June 30, 1936. E. A. SANTON 2,045,967

SHUTTLE CHECK AND RELEASE

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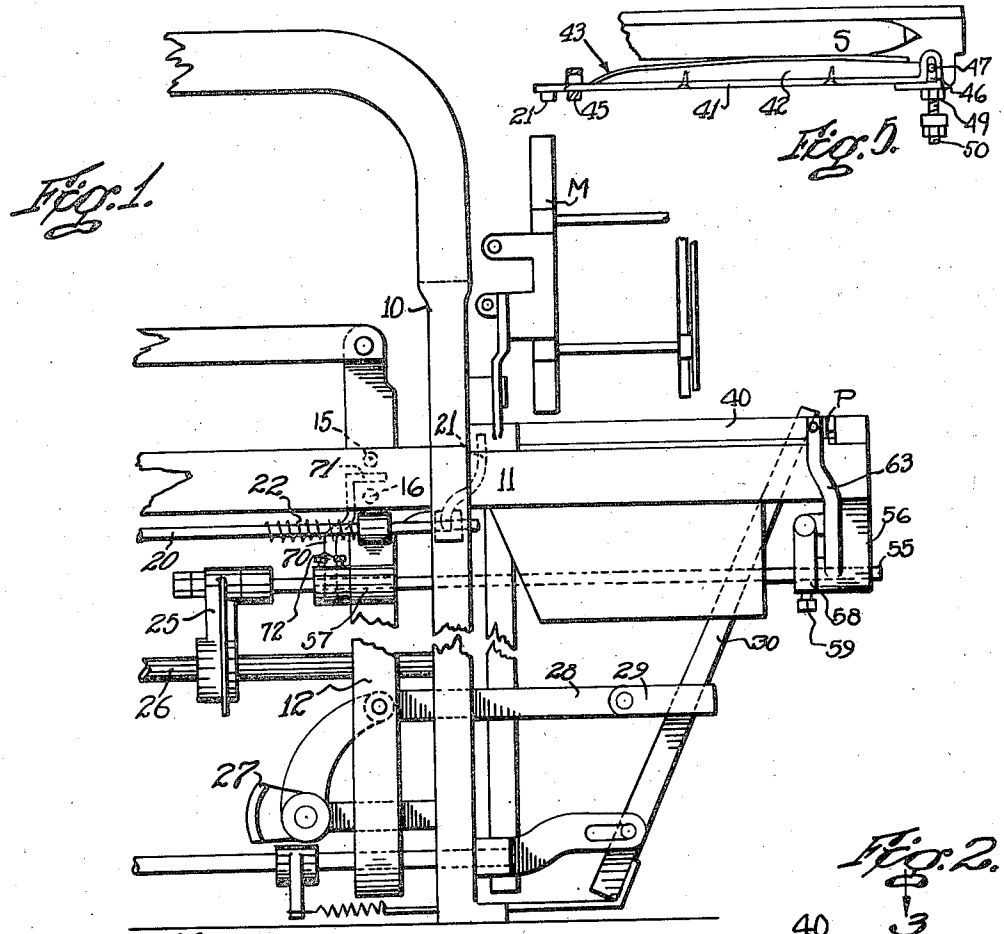


Fig. 5.

Fig. 1.

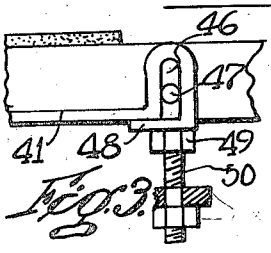


Fig. 3.

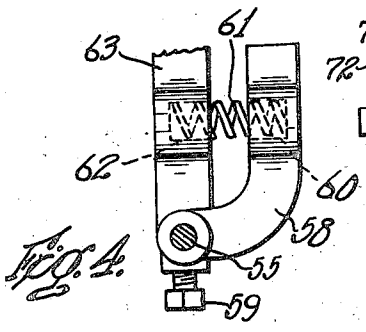
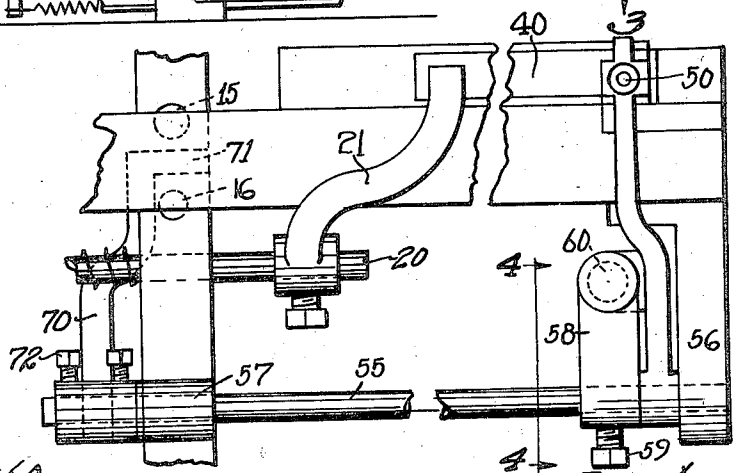


Fig. 4.

Fig. 2.



INVENTOR
E. A. SANTON
Southgate Fay & Hawley
ATTORNEYS

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SHUTTLE CHECK AND RELEASE

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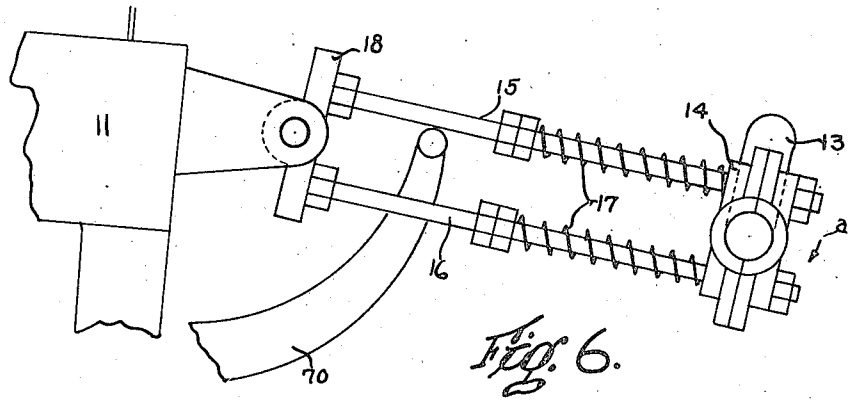


Fig. 6.

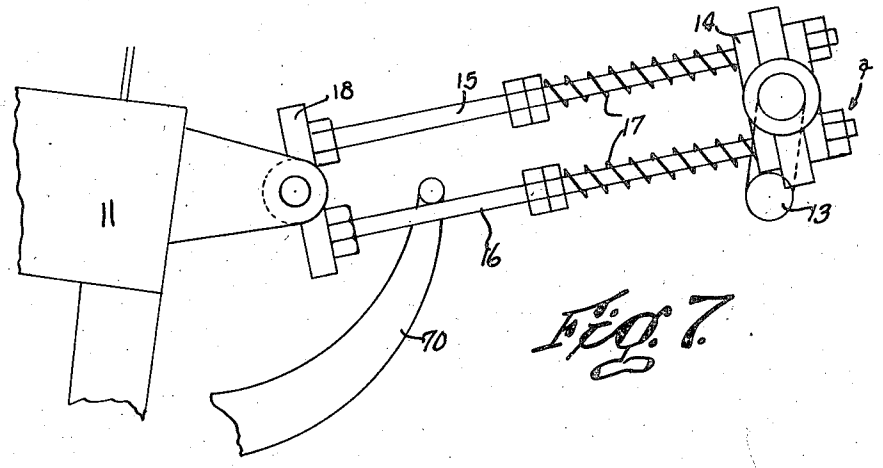


Fig. 7.

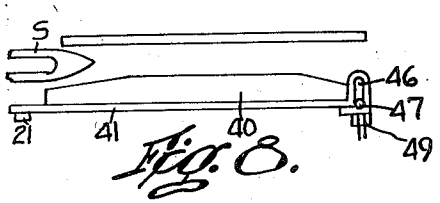


Fig. 8.

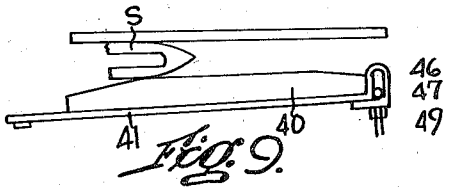


Fig. 9.

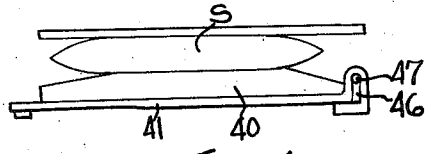


Fig. 10.

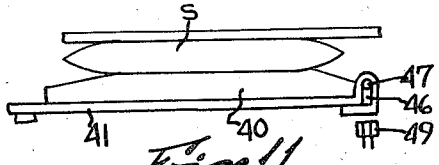


Fig. 11.

INVENTOR
E. A. SANTON

Scantlebury, Fay & Hawley
Attorneys

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SHUTTLE CHECK AND RELEASE

Elliot A. Santon, Worcester, Mass., assignor to Crompton & Knowles Loom Works, Worcester, Mass., a corporation of Massachusetts

Application June 26, 1934, Serial No. 732,493

7 Claims. (Cl. 139—187)

This invention relates to improvements in shuttle checking and releasing mechanism and it is the general object of the invention to provide a loom operating to check the shuttle effectively when it is boxed and relieve pressure on the shuttle at the time of picking.

In certain types of slow running looms, such as those weaving heavy worsted, it has been common practice to use comparatively loose shuttle binders which exert a minimum of pressure on the shuttle as it is boxed so that at the time of picking there will be no undue strain or excess power consumption. When looms of this type are operated at a higher rate of speed, however, it is found that the rebounding of the active shuttle is objectionable and it is accordingly a further object of my invention to increase the checking pressure of the shuttle as the latter is boxed and while the lay is in the forward part of its stroke to prevent rebounding, and thereafter relieve the pressure prior to picking.

It is a further object of my invention to provide a floating binder with the type of control specified which shall be acted upon at the inner end by the protector finger and at the outer end by a spring which will normally exert a greater pressure than does the protector finger. The result of this construction is that as the shuttle enters the box the protector finger will be thrown forwardly to permit continued running of the loom. When the inner end of the binder reaches the limit of its forward movement, the outer end will begin to move against the relatively heavy spring. A connection from the crank connector of the lay causes the heavy spring to exert considerable pressure and continued movement of the shuttle into the box will be effectively retarded, the binder moving bodily forwardly so that each end thereof is pressed yieldingly rearwardly and the binder surface can bear against the front wall of the shuttle.

The parts are so related that at the time of picking the pressure exerted by the heavy spring on the outer end of the binder is substantially or completely relieved and the protector finger is relied upon to hold the binder in guiding relation with respect to the shuttle. This is found to permit a very easy picking of the shuttle with a reduced power of consumption and wear of the shuttle.

The picker which propels the shuttle is subjected to wearing when the shuttle is boxed with too much force and also when it is picked out of the box against abnormal pressure. By checking the shuttle with a relatively high pressure when it first enters the box I relieve the picker of the necessity of absorbing very much of the momentum of the shuttle, and likewise by relieving the pressure at the time of picking the picker is required to transmit only that pressure which is required to set the shuttle into motion plus that required to overcome the light force exerted by the protector finger. In this way the boxing and picking of the shuttle are controlled to reduce the wear of the picker to a minimum.

With these and other objects in view which will appear as the description proceeds, my invention resides in the combination and arrangement of parts hereinafter described and set forth in the claims.

In the accompanying drawings, wherein a convenient embodiment of my invention is set forth,

Fig. 1 is a front elevation of the plain end of the loom having my invention applied thereto,

Fig. 2 is an enlarged front elevation of a portion of Fig. 1,

Fig. 3 is a detailed top plan view in the direction of arrow 3, Fig. 2,

Fig. 4 is a detailed vertical section on line 4—4 of Fig. 2,

Fig. 5 is a detailed assembly view of the box and shuttle contained therein,

Figs. 6 and 7 are diagrammatic end elevations of the loom showing the positions to exert and relieve pressure, respectively,

Figs. 8, 9 and 10 are diagrammatic views representing different positions of the binder as the shuttle is boxed, and

Fig. 11 is similar to Fig. 10 but with the parts in position for picking.

Referring particularly to Figs. 1 and 6, the loom frame 10 is provided with a lay 11 mounted on swords one of which is indicated at 12. The crank shaft 13 drives a connector 14 comprising upper and lower rods 15 and 16, respectively, surrounded by compression springs 17. The forward ends of the rods are attached by a head 18 to the lay and back and forth movement of the latter is caused by the connector as the crank shaft rotates. The connector yieldingly drives the lay and as protection the springs compress to avoid shock to the shaft. For a further description of the structure and operation, reference may be had to patent to Hillman No. 1,323,391.

A protector rod 20 of usual form is pivotally mounted on the front lower part of the lay and has secured thereto a protector finger 21 which is normally uregd rearwardly by a compression

spring 22 surrounding the rod 20 and acting in the usual manner.

A picking arm 25 on the bottom shaft 26 strikes a picker shoe 27 and moves the sweep-stick 28 and lug-strap 29 inwardly to draw the picker stick 30 inwardly from the position shown in Fig. 1 whenever the shuttle is to be picked. A magazine M may be used if desired and is of the usual form, such as shown for instance in patent to Ryon No. 1,030,748.

The matter thus far described may be of usual construction, the protector finger exerting a relatively light pressure rearwardly and operating in known manner to stop the loom should the shuttle fail to be boxed properly, but permitting continued running of the loom should the shuttle be effective to move the finger forwardly at a given point in the advance of the lay.

In carrying my invention into effect I provide the outer end of the lay with an improved form of shuttle binder 40, the inner or left end of which as viewed in Figs. 2 and 5 receives the rear pressure of a protector finger 21. The binder may be formed of a strip of sheet metal 41 on the front thereof to which is secured a wooden block 42 formed substantially as shown in Fig. 5 and having on the rear surface thereof a leather strap 43. The inner end of the binder moves in and has its forward motion limited by a looped stop 45 of usual construction and associated with the box mouth.

The outer or right end of the metal strip 41 is bent as shown in Figs. 3 and 5 to define a slot 46 through which projects a vertical pin 47 carried by the lay and projecting upwardly high enough to have proper guiding relation with the side walls of the slot. The right end of the strip 41 may be bent back to the left and secured by welding to the main body thereof as shown at 48 to close the forward end of the slot and also provide means for receiving pressure which is exerted by head 49 of a pressure screw 50.

Mounted on the lay is a rocking shaft 55 having an outer bearing 56 depending from the lay and an inner bearing 57 on a lay sword. A pressure arm 58 is secured to shaft 55 in adjusted position by a set screw 59 and has the upper end formed with a pocket 60 to receive the forward end of relatively heavy compression spring 61. The rear end of the latter is received by another pocket 62 formed in an arm 63 pivoted loosely on the shaft 55. The upper end of arm 63 carries the previously described pressure screw 50 which is adjustable toward and from the binder 40 as is apparent from an inspection of Fig. 3.

The inner end of shaft 55 has secured thereto a rearwardly extending arm 70 having a laterally offset finger 71 passing preferably between the connector rods 15 and 16 as shown in Fig. 6. By means of a set screw 72 the angular position of the arm 70 with respect to the shaft 55 may be adjusted as desired.

It will be understood that as usually constructed the crank shaft will rotate in the direction of arrow *a* so that the connector rods are in low position when the lay is moving forwardly as shown in Fig. 6. The relation is such that the rods will assume their lowest position at about the time the shuttle enters the box, and I take advantage of this fact to cause rod 15 to push down on finger 71, thus pushing arm 58 rearwardly with maximum force at this time. The spring 61 is compressed and pushes the arm 63 rearwardly with maximum force, head 49 pressing against the binder and holding it substantially in the normal position indicated in Fig. 8.

Under these conditions the shuttle S will approach the shuttle box B as suggested in Fig. 8. The first contact of the shuttle with the binder moves the latter to the position shown in Fig. 9, the protector finger moving forwardly and the outer end of the binder held by spring 61. As the shuttle continues to travel into the box, it will push the binder forwardly against the action of spring 61, being resisted by the latter so that it strikes the picker P with only a slight force. The shuttle is then completely boxed, as shown in Fig. 10. Pin 47 guides the binder in its back and forth motions relatively to the lay.

During boxing rod 15 is near its lowest position, and exerts heavy pressure on the binder throughout the movement of the shuttle into the box. Experience shows that the shuttle enters the box before the connector reaches its lowest position, hence the force exerted by the rod 15 continues to increase, and in practice is found to be greatest at about the time the shuttle comes to rest, thereby preventing rebounding.

As the lay moves backwardly it approaches the top center or picking position, and rod 15 continues to rise, until the parts reach substantially the position shown in Fig. 7. By this time rod 15 has moved above and away from finger 71 and the previously exerted heavy pressure on the binder is relieved. The shuttle is then picked against a very light resistance which is due to the protector finger and the unbalanced weight of arm 70. Such resistance is found to be adequate to effect correct delivery of the shuttle from the box.

From the foregoing it will be seen that I have provided an improved shuttle binder and release effective to check the binder as the shuttle enters the box and to relieve the pressure at the time of picking, thus sparing the picker of unnecessary wear incident to boxing and picking. It will further be seen that the floating binder 40 acts first to move the protector finger after which its outer end retards the shuttle. It will further be seen that the means for exerting and relieving the pressure described result in a very light pressure on the binder at the time of picking.

Having thus described my invention it will be seen that changes and modifications may be made therein by those skilled in the art without departing from the spirit and scope of the invention and I do not wish to be limited to the details herein disclosed, but what I claim is:

1. In a loom having a lay and a shuttle box to receive a shuttle, a binder on the lay forming part of the shuttle box, a lay driving connector, a protector finger exerting a relatively light pressure on the inner end of the binder toward the cloth being woven, an arm pressing on the outer end of the binder, a relatively heavy resilient means operatively related to the arm, and connections operatively related to the connector to cause the relatively heavy resilient means to press the arm against the outer end of the binder, whereby both ends of said binder have yielding outward movements thereof resisted one end with the force greater than the other end when the shuttle is boxed.

2. In a loom having a shuttle box to receive a shuttle, a binder restrained against substantial longitudinal movement relatively to the lay but movable bodily in a direction transverse of the lay, a lay driving connector, a protector finger

adjacent one end of the binder to exert a relatively light force on said binder, an arm operatively related to the other end of the binder, and a relatively heavy resilient means operatively related to the arm and the connector and deriving from the latter a force which is communicated by said resilient means to the arm to resist movement of said other end of the binder by a force greater than that exerted by the protector finger when the shuttle is boxed.

3. In a loom having a lay provided with a shuttle box to receive a shuttle, a binder for the shuttle forming part of the box, means to prevent substantial movement of the binder longitudinally of the lay and to guide the binder as the latter moves bodily transversely of the lay, and means to exert two different degrees of yielding pressure on the ends of the binder, the lesser pressure on the ends of the binder being exerted at the protector end which is engaged first by a shuttle when the latter is being boxed and the greater pressure being exerted against the other end of the binder.

4. In a loom having a lay with a shuttle box to receive a shuttle, a binder forming part of the shuttle box to check the motion of the shuttle, a connector to drive the lay having rising and falling movements during the loom operation, a shaft carried by the lay and extending substantially parallel to the direction of motion of the shuttle, means secured to the shaft to rock the latter by a force derived from the connector when the latter is in low position to rock said shaft in a given direction, an arm secured to the shaft and movable therewith, a second arm loosely pivoted to the shaft and operatively related to the binder, and a resilient connection between the two arms effective when said shaft is moved in the given direction by a force derived from the connector to urge the second named arm toward the binder to urge the latter yieldingly toward shuttle checking position, the binder being movable by the shuttle when the latter is being boxed to move the second named arm against the action of the resilient means.

5. In a loom having a lay with a shuttle box to receive a shuttle, a binder forming part of the shuttle box to check the motion of the shuttle, a connector to drive the lay having rising and falling movements during the loom operation, a shaft mounted on the lay and extending substantially in the direction in which the shuttle is picked, means secured to the shaft to be operatively related to and moved by the connector, the latter effective through the means to rock the shaft in a given direction when the shuttle is about to be boxed and to rock said shaft in the opposite direction when the shuttle is about to be picked, an arm secured to the shaft, a second arm loosely pivoted to the shaft and operatively related to the binder, and resilient connections between the two arms, the first arm operative when the shaft is moving in said given direction to cause the resilient means to urge the second arm in a direction toward the binder, and said first arm operative when the shaft moves in the opposite direction to move in a direction away from the resilient means to lessen the pressure exerted by said resilient means against the second arm.

6. In a loom having a lay with a shuttle box to receive a shuttle, a binder forming part of the shuttle box to check the motion of the shuttle, a connector to drive the lay having rising and falling movements during the loom operation, an element to be operatively related to and moved by the connector periodically when the connector is in one position and to be disconnected from the connector when the latter is in a different position, a pair of arms movable relatively to each other, one of said arms fixed with respect to the element and movable with the latter, and resilient means between the arms, the arm which is fixed relatively to the element operative when the latter is operatively related to the connector to cause the yielding means to urge the other arm toward the binder.

7. In a loom having a lay with a shuttle box to receive a shuttle, a binder forming part of the shuttle box to check the motion of the shuttle, a connector to drive the lay having rising and falling movements during the loom operation, means carried by the binder to define a slot extending transversely of the shuttle box, a guide secured to the lay and projecting through the slot, an element to have periodic operative relation with the connector when the latter is in one position to be moved by said connector, an arm in fixed relation with respect to and moving with the element, a second arm movable relatively to the first arm to engage the binder at a point adjacent the slotted means, and a resilient connection between the arms effective when the connector moves the element and first arm to urge the second named arm against the binder and tend to move that part of the binder adjacent the slotted means transversely of the shuttle box toward the shuttle when the latter is being boxed.

ELLIOT A. SANTON.