

No. 653,868.

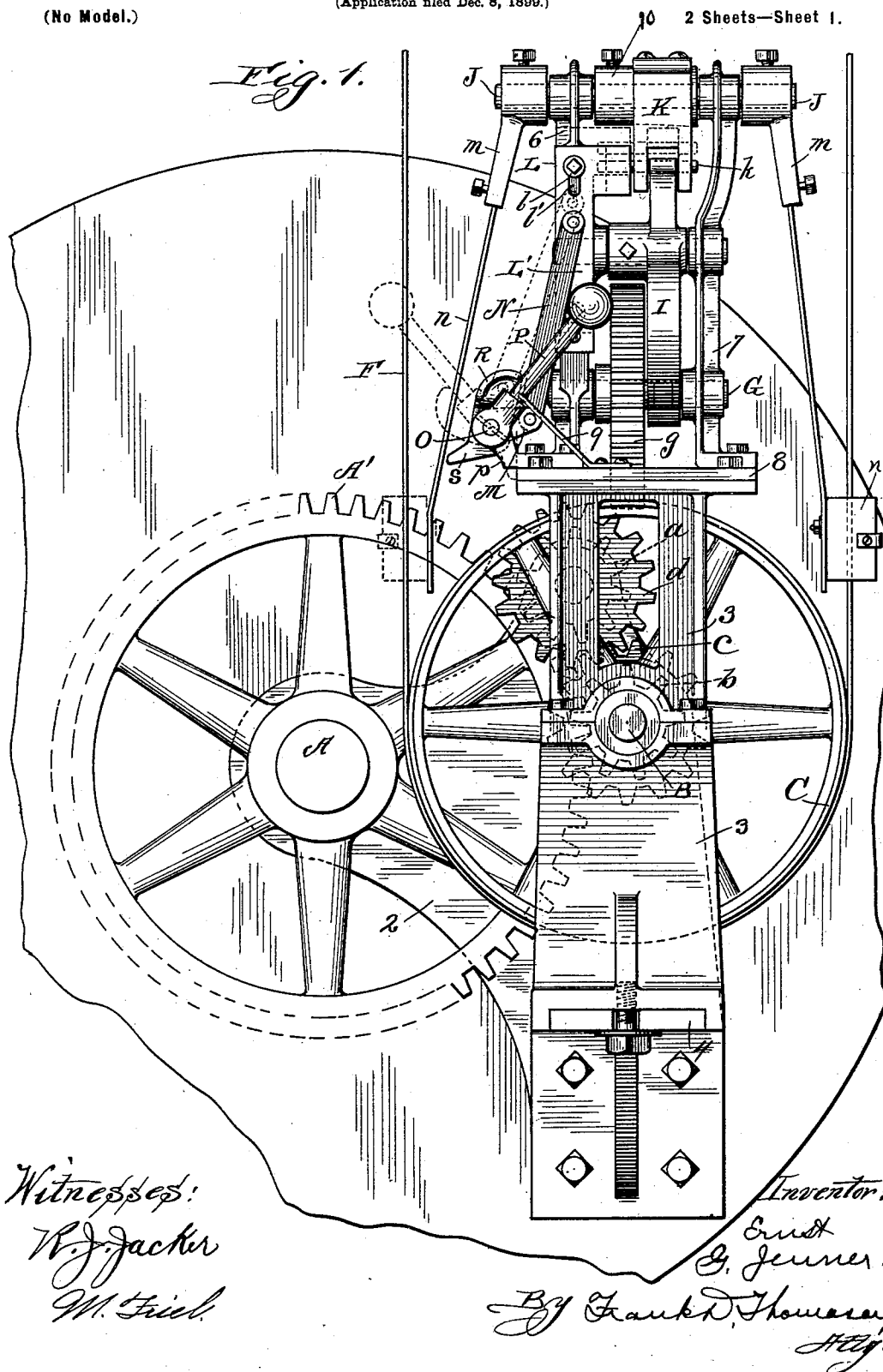
Patented July 17, 1900.

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BELT SHIFTER.

(Application filed Dec. 8, 1899.)

(No Model.)

2 Sheets—Sheet 1.



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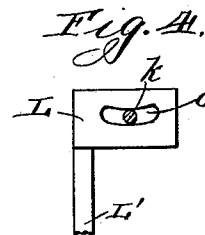
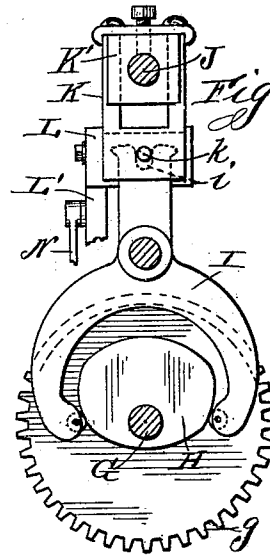
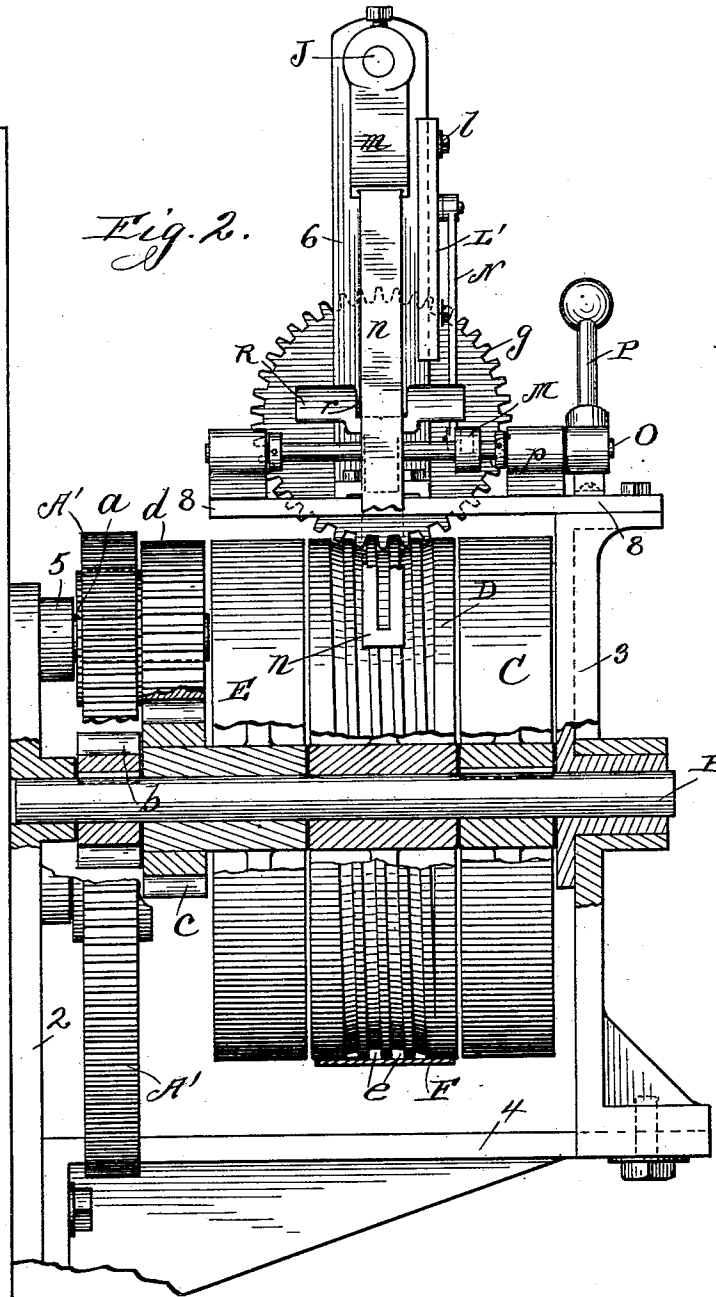
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BELT SHIFTER.

(Application filed Dec. 8, 1899.)

(No Model.)

2 Sheets—Sheet 2.



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UNITED STATES PATENT OFFICE.

ERNST G. JENNER, OF CHICAGO, ILLINOIS.

BELT-SHIFTER.

SPECIFICATION forming part of Letters Patent No. 653,868, dated July 17, 1900.

Application filed December 8, 1899. Serial No. 739,892. (No model.)

To all whom it may concern:

Be it known that I, ERNST G. JENNER, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Belt-Shifters, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, and to the characters of reference marked thereon.

The object of my invention is to obtain a rotary reciprocal motion of a shaft by means of shifting devices which utilize the motion of but one belt instead of employing two, according to the method now in extensive use. By my improvements it is possible to make the forward and reverse revolution of the rotary reciprocal shaft of exactly the same speed, something which it is very difficult to accomplish by the use of the ordinary straight and crossed belts, because of the almost unavoidable difference in the tight or loose contact of the same on the pulley. This I accomplish by the means hereinafter fully described and as particularly pointed out in the claims.

In the drawings, Figure 1 is a side view of the belt-shifter embodying my invention. Fig. 2 is a front elevation thereof. Fig. 3 is a transverse vertical section taken on dotted line 3 3, Fig. 1, looking in the direction indicated by the arrows. Fig. 4 is a detail view showing the rear side of the upper broken-away portion of the vertically-reciprocal frame connected with the stopping mechanism and used for lifting the device through which power is imparted to the belt-shifting shaft.

In the drawings, A represents the reversible rotary shaft, having a comparatively-large gear A' mounted thereon, which is respectively engaged by an idle pinion *a* and by the pinion *b*, fast on the end of a pulley-shaft B. This pulley-shaft B has its inner end journaled in a supporting-plate 2, which is triangular-shaped and has one of its angles pivoted on shaft A, between gear A' and the side of the machine to which it is intended to apply my invention, so that said plate 2 can be adjusted at any angle desired to the perpendicular plane striking through shaft A. Suitably secured to plate 2, between its other angles, is a bracket 4, and secured to and arising

from the outer end of this bracket is an upright frame in which the outer end of shaft B is journaled.

Secured to the outer end of the shaft B, next its outer bearing, is a fast pulley C, and mounted upon said shaft B, immediately next pulley C, is a loose pulley D, and immediately next this loose pulley is a pulley E, which also is loose on said shaft. Pulley E has its boss extended laterally toward pinion *b* and provided with a gear *c*. A single belt F engages these three pulleys, and its width is such that when engaging either pulley C or E it will lap over and engage a sufficient portion of the loose pulley D so as to always keep said pulley revolving while the belt is in operation. Pinion *c* is so located as to come next pinion *b* and engages an idle gear *d*, secured to and revolving with the idle pinion *a*, which latter is preferably of a greater diameter and revolves on the stud 5, projecting from supporting-plate 2. Pulley D is provided with a peripheral worm *e*, the threads of which are flat and of a slightly-less circumference than the portions of the circumference of the pulley on each side of the same. This pulley engages a worm-gear *g*, which is fast on a shaft G, journaled in vertical standards 6 and 7 at right angles to the pulley-shaft. These standards are secured to an overhanging platform 8, one end of which is securely fastened to the upper end of the upright 3 of the supporting-frame.

Between the worm-gear *g* and the rear standard 7 an elliptical cam H is secured eccentrically to shaft G, substantially as shown, and is adapted to engage the intumed ends of the crescent-shaped lower portion of the rocking frame I, the upper single straight arm of which alines with an imaginary plane intersecting the center of motion of said frame and striking midway between the ends of the bifurcations of the said lower crescent-shaped portion thereof. This rocking frame is secured to a short shaft extending parallel to and located above shaft G, which latter is suitably journaled in standards 6 and 7. The upper end of the upper straight arm of rocking frame I is adapted to receive a cross-pin *k*, secured in the downwardly-projecting lugs of the diametrically-reciprocal crank-frame K, which actuates rock-shaft J, which latter is

journalled in bearings in the upper ends of standards 6 and 7. The forward end of the rock-shaft J extends beyond its bearings and has secured thereon the shifting-arm *m*. This shifting-arm is provided with a suitable longitudinal socket for the reception of the end of the extension *n* thereof. The lower end of the extension *n* is preferably bent about as shown, and has pivoted thereto in suitable manner the U-shaped sheet-metal guide *n'*, between the parallel portions of which belt F passes.

The operation of the mechanism hereinbefore described is substantially as follows:

15 The worm *e* of the pulley D, engaging the worm-gear *g*, rocks the rocking frame I through the medium of the frame K, and frame I, by virtue of its engagement with the arm K, rocks shaft J slowly from side to side, so that the belt F engages first the pulley C and then the pulley E, and so on. The belt is, as I have heretofore explained, of such a width that it engages the central pulley all the time, so that

25 the oscillation of the shifting-arm would continue until the belt was slipped from the pulleys or the main shaft stopped. This is avoided, and I am enabled to stop the oscillation of the shifting-arm whenever desired by comparatively-simple mechanism. This mechanism consists of a vertically-reciprocal head L, which is provided with a rectangular block normally located immediately in front of the lower end of the crank-frame K, which block

35 has a segmentally-elongated horizontal groove *o* in its rear side, into which the forward end of the crank-pin *k*, which extends beyond its bearings, enters. This head has a downward extension *L'* depending from one side thereof, which projects forward from the same in such manner as to enable its flanged vertical edges to embrace the sides of the standard 6, which serves as a guide therefor. It is held to this standard by means of set-screws *l*, which extend through vertically-elongated openings

45 *l'* in the extension of said head and are tapped into said standard 6. The extension of head L is connected to an arm M by a link N, and arm M projects from a short rock-shaft O, the ends of which are journalled in bearings in the ends of knuckles *p*, that are suitably bolted or otherwise secured to the overhanging platform. One of the ends of this rock-shaft O extends through one of its bearings

55 and has a weighted arm P, which when thrown back into the position shown in Fig. 1 preferably rests against or in the notched end of a brace 9. Between its bearings the rock-shaft O has mounted thereon a shoe R, which consists of a T-shaped casting having the upper edges of its alining arms parallel with the shaft O and rounded on that side nearest the shifting-arm and provided with a depression or recess *r* at about its center of length that

65 alines with the vertical axial plane of shaft J. When weighted arm P is thrown forward

into the position shown in dotted lines in Fig. 1, link N moves the head L upward, and the latter lifts the crank-frame K until the pin *k* is out of engagement with the recess *i* in the upper end of the rocking frame I. At the same time the shoe R is moved or thrown forward, and if the shifting-arm is not in a vertical position bears against said arm until the latter oscillates to a vertical position, whereupon it falls forward, so as to confine the extension *n* in its depression or recess *r*, and until the heel *s* of said shoe bears against the adjacent side edge of the platform to prevent further forward movement of the same. It will be observed that until the rocking frame I is in a substantially-vertical position pin *k* could not be lifted out of the recess *i* in its upper end. The relative arrangement of the shifting-arm and this rocking frame I is such that they will arrive at a vertical plane simultaneously. Thus the shoe will not move forward to the limit of its movement in that direction until the crank-frame K is lifted out of engagement with said rocking frame, and vice versa. When it is desired to start the belt-shifting arm again, the weighted arm P is thrown back to the position shown in Fig. 1, thus drawing the head L downward, so that when frame I shall next arrive at the vertical plane the crank-frame can be moved down, (partly by its own weight,) so that the pin *k* enters the recess *i*.

The crank-frame K has a longitudinal slot in it, the length of which corresponds to the extent of its reciprocal movement and the width of which corresponds to the width of a block K', secured to the shaft and fitted within the slot of said crank-frame K. This arrangement permits the crank-frame to reciprocate and yet imparts its rocking motion to shaft J. The crank-frame is prevented from becoming longitudinally displaced on shaft J by means of a collar 10 on one side and any other suitable means on the other side.

If desired, both ends of the shifting-shaft J may extend beyond their bearings, and both of these extended ends may have shifting-arms *m n*.

What I claim as new is—

1. The combination with a shaft, three pulleys, placed side by side thereon, the outer one only of which is fast to said shaft and the central one of which is provided with a suitable circumferential worm and means for imparting the motion of said shaft and the outer loose pulley to a reciprocal rotary shaft, of a rocking shaft, and means actuated by said central pulley for rocking said shaft, a shifting-arm on the end of said rock-shaft, and a belt movable from side to side by said shifting-arm.

2. The combination in a belt-shifting device with a shaft, three pulleys, the central and one outer one of which are loose on said shaft and the other outer one fast thereon, of a rocking shaft, means actuated by the cen-

tral pulley for rocking said rocking shaft, a shifting-arm on the end of the same and a belt shifted by said arm.

3. The combination in a belt-shifting device with a shaft, three pulleys, the central and one outer one of which are loose on said shaft and the other outer one fast thereon, of a rocking shaft, means actuated by the central pulley for rocking the rocking shaft, a shifting-arm secured to the same, and a belt of such width as to always engage said central pulley and which is shifted by said arm.

4. The combination in a belt-shifting device, with a shaft, three pulleys the central and one outer one of which are loose on said shaft and the other outer one fast thereon, and the central one of which is provided with a peripheral worm, of a worm-gear actuated by the worm of the central pulley, a rocking shaft, means for converting the rotary motion of said gear to an oscillatory movement and imparting the same to said rock-shaft, a shifting-arm connected to said rock-shaft, and a single belt engaging said pulleys and shifted by said arm.

5. The combination in a belt-shifting device, with a shaft, three pulleys thereon the central and one outer one of which are loose on said shaft and the other outer one fast thereon, and the central one of which is provided with a circumferential worm, of a worm-gear engaged by said central pulley, a rock-shaft actuated by said worm-gear a shifting-arm connected to said rock-shaft and a single belt engaging said pulleys and shifted by said arm.

6. The combination in a belt-shifting device, with a shaft, three pulleys thereon the central and one outer one of which are loose on said shaft and the other outer one of which is fast thereto, and a single belt of such width that it always engages said central pulley, of belt-shifting devices, and means actuated by said central pulley for operating said shifting devices.

7. The combination in a belt-shifting device, with a shaft, and three pulleys, thereon, the central one of which is loose and has a peripheral worm, of a worm-gear engaging said central pulley.

8. The combination in a belt-shifting device, with a shaft, three pulleys thereon, the central one of which is loose and is provided with a peripheral worm, of a worm-gear engaged by said central pulley, a cam on the same shaft thereon, a rocking frame actuated by said cam, a rock-shaft, a crank-block thereon engaged by said rocking frame, and a shifting-arm on the end of said rock-shaft.

9. The combination in a belt-shifting device, with a shaft, a nest of three pulleys thereon the central one of which is loose and is provided with a peripheral worm, of a worm-gear engaged by said central pulley, a cam on the same shaft thereon, a rocking frame actuated by said cam, a rock-shaft, a crank-

block thereon rocking with said shaft but having an independent reciprocal movement of its own whereby it can be disengaged from said rocking frame, and a shifting-arm secured to said rock-shaft.

10. In a belt-shifting device a rock-shaft, and a belt-shifting arm secured thereto, in combination with a crank-block on said shaft which rocks therewith but has an independent reciprocal movement, means for actuating said rock-shaft through the medium of said crank-block, and devices for moving said crank-block longitudinally out of engagement with the shaft-actuating devices.

11. In a belt-shifting device, a rock-shaft, and a belt-shifting arm secured thereto in combination with a crank-block on said shaft which rocks therewith but has an independent reciprocal movement, a rocking frame having a recess in the end of its upper arm which is engaged by said crank-block, and devices for moving said crank-block longitudinally out of engagement with said rocking-frame.

12. In a belt-shifting device, a rock-shaft, and a belt-shifting arm secured thereto, in combination with a crank-block adapted to rock with said shaft but having a reciprocal movement transverse thereto and provided with downwardly-projecting lugs and a horizontal pin extended through the same, a rocking frame having a recess or notch in the end of its upper arm into which the said pin is adapted to enter and devices for actuating said rocking frame and means for reciprocating said crank-block out of engagement with said rocking frame.

13. In a belt-shifting device a nest of three pulleys, a shifting rock-shaft, and a belt-shifting arm secured thereto, in combination with a crank-block, and means for actuating said shaft through the medium of said crank-block, an arm, a link, a head connected to said arm by said link, a rock-shaft and means connected to said shaft which when said shaft is moved toward the front engages and confines said shifting-arm in a vertical position and simultaneously causes said crank-block to become disengaged from its actuating mechanism.

14. In a belt-shifting device, a nest of three pulleys, a belt-shifting arm, and a rock-shaft to which said arm is secured, in combination with a crank-block a shoe having a recess in its edge to receive said shifting-arm, a rock-shaft to which said shoe is secured and means connecting said rock-shaft and crank-block whereby said crank-block is moved transversely on said shaft when said shoe is moved forward to engage said shifting-arm.

15. In a belt-shifting device, a nest of three pulleys, a belt-shifting arm, and a rock-shaft to which said belt-shifting arm is secured, in combination with a crank-block secured to said rock-shaft but having an independent transverse movement thereon and means for

actuating said shaft through the medium of
said crank-block, a shoe having a recess in its
edge adapted to engage said belt-shifting arm,
a rock-shaft from which said shoe projects a
5 weighted arm secured to said rock-shaft, a
crank-arm, a link, and a reciprocal head con-
nected to said crank-arm by said link and

adapted to engage said crank-block as and for
the purpose set forth.

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Witnesses:

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