

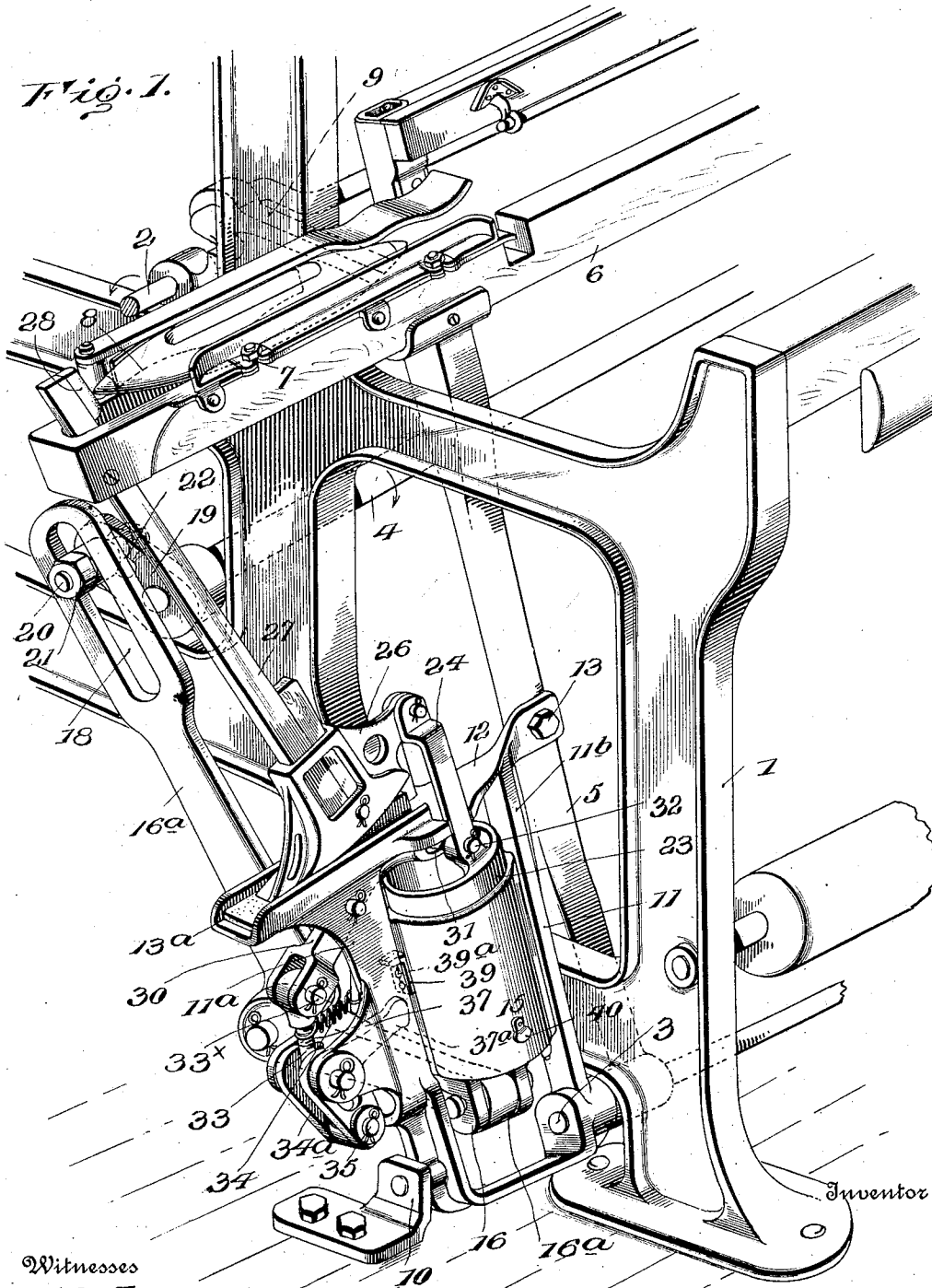
J. E. YARBROUGH.
LOOM.

APPLICATION FILED AUG. 10, 1912.

Patented Dec. 17, 1912.

4 SHEETS—SHEET 1.

1,047,364.



Witnesses

W. A. Tullman
E. M. Meyer

By

Em. Imrie

Attorney

J. E. Yarbrough

Inventor

J. E. YARBROUGH.

LOOM.

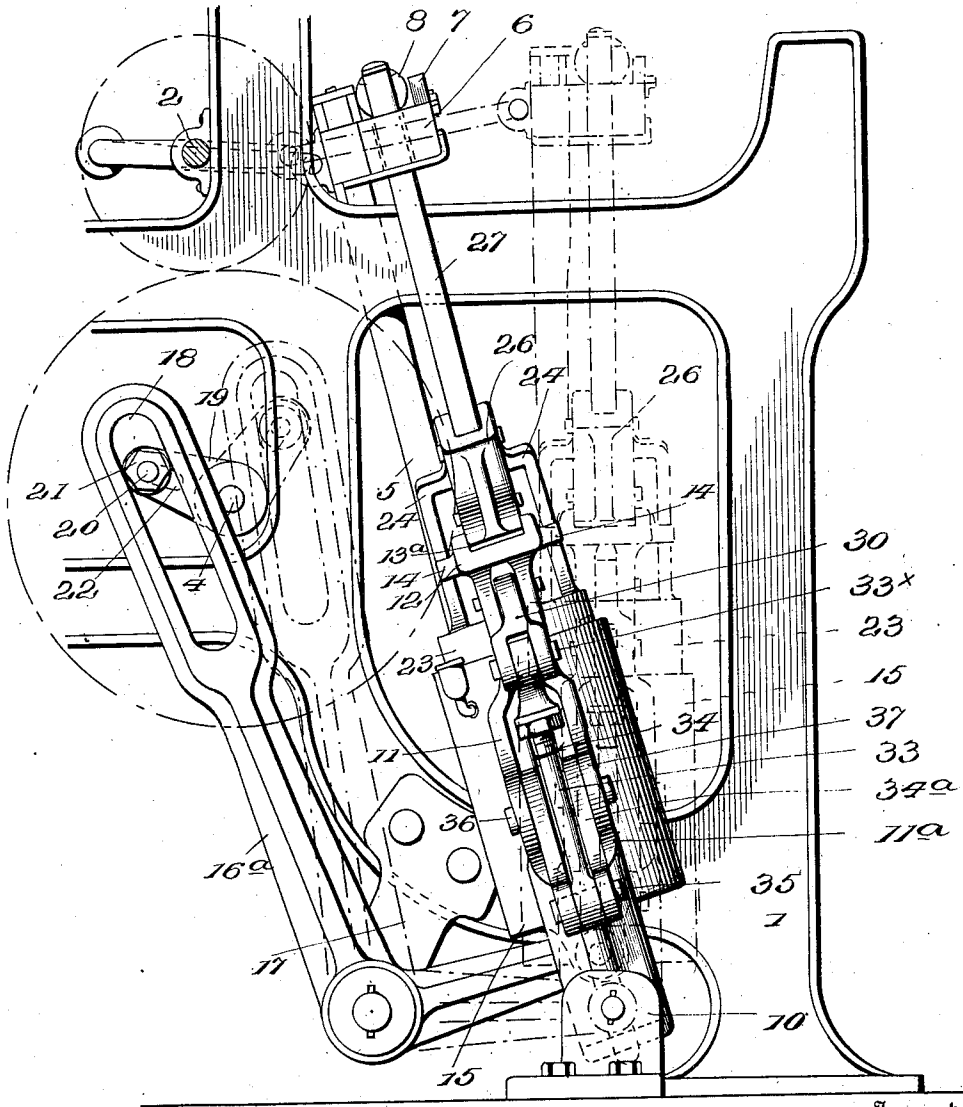
APPLICATION FILED AUG. 10, 1912.

Patented Dec. 17, 1912.

4 SHEETS-SHEET 2.

1,047,364.

Fig. 2.



Inventor

J. E. Yarbrough.

Witnesses

W. Williams
J. M. Meyer

By *J. M. Meyer* Attorney

J. E. YARBROUGH.

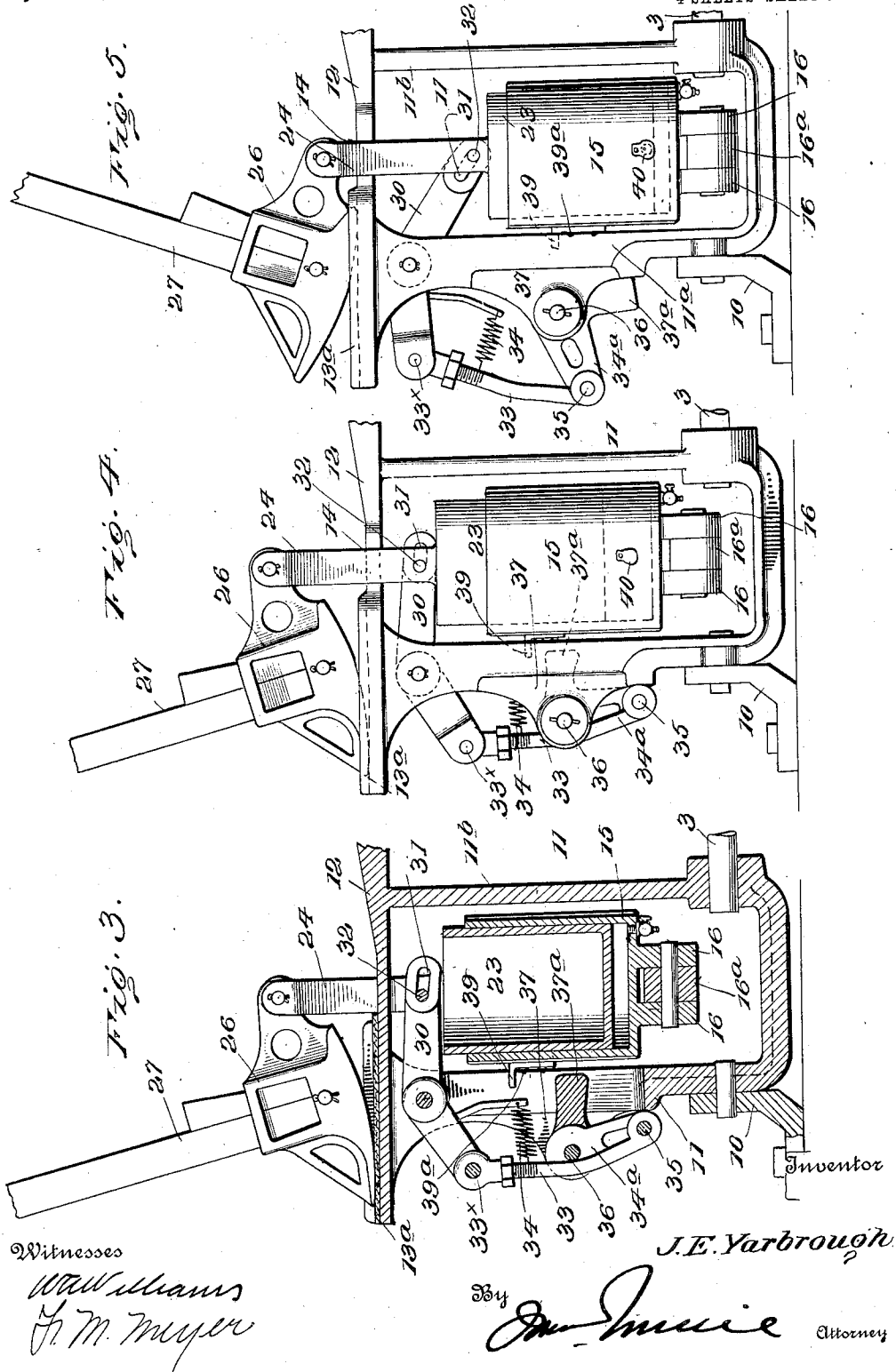
LOOM.

APPLICATION FILED AUG. 10, 1912.

Patented Dec. 17, 1912.

4 SHEETS—SHEET 3.

1,047,364.



J. E. YARBROUGH.
LOOM.

APPLICATION FILED AUG. 10, 1912.

Patented Dec. 17, 1912.

4 SHEETS-SHEET 4.

1,047,364.

Fig. 6.

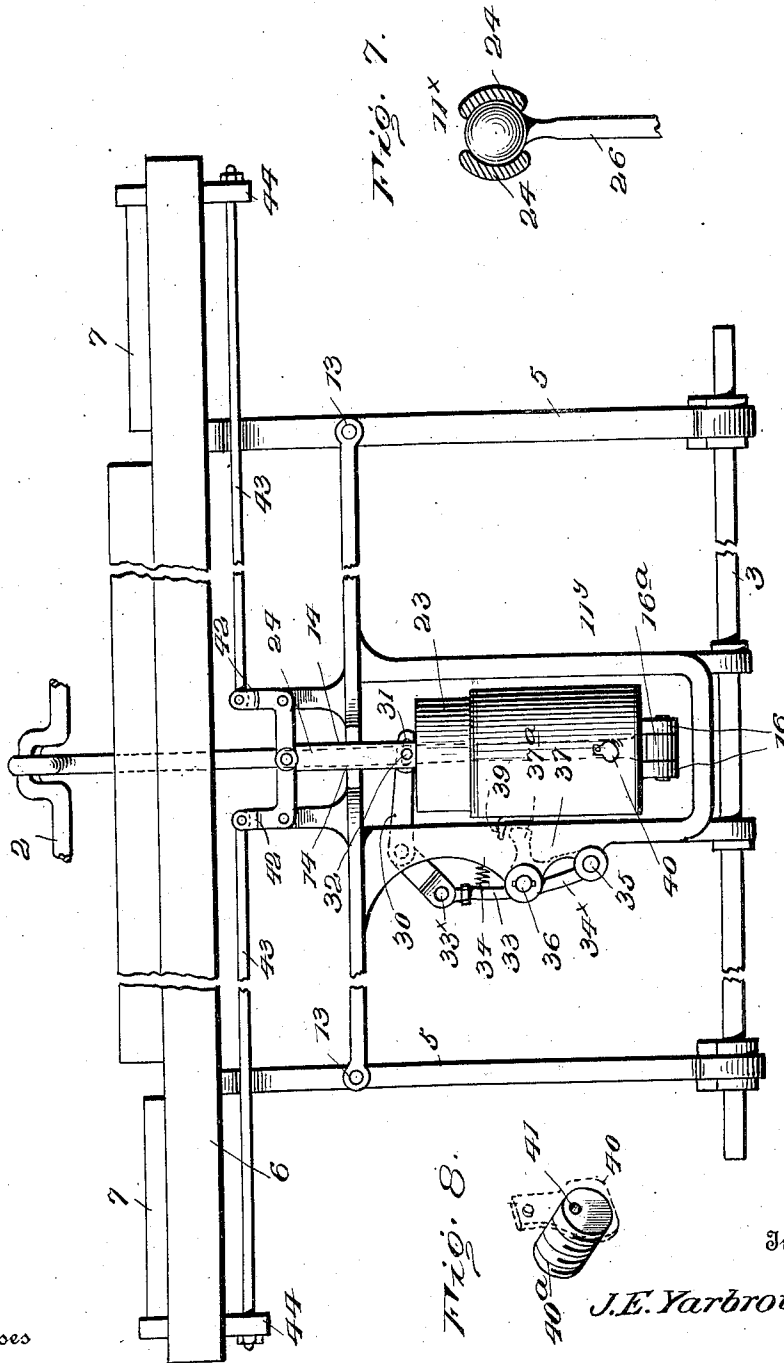


Fig. 7.

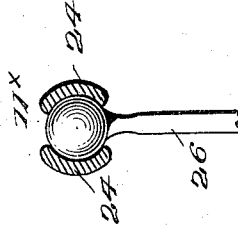
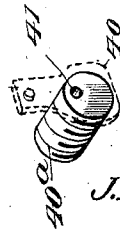


Fig. 8.



Witnesses

W. Williams
H. M. Mager

Inventor

J. E. Yarbrough.

By

J. E. Yarbrough
Attorney

UNITED STATES PATENT OFFICE.

JOHN E. YARBROUGH, OF ATLANTA, GEORGIA, ASSIGNOR OF ONE-HALF TO C. S. McMAHAN, OF ATLANTA, GEORGIA.

LOOM.

1,047,364.

Specification of Letters Patent.

Patented Dec. 17, 1912.

Application filed August 10, 1912. Serial No. 714,431.

To all whom it may concern:

Be it known that I, JOHN E. YARBROUGH, citizen of the United States, residing at Atlanta, in the county of Fulton and State of Georgia, have invented certain new and useful Improvements in Looms; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

15 This invention relates to improvements in looms, and more particularly the means employed for throwing the shuttle.

In my allowed application for patent, Serial No. 642,627, filed August 7, 1911, I have shown, described, and claimed broadly means for forming a partial vacuum for throwing a shuttle, the present invention being directed more especially to practical improvements in the mechanism set forth, and in the principles involved therein.

25 The object of the present invention is to provide effective means, operated by the loom, to form a partial vacuum whereby the subsequent restoration of atmospheric pressure will quickly and with little friction, throw a shuttle across the lay.

30 A further object of the invention is to provide vacuum forming means which when operating requires but little movement of the parts to create sufficient sub-atmospheric pressure that the subsequent restoration of atmospheric pressure will impart to the shuttle a quick blow to drive it across the loom.

40 A still further object of the invention is to provide means for forming a partial vacuum, and before same is completed utilize the destruction thereof to throw the shuttle.

45 The invention also aims to provide shuttle throwing mechanism which will insure of the shuttle being carried entirely across the lay, should the device be tripped when stopping the mechanism, thereby preventing the shuttle stopping part way of its travel and interfering with the thread.

50 A still further object of the invention is to provide means for insuring of the lay assuming its normal position when the mechanism is stopped, to allow the operator to immediately adjust or repair the threads, or

to regulate the harness, etc., consequently eliminating the necessity of manually turning the mechanism to cause the lay to assume a position to permit the operator to manipulate the threads.

The invention also relates to improvements in the means employed for tripping and operating the vacuum forming means.

60 The invention comprehends improvements in the details of construction and arrangement of parts which will be hereinafter described, and particularly pointed out in the claims.

In the drawings: Figure 1 is a perspective view showing the application of my present improvement. Fig. 2 is an end elevation of the same, illustrating the parts in full lines when the lay is in normal position, and in dotted lines when the lay has been moved to the limit of its forward stroke. Fig. 3 is a detail vertical section of the picker operating mechanism, the cylinder and piston being in elevated position preparatory to creating a vacuum. Fig. 4 is a detail side elevation of the same, but the cylinder having been moved downwardly to form a partial vacuum. Fig. 5 is a similar view, but illustrating the piston releasing mechanism as having been tripped to throw the shuttle across the lay. Fig. 6 is a front elevation illustrating the application of my invention in a somewhat different form. Fig. 7 is a detail cross section of the modified construction of connection between the picker shoe and the standards of the cylinder. Fig. 8 is a detail view of a cushion regulating valve.

In the drawings, 1 indicates the frame of an ordinary loom, 2 the crank shaft, 3 the rocker shaft, and 4 the counter shaft. Mounted on the rocker shaft 3, are the swords 5, carrying at their upper ends the usual lay 6. At the ends of the lay are the shuttle boxes 7, to receive a shuttle 8. The crank shaft 2, is connected to the lay by pitmen 9 in the manner now practised in machines of this type.

95 The description thus far relates to a loom of ordinary construction, and requires no further description, it being essential, however, to a thorough understanding of my present improvement.

100 Mounted on the rocker shaft 3, and a fixed bearing 10, in alinement therewith, is a laterally swinging frame 11, comprising two parallel spaced side bars 11^a and 11^b, and a

horizontal bar indicated at 12. The horizontal bar 12, is secured at 13, to one of the swords 5, and on its free outer upper surface it is formed with a guideway 13^a, and on its edges are vertical guides 14. Supported between the vertical bars 11^a and 11^b of the swinging open frame 11, is a cylinder 15, and from the bottom thereof depend ears 16, between which is pivoted the lower end of a bell crank lever 16^a. The bell crank lever 16^a, is fulcrumed on a casting depending from the frame 1, as indicated at 17, and the upper end of the said lever is formed with a slot 18. The counter shaft is provided with a crank arm 19, having a projecting pin 20, the latter passing through the slot 18, and being provided with a nut 21. The crank arm 19, is slotted at 22, to afford minute adjustment of the pin 20, to properly throw the shuttle. Fitting in the upper open end of the cylinder 15, is a hollow piston 23, from the upper edges of which project two spaced apart standards 24. The standards fit in the vertical guides 14, on the horizontal bar 12, of the frame 11, to properly guide the piston in its vertical movement during the operation of the loom.

26, indicates a picker shoe, the inner end of the same being pivoted between the upper spaced ends of the standards 24, while its lower curved surface rocks in the guideway 13^a. Extending from the shoe 26, is a picker stick 27, the upper end being projected through the usual slot in the end of the lay, and it carries a picker 28.

A setting lever 30, is pivotally mounted in a slot in the vertical member 11^a of the swinging frame 11, and its inner end is formed with a slot 31, through which projects a pin 32, mounted in the standards 24. The outer end of the setting lever 30, is bifurcated, and is pivoted at 33^x to a link 33, which is normally drawn toward the frame 11, by a spring 34. The lower end of the link 33, is pivoted at 35 to the lower end of a bell crank tripping lever 34^a. The tripping lever 34^a, is pivoted on a pin 36, supported in ears 37, which project outwardly from the vertical members of the swinging frame 11. The inner end 37^a of the bell crank lever 34^a projects through a slot in the vertical bar 11^a of the frame 11, and adjacent the cylinder 15, and arranged in the path of movement of the end 37^a, of the bell crank lever 34^a, is a tripping dog 39, designed to release the piston to cause the restoration of atmospheric pressure consequent upon the partial vacuum between the cylinder and piston to operate the picker stick, to throw the shuttle. This dog is formed with a slot to receive bolts 39^a, to permit of adjustment.

It will, of course, be understood that the mechanism described is duplicated on the opposite side of the loom, to throw the shut-

tle in the reverse direction in the usual manner.

In operation, let it be assumed that the parts are in the position shown in Fig. 1. That is, the lay is in its normal position to permit the operator to place the threads and adjust the harness, etc. It may at this time be stated that the crank shaft is geared to the counter shaft, so that the latter will be rotated once, while the crank shaft is making two revolutions, so as to form a vacuum at each end of the loom in one complete reciprocation of the lay. As the counter shaft rotates, the crank pin 20, will rock the crank lever 16 (viewing Fig. 1) and draw the cylinder 15, down, the piston being held in locked relation to the frame 11, by the tripping lever 34^a, as hereinafter specifically described. During the time the cylinder is being drawn down, the lay is rocked toward the front of the frame 1, and halfway back again toward its normal position, the crank 2 at this time being at the top center. But, before the cylinder 15, reaches the limit of its downward movement, the dog 39, will contact with the end 37 of the bell crank lever 34^a, and rock it on its pivot, and thereby throw its lower end out. Immediately the pivot pin 35, passes the vertical plane of the pivots 36 and 33^x, the vacuum created by the moving cylinder will suddenly draw the piston down into said cylinder and operate the picker stick, by the restoration of atmospheric pressure. As the picker shoe is pivoted to the standards 24, the picker will quickly throw the shuttle from the left hand box 7, and across the lay. It is to be borne in mind that the cylinder tripped the setting mechanism before the former completed its stroke, consequently the vacuum is not maintained for a period after the parts are operated, which effectually avoids liability of leakage and loss of power when the shuttle is thrown.

Near the bottom of the cylinder is a valve 40, which in the instance shown, comprises a threaded plug 40^a, formed with an eccentrically disposed vent opening 41, over which a flap valve operates. This valve is arranged some distance above the bottom of the cylinder and is rendered adjustable so as to control the cushioning effect of the piston. In the downward stroke of the piston by the force of the vacuum, it is cushioned below the opening 41, thereby preventing undue jar and liability of breakage. By turning the plug, the opening 41, may be positioned closer to or farther from the bottom of the cylinder to obtain the proper cushioning effect.

Upon the completion of the rearward movement to normal position, and in fact during the next succeeding forward movement, of the lay, the crank lever 16^a, is operating to elevate both the piston and cylin-

der to normal or set position. That is to say, the lower end of lever 16^a, raises the cylinder and piston together until they reach the position shown in Fig. 1. In the upward movement the pin 32, rocks the lever 30, and the latter in turn depresses the link 33, and swings the outer member of the bell crank lever 34^a, down until the pivot 35, passes the plane of the pivots 36 and 33^a; at which time the spring 34, will draw the link; and consequently the bell crank lever 34^a into locked position, which will set, or in other words, lock, the piston to the frame 11, in its elevated position for the next operation. It is to be understood that during the foregoing operation, the setting and operating mechanism on the opposite side of the loom is performing exactly the same movements, but at a different period in the cycle, so that upon each return stroke of the lay, one or the other of the picker sticks will be operated to throw the shuttle across the lay.

The pivotal center of the swinging frame 11, is substantially the same as that of the swords, but to provide for any slight differences, the pivotal connection may be in the form of a ball and socket joint, as shown at 11^x, in Fig. 7.

By constructing and arranging the parts as described, I greatly increase the speed of the shuttle, and am enabled to practically double its reciprocal movements across the lay with substantially the same power. This increase of reciprocations of the shuttle is of inestimable value, as a greater percentage of weaving can be accomplished in a given time over what has been obtained heretofore.

By placing the cylinder and piston to operate vertically, and in the manner set forth, the necessity of holding the vacuum before exerting its effective force to throw the shuttle is done away with. Furthermore, it enables me to greatly increase the leverage, so that the blow imparted to the shuttle is more effective, and is instantaneous.

One of the most important results which flow from this invention, in addition to the rapidity with which the shuttle is thrown, resides in the fact that whenever the loom is stopped, the weight of the parts, and the partial vacuum will, always restore the lay to its normal or rear position. Under these conditions the operator can with great convenience adjust or repair the threads, and at the same time thin places or bulges in the fabric will be avoided. In looms now in use, when the mechanism is stopped the power necessary to operate the picker sticks decreases and many times the shuttle is thrown only part way across the lay, and as the latter is still moving, great damage is done to the cloth. This difficulty is successfully overcome in my present improvement,

for if the loom be stopped just at the time the trip is released the force of the vacuum will throw the shuttle entirely across the lay, with the same force as when the mechanism is running at full speed. If, when the loom is stopped, and the cylinder has moved far enough to create a vacuum, but the trip has not been reached, obviously the shuttle will remain in its box, while the lay will gradually assume its normal position as previously stated.

In Fig. 6, I have shown a somewhat different embodiment of my improvement. According to this construction a single cylinder and piston arrangement is employed in the center of the loom. To the upper ends of the standards 24, are pivoted two bell crank levers 42—42, each pivoted to brackets extending from the frame 11^x. To the upper ends of the bell crank levers are pivoted rods 43, 43, which extend in opposite directions toward the ends of, and under the lay. At the outer ends of the rods 43, are secured arms 44—44, carrying the pickers. The crank lever 16^a, in this case, is connected directly to a crank on the crank shaft 2, so that upon each stroke of the lay the cylinder 15, is drawn down and both pickers will, as a result, be operated. But as there is but one shuttle, and as it is at either one side or the other, it follows it will be thrown across in the usual manner.

What I claim is:

1. In a pick motion for looms, a shuttle-throwing element, means for holding said element in set position for operation under atmospheric pressure including two vacuum forming elements, means for moving one of said elements relative to the other to create a vacuum, and means for subsequently releasing the other said element to permit the restoration of atmospheric pressure to operate the shuttle throwing element.

2. A pick motion for looms, a power means therefor including a cylinder and a piston in said cylinder, mechanism actuated in the movement of the loom to operate the cylinder to form a vacuum therein acting against said piston, and means to release the piston at a predetermined time.

3. A pick motion for looms, operating mechanism therefor, said mechanism including a cylinder, a piston therein, means for holding the piston in set position, means for operating the cylinder to form a vacuum therein acting on the piston, and means operated by the cylinder to automatically release the piston setting means to cause the vacuum to operate the pick.

4. A pick motion for looms and an operating mechanism therefor including two elements, one fitting within the other, means for holding one of the elements in set position, means for operating the second one of said elements to create a vacuum, and means

carried by the said second mentioned element for releasing the holding means during movement of the former, whereby the vacuum formed will operate the first mentioned element and operate the shuttle.

5. A pick motion for looms and operating mechanism therefor including a piston and cylinder, means for operating the piston and cylinder to create a vacuum acting on the piston, and automatic means for destroying the vacuum before the completion of the stroke of the operating parts in forming said vacuum.

6. In a loom, the combination of power means, a swinging lay operated by the power means, a picker, mechanism for operating the picker including a piston and cylinder pivoted to swing with the lay, means operated by the power means for operating the cylinder to form a vacuum between the cylinder and piston, and automatic means operable by the cylinder to release the piston to permit it to be operated by the vacuum, the piston and cylinder being normally one within the other when the lay is in a normal position.

7. In a pick motion for looms, a shuttle throwing element periodically operated, means for forming a vacuum for operating the shuttle throwing element, and an automatic tripping device for releasing the vacuum into operation during the period the vacuum is being formed.

8. In a loom, the combination of power means, a lay, shuttle throwing means, a vertically disposed piston pivoted to the shuttle throwing means and movable with the lay, a cylinder in which the piston operates, means between the power means and the cylinder to operate the same to create a vacuum, a setting device for locking the piston in one position, and means operated by the movement of the cylinder to release the piston before the movement of the cylinder ceases.

9. In a loom, the combination of power means including a crank, a lay, a picker, a piston, connections between the piston and picker, a cylinder in which the piston operates, a lever between the crank and the cylinder to elevate the cylinder and piston, means for locking the piston in elevated position, the crank and lever subsequently lowering the cylinder to create a vacuum, and means operated before the cylinder completes its movement for operating the setting mechanism to release the piston to cause the vacuum to operate the picker.

10. In a pick motion for looms, a cylinder, a piston operating in the cylinder, a picker connected with the piston, means for moving the piston and cylinder together in one movement and subsequently operating the cylinder alone in the reverse movement to create a vacuum between said cylinder and

said piston, mechanism operated by one movement of the piston for holding the same in the position it was moved to by the cylinder, and a device carried by the cylinder for releasing the holding mechanism before the cylinder completes its movement to cause the vacuum to operate the picker.

11. In a pick motion for looms, a shuttle throwing element, means for holding said element in set position for operation under atmospheric pressure, means coacting with said element for producing a vacuum, and means for automatically releasing the said element during the vacuum forming operation.

12. In a pick motion for looms, the combination with a picker stick, of a piston pivotally connected thereto, a laterally swinging support on which the picker stick is mounted to rock, a cylinder carried by said support, the piston being operable within said cylinder, means for raising the piston and cylinder, a setting lever carried by said support and operatively connected to the piston, means whereby said setting lever will be rocked in one position upon the upward movement of the cylinder and piston, means for drawing the cylinder down independently of the piston to create sub-atmospheric pressure, and means for automatically unlocking the setting lever during the downward movement of the cylinder, for the purpose specified.

13. In a pick motion for looms, the combination with a picker stick, of a laterally swinging frame therefor upon which the picker stick is mounted to rock, a cylinder mounted in and carried by the frame, a bell crank pivotally connected at one end to the frame, a main frame on which said bell crank is fulcrumed, a countershaft having a crank pin and slot connected with one arm of said bell crank, a piston operable in the cylinder and pivotally connected to the picker stick, a setting lever fulcrumed in the frame and operatively connected to the piston, means tending to lock said setting lever in one direction to hold the piston in a relatively raised position, a bell crank fulcrumed in the frame and operatively connected to the setting lever, and a tripping dog carried by the cylinder and adapted to engage the last named bell crank, for the purpose specified.

14. In a pick motion for looms, the combination with a frame, a lay mounted in said frame, a rocker shaft, a laterally swinging frame journaled on the rocker shaft and operatively connected with the lay to swing therewith, a cylinder mounted in the second named frame, a bell crank fulcrumed on the first named frame and having one of its arms pivotally connected to the lower end of the cylinder, a countershaft having a crank and slot connection with the other

arm of said bell crank, a piston operable within the cylinder and pivotally connected to the picker stick, a setting lever fulcrumed in the second named frame and having one of its arms operatively connected to said piston, a bell crank fulcrum in the second named frame and operatively connected to one arm of the setting lever, a contractile spring operatively connected to the setting lever and tending to draw the same in a direction to hold the piston at the upper limit of its movement, and a tripping dog carried by the cylinder and movable against the second named bell crank, for the purpose specified.

15 15. In a pick motion for looms, the combination of a main frame-work, a lay mounted therein, a sword operatively connected to the lay, a picker stick, a laterally swinging frame on which the picker stick is mounted to rock, a connection between said frame and the sword, a bell crank lever fulcrumed on the main frame, a cylinder mounted in the laterally swinging frame and operatively connected to one arm of said bell crank, a countershaft having a crank pin and slot connection with the other arm of said bell crank, whereby the rotation of said shaft will cause the cylinder to move upwardly and downwardly in the laterally swinging frame, a piston mounted to move in the cylinder and having a pivotal connection with the picker stick, a setting lever fulcrumed intermediate of its ends in the laterally swinging frame and operatively connected at one end to the piston, a bell crank fulcrumed in the laterally swinging frame, a link pivotally connecting the other end of the setting lever to one arm of the second named bell crank, a spring tending to draw said link inwardly for the purpose specified, and a tripping dog carried by the cylinder and adapted to engage the second named bell crank upon the downward movement of the cylinder, whereby to throw the setting lever to its inoperative position.

50 16. In a pick motion for looms, the combination with a main frame-work, of a lay mounted therein, a picker stick, a countershaft, a bell crank fulcrumed on the main frame-work and having a crank pin and slot connection with the countershaft, a laterally swinging frame on which the picker

stick is mounted to rock, a sword connected to the lay, a connection between the laterally swinging frame and said sword, a cylinder movable in said frame and pivotally connected at its lower end to one arm of said bell crank, a piston movable in said cylinder and pivotally connected to the picker stick, a setting lever fulcrumed intermediate of its ends in the laterally swinging frame, one arm of said setting lever having a slot and pin connection with the piston, a bell crank fulcrumed in the laterally swinging frame, a link operatively connecting one arm of said second named bell crank to the outer arm of the setting lever, the other arm of said second named bell crank projecting into the frame toward the cylinder, and a tripping dog carried by the cylinder and adapted to engage the last named arm of the second named bell crank, as and for the purpose set forth.

17. In a loom, the combination of power means, a swinging lay operated by the power means, shuttle operating mechanism including two elements, one fitting within the other and pivoted to swing with the lay, means operated by the power means for operating the shuttle operating mechanism to form a vacuum between the two elements, automatic means for destroying the vacuum to throw a shuttle, the two elements being normally one within the other when the lay is at back center.

18. In a loom, the combination of power means, a swinging lay operated by the power means, shuttle operating mechanism including two elements, one fitting within the other and pivoted to swing with the lay, means operated by the power means for operating one of the elements to form a vacuum between the two elements, and automatic means operable by one element to release the other element to permit the latter to be operated by the vacuum to throw a shuttle, the two elements being normally one within the other when the lay is at back center.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN E. YARBROUGH.

Witnesses:

S. C. JOHNSON,
JNO. IMIRIE.