

Nov. 3, 1942.

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2,301,077

LEVER FOR LOOM BOX LIFTING MECHANISM

Filed May 20, 1942

2 Sheets-Sheet 1

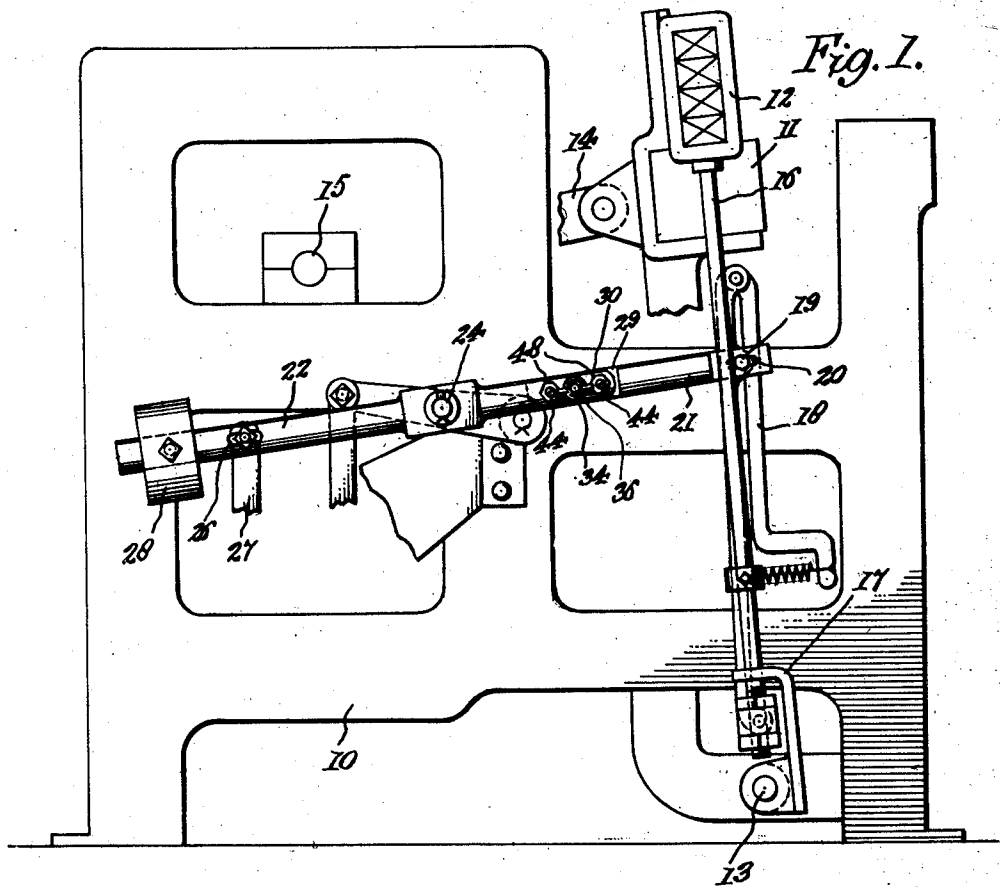


Fig. 2.

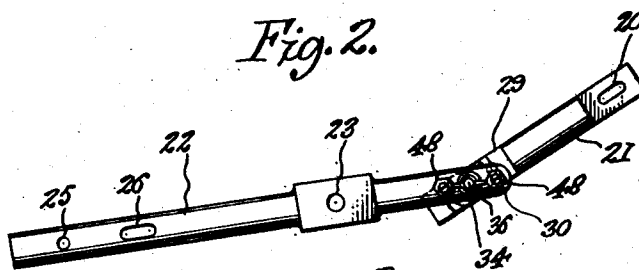
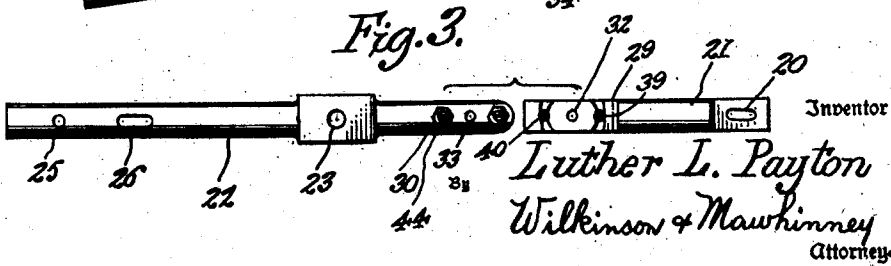


Fig. 3.



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2 Sheets-Sheet 2

Fig. 4.

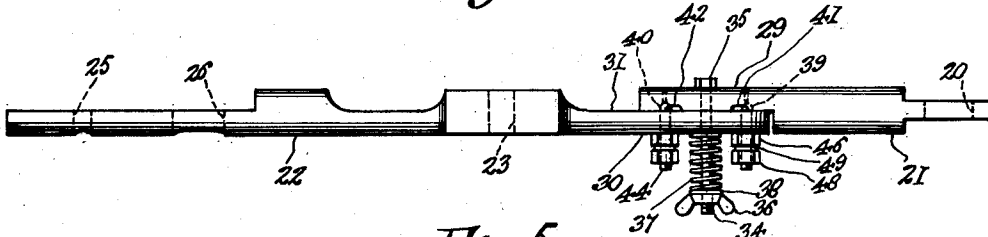


Fig. 5.

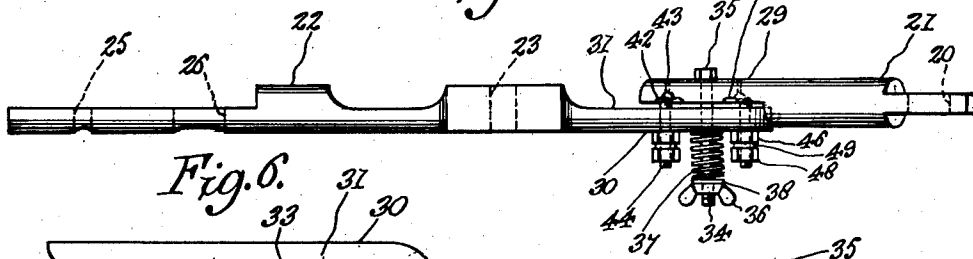


Fig. 6.

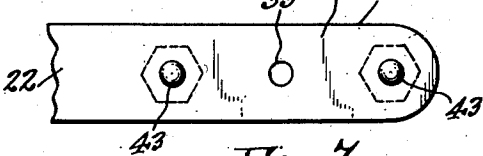


Fig. 7.

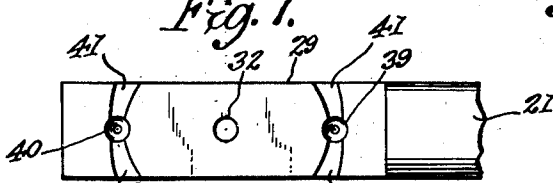


Fig. 8.

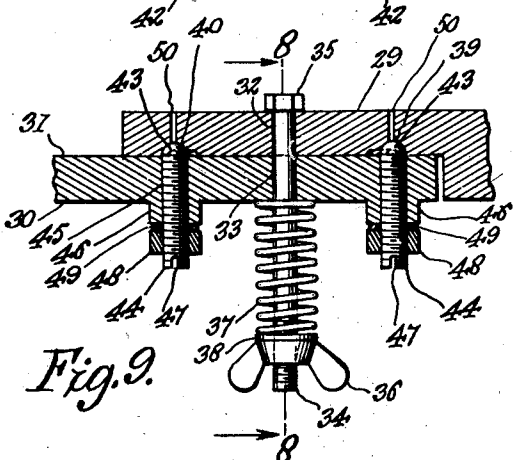
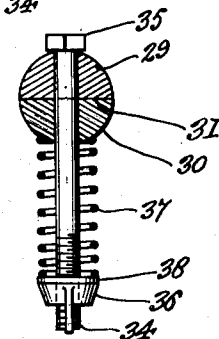


Fig. 9.

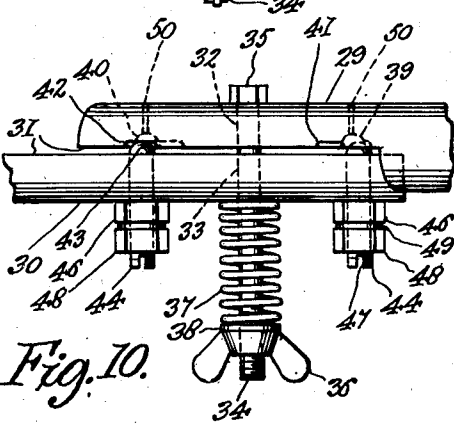


Fig. 10.

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UNITED STATES PATENT OFFICE

2,301,077

LEVER FOR LOOM BOX LIFTING
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Application May 20, 1942, Serial No. 443,804

11 Claims. (Cl. 139—181)

The present invention relates to improvements in levers for loom box lifting mechanism, and has for an object certain improvements over the device shown in the prior Patents Nos. 1,793,183, granted February 17, 1931, and 1,679,616, granted August 7, 1928.

The box motion on the box loom carries the different colors of filling, such boxes having up to four cells to take care of four shuttles for the four different kinds of filling. When the loom is in operation and as the different fillings are called for in the pattern weaving, the gearing on the loom is so set to make the proper shift of the box so that the proper filling will be introduced at the proper time and place. In the conventional construction a lever is used for the lifting of the box called the drop box lifting lever. During the operation of the loom the box lifting mechanism often hangs or sticks, at which times the lifting lever being rigidly entrained therewith and with the gearing referred to breaks.

To overcome this breakage in this lever, the present invention proposes an improved construction of lever with a breach to enable the lever to give away under a certain load or tension equal to that developed when the boxes hang or stick.

It is the purpose of the invention to eliminate the expense and waste incident to such breakages in drop box lifting levers which, among other items, include the cost of the lever, labor of inserting the new part, loom stoppage during repair with sacrifice of loom output and the general and overhead losses occasioned by failure to deliver on time the delayed product of the stalled loom.

The invention has for a further object to provide an improved construction of drop box lifting lever in which the lever is of simple form simply assembled, adapted for reliable operation in avoiding breakage to the lever and admitting of the ready restoration of the lever to its operative position and the ready adjustment of the load under which the lever will give away.

With the foregoing and other objects in view, the invention will be more fully described hereinafter, and will be more particularly pointed out in the claims appended hereto.

In the drawings, wherein like symbols refer to like or corresponding parts throughout the several views:

Figure 1 is a side elevation of a loom of a well known variety illustrating an improved drop box lifting lever constructed in accordance with the present invention.

Figure 2 is a side view of the lever apart from the loom with the breach section shown in its "broken" condition.

Figure 3 is a similar view of the improved lever with its sections detached.

Figure 4 is a top edge view of the lever shown in its straight or operative position.

Figure 5 is a similar view with the lever breached.

Figure 6 is a fragmentary view of the main lever section showing the face which overlaps the mating face of the breach section.

Figure 7 is a similar view of the mating face of the breach lever section.

Figure 8 is a cross section taken on the line 8—8 in Figure 9.

Figure 9 is a fragmentary longitudinal section taken through the two lever sections at the overlapped portions, and

Figure 10 is a fragmentary top edge view taken on an enlarged scale with parts of the lever sections broken away and showing the breached condition of the lever.

Referring more particularly to the drawings 10 designates the frame of a Crompton and Knowles loom, as an example of any conventional or customary loom, having a lay 11 and drop boxes 12, mounted to swing about a rock shaft 13 and actuated by connecting rods 14 from a crank shaft 15 in the usual manner. The drop boxes are mounted upon a lifter rod 16 guided for vertical movement in a lower bearing or bracket 17 and connected with the improved drop box lifting lever in any suitable manner. The give-away link or connection 18 is that shown in the Patent No. 1,679,616, but is not necessary in the present instance, the same being used for purposes of illustration only as indicating one form of connection between the drop box lifting lever and the lifter rod 16. A pin 19 in the lifter rod or other connection engages through a slot 20 in the free end portion of one member 21 of the improved drop box lifting lever, of which the other member is indicated at 22. The member 22 may be designated as the main member or rear long member, while the member 21 is the forward short member or the breach member. The main member 22 has a bearing 23 for a stud 24 on which the lever rocks.

As shown in Figures 2 and 3 a hole 25 is made in the rear end portion of the main lever section 22 for the purpose of receiving a set screw of a counterweight 28. Spaced from the hole 25 is a slot 26 to receive the link connection 27 to the pattern mechanism.

As shown more particularly in Figure 9 the members 21 and 22 of the improved lever have overlapping parts 29 and 30 with mutual flat faces 31 (Figure 8) on which the members may with facility rotate with respect to one another.

In the overlapping parts are registering bolt holes 32 and 33 for the slidable reception there-through of a bolt 34 having a head 35 to take against one member, for instance the member 29, while the bolt projects out to a considerable dis-

tance beyond the outer plane face of the other member 30 where it receives the butterfly or other adjusting nut 35 threaded on the bolt for confining a coil spring 37 which is wound in a suitable number of convolutions about the bolt 34 and between the member 30 and the wing nut 37. A washer 38 may be interposed between the adjusting nut 35 and the adjacent end of the helix 37.

As shown more particularly in Figure 7, sockets 39 and 40 are provided in the inner face of the overlapping part 29, such sockets being to opposite sides of the bolt hole 32 and struck on the same circumference generated from the center of the bolt 34 which is the axis about which the two members of the lever relatively rotate. The sockets 39 and 40 may be diametrically opposite one another and are each a section of a sphere whose widest truncated base opens outwardly on the face 31 of the overlapped part 29.

Leading to each socket are runways 41 and 42. Viewing the runways 41, 42 and the intermediate socket, the same are all arranged concentrically as to both sockets 39 and 40. Each socket and its attendant runways 41 and 42 are generally arranged in the arc of a circle, the runways being fan shaped or flaring from the socket outwardly to the edge of the member 29. The runways 41 and 42 are shallower than the sockets, at their outer larger ends they open through the upper and lower edges respectively of the overlap lever part 29 and at their inner smaller or tapering ends they merge into the socket with their inner ends preferably less wide than the diameter of the socket.

Referring more particularly to Figure 6, the companion or complemental overlapped member part 30 carries rounded heads 43 of a size and shape to occupy the sockets 39 and 40. Such heads 43 are conveniently carried upon screws 44 which are threaded in the threaded openings 45 made in the part 30 and continued in bosses 46 which outstand from the main lever part 22. Cross-slots 47 in the outer ends of the screws 44 accommodate a screw driver or other tool for rotating the screws 44 into and out of the threaded opening 45 and in adjusting the rounded heads 43 to proper projected position from the inner face 31 of the overlapped part 30. Nuts 48 threaded on the screws 44 act, in conjunction with washers 49 interposed between the nuts 48 and the bosses 46, to lock the screws 44 against casual or accidental rotation, and in other words to preserve the adjustment of the screws 44.

In operation, the main portion of the lever 22 is connected to the pattern mechanism and must therefore rock about the stud 24 in accordance with a rigid mechanical train by which the boxes 12 are raised and lowered in conformity with pattern requirements. Whenever the boxes stick or hang and refuse obedience to this movement, and on the other hand the main section 22 of the lever must respond to its mechanical train of movement, the lever section 21 may breach on the axial line of the bolt 34, as indicated in Figure 2, and thus breakage of the drop box lifting lever is avoided. The slot 20 in the end of lever member 21 enables the necessary shortening and lengthening of the lever with reference to pin 19. When breach member 21 is in alignment with main lever member 22, as seen in Figure 1, the lever will be longer, while when breached, as shown in Figure 2, the lever will be shorter in overall dimension. Differently stated the length from the rocking center 24 to pin 19

will vary in the two conditions of the lifting lever, which requires a slot 20 elongated in the direction of length of the lever to be provided about the pin 19.

The spring 37 acting expansively directly against overlapped part 30 of the main lever section 22 will urge this part toward the companion overlapped part 29 which is pulled by the same spring through bolt head 35 towards its companion member 30. The load of the spring 37 will determine the amount of the force which must be exerted to rotate breach member 21 about the bolt 34 carried by the main lever section 22. Therefore this spring will be selected roughly as of the requisite strength for this purpose. A fine adjustment may be made by the use of the nut 36. By compressing the spring 37 the load will be increased so that the lever will breach only when the reluctance of the boxes exceeds this high load. If it is desired to have the lever breach at a lesser load, the wing nut 36 is backed off the requisite turns.

The spring 37, in cooperation with the heads 43 and the sockets 39 and 40, will lock the lever members 21 and 22 in a straight position of Figure 1 inasmuch as the heads and sockets diametrically aline with this long axis of the lifting lever. If desired the runways 41 and 42 may be mutually inclined to their respective sockets so that the action of the spring 37 would tend to require the inclined bottoms of the runways 41 and 42 to move over the heads 43 until the sockets were presented at which time the heads would snap into the sockets. In breaching, the mutual faces 31 are required to move apart, as indicated in Figures 5 and 10 because the heads 43 must ride out of the sockets onto the shallower runways 41 or 42; this action causing compression of the spring 37. In other words the spring 37 must be compressed at the time the lever is breached. The spring thus opposes the breaching of the lever, and the lever may not be breached until the hang of the shuttle boxes exceeds the load for which the spring 37 has been set or adjusted. This load may be further adjusted by the axial extent to which the heads 43 project out from the face 31 of the overlapped part 30.

The inner ends of the runways 41 and 42 being narrower than the diameter of the sockets 39 and 40, require the heads 43 to ride out at right angles away from the face 31 of overlap member 29, which action compresses spring 37, just before being presented to the sockets, which potentially charges the spring so that when the movement of member 21 into alignment with member 22 is completed the spring 37 will develop great kinetic force to snap the heads 43 into the respective sockets. Conversely in climbing out of the sockets onto the narrowest adjacent portions of the runways 41, 42 the spring 37 will have to be put under similar compression; therefore the tendency to maintain the lever straight or unbreached.

Particularly from Figure 7 it will be apparent that the bottoms of the sockets 39 and 40 communicate with ducts 50 which extend all the way through the overlapped part 29. Such ducts permit breathing of the sockets when the heads 43 snap into and out of the same, carrying atmospheric air to the bases of the sockets to avoid vacuum conditions. Moreover these ducts 50 are useful to automatically enable the heads 43 to relieve the sockets of any foreign matter that may have a tendency to move therein.

The wide outer free ends of the runways 41,

42 are designed to more easily receive the heads
43 in the initial entrainment of the heads with
the runways.

It is obvious that various changes and modifications may be made in the details of construction and design of the above specifically described embodiment of this invention without departing from the spirit thereof, such changes and modifications being restricted only by the scope of the following claims.

What is claimed is:

1. In a box motion for looms, an improved drop box lifting lever comprising relatively swinging members, one connected to the pattern mechanism and the other to the drop box mechanism, spring means for resisting the relative swinging movement of said members to preserve normal drop box operation but to give away when the drop box mechanism exceeds a predetermined stress load on the lever, and means for adjusting the load of said spring tension means.

2. An improved drop box lifting lever comprising relatively movable members, yieldable means for holding said members against movement, and means for adjusting the load of said yieldable means.

3. An improved drop box lifting lever comprising relatively movable members, yieldable means for maintaining said members against relative movement, and other means cooperating with said yieldable means for maintaining said members against movement.

4. An improved drop box lifting lever comprising relatively movable members having overlapped parts, a pivot for connecting such overlapped parts, ball-and-socket snap fastener means between said overlapped parts normally tending to preserve the members in alinement and against relative rotation about said pivot, and spring means associated with said pivot for drawing the overlapped parts and said ball and socket members yieldingly together.

5. In a box motion for looms, a drop box lifting lever comprising a main lever portion fulcrumed on the loom and connected to the pattern mechanism, a breach member movably connected to the main member and having a lost motion connection with the box mechanism, and yieldable means for maintaining said breach member in normal operating position with respect to said main member.

6. In a box motion for looms, a drop box lifting lever comprising two members having overlapped parts pivoted together, one of the overlapped parts having a head, the other overlapped part having a socket to receive said head in the normal operating position of the members, and spring means for urging the overlapped parts together with the head occupying the socket.

7. In a box motion for looms, a drop box lifting lever comprising two relatively movable members having overlapped parts pivoted together, a rounded head projecting from one overlapped part, said other overlapped part having a rounded socket and a fan-shaped runway leading to said socket, and spring means for urging the parts together and the head into said runway and socket.

8. In a box motion for looms, a drop box lifting lever comprising relatively movable members

having overlapped parts pivoted together, a head projecting from one part, said other overlapping part having a socket therein with fan-shaped runways of lesser depth than the socket converging to the socket along concentric lines having the same radius generated from the center of relative pivotal movement of the members, the inner convergent end portions of the runways being narrower than the diameter of the socket into which they lead, and spring means for urging the two overlapped portions together and the head into said socket and runways.

9. In a box motion for looms, a drop box lifting lever comprising relatively movable members having overlapped parts pivoted together, a head projecting from one part, said other overlapping part having a socket of complementary shape and size to receive said head into interlocking engagement resisting relative pivotal movement of the members, said other overlapped part also having substantially fan-shaped runways shallower than the socket and leading thereto with their convergent ends merging at substantially diametric opposite points into said socket, the said runways opening through upper and lower edges of the overlapped member carrying the same and also opening inwardly of said overlapping member, the bases of the runways being inclined toward said socket, and spring means for urging the two overlapped parts together and the head against the inclined bases of the runways and said socket.

10. In a box motion for looms, a drop box lifting lever comprising relatively movable members having overlapped parts pivoted together, a screw adjustably mounted in one part having a head projecting from that part, said other overlapped part having a socket to receive said head, and spring means to urge the head and socket together.

11. In a box motion for looms, a drop box lifting lever comprising a main lever member pivoted on the loom and coupled to the pattern mechanism, a breach lever member having a lost motion connection to the box motion, said lever members having overlapped parts with mutual flat faces, a pivot bolt extending through the overlapped parts, a helical spring about said bolt engaging one part, an adjusting nut on said bolt engaging the other end of the helical spring, bosses on one part, said part having threaded openings therethrough and through said bosses, screws adjustably mounted in said threaded openings and having rounded heads projecting toward the companion overlapped part, means associated with said screws and bosses for maintaining the rotational adjustment of said screws, said other overlapped part having sockets therein concentrically arranged with reference to said pivot bolt and on a substantially diametric line therethrough and in line to simultaneously receive the rounded projecting heads on said screws, said other overlapping part also having concentric runways of shallower depth than the sockets and leading thereto along convergent lines within inclined bases deeper as they approach the sockets, said screw heads mounted concentrically with said runways.

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