

C. H. DRAPER & J. NORTHRUP.
SHUTTLE CHECKING MECHANISM FOR LOOMS.
APPLICATION FILED FEB. 16, 1911.

1,058,292.

Patented Apr. 8, 1913.

2 SHEETS—SHEET 1.

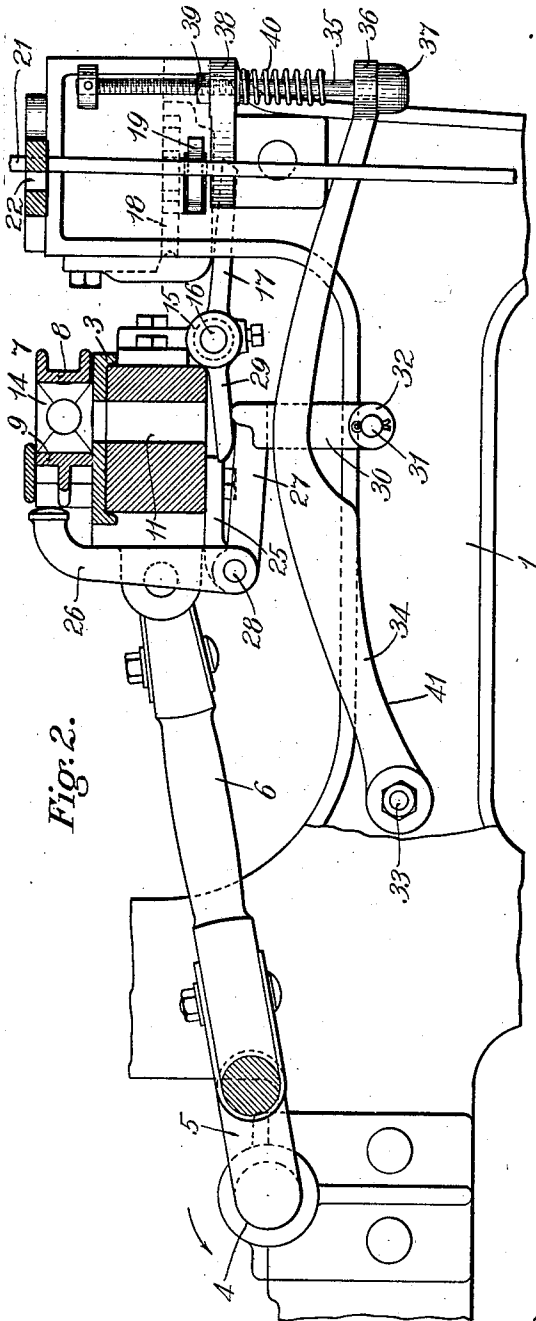


Fig. 2.

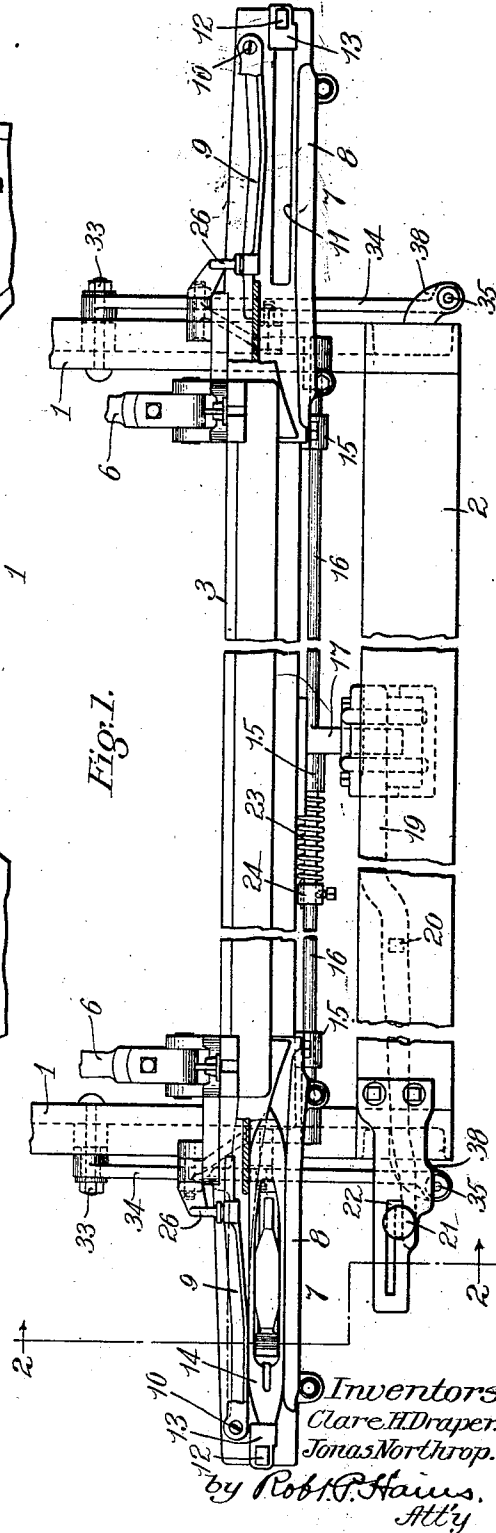


Fig. 1.

Witnesses:
Amelia M. Ross
May A. Hurley

Inventors
Clare H. Draper.
Jonas Northrup.
by Robt. P. Haines.
Att'y

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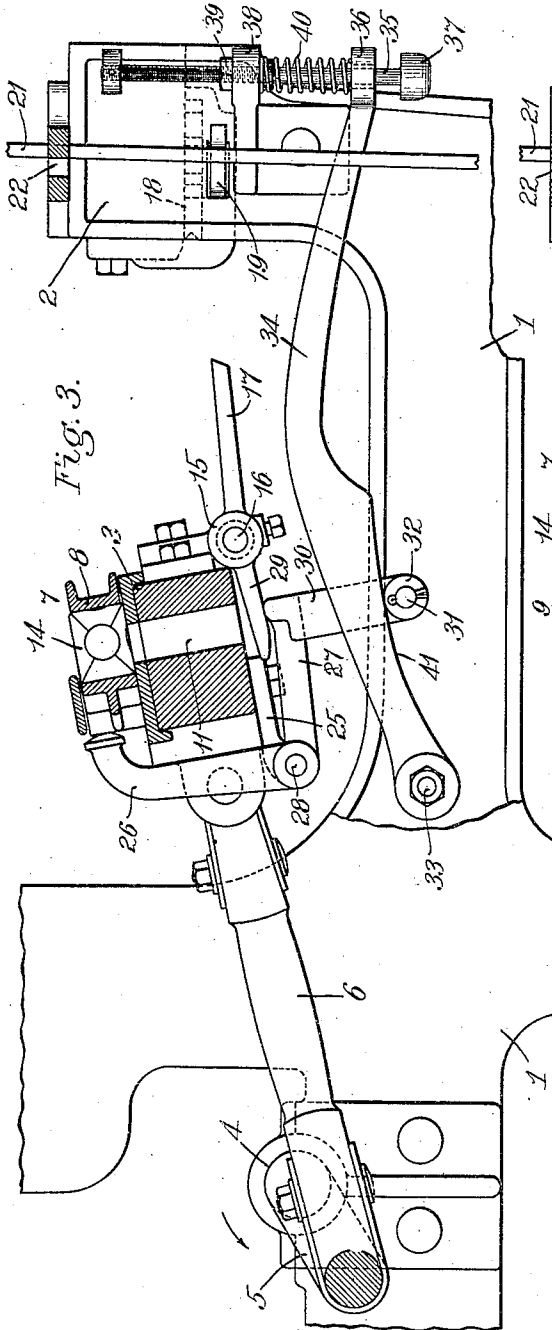


Fig. 3.

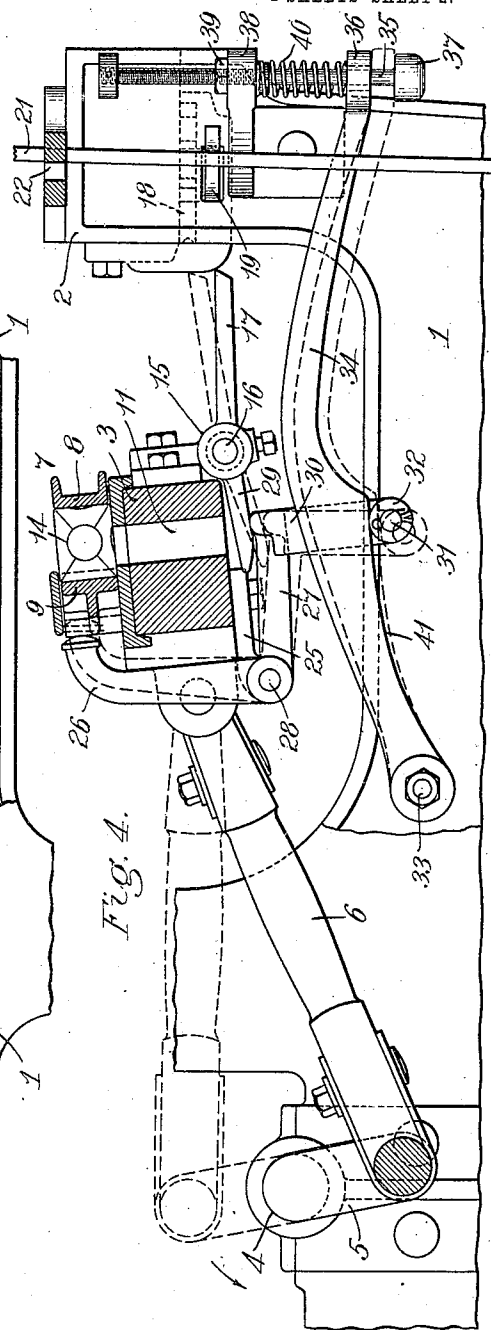


Fig. 4.

Witnesses.
Amelia M. Rose
May A. Tourley

Inventors
Clare H. Draper
Jonas Northrop.
by Robt. P. Harris, Att'y

UNITED STATES PATENT OFFICE.

CLARE H. DRAPER AND JONAS NORTHBOP, OF HOPEDALE, MASSACHUSETTS, ASSIGN-
ORS, BY MENNE ASSIGNMENTS, TO DRAPER COMPANY, A CORPORATION OF MAINE.

SHUTTLE-CHECKING MECHANISM FOR LOOMS.

1,058,292.

Specification of Letters Patent.

Patented Apr. 8, 1913.

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To all whom it may concern:

Be it known that we, CLARE H. DRAPER and JONAS NORTHBOP, citizens of the United States, residing at Hopedale, in the county of Worcester and State of Massachusetts, have invented an Improvement in Shuttle-Checking Mechanism for Looms, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

The invention to be hereinafter described relates to looms, and more particularly to means for insuring proper positioning of the shuttle in the shuttle box as it is picked or thrown from the opposite side of the loom. The importance of thus insuring proper boxing of the shuttle in a common or ordinary loom is well understood by those skilled in the art, and failure in this regard has been a recognized source of warp breakage, trouble, and expense. In filling replenishing looms, the importance of properly boxing the shuttle becomes emphasized, because if not in position for the action of the replenishing mechanism either replenishment will fail or breakage occur.

In the ordinary operation of a loom, the shuttle is thrown or picked from one shuttle box and starts on its excursion to the opposite box as the lay moves backward or away from the fell of the cloth, and in the absence of any disturbing cause it would always enter the opposite box as the lay reached a fixed position in its forward movement toward the fell of the cloth. It is a fact, however, well known to those familiar with the weaving art, that owing to one or more of numerous causes, the operation of the loom varies and the effective action of the picking means on the shuttle is not uniform, with result that the shuttle does not always enter the shuttle box at the opposite side of the loom when the lay is in the same position of its forward movement. If, for instance, the pick is a weak one or relatively non-effective, the shuttle will enter the opposite box relatively later in the forward movement of the lay; while, on the other hand, if the pick is relatively strong or effective the shuttle will enter the opposite box relatively earlier in the forward movement of the lay. In the first case the shuttle may not fully enter the box in opposition to the usual check, whereas, in the

second case, it may enter and rebound. Either of these conditions is objectionable in both the simple and filling replenishing loom.

With the above generally stated facts in view, the present invention has for its aims and purposes the provision of means whereby to apply to the shuttle, as it enters the box, a checking action proportional to the picking energy or momentum of the shuttle and to insure proper boxing of the shuttle whatever the position of the lay when the shuttle enters the box, all of which will hereinafter more fully appear and be definitely pointed out by the claims.

In the drawings, which illustrate a convenient form of means for carrying the invention into practical effect,—Figure 1 represents in plan view sufficient of the front portion of a loom to make clear the use of the present invention; Fig. 2 is a section on line 2—2, Fig. 1, showing one form of the invention and the position of the parts when the lay is in full forward position; Fig. 3 is a view similar to that of Fig. 2 showing the relation of parts when the lay is in substantially rear position and starting forward; and Fig. 4 is a similar view showing the lay in center position, the full lines indicating the lay as moving forward and the dotted lines as moving rearward.

The loom frame 1, the breast beam 2, the lay 3 and its mounting, the crank shaft 4, the crank 5, and the connecting rod 6 joining the crank and lay may be of any usual or desired form and construction. The lay 3 may be provided with usual shuttle boxes 7, one at each end of the lay, as indicated in Fig. 1. In the particular construction shown, the shuttle boxes are each provided with a fixed front wall 8, and a rear binder 9 which is pivoted at its outer end 10 to the lay or one of its adjuncts, but it is to be understood that the invention is not restricted in these respects and that the shuttle boxes may be variously modified within the true scope of the invention. The floor or lower wall of each shuttle box is shown as having a slot 11 for the passage of the picker stick 12, Fig. 1, which by its movement longitudinally of the lay causes the picker 13 to act upon and throw or pick the shuttle 14, all as is common and well understood. Obviously, if the present in-

vention is to be applied to a filling replenishing loom, the shuttle box at the replenishing side will be provided with the usual exit for the filling carrier, but as this is old and well known, its detail showing and description are unnecessary.

Mounted in suitable bearings 15 at the front of the lay 3 is the protector rod 16, Fig. 1, having a dagger 17, under certain conditions to be described adapted to contact with the bunter 18 connected to the knock-off lever 19, pivoted at 20 to the breast beam 2, the other end of said knock-off lever being disposed to bear upon the shipper handle 21, Figs. 1 and 2, and detach it from its usual holding notch 22 to cause loom stoppage, as will be fully understood by those skilled in the art. The protector rod 16 is normally under the control of a spring 23, Fig. 1, one end of which is secured to the rod by a collar 24 and the other end whereof is secured to one of the bearings 15, the construction being such that said spring normally acts to raise the dagger, when the latter is free to respond to the demands of the spring, and place the end thereof in position to contact with the bunter 18 on the forward movement of the lay.

Secured to the lay adjacent each shuttle box is a bracket 25, to each of which is pivotally connected a device to act upon the adjacent shuttle binder to check the shuttle as it enters the box. This device may for convenience of identification be herein termed the shuttle checking-pressure transmitter, and in the form shown it comprises a finger 26, the upper end of which is adapted to bear upon the adjacent binder, and an arm 27 extending beneath the lay. Said finger and arm are connected to move in unison, being preferably formed integral, and are pivoted to the bracket to move about a center 28. The forward portion of each of the arms 27 extends beneath a toe 29 connected to the protector rod 16 near each end thereof, the construction being such that should a shuttle be properly boxed in one of the shuttle boxes, the finger 26 of the adjacent shuttle checking-pressure transmitter would be moved backward turning about the axis 28, raising the arm 27 and, through the toe 29, turning the protector shaft to depress the dagger 17, so that on the forward movement of the lay, the end of the dagger will not contact with the bunter. Should, however, the shuttle not enter the box sufficiently to move the adjacent finger 26 backward as described, the arm 27 will not lift the toe 29, and on the forward movement of the lay the dagger will contact with the bunter, and cause loom stoppage.

It is not essential to the present invention that the protector rod, dagger, and bunter be arranged in the particular relation stated, nor that the rod be directly under the

control of the shuttle checking-pressure transmitter, because the only essential with relation to the dagger and its cooperating parts is that when a shuttle is properly boxed as the lay beats up the loom will not "knock-off," but when a shuttle fails to box, and warp breakage is liable to occur by reason thereof, that the dagger will be positioned to "knock-off" the loom as the lay beats up. Obviously, this effect can be variously secured and, broadly speaking, is not new, so that any appropriate devices may be employed without departing from the true scope of the invention, as will later appear.

Depending from the arm 27 of each of the shuttle checking-pressure transmitters, one at each side of the loom, is a hanger 30, carrying a pin 31 and a roll 32. This hanger 30 is preferably, though not of necessity, made integral with its arm 27. Pivotally mounted on each side of the loom frame at 33 is an arm 34, which for convenience of identification may be herein referred to as a pressure arm, and since the arms and their operations on opposite sides of the loom may be the same, a description of one will be sufficient.

The pressure arm 34 extends forward from its pivotal support 33, and at its front end engages a supporting and adjusting rod 35. In the form of the invention illustrated, the rod 35 passes through a perforation in the enlarged end 36 of the pressure arm, and has a head 37 on which the end of the pressure arm may rest when said arm is otherwise unsupported. The rod 35 passes upward through a bracket 38 secured to the loom frame, and is provided with suitable adjusting means for adjusting the position of the head 37 and perforce the height at which the end of the pressure arm 34 may be held for a purpose that will presently appear. In the form of the device illustrated by Figs. 1 to 4 inclusive, the adjustability of the head 37 is secured by a nut 39 screw threaded upon the rod 35 and resting upon the top of the bracket 38.

A spring 40 surrounds the rod 35 to cushion the upward movement of the pressure arm 34, said spring being preferably sustained in position from the under side of the bracket 38, as indicated by Figs. 2, 3, and 4. The under surface of the arm 34 is disposed above the pin 31 and roll 32 of the hanger 30 secured to the shuttle checking-pressure transmitter, the parts being so related that during a portion of the backward and forward movement of the lay, the roll 32 rides under and lifts or supports the weight of the pressure arm. When the lay is nearer its rear position, the roll 32 sustains the weight of the pressure arm 34 at a point nearer the pivot 33 of said arm, with the result that the weight or gravity of the pressure arm acting upon the shuttle checking-pressure trans-

mitter with greater leverage transmits to the binder 9 its greater pressure. As the lay moves forward the roll 32 travels along the under surface of the pressure arm 34 thereby constantly diminishing the leverage of the pressure arm upon the transmitter.

Bearing in mind that the shuttle will reach the box at the opposite side of the loom at a time in the forward movement of the lay dependent upon the power or energy of the pick, and that under a weak pick the shuttle will enter the opposite box later and under a relatively strong pick will enter the box earlier, it will be seen that the device described presents means that will act upon the shuttle to check the same with a force proportional to the force of the pick or momentum of the shuttle. Should the shuttle be driven across the lay with great energy, it will reach the opposite box sooner and when the lay is nearer its rear position, but at such time the pressure arm through the shuttle checking-pressure transmitter is acting upon the binder with greater energy, so that the highly energetic shuttle as it enters the box is met by a correspondingly highly energetic checking action of the binder with the result that it is stopped and boxed in proper position. On the other hand should the shuttle be driven across the lay with less energy or by a so called "weak pick" it will reach the opposite box more tardily and when the lay is farther forward. At such time, however, the pressure arm is acting upon the binder through the shuttle checking-pressure transmitter with less pressure, so that the less energetic shuttle as it enters the box is met by a correspondingly less energetic checking action.

From the character of the invention thus far set forth, it will be noted that when the shuttle reaches the opposite box it will be met by a shuttle checking force corresponding with the energy of movement or momentum of the shuttle, and whether this be relatively small or great the shuttle will always enter the box to the desired extent and be properly positioned therein without rebound. It will also be noted that the force of the checking action decreases gradually as the lay moves from its rear toward front position and whether the shuttle enters the box early or late, due to its varying energy of movement under varying conditions in the effective picking action, it will be properly received by and stopped in proper position in the shuttle box. When the pressure arm rises under the lifting action of the shuttle checking-pressure transmitter any overthrow or excessive rising movement of the pressure arm is overcome and cushioned by the spring on the rod 35.

It becomes desirable at times to regulate the checking action upon the shuttle, even though the present device insures proper

boxing of the shuttle regardless of the effective energy of the pick. To effect this in looms heretofore it was necessary for the loom fixer to stop the loom and adjust the walls of the shuttle box, the picker strap, or other part, and then start the loom and observe the effect of his adjustment. In the present device, however, this is unnecessary because by adjusting the rod 35, which can be done while the loom is operating, the action of the shuttle check can be regulated to suit the running condition of the loom.

The under surface of the pressure arm is preferably formed with a riding portion 41 to engage and ride upon the roll 32 during that portion of the lay movement when the picking action of the shuttle must be commenced and completed, so that as the lay moves back and during the time the shuttle is to start on its excursion, the action of the pressure arm is at first least and then gradually increases until it reaches a maximum at the rear position of the lay. Then as the lay starts forward the action of the pressure arm gradually becomes less and less, until at the expiration of the time when the shuttle must have completed its excursion, the roll 32 passes from contact with the pressure arm and the shuttle is held in the box by the light pressure of the binder. This light pressure may be secured by the weight of the arm 27, hanger 30 and the light spring 23 acting on the protector rod. Thus when the shuttle is finally boxed it is lightly held, so that in a filling replenishing loom it may be moved, if necessary, by the incoming carrier to properly receive the base of the bobbin between the usual holding jaws of the shuttle. In the present device such freedom for shuttle movement is not of prime importance, because the shuttle checking means can always be readily adjusted to insure the correct positioning of the shuttle in the box and with respect to the replenishing mechanism.

While the means hereinbefore described is a simple and efficient form of the invention, it is to be understood that the invention is generic in character and not restricted thereto; and effective operation of the invention will be secured though the parts and their relation may be variously changed or modified. For instance, the knock-off device might be otherwise operated or the binder might be otherwise arranged and disposed.

It has not been deemed necessary to specifically mention the various causes which influence or modify the picking action and cause variations in the moving energy or momentum of the shuttle and its consequent arrival in the opposite box at different positions of lay movement and with different degrees of energy, as these matters are well understood by those familiar with the art, and the present invention acts to secure the

ends stated irrespective of the cause of such variations.

What is claimed is:

1. In a shuttle checking mechanism for 5 looms, the combination of the lay and shuttle boxes, means for engaging the shuttle to check it as it enters a shuttle box, means acting through said engaging means to exert upon the shuttle a maximum checking 10 action when the lay is in extreme rear position and a progressively decreasing checking action as the lay moves from said extreme rear to front position, and a device for 15 varying the maximum and progressively decreasing action of the shuttle checking means during the operation of the loom.

2. In a loom, the combination of the lay and shuttle boxes, a shuttle checking device carried by the lay, a lever pivotally connected to the loom frame and acting through 20 said device with varying leverage thereon in different positions of the lay to exert maximum checking energy when the lay is in back position and decreasing checking energy as the lay moves forward.

3. In a loom, the combination of a lay and shuttle boxes, a shuttle checking device, means including a lever cooperating therewith and acting therethrough with a 30 maximum checking action when the lay is in back position and to vary the checking energy of said device in a decreasing ratio corresponding to the picking energy of the shuttle as the lay moves forward, and an 35 adjusting device adjustable during the operation of the loom for regulating the checking action of said means.

4. In a shuttle checking mechanism for looms, the combination of the lay and shuttle boxes, a shuttle checking device to check 40 the shuttle as it enters a shuttle box, and a lever pivoted to the machine frame at a rear portion thereof and projecting toward the front of the loom, said lever acting 45 through said device with varying leverage at different positions of the lay and exerting a maximum checking energy when the lay is in back position and gradually decreasing said checking energy as the lay 50 moves forward.

5. In a loom, the combination of a lay, shuttle boxes having binders, means cooperating therewith to exert a maximum checking energy upon the binders when the 55 lay is in back position and to vary the checking energy of said binders in a decreasing ratio corresponding to the picking energy or momentum of the shuttle as the lay moves forward, and an adjusting device at 60 the front of the loom for regulating the checking action of said binders during the operation of the loom.

6. In a loom, the combination of a lay

and shuttle boxes, means for acting on the shuttle to check the same, a lever pivotally 65 mounted on the loom frame and adapted to act with varying leverage through said means from a maximum when the lay is in rear position, and means connected with the free end of said lever for regulating its ac- 70 tion during the operation of the loom.

7. In a loom, the combination of the lay and shuttle box, a binder for said box to act upon the shuttle, a shuttle checking-pressure transmitter to act upon the binder and hav- 75 ing a part or hanger, a pressure arm pivoted to the loom frame at a fixed point and adapted to bear on said part or hanger with maximum leverage when the lay is in back position and with decreasing leverage 80 as the lay moves forward.

8. In a loom, the combination of a lay and shuttle box, a binder for said box to act upon the shuttle, a shuttle checking-pressure transmitter engaging said binder, a 85 pressure arm pivoted to the loom frame back of the rearmost position of the lay and acting upon said transmitter with maximum pressure when the lay is in rearmost position and to vary the pressure of the 90 binder on the shuttle in a decreasing ratio as the lay moves forward, and a device for adjusting the action of the pressure arm during the operation of the loom.

9. In a loom, the combination of a lay 95 and shuttle box, a binder for said box, a shuttle checking-pressure transmitter mounted on the lay and engaging the binder, and a pressure arm mounted on the loom frame with its free end toward the front of 100 the loom and acting on the transmitter to vary the pressure on the binder in a decreasing ratio corresponding to the picking energy of the shuttle as the lay moves forward, and means connected with the free end 105 of said pressure arm to vary its pressure upon the transmitter.

10. In a loom, the combination of a lay and shuttle boxes, means for acting on the shuttle to check the same, a lever pivoted to 110 the loom frame and adapted to act upon the shuttle with varying leverage through said means from a maximum with the lay in rear position, means connected to the free end of said lever adjacent the front of the loom for 115 adjusting the action of said lever during the operation of the loom.

In testimony whereof, we have signed our names to this specification, in the presence of two subscribing witnesses.

CLARE H. DRAPER.
JONAS NORTHPROP.

Witnesses:

WENDELL WILLIAMS,
BERTHA I. SNARE.