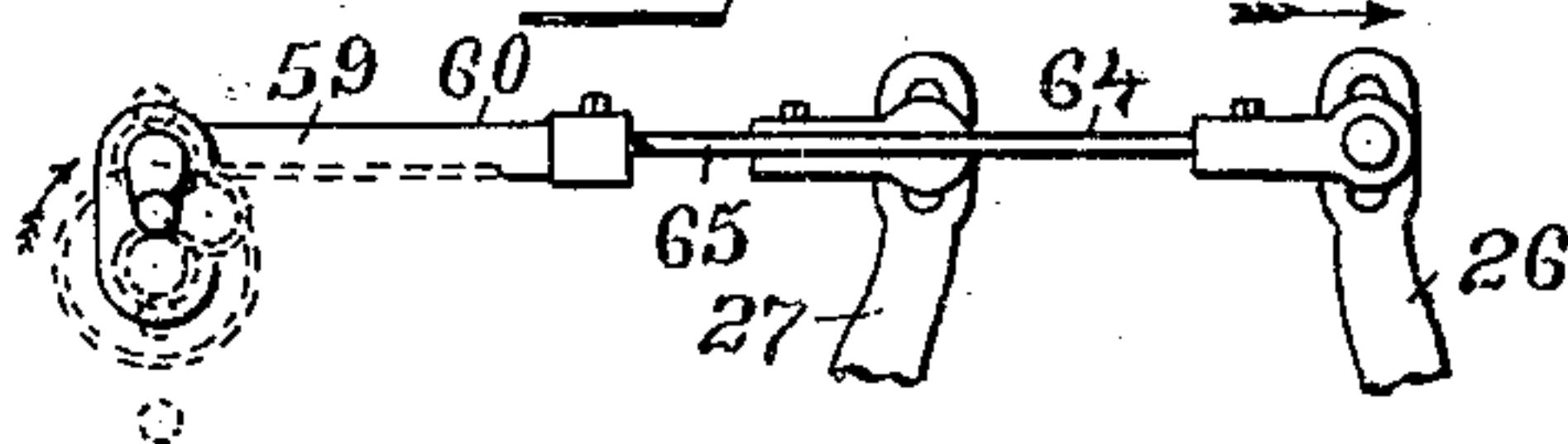


Fig. 3.

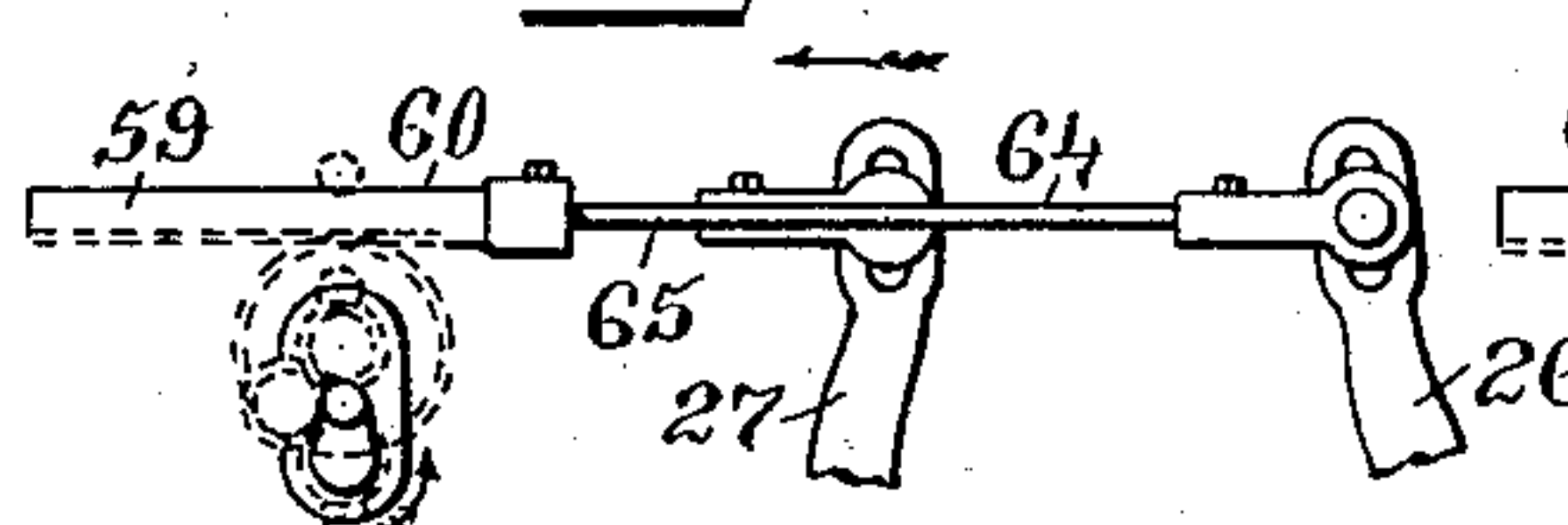
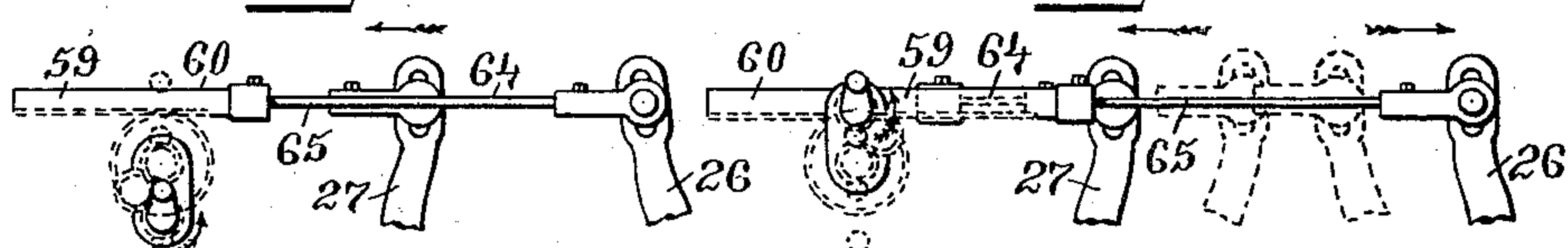


Fig. 5.



WITNESSES:

Chas. H. Luther Jr.
Wm. F. Bligh

INVENTOR:

Ephraim E. Orrell
by Joseph A. Miller & Co.
Attys

(No Model.)

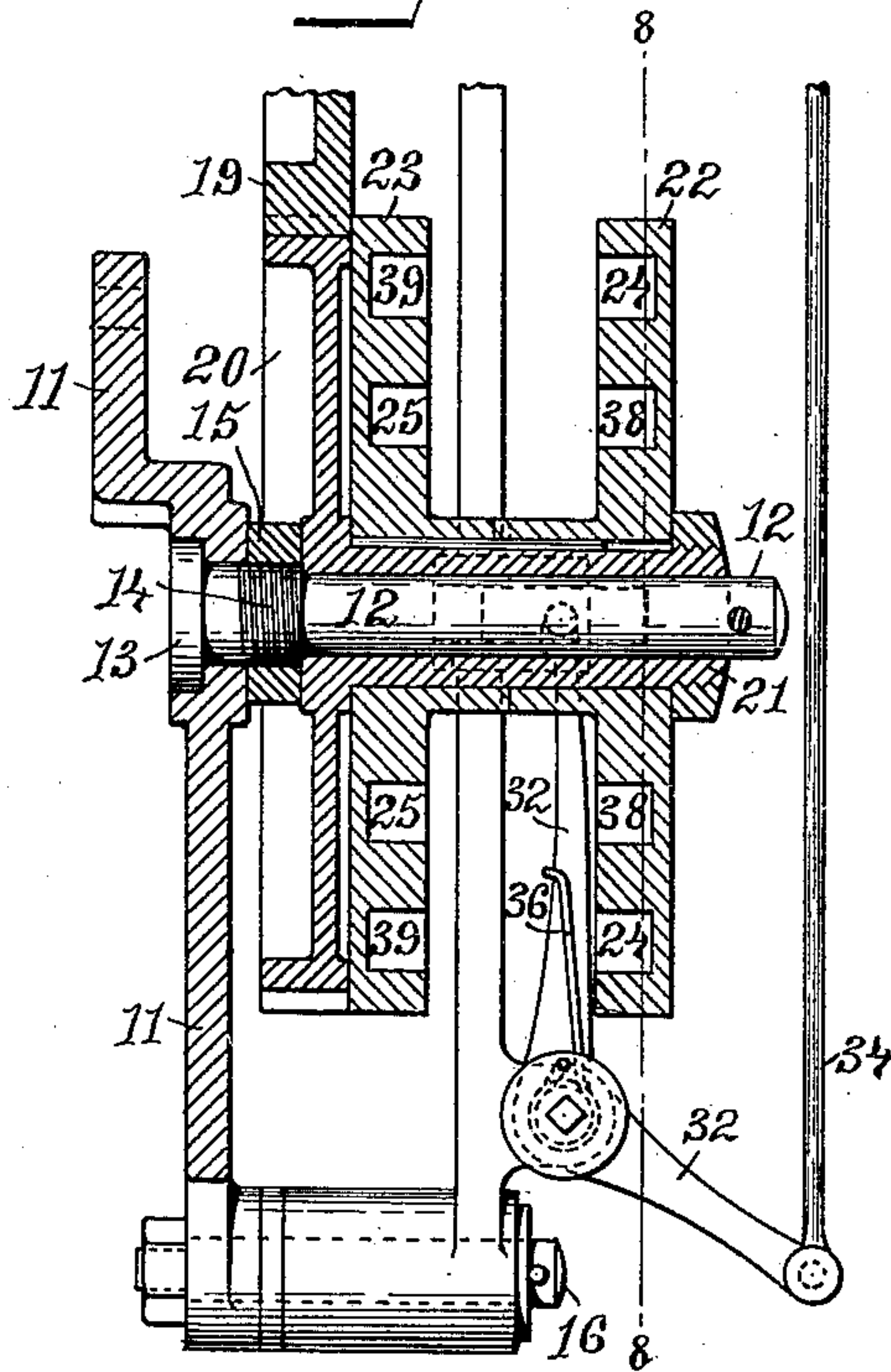
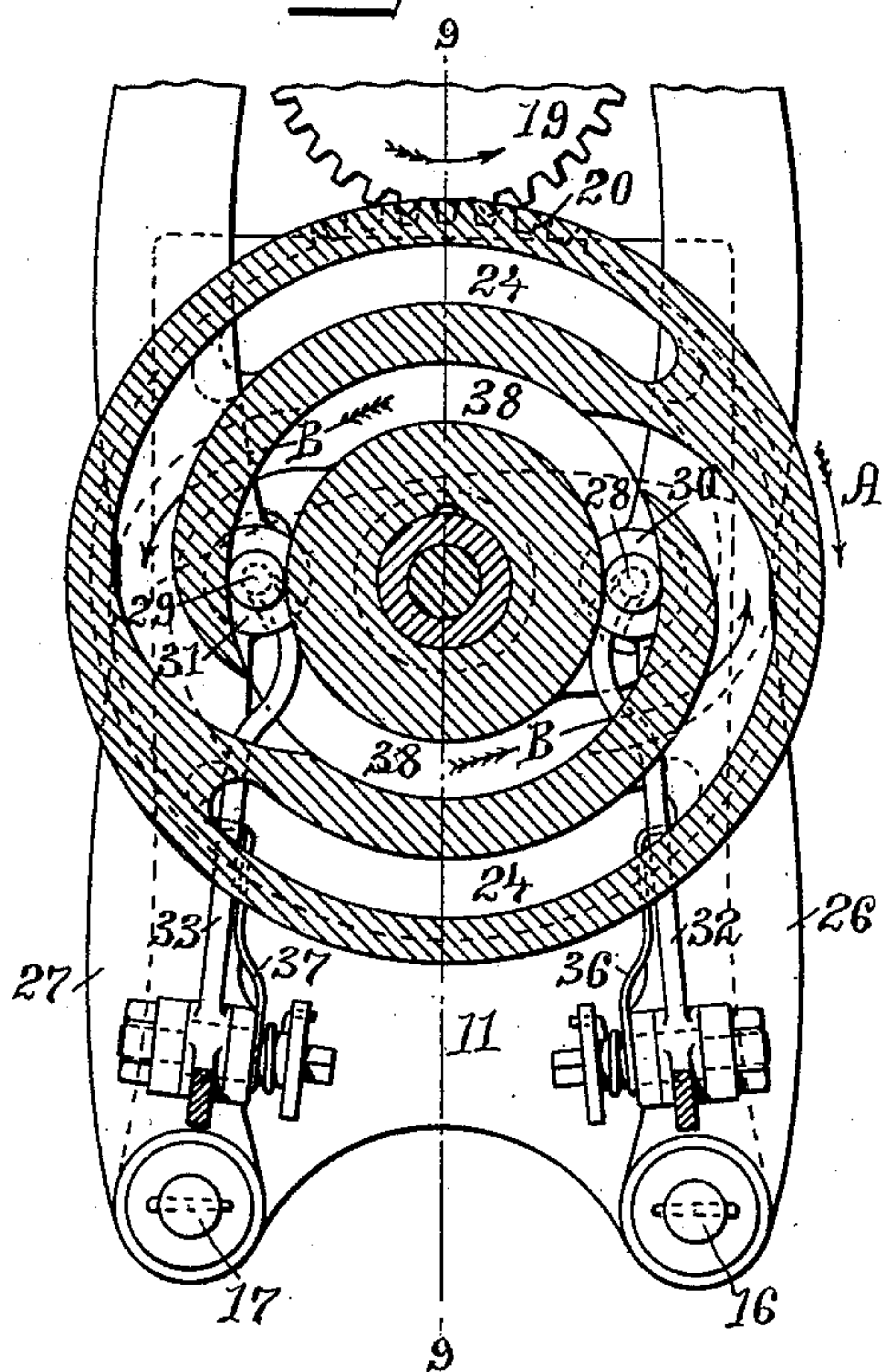
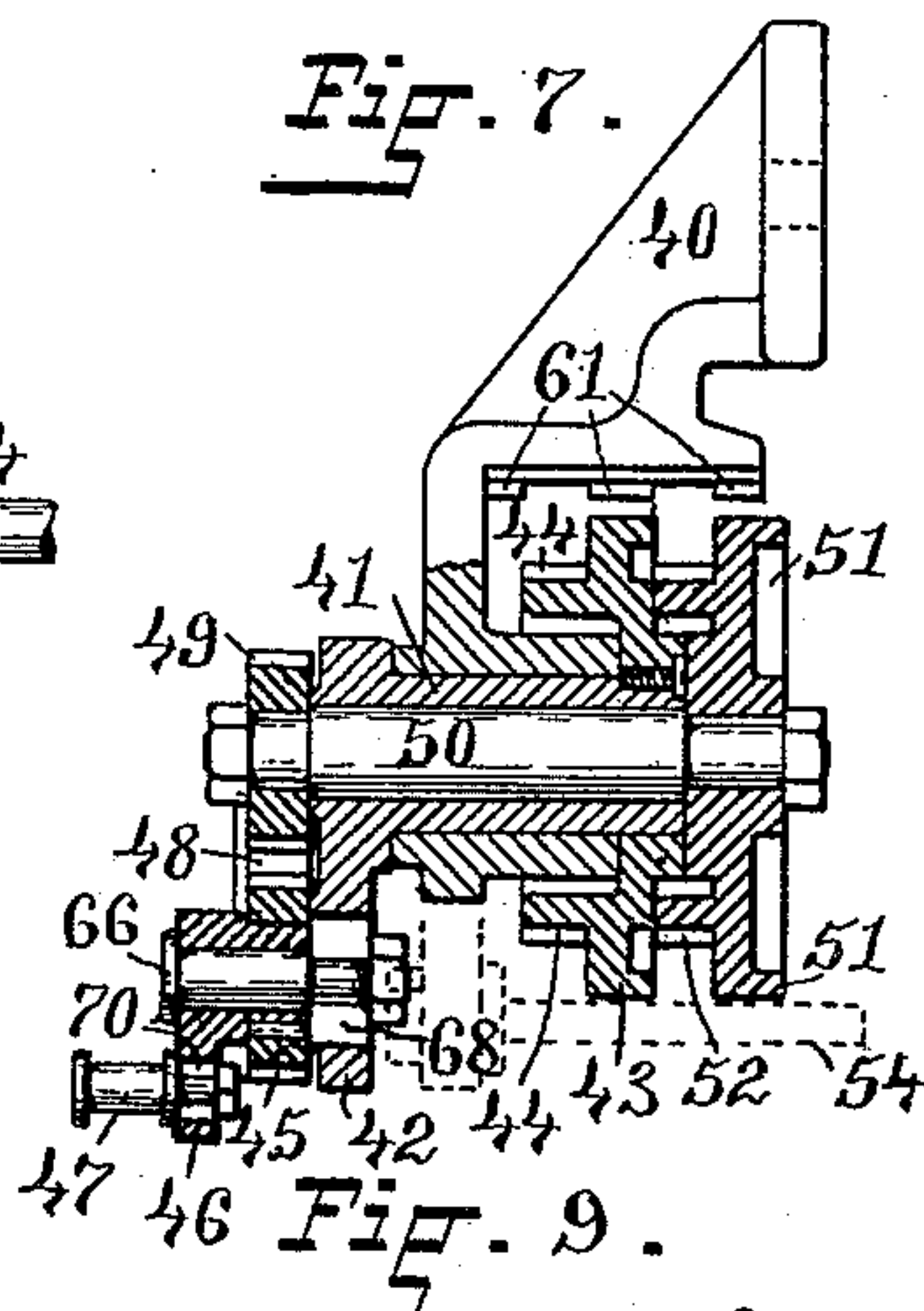
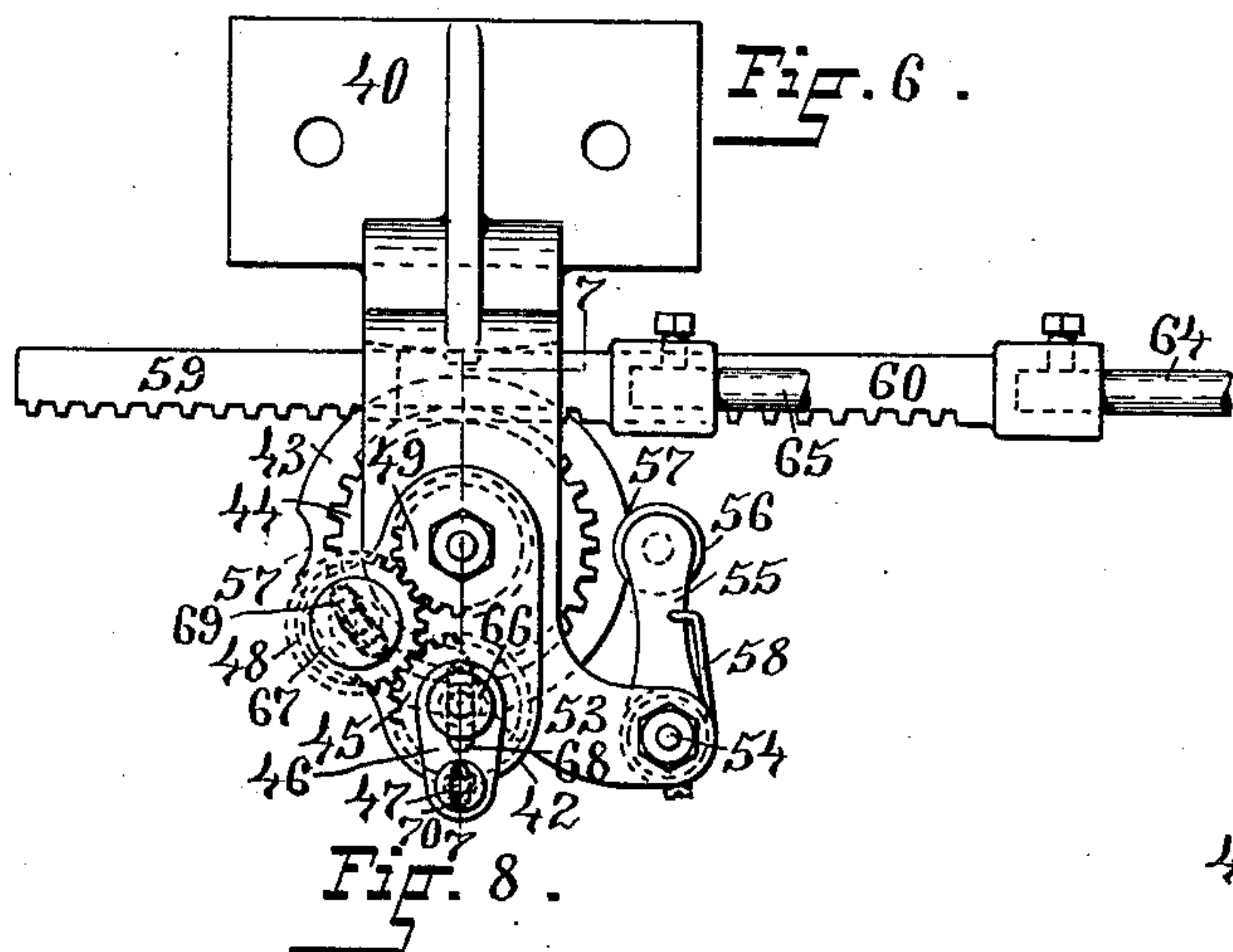
3 Sheets—Sheet 2.

E. E. ORRELL.

SHUTTLE BOX OPERATING DEVICE FOR LOOMS.

No. 410,850.

Patented Sept. 10, 1889.



WITNESSES:

Chas. H. Luther Jr.
M. F. Bligh.

INVENTOR:

Ephraim E. Orrell
by Joseph A. Miller & Co
Attys

(No Model.)

3 Sheets—Sheet 3.

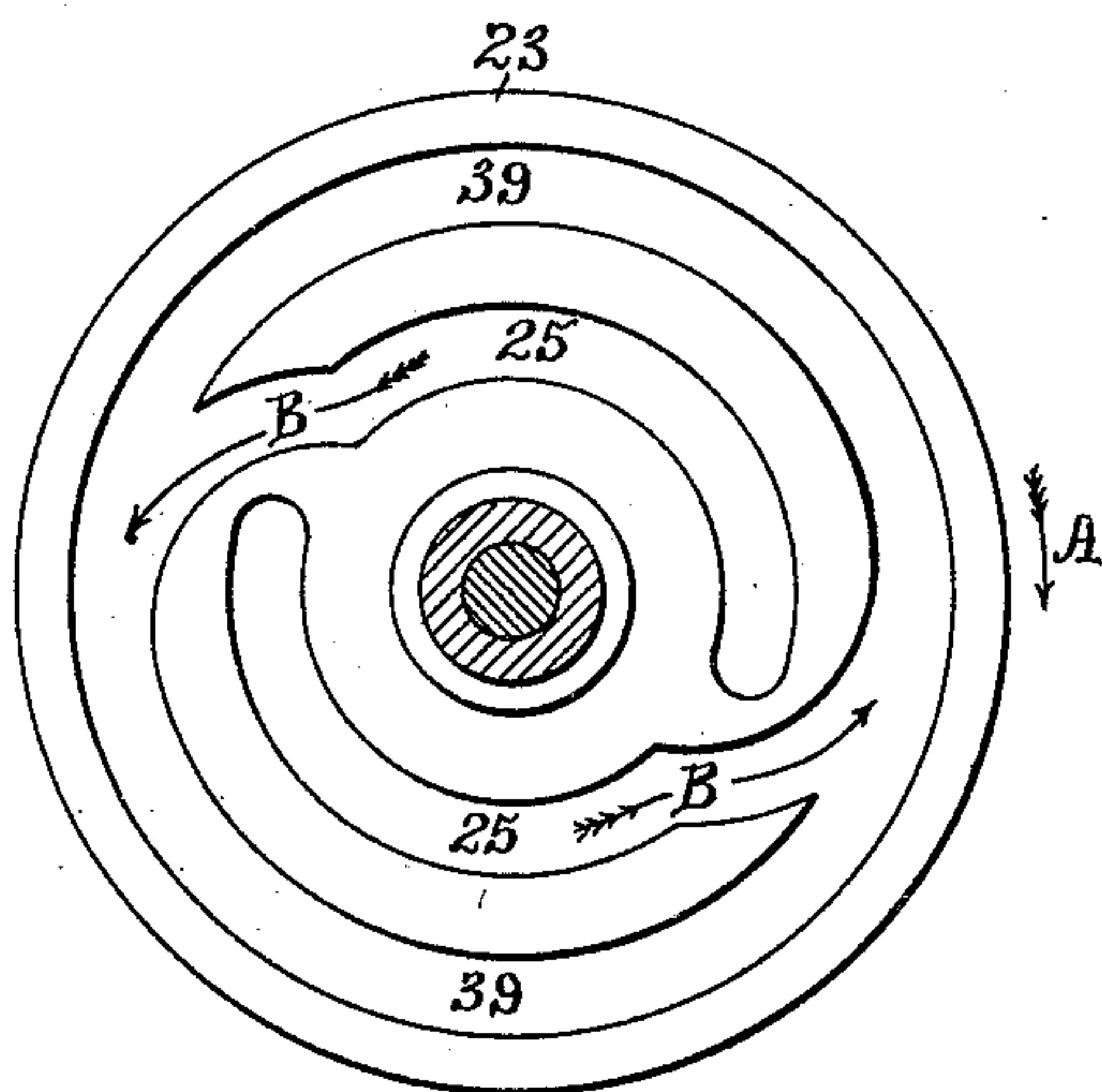
E. E. ORRELL.

SHUTTLE BOX OPERATING DEVICE FOR LOOMS.

No. 410,850.

Patented Sept. 10, 1889.

Fig. 10.



WITNESSES:

M. F. Bligh.
Chas. H. Luther Jr.

INVENTOR:

Ephraim E. Orrell
by Joseph A. Miller & Co.
attorneys

UNITED STATES PATENT OFFICE.

EPHRAIM E. ORRELL, OF WARE, MASSACHUSETTS.

SHUTTLE-BOX-OPERATING DEVICE FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 410,850, dated September 10, 1889.

Application filed July 16, 1888. Serial No. 280,095. (No model.)

To all whom it may concern:

Be it known that I, EPHRAIM E. ORRELL, residing at Ware, in the county of Hampshire and State of Massachusetts, have invented certain new and useful Improvements in Shuttle-Box-Operating Devices for Looms, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

This invention relates to a device for operating the shuttle-boxes of looms in which goods having different colors in their designs are being woven, and is in part an improvement on Patent No. 357,499, issued to me February 8, 1887.

The object of the invention is to obtain positive action of the shuttle-boxes, so that the box containing the shuttle carrying the required thread will be at once and positively moved in position to allow of the throwing of the shuttle across the shed.

In the accompanying drawings, forming part of this specification, Figure 1 is a side elevation of the frame of a loom with my improved device attached thereto. Figs. 2, 3, 4, and 5 are side views of portions of the device to clearly show the successive positions of the parts in operation. Fig. 6 is a side view of the box-operating device. Fig. 7 is a sectional view taken on the line 7 7 of Fig. 6. Fig. 8 is a side view of part of the rack-operating device, the front cam being shown in section, the section being taken on the line 8 8 of Fig. 9. Fig. 9 is a sectional view of part of the rack-operating device, the section being taken on the line 9 9 of Fig. 8. Fig. 10 is a view of the cam 23, showing the grooves in the same.

In the accompanying drawings, illustrating my invention, like numbers of reference designate corresponding parts throughout.

Referring to the drawings, 10 represents the side frame of a loom; 11, a frame-piece used when the device is attached to the old form of loom. In making the side frame 10 of a loom to be provided with my attachment the frame-piece 11 may be cast integral with the side frame of the loom, and therefore form part thereof.

The frame-piece 11 is provided with the bearing-pin 12, having the head 13 and the screw-threaded portion 14, which pin is se-

curely held in position on the frame-piece 11 by means of the nut 15. The frame-piece 11 is also provided with the two pins 16 and 17.

On the main driving-shaft 18 of the loom is secured the gear 19, which intermeshes with and drives the gear 20, provided with the hub 21, having a nut screw-threaded on the end thereof, said gear 20 being mounted on the bearing-pin 12.

On the hub 21 of the gear 20 are mounted the two cams 22 and 23. These cams 22 and 23 are secured to the gear 20 or hub 21 by a spline or otherwise, so as to revolve with the gear in the direction indicated by the arrow A in Figs. 1 and 8. In the face of the respective cams 22 and 23 are cut the grooves or ways 24 and 25. The arms or levers 26 and 27 are respectively mounted on the pins 16 and 17, and are provided with the movable bolts 28 and 29, located in and capable of being moved in the bosses 30 and 31, formed on the inner faces of the arms 26 and 27, respectively. To the said arms 26 and 27 are pivoted the bell-cranks 32 and 33. One end of each of the said bell-cranks is pivoted to the movable bolts 28 and 29, while to the other end of each of the bell-cranks are connected the rods 34 and 35, which rods are operated by the balls on the pattern-chain mechanism, so as to be lifted, thereby lifting the lower end of the bell-crank and moving the upper end or that connected with the bolt in toward the frame of the loom. Each of the bell-cranks is provided with a spring 36 37, consisting of a length of spring-wire one end of which is bent so as to enter a hole in the disk shown on the inner square end of the projecting fulcrum pin or shaft on which the bell-crank is journaled. The wire is wound once or twice around the fulcrum-pin and then projects upward, having the other end bent to bear against the vertical arm of the bell-crank. The tension of these springs is regulated by turning the shafts on which the springs are wound with a wrench placed on the projecting square ends shown in Fig. 8. In the normal position the ends to which the rods 34 35 are attached will be depressed by the springs 36 37, thereby keeping the bolts 28 29 shot into the groove or way formed in the outer cam 22.

It will be readily seen from Fig. 8 of the

drawings, which shows a section of the cam 22 taken on the line 8 8 of Fig. 9, that the grooves or ways 24 cut in said cam 22 are closed at one of their ends, and that the open ends lead into the groove 38, which is in the form of a complete circle. In the cam 23 the position of the grooves is reversed, the groove or way 39 forming a complete circle, which is in the same position relative to the center of the cam as the circular portions of the ways 24 in the cam 22, and the grooves or ways 25 are closed ways, their circular portion coinciding with the circular groove 38 on the cam 22 and their open ends leading into the circular groove or way 39. The cam 23 has the ways 25 leading out from the central closed ways to the circular groove or way 39, as indicated in Fig. 8 by the arrows B.

It will therefore be readily seen that the operation of this part of the device is as follows: Upon the lower end of the bell-crank 32 being lifted by the rod 34 the upper end of the bell-crank, or that connected to and moving the bolt 28, movably secured in the boss 30 on the arm 26, will be moved in toward the frame of the loom, carrying with it the bolt 28, the end of which will enter the way 25 in cam 23, and as the cams are revolved in the direction indicated by arrow A the bolt will be caused to travel from the inner circle to the outer one, or that designated 39, thereby moving the free end of the pivoted arm 26 away from the central line. To return the arm to its normal position, the ball on the pattern-chain, which has lifted the rod 34 in the common and well-known manner, having passed, the spring 36, which was under tension, will at once depress the lower end of the bell-crank 32, carrying with it the rod 34, and will also move the upper end of said bell-crank, carrying the bolt 28 toward the outer cam 22. The bolt 28 will enter the groove 24 and pass therefrom into the circle 38, whereupon the arm 26 will be returned to its normal position.

In the above description of the operation only one lever, or that designated 26, and its connecting parts are described as being operated. It is, however, evident that the lever 27 is operated in precisely the same manner as the lever 26, and therefore the description of the operation of one will be sufficient for both.

Near the line of movement of the shuttle-boxes I secure to the loom-frame the bracket 40, which has journaled therein the sleeve 41, provided on one end with the crank-arm 42. To this sleeve 41 is secured the disk 43, provided with the gear 44, and on the crank-arm 42 is journaled the gear 45, carrying the arm 46, to which the crank-pin 47 is attached. Journaled on this crank-arm 42 is the idle-pinion or intermediate gear 48, which intermeshes with the gear 45 and the gear 49, secured at one end of the shaft 50. The shaft 50 is provided with the disk 51, having the gear 52.

The stud-pins 66 and 67, supporting the two

gears 45 and 48, pass through the slots 68 and 69, formed in the crank-arm 42, and by reason of said slots the said gears 45 and 48 may be suitably adjusted. The crank-pin 47 is also supported in a slot 70, formed in the arm 46, whereby said pin may also be given adjustment.

Extending from the arm 53, which forms part of the bracket-piece 40, is the bearing-pin 54, (shown in dotted lines in Fig. 7,) on which are loosely pivoted two arms 55, one for each of the disks 43 and 51. The said arms 55 are provided at their free ends with the anti-friction rollers 56, the object of the rollers being to enter the depressions 57 in the disks 43 and 51, and thereby lock said disks against jar or movement incidental to the running of the loom by reason of the force exerted on the arms 55 by the springs 58.

The gears 44 and 52 are provided with the operating-racks 59 and 60, respectively. These racks are held in position by means of the lugs 61, cast on the under side of the bracket 40. The link 62 is connected at one end to the crank-pin 47 and at the other end to the rod 63, secured to the bottom of the shuttle-boxes C, D, E, and F.

By using the intermediate pinion 48, I am enabled to positively move the shuttle-box into the desired position without any yank motion—that is, moving the boxes to a higher position and then dropping them to the desired position.

Having thus described the invention and its object, I will now describe the operation of the several devices composing my said invention.

In Figs. 1 and 2 the device is shown in its normal position—that is to say, when the free ends of the arms 26 and 27 are the nearest together and the shuttle-box C is in position to receive or have the shuttle thrown therefrom. For the parts to obtain the position shown in Fig. 3—that is, to lift the D box into position—the following operation is necessary: The proper ball arriving on the pattern-chain, the rod 35 will be drawn up, thereby lifting the lower end of the bell-crank 33 and moving the upper end in, and with it the bolt 29 out from the groove 38 in the cam 22 and into the groove 25 of the cam 23, whence the bolt 29 will travel out to the circular groove 39, and with it the arm 27 will be moved into the position shown in Fig. 3. As the arm 27 is connected to the rack 60 by means of the rod 64, the rack 60 will be moved in, causing the gear 52 to revolve, and with it the shaft 50 and gear 49, and through the intermediate pinion 48 the gear 45, thereby moving the crank-pin 47 into the position shown in Fig. 3 and lifting the D box into position by means of the connecting-link 62 and rod 63.

To obtain the position shown in Fig. 4—that is, to lift the E box into the desired position—the arms 26 and 27 being then in the normal position shown in Figs. 1 and 2 and the proper ball arriving on the pattern-chain,

the rod 34 will be drawn up, thereby lifting the lower end of the bell-crank 32, moving the upper end in and with it the bolt 28 out from the groove 38 in the cam 22 and into the groove 25 of the cam 23, whence the bolt 28 will travel out into the circular groove 39, and with it the arm 26 will be moved into the position shown in Fig. 4, and as the arm 26 is connected to the rack 59 by means of the rod 65 the rack 59 will be moved out, causing the gear 44 to revolve, and with it the sleeve 41 and crank-arm 42, thereby moving the crank-pin 47 into the position shown in Fig. 4 and lifting the E box into position by means of the connecting-link 62 and rod 63.

To obtain the fourth and last position, or that shown in Fig. 5, or the lifting of the F box into position, the arms 26 and 27 being then in the normal position shown in Figs. 1 and 2 and the proper balls arriving on the pattern-chain, the rod 34 will be drawn up, thereby lifting the lower end of the bell-crank 32, moving the upper end in and with it the bolt 28 out from the groove 38 in the cam 22 and into the groove 25 of the cam 23, whence the bolt 28 will travel out into the circular groove 39, and with it the arm 26 will be moved into the position shown in Fig. 4, and as the arm 26 is connected to the rack 59 by means of the rod 65 the rack 59 will be moved out, causing the gear 44 to revolve, and with it the sleeve 41 and crank-arm 42, thereby moving the crank-pin 47, and at the same time the rod 35 will be drawn up, thereby lifting the lower end of the bell-crank 33 and moving the upper end in and with it the bolt 29 out from the groove 38 in the cam 22 and into the groove 25 of the cam 23, whence the bolt 29 will travel out to the circular groove 39, and with it the arm 27 will be moved into the position shown in Fig. 3, and as the arm 27 is connected to the rack 60 by means of the rod 64 the rack 60 will be moved in, causing the gear 52 to revolve, and with it the shaft 50 and gear 49, and through the intermediate pinion 48 the gear 45, thereby moving the crank-pin 47 into its highest position, and with it the box F by means of the connecting-link 62 and rod 63.

To simplify and make the description more clear, I have described the last operation as occurring in two steps, whereas in point of fact, as the two balls on the pattern-chain arrive at the same moment, the two arms 26 and 27 and their connecting parts are all moved at the same time.

In order to overcome the effect of any inequalities which may occur in the casting of the boxes, whereby the distance might vary from one box to another, and to enable us to present accurately all the series of four boxes at a level with the shuttle-race, according to the demands of the pattern being woven, I adopt the following method of adjustment:

If the distance from the bottom of the C box to the bottom of the D box is found to be by actual measurement two inches, it is only

necessary to place the crank-pin 47 and the stud-pin 66 for gear 45 one inch from center to center. This also serves for movement from E box to F box. If there is any variation, it must be divided. The adjustment for the distance from the bottom of the box D to the bottom of the box E is made with reference to the center of the shaft 50. If by actual measurement the distance is two and one-eighth inches, then the distance from the center of the crank-pin 47 to the center of the shaft 50 when the crank-pin is in the position shown in Fig. 3 or in Fig. 4 must be one and one-sixteenth inch. To adjust the intermediate gear 48 and gear 49 so as to properly mesh with the gear 45, it will be necessary only to loosen the nut of the stud-pin 66 and move the stud-pin, and with it the gear 45, so that the distance from the center of the crank-pin 47 when in its upper position to the center of the shaft 50 will be one and one-sixteenth inch, at which point the stud-pin 66 will be secured by tightening the nut, and to move said gear 48 down the slot 69 until it meshes properly with gear 45, and then secure the same.

It is obvious that any desired box may be called into action whenever desired by the proper arrangement of the pattern-chain.

Various modifications may be made in the construction of the devices herein shown and described without departing from the spirit of my invention.

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

1. In combination, the driven gear provided with the hub, the two cams mounted upon said hub, the pivoted arms or levers provided with movable bolts, and the bell-cranks for moving the bolts out of connection with one cam and into connection with the other cam, substantially as and for the purpose herein shown and described.

2. In a shuttle-box-lifting device, the arms or levers provided with the bolts, the cams, and the bell-cranks for operating the said bolts, in combination with the racks, the shaft having the disk provided with the gear mounted at one end and the gear mounted on the other end of said shaft and operating the gear carrying the arm provided with the crank-pin through the intermediate gear, the crank-arm, the gear, the crank-pin, and the intermediate gear or pinion, the said crank-arm being provided with a sleeve upon which is mounted the disk provided with a gear, the shuttle-boxes, and connections from the crank-pin to the shuttle-boxes, substantially as described.

3. In a shuttle-box-lifting device, the combination, with the arms 26 and 27, provided with the bolts 28 29, the cams 22 and 23, provided with the ways 24 38 39 25, and the bell-cranks 32 33, connected with the bolts 28 29 and operated by the pattern-chain through the rods 34 35, of the racks 59 60, the crank

46, (and the gears 45, 48, 49, 52, and 44, the shaft 50, the sleeve 41, the arm 42, and the pin 66,) the shuttle-boxes, and connections from the crank-pin 47 to the shuttle-boxes, as described.

4. In combination, the racks 59 60, the shaft 50, the gear 52, the gear 45, having the crank-pin 47, the intermediate gear 48, the gear 49, and the crank-arm 42, provided with the gear 44, the shuttle-boxes, and connections from crank-pin 47 to the shuttle-boxes, substantially as described.

5. In a shuttle-box-lifting device, the arms or levers 26 27, pivoted to the frame-piece and provided with the bolts 28 29 and the bell-cranks 32 33, having the springs 36 37, for holding one arm of each of said bell-cranks depressed, the said bell-cranks being pivoted on said arms and connected to and operating the bolts 28 29, in combination with the racks 59 60, the shaft 50, the disk 51, having the depressions 57 and the gear 52, the gear 45, having the arm 46, carrying the crank-pin 47, attached thereto, the intermediate gear 48, the gear 49, the crank-arm 42, provided with the sleeve 41, having the disk 43, provided with the depressions 57, and the gear 44, mounted on said disk, and the pivoted arms 55, carrying the rolls 56 and provided with the springs 58, for holding said rolls in contact with the said disks 43 and 51, the shuttle-boxes, and connections from crank-pin 47 to the shuttle-boxes, substantially as described.

6. In a shuttle-box-lifting device, the combination, with the shuttle-boxes and connections to the pin 47, the sleeve 41, and arm 42, the racks 59 and 60, and the gears 44 and 52, of the shaft 50, provided with the gear 49, the intermediate gear 48, the stud-pin 67, the gear 45, connected to and adjustable with the crank 46, the crank 46, the crank-pin 47, and the stud-pin 66, constructed to adjust the throw of the crank to the shuttle-boxes, as described.

7. In a shuttle-box-operating device for drop-box looms, the combination, with the two racks for operating the drop-box mechanism, of the shipper mechanism consisting of the bell-crank levers 32 33, the cams 22 23, the bolts 28 29, and the arms 26 27, as described.

8. A device for controlling the drop-boxes of a loom, consisting of the bell-crank levers 32 33, operated from the pattern-chain, the cams 22 23, and the bolts 28 29, the arms 26 and 27, the racks 59 and 60, the cranks 42 and 46, the mechanism intermediate the racks and the cranks, and the connection between the crank 46 and the drop-boxes, as described.

In witness whereof I have hereunto set my hand.

EPHRAIM E. ORRELL.

Witnesses:

BENJ. GRIDLEY,
WM. B. DIXON.