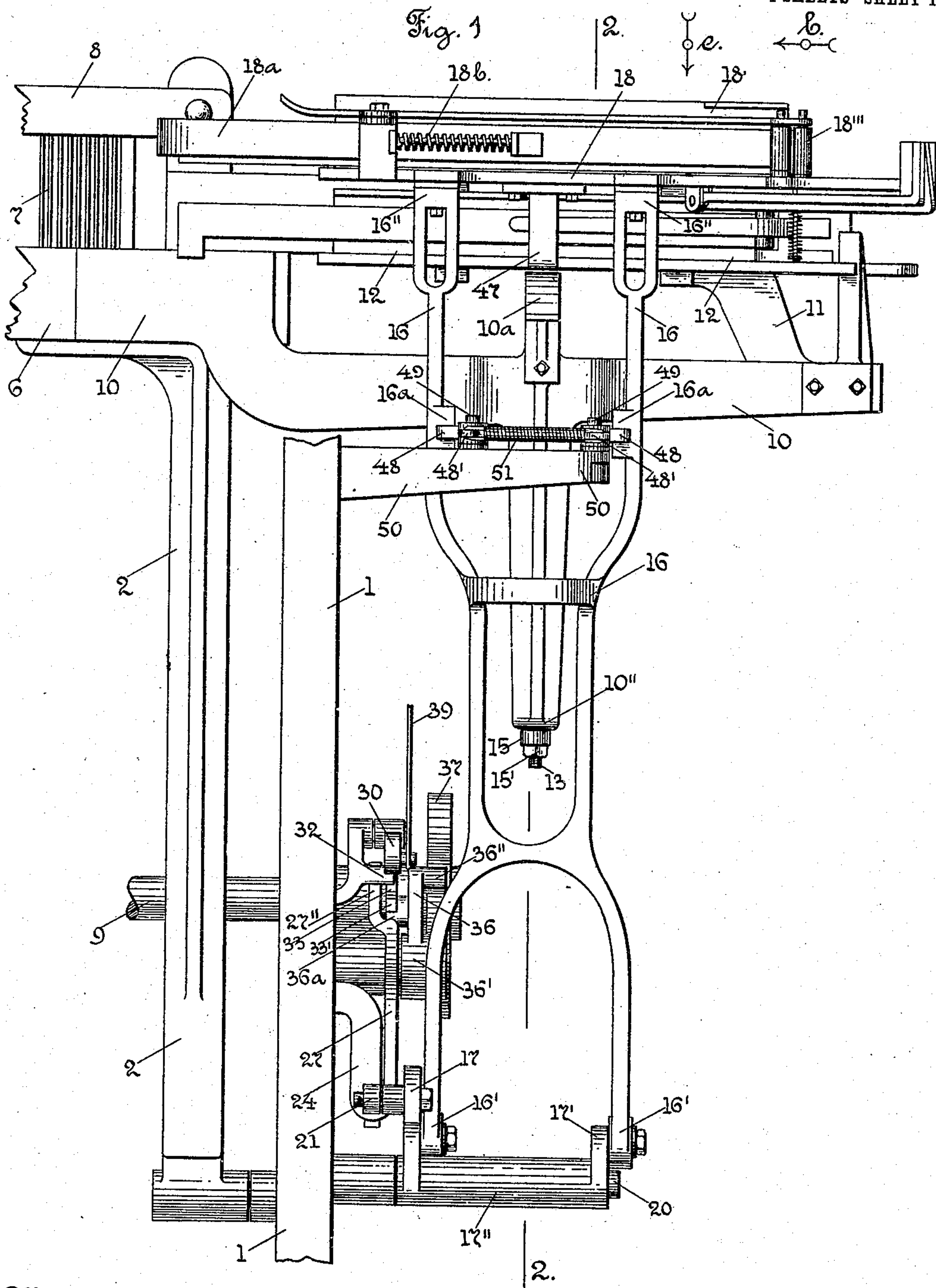


936,949.

E. H. RYON.  
SHUTTLE CHANGING LOOM.  
APPLICATION FILED JULY 17, 1908.

Patented Oct. 12, 1909.  
4 SHEETS—SHEET 1.



Witnesses  
M. Bredt.  
M. Leas.

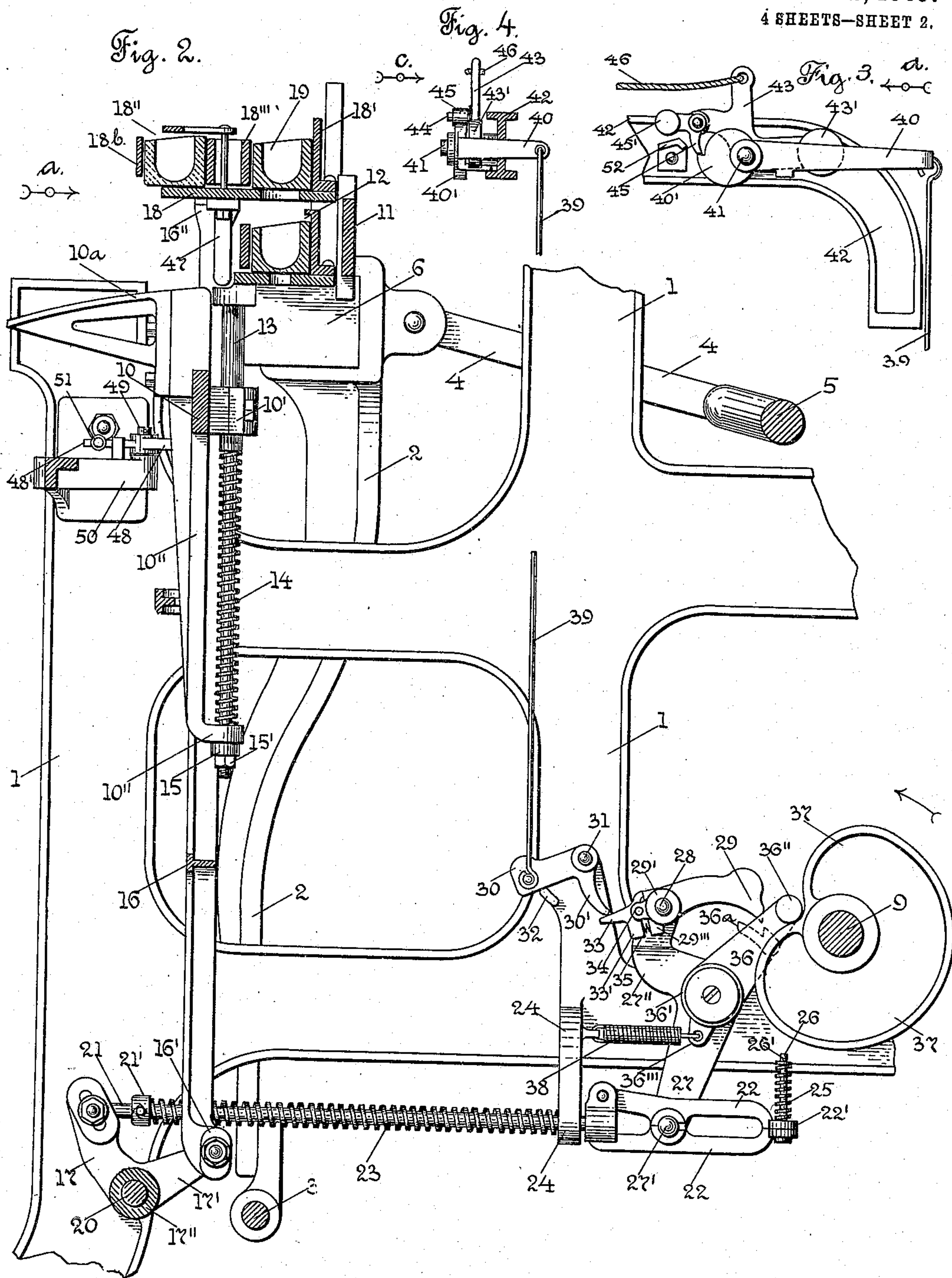
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4 SHEETS—SHEET 2.



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4 SHEETS—SHEET 3.

Fig. 5.

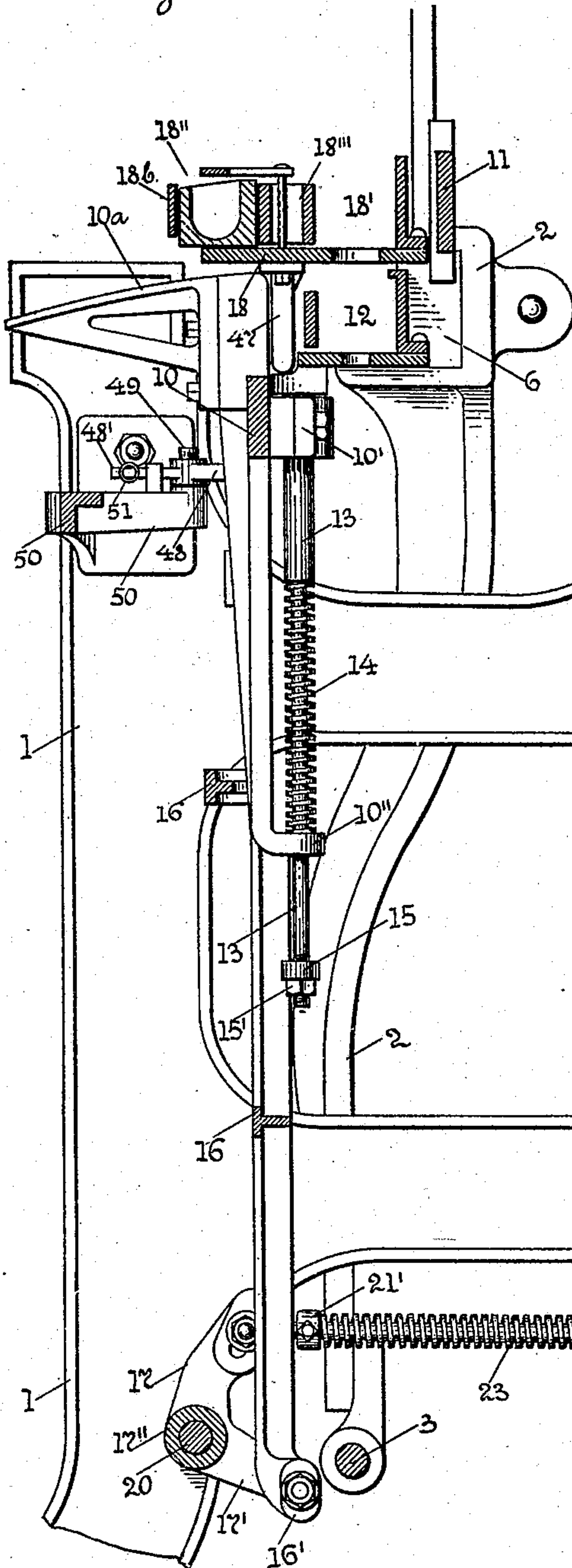
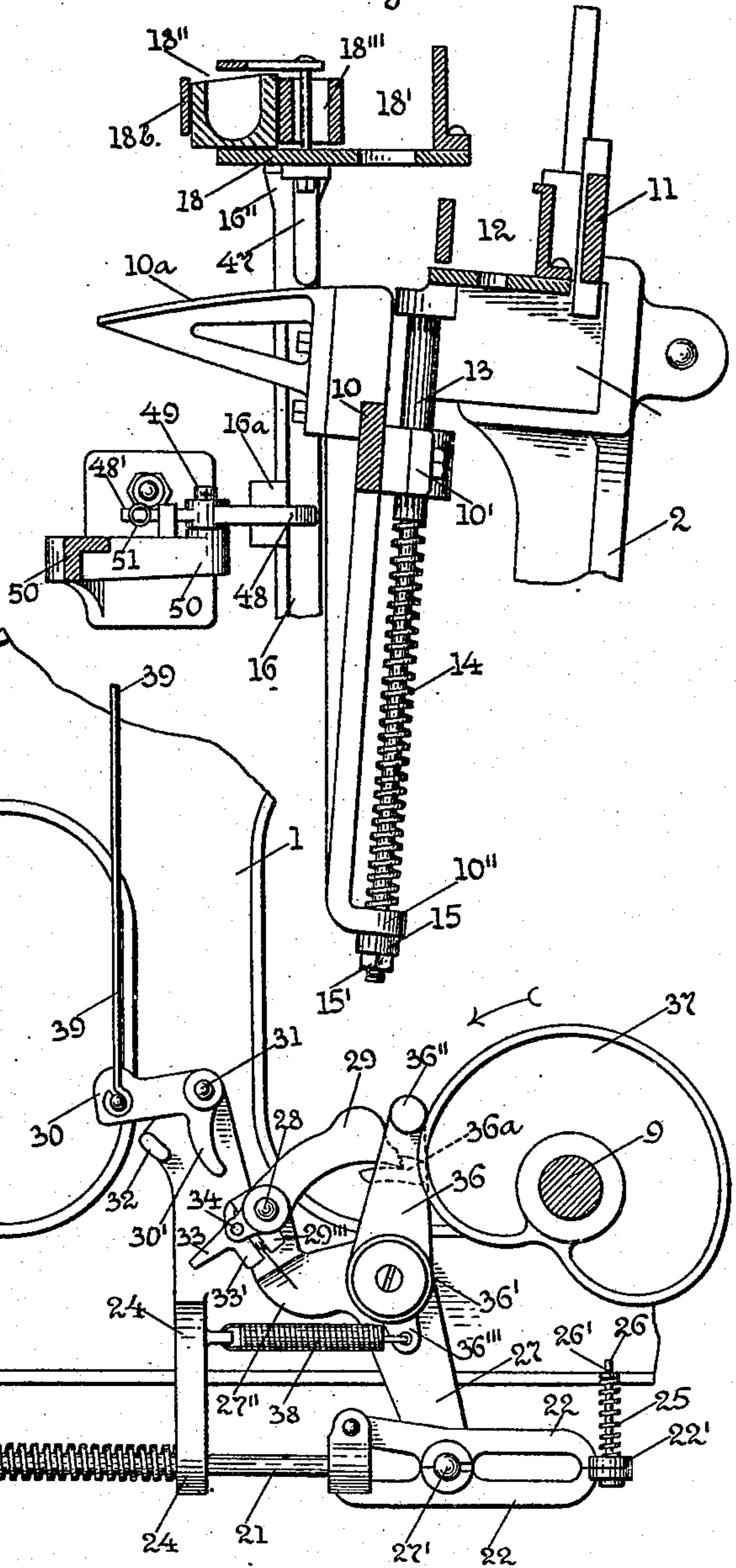


Fig. 6.



Witnesses  
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Fig. 7.

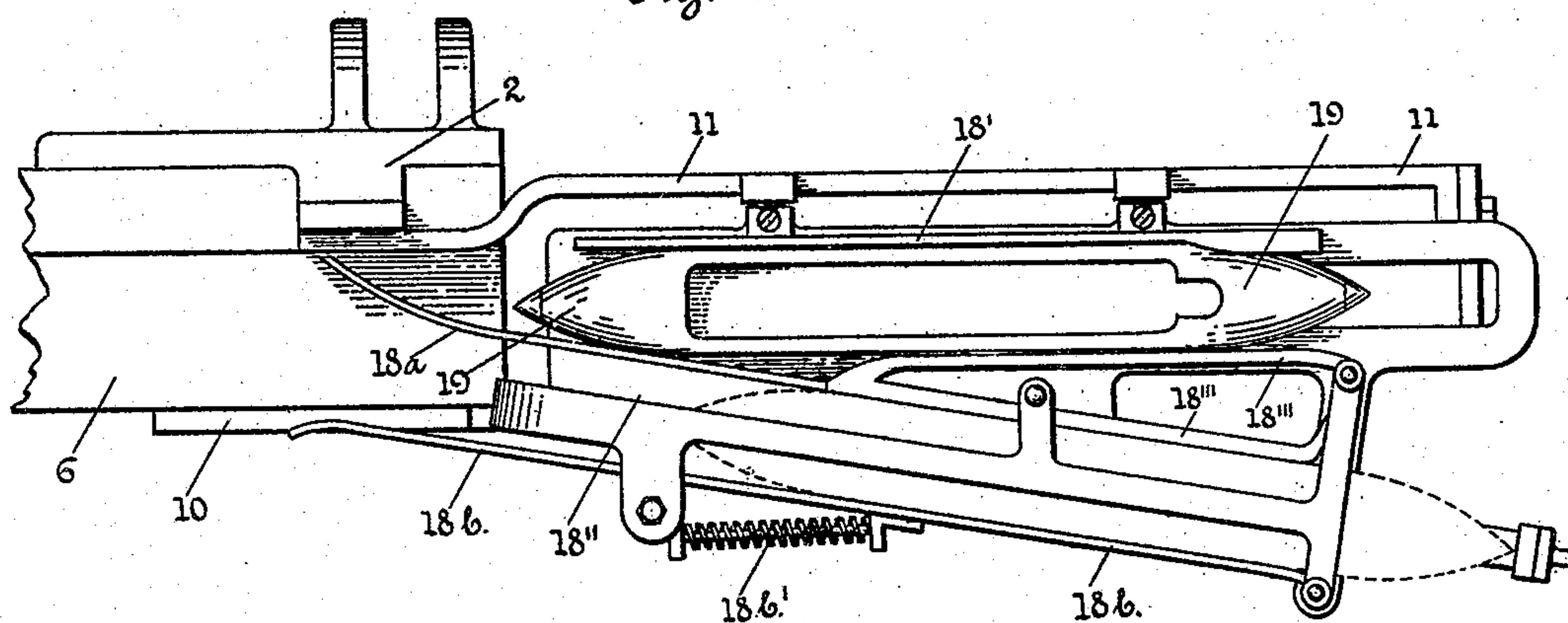
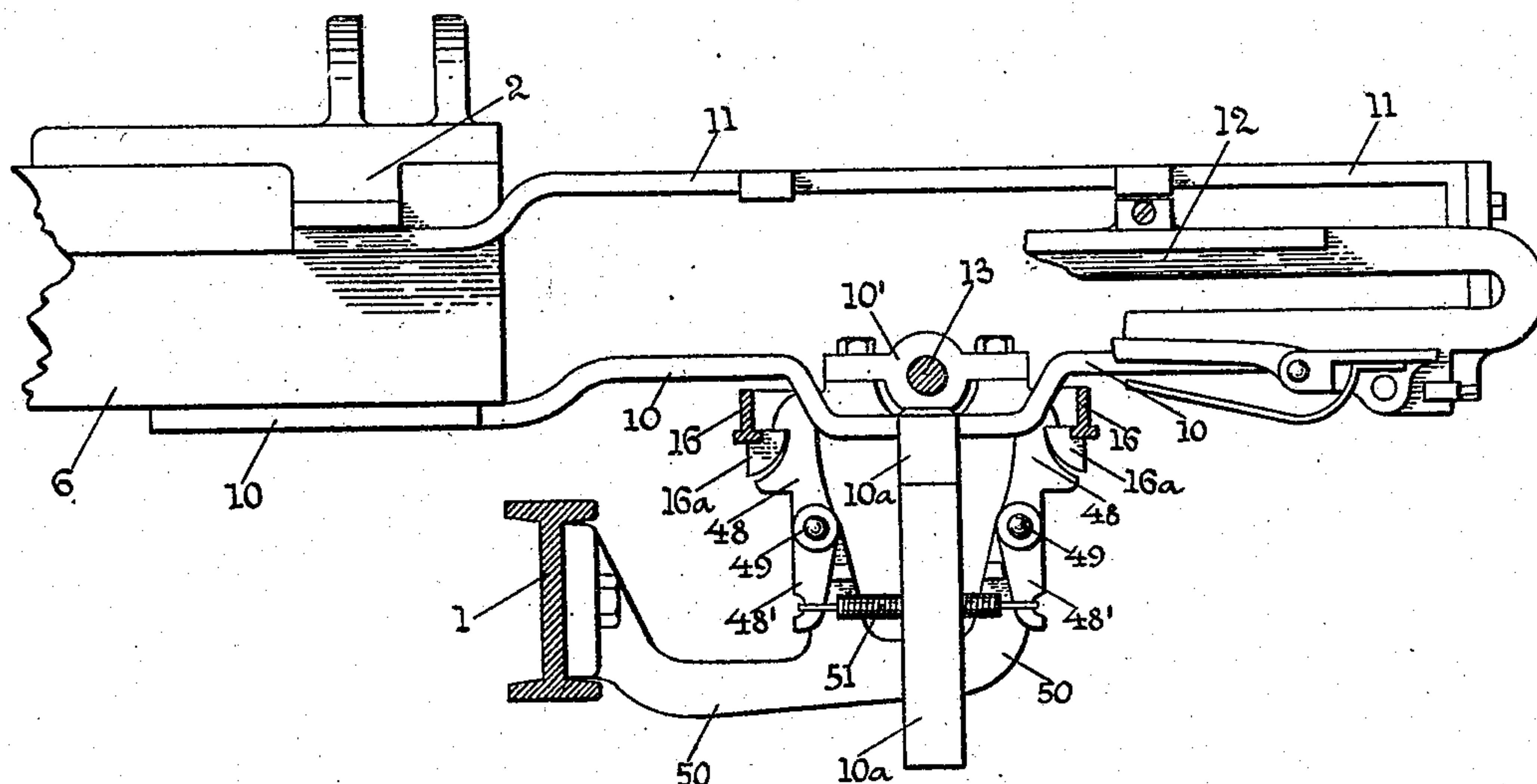


Fig. 8.



Witnesses  
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# UNITED STATES PATENT OFFICE.

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LOOM WORKS, A CORPORATION OF MASSACHUSETTS.

## SHUTTLE-CHANGING LOOM.

936,949.

Specification of Letters Patent.

Patented Oct. 12, 1909.

Application filed July 17, 1908. Serial No. 443,963.

*To all whom it may concern:*

Be it known that I, EPPA H. RYON, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Shuttle-Changing Looms, of which the following is a specification.

My invention relates to a shuttle changing loom, and particularly to shuttle changing mechanism for looms, by means of which a shuttle having the filling thereon practically or substantially exhausted, may be automatically exchanged for a shuttle having a full supply of filling.

The object of my invention is to provide a shuttle changing mechanism of simple construction, and adapted to be combined with and used on a loom having a single shuttle box at each end, which mechanism may be put into operation by the manual operation of the weaver, or automatically, to cause the exchange of a shuttle having the filling thereon practically or substantially exhausted, for a shuttle having a full supply of filling.

My invention consists in certain novel features of construction of my improvements as will be hereinafter fully described.

I have only shown in the drawings a detached portion of a change shuttle loom, having my shuttle changing mechanism combined therewith, sufficient to enable those skilled in the art to understand the construction and operation thereof.

Referring to the drawings:—Figure 1 is a front view of the change shuttle end of a loom, looking in the direction of arrow *a*, Fig. 2, with my improvements combined therewith. Fig. 2 is a section, on line 2, 2, Fig. 1, looking in the direction of arrow *b*, same figure. Fig. 3 is a front view of a detached portion of the loom arch, and the indicating lever mechanism supported thereon, looking in the direction of arrow *c*, Fig. 4. Fig. 4 is an end view of the parts shown in Fig. 3, looking in the direction of arrow *d*, same figure; the loom arch is shown in section. Fig. 5 corresponds to Fig. 2, but shows some of the parts in a different position. Fig. 6 shows the parts shown in the upper part of Fig. 2, in a different position. Fig. 7 is a plan view of the switch shuttle box, looking in the direction of arrow *e*, Fig. 1, and Fig. 8 shows a partial

plan view of the lower shuttle box, looking in the direction of arrow *e*, Fig. 1. The switch shuttle box shown in Fig. 7 is removed.

In the accompanying drawings, 1 is the loom side or end frame, 2 is the lay sword, pivotally mounted at its lower end on a stud 3, and connected by a crank connector 4 to the crank shaft 5.

6 is the lay beam, 7 the reed, and 8 the hand rail, 9 is the bottom shaft. Secured to the front of the lay beam 6 is a frame 10; a second frame 11 is secured to the lay sword 2, see Fig. 8. Said frames 10 and 11 form the guides for the shuttle boxes at the shuttle changing end of the loom, in this instance the right hand end of the loom. The lower shuttle box 12 is in this instance the ordinary shuttle box, and is mounted on a vertically extending rod 13, see Fig. 2. The upper portion of the rod 13 is loosely mounted in a bearing 10' on the frame 10, and the lower part of said rod 13 extends loosely through an opening in the lower inwardly extending end on the downwardly extending arm 10'' of the frame 10, see Fig. 2. A helically coiled expansion spring 14 encircles the reduced portion of said rod 13, and bears at one end against the lower end of the arm 10'', and at its other end against the enlarged part of the rod 13, and acts to move the shuttle box 12 upwardly. The upward movement of said rod 13 is limited by a collar 15 and nut 15', on the lower end of the rod 13.

A frame 16 has each of its two lower ends 16' adjustably secured to ears or extensions 17' extending out from the hub 17'' of a lever 17, see Figs. 1 and 2. The two upper ends 16'' of the frame 16, support on their upper ends the switch shuttle box 18, comprising in this instance an inner cell 18' for the spare shuttle 19, which is placed in said cell by the hand of the weaver, and an outer cell 18'', to receive the shuttle to be changed. The switch shuttle box 18 shown in the drawings, is of similar construction to the switch shuttle box shown in my pending application for Letters Patent of the United States, Serial No. 358,847. The outer cell 18'' is inclined outwardly, and the inner wall 18''' forms a binder for the inner cell 18', at its outer end. There is a spring actuated plate 18<sup>a</sup> at the inner end of the cell, and a plate 18<sup>b</sup> forms the outer wall of the



outer cell 18'', and also acts as a binder, actuated by a spring 18'', see Fig. 7. The lever 17 above referred to, has its hub 17'', loosely mounted on a stud 20 on the loom side. To the lever 17 is adjustably connected one end of a rod 21; the other end of the rod 21 is connected to a give-way mechanism 22. A helically coiled expansion spring 23 encircles the rod 21, and bears at one end against the collar 21' on said rod, and at its other end against a bracket or hanger 24 on the loom side 1. The give-way mechanism 22 comprises two jaws yieldingly held together by an expansion spring 25 on a rod 26 secured to one of the jaws, and adapted to be moved through an opening in the extension 22' on the other jaw. Said spring 25 bears at one end against said extension 22', and at its other end against the pin 26' on the rod 26. The two jaws of the give-way mechanism 22 are recessed to receive a stud 27' on an arm or lever 27 which is pivotally supported. An upwardly extending extension 27'' on the arm or lever 27, has a pin 28 thereon, on which is pivotally mounted the hub 29' of a pawl 29. The pawl 29 is held in an inoperative position, as shown in Fig. 2, in this instance by an upwardly extending projection 30' on a lever 30, pivotally mounted on a stud 31. An ear or lug 32 limits the downward motion of the lever 30. The projection 30' on the lever 30 is adapted to engage, in this instance a lever 33 pivotally mounted on a pin 34. A helically coiled expansion spring 35 engages an extension 33' on the lever 33, and an extension 29''' on the lever 29, and acts to yieldingly hold the lever 33 in its raised position, shown in Fig. 2.

On the hub of the lever 27 is loosely mounted the hub 36' of a lever 36, which in this instance has a side extension 36'' thereon, which extends in the path of and is adapted to be engaged by a cam 37 fast on the bottom shaft 9. A helically coiled contraction spring 38, fast at one end to an extension 36''' on the hub 36' of the lever 36, and at its other end to the stand 24, acts to hold the side extension 36'' on the lever 36 in engagement with the cam 37. On one side of the lever 36 is in this instance a notched extension 36<sup>a</sup>, adapted to be engaged by the pawl 29. The lever 30, which is normally in its lowered position shown in Fig. 2, has attached thereto the lower end of a wire or connector 39. The upper end of said wire 39 is connected with a lever 40, see Figs. 3, and 4; said lever 40 is loosely mounted on a stud 41 on the loom arch 42. On the stud 41 is also loosely mounted the hub of a lever 43, which has a weighted end 43', to hold said lever in its normal raised position, see Fig. 3. The lever 43 has pivotally mounted thereon, on a pin 44, a latch 45 having a weighted arm 45'. The latch 45 is adapted

to engage a notch in a rearward extension 40' on the hub of the lever 40. A cord 46 is attached at one end to the lever 43, and is adapted to be grasped and moved by the weaver, or to be moved automatically by some suitable indicating mechanism. The movement of the cord 46 will move the lever 43, and cause the latch 45 thereon to engage with the extension 40' on the lever 40, and raise the outer end of said lever, and through the wire 39 raise the lever 30, and cause the finger 30' thereon to be disengaged from the extension 33 on the lever 29, and allow the weighted outer end of said lever 29 to drop down and engage the notched extension 36<sup>a</sup> on the lever 36, as shown in Fig. 5. The revolution of the cam 37 will move the lever 36 and through the lever 29 will move the lever 27, and through the give-way device or mechanism 22, and rod 21, will move the lever 17, and cause a downward movement of the frame 16 and the switch shuttle box thereon. Secured upon the underside of the switch shuttle box 18 is an arm or extension 47, see Fig. 2, which is adapted to engage the front of the ordinary shuttle box 12, to push it downwardly, as shown in Fig. 5, below the race-way of the lay, so that the shuttle may be changed. The switch shuttle box 18 is in this instance locked in its forward position by two spring actuated hooks 48, see Fig. 8, which have their hubs pivotally mounted on studs 49 on a stand 50 which extends out from the loom side. The inner ends of the hooks 48 are adapted to engage extensions 16<sup>a</sup> on the frame 16. A helically coiled contraction spring 51 is attached at each end to the outwardly extending extension 48' on the hooks 48, see Fig. 8. In the downward movement of the frame 16, carrying the switch shuttle box 18, the hooks 48 will become disengaged from the extensions 16<sup>a</sup> on the frame 16, and allow the frame to move with the lay to its rear position. The latch 45, through the engagement of the weighted end 45' with the inclined upper edge of a stand 52 on the loom arch 42, see Fig. 3, is released from the extension 40' on the lever 40, and allows the lever 40 and the parts connected therewith to return to their normal position.

After the shuttle is changed the switch shuttle box 18 is raised, through the continued rotation of the cam 37 on the bottom shaft 9, and intermediate connections to the frame 16, and as the lay moves to its front position, the downwardly extending arm 47 on the switch shuttle box 18, will extend over and move along the inclined upper edge of a bracket or stand 10<sup>a</sup>, see Fig. 6, secured to the front of the frame 10, causing the switch shuttle box to be normally held in its raised position. The frame 16 will be caught by the locking hooks 48 and held in its forward position. The ordinary shuttle box 12 is also



raised to its normal operative position, shown in Fig. 6.

From the above description in connection with the drawings, the operation of my improvements will be readily understood by those skilled in the art.

In the normal operation of the loom, the swinging frame carrying the switch shuttle box having a spare shuttle in one of the cells, and the other cell ready to receive the shuttle to be exchanged, will be locked in its front position, as shown in Fig. 6, and the ordinary shuttle box 12 will be on a line with the raceway of the lay, to receive the running shuttle. When the filling in the running shuttle is substantially or practically exhausted, the cord 46 is moved by the weaver, or by suitable detecting mechanism, and through intervening connections, comprising the lever 43, latch 45, lever 40, connector 39, and the extension 33' on the lever 29, the lever 29 is released and allowed to move into its operative position to engage the notched extension 36<sup>a</sup> on the lever 36. The lever 36 is operated by a cam 37, and through the engagement of the lever 29 with the notched extension 36<sup>a</sup> on said lever, the lever 27 is moved, and through the give-way mechanism 22, rod 21 and lever 17, the frame 16 is moved downwardly, and with it the switch shuttle box 18, causing the frame 16 to be disconnected from the locking mechanism, and allowing it, when the downwardly extending arm 47 passes off from the rear edge of the stand 10<sup>a</sup> on the forward movement of the lay, to be drawn downwardly as shown in Fig. 5, and to move downwardly with it the ordinary shuttle box 12, and cause the switch shuttle box 18 to be brought on a line with the raceway, so that the running shuttle may be picked into the front or outer cell 18'', as shown by broken lines in Fig. 7, to be removed by the weaver, and on the next pick the spare shuttle 19 is picked out of the spare shuttle cell 18'. The continued rotation of the cam 37, through intervening connections, will raise the frame 16 and the switch shuttle box 18, and allow the spring 14 to raise the ordinary shuttle box 12 to its normal position, and on the forward movement of the lay, the downwardly extending arm 47' will move along the inclined stand 10<sup>a</sup> on the frame 10 and hold the frame 16 and the switch shuttle box 18 in their raised position, and the frame 16 will be locked in its front position, as shown in Fig. 6.

It will be understood that the details of construction of my improvements may be varied if desired.

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

1. In a change shuttle loom, a lay, a working shuttle box thereon, a change shuttle box

normally separated from the lay, said change shuttle box comprising a cell to receive the spent shuttle, and a cell to receive a fresh shuttle to be picked into the shed, both cells in the same horizontal plane, and means to connect said change shuttle box to the lay.

2. In a change shuttle loom, a lay, and a working shuttle box, a guide for said box, and a spring to support said box, a change shuttle box normally disconnected from and located above the lay, and having a cell for the spent shuttle, and a cell for a fresh shuttle to be exchanged, and mechanism to cause said working shuttle box to be carried beyond the line of the race, and the change shuttle box to be brought in line with the race, to automatically change the shuttles.

3. In a loom of the class described, a lay, a working shuttle box adapted to be lowered below the line of the race, a change shuttle box normally disconnected from the lay, a swinging arm to support said change shuttle box, fulcrumed adjacent the center of the rocker shaft, and means to connect the said change shuttle box with the lay and to lower said shuttle box to the line of the raceway, to pick out a spent shuttle, and pick in a fresh shuttle.

4. In a loom of the class described, a lay having a working shuttle box, a change shuttle box, an arm to support the same, a rotating shaft and cam fast thereon, and connections from said cam to said change shuttle box, to cause the same to be attached to the lay and to be brought to the line of the race for a change of shuttles.

5. In a loom of the class described, a lay having a working shuttle box thereon, a rotating shaft and cam fast thereon, an arm adapted to be operated by said cam, a lever having a common fulcrum with said arm, and a pawl having an extension thereon, and a latch coöperating with said extension, and a change shuttle box and connections between said cam arm and the change shuttle box, to bring the latter into position for a change of shuttles when said latch is released from said pawl extension.

6. In a loom of the class described, a lay having thereon a working shuttle box adapted to be lowered from the line of the raceway, a change shuttle box having a cell to receive the spent shuttle, and a cell for a fresh shuttle, both in the same horizontal plane and normally detached from the lay, and mechanism to automatically attach the said change shuttle box to the lay and lower the same to the line of the race, and to retain the same for a change of shuttles.

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