

E. C. SMITH.
SHIFTING DEVICE.
APPLICATION FILED NOV. 9, 1908.

1,036,737.

Patented Aug. 27, 1912.
3 SHEETS—SHEET 1.

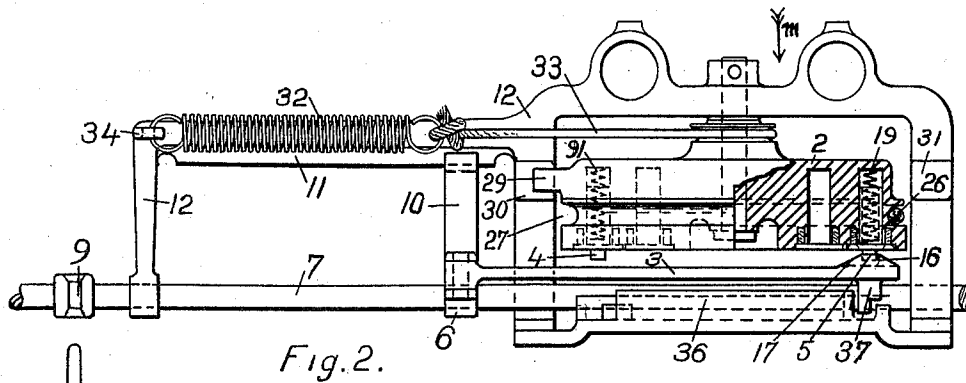


Fig. 2.

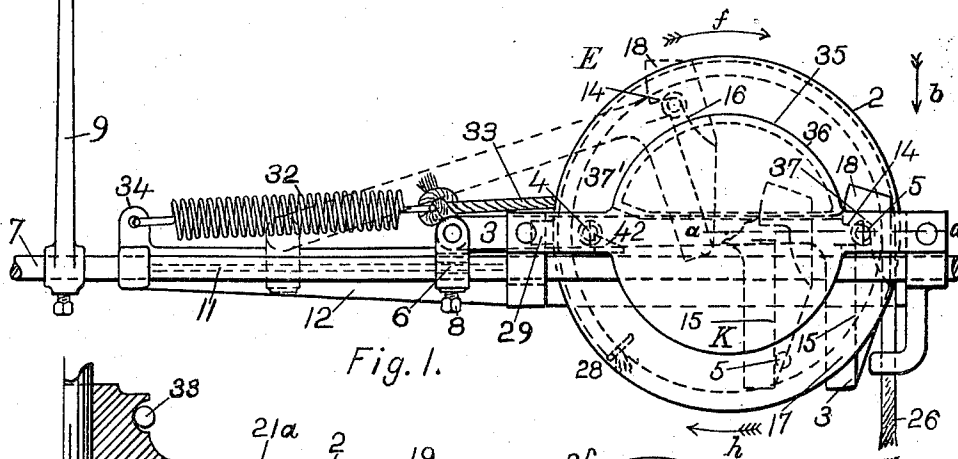


Fig. 1.

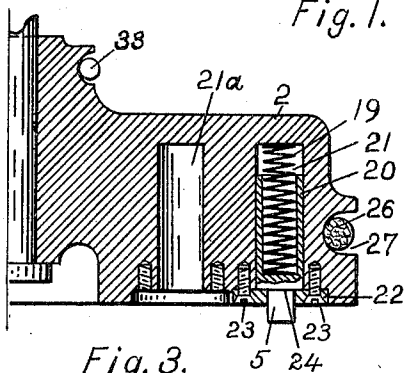


Fig. 3.

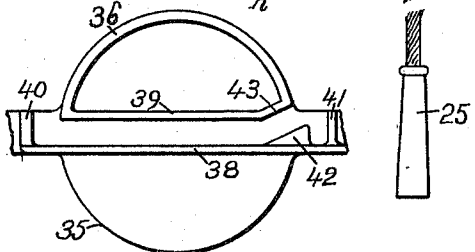


Fig. 4.

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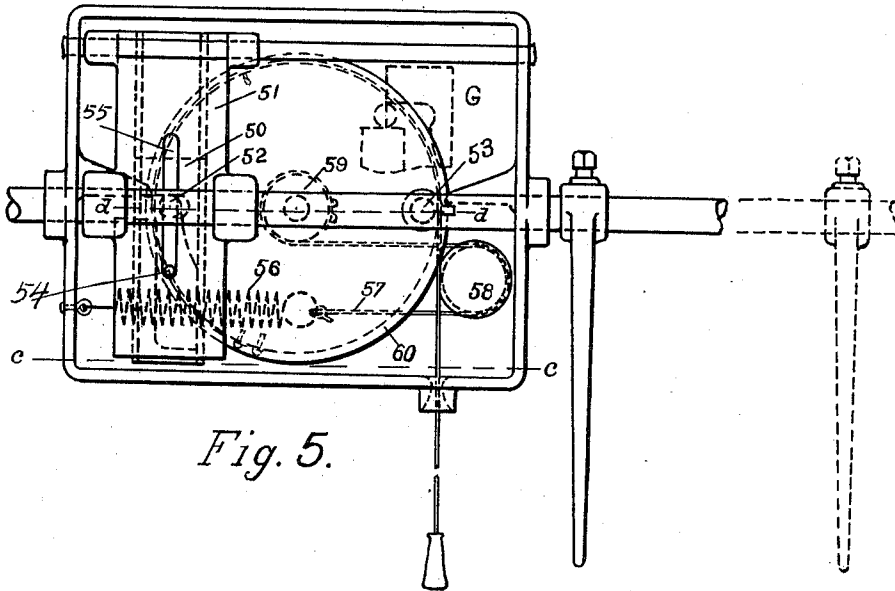


Fig. 5.

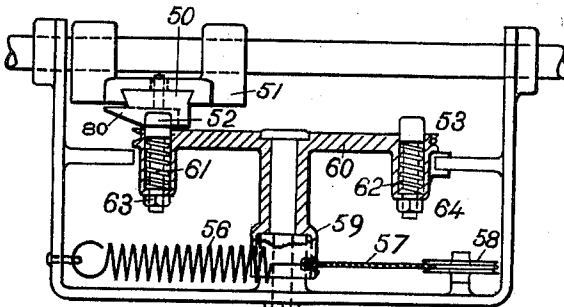


Fig. 6.

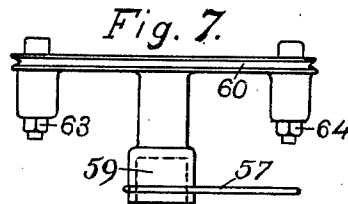


Fig. 7.

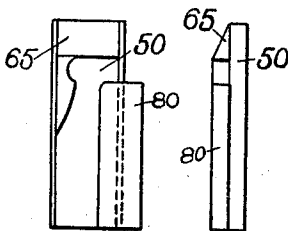


Fig. 8.

Fig. 9.

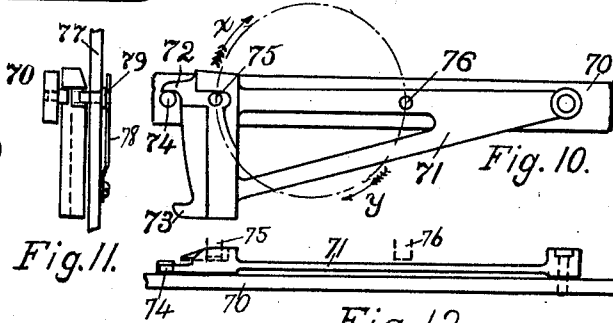


Fig. 10.

Fig. 11.

Fig. 12.

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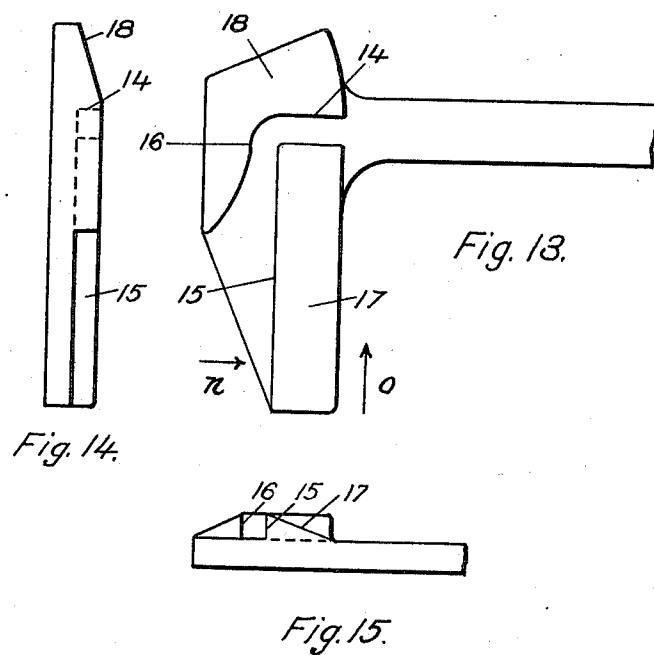
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3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

EDWIN C. SMITH, OF SEEKONK, MASSACHUSETTS.

SHIFTING DEVICE.

1,036,737.

Specification of Letters Patent.

Patented Aug. 27, 1912.

Application filed November 9, 1908. Serial No. 461,819.

To all whom it may concern:

Be it known that I, EDWIN C. SMITH, a citizen of the United States, residing at Seekonk, in the county of Bristol and State of Massachusetts, have invented a new and useful Shifting Device, of which the following is a specification.

My invention relates to belt shifters, and particularly to that class known as "pull" belt shifters in which the movement of the belt shifter fork in alternately opposite directions is effected by pulling the operating handle and always in the same direction.

The following specification with the accompanying drawings fully discloses my invention, the drawings representing respectively:—Figure 1, a front elevation of the preferred embodiment of my invention. Fig. 2, a plan view of the same in part section on the line *a—b*, viewed in the direction of the arrow *b* Fig. 1. Fig. 3, a sectional detail of the wheel 2, showing the mode of mounting the pins 4 and 5. Fig. 4, a part view of the cover 35 showing the shaped guide 36, and devices for locking the member 3 against displacement. Fig. 5, a front elevation of a modification. Fig. 6, a plan view of same, sectional on the line *c—c*, but showing the wheel 60 in section on the line *d—d*. Fig. 7, a detail of the wheel 60. Figs. 8 and 9, details of the slide 50. Figs. 10, 11 and 12, further modifications. Fig. 13 is a view of the head of member 3 looking in the direction of the arrow *m* of Fig. 2. Fig. 14 is a view of the same looking in the direction of the arrow *n* of Fig. 13. Fig. 15 is a view of the same looking in the direction of the arrow *o* of Fig. 13.

My invention comprises essentially a wheel 2 which is capable of oscillation through substantially a half rotation, a reciprocating member 3, preferably in the form of a connecting rod or pitman, and two pins or pawls 4 and 5 which alternately engage the reciprocating member 3 and coact therewith as crank pins. The result of this action is to shift the member 3, together with whatever parts or apparatus are therewith connected, alternately from one extreme to the other of its extent of travel. The reciprocating member 3 is connected with the cross head 6 which in turn is secured to the shipper rod 7 by the set screw 8, and there is also secured to the shipper rod 7 whatever belt guide may be employed, represented

here by the finger 9. The shipper rod 7 is prevented from turning, with resultant displacement of connected parts, by the forked arm 10 which engages the guide 11 on the frame 12. The extremity of the reciprocating member 3 is shaped substantially like the head of a hammer, and in the face of this head portion which is opposed to the face of the wheel 2, is a groove or channel that roughly approximates in form an inverted L, see Fig. 13.

Starting from its extreme left hand position (Fig. 1) the reciprocating member 3 is shifted by engagement of the pin 4 with the edges 14 and 16 of the channel in the head of said member. As the pin 4 revolves about the axis of the wheel 2, the latter turning in the direction of the arrow *f* Fig. 1, it carries with it the member 3, the head of the latter describing an orbit corresponding to that of the pin 4. This is best shown at E—Fig. 1, where the member 3 is indicated by broken lines. The action is essentially that of a crank and connecting rod or pitman. When the pin 4 has traveled through half a revolution it has carried the reciprocating member 3 to the extent of its travel in which position its exposed portions are represented by full lines in Fig. 1. As the pin 4 returns to its initial position, it engages the edge 14 and raises the head of the reciprocating member 3 but recedes from it, passing out through the lateral of the L shaped channel. This is best illustrated at G in Fig. 5, where, though the details of construction differ from the preferred construction, the action is the same. As the head of the reciprocating member 3 traveled from left to right under action of the pin 4 it was raised above and away from interference with the pin 5 which was concurrently moving in the direction of the arrow *h*—Fig. 1. In returning to its own initial position, the pin 5 encounters the head of the member 3 but it engages the beveled surface 17, see Fig. 15 over which it rides and enters the L shaped channel. When the wheel is again turned forward *i. e.* so the pin 4 travels in the direction of the arrow *f* and the pin 5 in the direction of the arrow *h*—the pin 5 engages the edge 15 of the L shaped channel. By means that will be later disclosed, the reciprocating member 3 is withheld from depression below the position indicated by full lines in Fig. 1. Its head cannot follow the

orbit of the pin 5 as it does that of the pin 4, and the pin 5 therefore acts on it with the same action as that of a crank pin with a "slotted cross-head". This is best shown at K in Fig. 1, where the pin 5 and the head of the reciprocating member 3 are shown at near mid position between extremes of travel. The movement of the pin 5 is continued to the extreme of its half revolution and then returned to its initial position by a reverse movement of the wheel 2. Concurrently, the pin 4 returns to its initial position but as it approaches the same, it encounters the head of the reciprocating member 3 at the beveled surface 18, see Fig. 14 over which it rides and again enters the L shaped channel in said head.

The form and disposition of the surfaces 17 and 18 may be best understood by reference to Figs. 13, 14 and 15 which show the head of the member 3 on an enlarged scale.

The pins 4 and 5 are mounted in the wheel 2, in the manner indicated by Fig. 1 and Fig. 3. Springs 91 and 19 project the pins from the wheel 2, to enter the L shaped channel of the head of the reciprocating member 3. Referring to Fig. 3 which shows the pin 5, each pin has an enlarged body 20 which is tubular and within which is the projecting spring 19. The body of the pin is slidable in the bore 21 of the wheel 2, and is held therein by the washer 22 which is secured by two screws 23, forming an abutment for the shoulder 24.

The wheel 2 is operated by the handle 25 on the cord 26, which latter lies in a groove 27 of said wheel and is secured to the wheel at any convenient and suitable point at 28. The wheel 2 is prevented from turning more than a half rotation by the stop 29 which encounters the seat 30 at one extreme of its movement and the seat 31 at the other extreme. It is returned, after operation, by the return spring 32 which is connected with the wheel 2 by the cord 33 and is anchored to the frame 12, by the ear or lug 34. In front of the wheel is a cover 35 on which is a guide 36 of arcuate form, whose function is to sustain the reciprocating member 3, if by chance the pin 4 should be disengaged therefrom before completing its action. For this purpose a projection 37 is provided on the reciprocating member 3 which over-rides the arcuate guide aforesaid, the latter being conformed to the path of travel of the projection 37. Also there is a guide or track 38 which both supports the reciprocating member in its horizontal position and prevents its depression below that position, thus compelling the pin 5 to act with the same effect on the said member 3, as that of a crank pin on a slotted cross-head. But, as the pin 5 nears the end of its travel it is rising, and tends to raise the reciprocating member 3, which tendency is

prevented by the straight guide 39 which subtends the arcuate guide 36.

The reciprocating member 3, with its conjoined parts, is restrained and locked from self movement beyond the extremes of its designed extent of travel by suitable abutments 40 and 41 which are opposed to the projection 37. Movement inward, toward the axis of the wheel 2 is prevented when the reciprocating member 3 is to the right, as indicated in Fig. 1, by engagement of the edge 16 with the pin 5. At the opposite extreme of its travel, to the left in Fig. 1 a lock 42 is formed on the cover 35, behind which the projection 37 drops as indicated at 37'. To provide clearance for the projection 37 as it rides over the stop 42, the straight guide is inclined slightly at its extreme end 43, to conform to the inclination of the stop 42.

It is possible to arrange this device so as to secure different extents of throw with the same device and with but little modification: In Fig. 3 I have shown a second bore 21^a closer to the axis of the wheel 2 than the bore 21. Obviously, with such a change in location of the pins, their extent of action is changed. The only other alteration required is a substitution for the cover used with the longer travel, of a different one with the arcuate guide of different dimension to accommodate the shorter extent of travel. Because such a cover would differ only with respect to its dimensions and not in form from the cover shown, it is not illustrated.

The curvature of the edge 16 of the L shaped channel in the head of the reciprocating member 3, is of sufficiently small radius to permit the pin 5 to leave the channel when set at its closest position to the axis of the wheel 2, *i. e.* in its position of least radius of action.

To recapitulate, the action of the device is as follows: Assuming that the reciprocating member is to the left in Fig. 1, on pulling the handle 25, the wheel 2 is turned, the two pins 4 and 5 revolving about its axis in the directions of the two arrows *f* and *h* respectively. The pin 4 picks up the head of the reciprocating member 3 and carries it above and over the pin 5 to its extreme of travel, the two coacting as a crank and connecting rod. The handle 25 being released, the wheel 2 is returned to its initial position by the return spring 32 acting through the agencies already described. As the pins 4 and 5 return to their initial positions, the pin 5 encounters and rides up the inclined surface 17 of the head of the reciprocating member 3, and enters the L shaped channel thereof. At the next pull of the handle 25, the pin 5, carried by the wheel 2, revolves about the wheel's axis, in the direction of the arrow *h*, the pin 4 concurrently moving

in the direction of the arrow *f* and above the member 3. Under coaction of the pin 5 and head of the reciprocating member 3 as of a crank and slotted crosshead, the reciprocating member 3 is propelled to the extreme of its travel from which it originally started. When the handle 25 is this time released, the two pins 4 and 5 return to their starting points, this time the pin 4 encountering and riding over the inclined surface 18, into the L shaped channel aforesaid.

Obviously, the corporeal embodiment of my invention may be variously modified. Figs. 5 and 6 illustrate one form of such modification. Here, that element which corresponds with the reciprocating member 3 is a slide 50, and it is slidably mounted in the crosshead 51. In this case, there is no "crank and connecting rod" action, but in both cases the action is that of a crank with a slotted crosshead, the slide 50 moves on the crosshead 51 and the wear and friction of action occurs practically between the two latter members alone. In the return action, the slide 50 is stationary with relation to the crosshead 51, and the friction and wear of action occurs almost entirely between the pin 53 and the slide 50. In this form of construction the slide 50 is prevented from falling below its proper position by engagement of the pin 54 of the slide 50 with the end of the slot 55 in the crosshead 51. The return spring 56, acts through the cord 57, which, to insure suitable range of spring action with compactness of structure, is led over an idler sheave 58 to the hub 59 of the wheel 60. The two pins are retained in the wheel 60 against action of the springs 61 and 62, by nuts 63 and 64 instead of by the washers of the preferred construction shown in Fig. 8. As indicated in Fig. 7, the cord 57 may roll up on a plain ungrooved hub.

Figs. 8 and 9 show more clearly the form of the slide 50, Fig. 8 showing more exactly the form of the L shaped channel, so called, and Fig. 9, the beveled or inclined surface 65 which corresponds to the surface 18 on the head of the reciprocating member 3 in the preferred construction of Fig. 1.

Figs. 10—11 and 12 show a further modification in which the shipper rod 70 is a rectangular bar and therefore requires no crosshead to prevent it from rocking over. The reciprocating member 71 is mounted directly thereon and prevented from excessive movement by the projections 72 and 73 which encounter a projection 74 on the shipper bar. The pins 75 and 76 move in the direction of the arrows *x* and *y* respectively and are mounted in the wheel 77 which is simply shown in part in Fig. 11, but which has the same general form and arrangement as has the wheel 2 of Figs. 1 and 2 or the wheel 60 of Figs. 5 and 6 and 7. Further,

the pins 75 and 76 are projected by flat springs as indicated in Fig. 11 by 78, the corresponding pin being prevented from going through the wheel 77 by its head 79.

In all these constructions a manifest advantage lies in that each pin operates from the "dead center" thereby starting the reciprocating member with a gradual acceleration. Likewise, both pins engage the reciprocating member initially at the same point.

Therefore, without limiting myself to the precise form and arrangement of parts, I claim:

1. In a shifting device, the combination with a wheel that is oscillatable through substantially a half rotation, and a reciprocating member, of two pins carried by the wheel that alternately engage the reciprocating member to shift the latter in alternately opposite directions.

2. In a shifting device, the combination with a wheel that is oscillatable through substantially a half rotation, and a reciprocating member, of two pins carried by the wheel that alternately engage the reciprocating member to shift the latter in alternately opposite directions, one pin concurrently lifting and propelling the reciprocating member, the other pin only propelling the reciprocating member.

3. In a shifting device the combination with a wheel and a reciprocating member, of two pins carried by the wheel that alternately engage the reciprocating member in alternately opposite directions, one pin engaging the reciprocating member and coacting therewith in crank and connecting rod fashion to propel it, the other pin coacting with the reciprocating member in crank and slotted crosshead fashion to propel it.

4. In a shifting device the combination with a wheel and two pins carried by the wheel, of a reciprocating member alternately engaged by the two pins and thereby shifted in alternately opposite directions, and having a projection 32, and a stop 42 fixed to engage the projection to lock the reciprocating member against movement.

5. In a shifting device, the combination with a wheel and two pins carried thereby, of a reciprocating member alternately engaged by the two pins and thereby shifted in alternately opposite directions, and having a projection 37, and a guide 36, conformed to the path of travel of the projection 37.

6. In a shifting device, the combination with a wheel and two pins carried thereby, and a reciprocating member alternately engaged by the two pins and thereby shifted in alternately opposite directions, with a projection 37, of a cover 35, formed with an arcuate guide 36, two abutments 40 and

41, a stop 42, and a ledge 38 to uphold the reciprocating member, all said formations being made to engage the projection 37.

7. In a shifting device, the combination
5 with a reciprocating member, of an oscillating member, two independent pins carried by the oscillating member to propel the reciprocating member in alternately opposite directions, each engaging the reciprocating
10 member at substantially the same point at

the commencement of each propulsion as the other, and means to operate the oscillating member.

In testimony whereof I affix my signature in presence of two witnesses.

EDWIN C. SMITH.

Witnesses:

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FRANK J. ROWSE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."