

No. 891,618.

PATENTED JUNE 23, 1908.

E. HOLLINGWORTH.

## STOP MOTION AND REVERSING MECHANISM OF LOOMS.

APPLICATION FILED MAY 13, 1904.

4 SHEETS—SHEET 1.

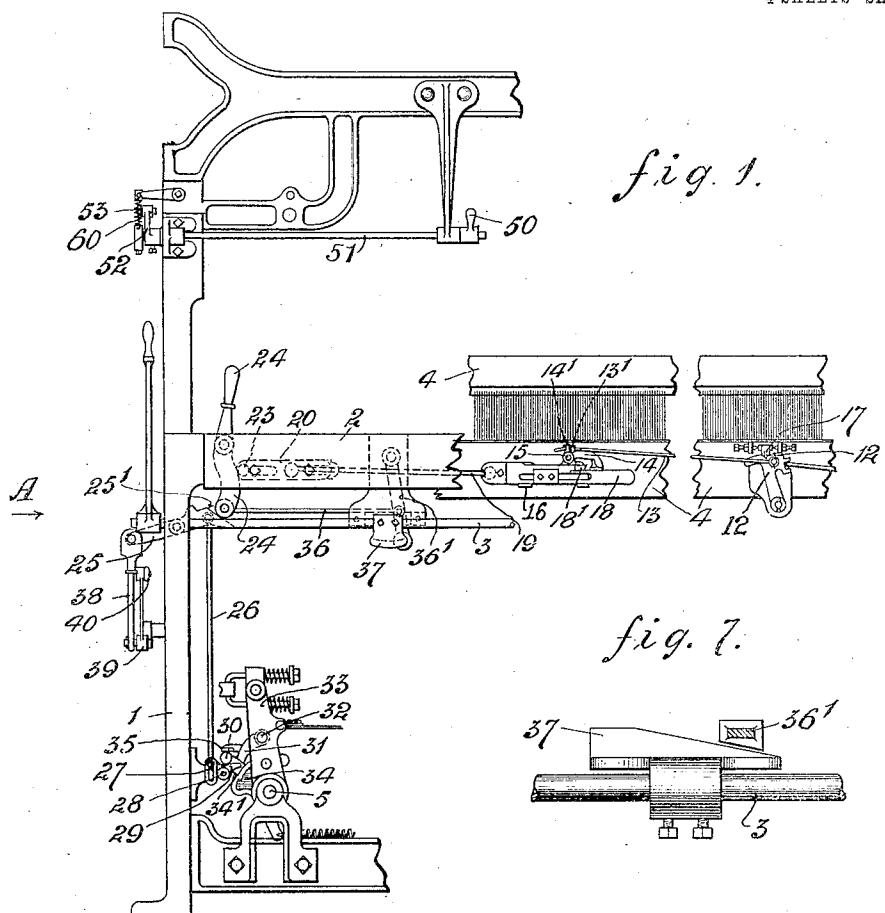


fig. 5.

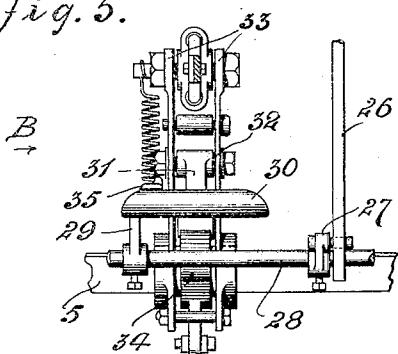
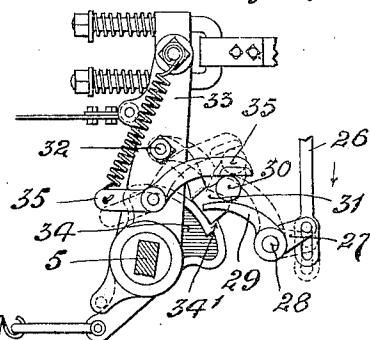


fig. 6.



Witnesses.

W. Head

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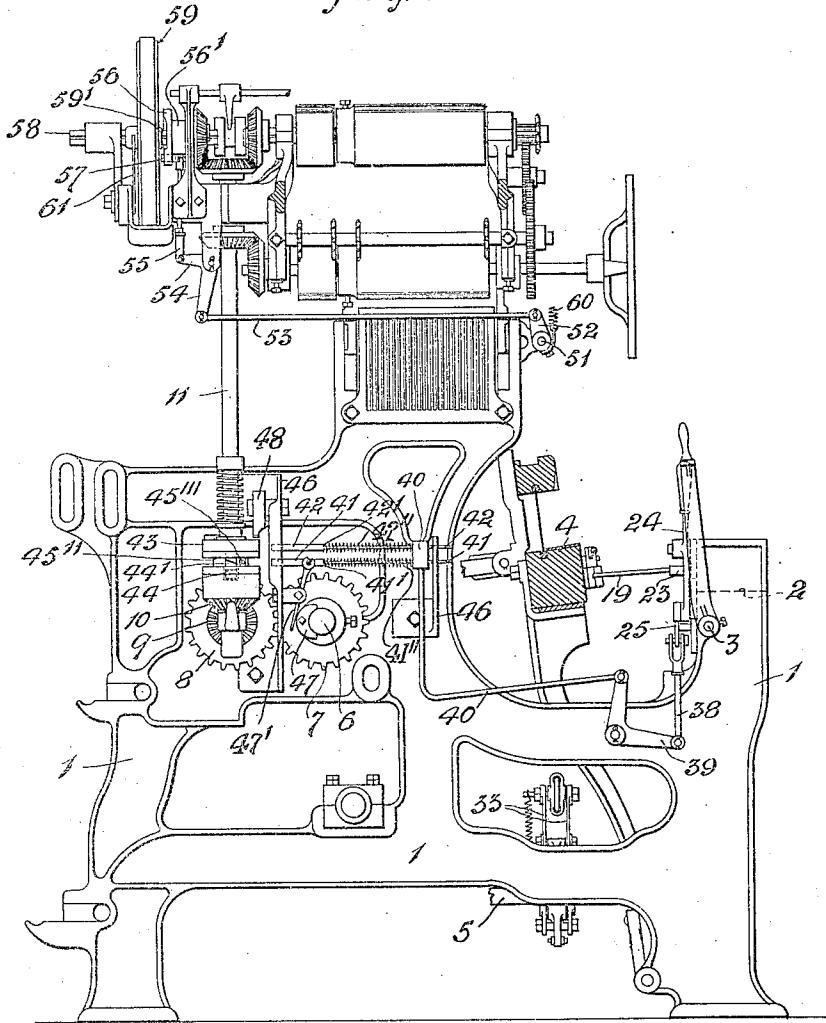
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4 SHEETS—SHEET 2.

fig. 2.



Witnesses.

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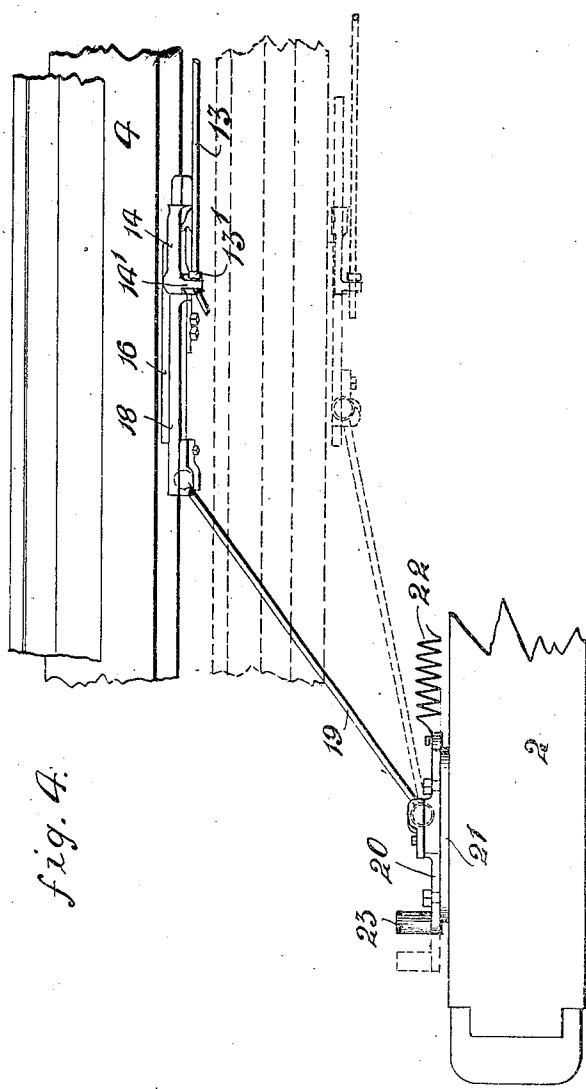
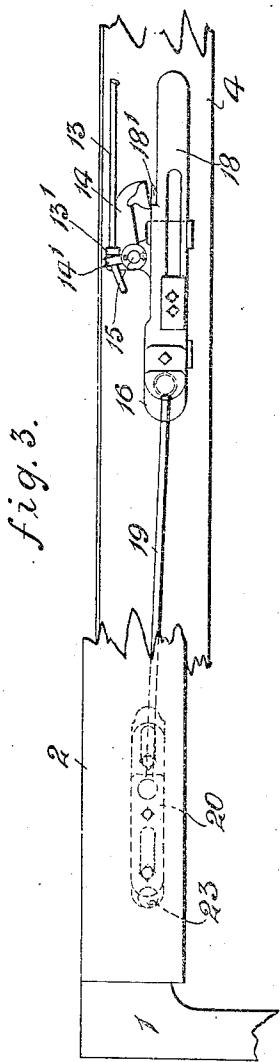
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4 SHEETS—SHEET 3



Witnesses.

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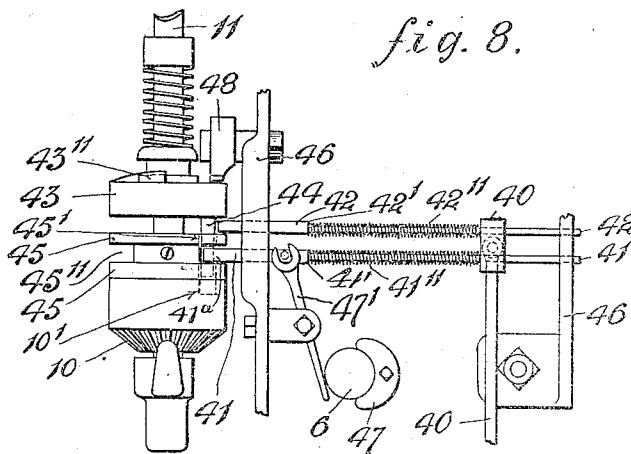
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STOP MOTION AND REVERSING MECHANISM OF LOOMS.

APPLICATION FILED MAY 13, 1904.

4 SHEETS—SHEET 4.



# UNITED STATES PATENT OFFICE.

EDWARD HOLLINGWORTH, OF DOBCROSS, ENGLAND, ASSIGNOR TO CROMPTON & KNOWLES LOOM WORKS, A CORPORATION OF MASSACHUSETTS.

## STOP-MOTION AND REVERSING MECHANISM OF LOOMS.

No. 891,618.

Specification of Letters Patent.

Patented June 23, 1908.

Application filed May 13, 1904. Serial No. 207,831.

*To all whom it may concern:*

Be it known that I, EDWARD HOLLINGWORTH, a subject of King Edward the Seventh of Great Britain, and resident of 5 Dobcross, in the county of York, England, have invented certain new and useful Improvements in Stop-Motions and Reversing Mechanism of Looms, of which the following description, in connection with the accompanying drawings, is a specification.

This invention in or connected with the weft stop mechanism and in the heddle or dobby operating and box mechanism of looms for weaving consists, firstly, in providing means to act in conjunction with the weft fork, or weft fork mechanism, for throwing the heddle or dobby operating and box mechanism and picking mechanism out of action or disconnecting them from the loom, 15 immediately the weft fork operates on the failure or absence of weft, apart from the stoppage of the loom by the actuation of the shipper handle to shift the strap from the fast to the loose pulley, in the usual way, 20 and, secondly, of improvements in means for reversing the loom mechanically in lagging back, either one pick at a time, or any number of picks in succession, by the slightest movement or pressure of the hand and with- 25 30 out throwing the least strain on the weaver.

In weft stop motions as at present constituted, the loom is liable to over-run itself by its own momentum after the weft fork or feeler mechanism has operated to stop it 35 and, consequently, before the fault can be remedied, the loom may have to be turned back to bring the parts into the position they ought to occupy for the re-introduction of the pick.

40 The object of this part of my present invention is to provide, in addition to means for actuating the usual knock-off rod to move the shipper handle to transfer the driving strap from the fast to the loose pul- 45 ley, novel and effective means for disconnecting or throwing out of action instantaneously on the weft breaking or failing, both the shedding or heddle operating and box mechanism and the picking motion, in order 50 that the weaving operation, as regards both the formation or change of shed and movement of the shuttle boxes and the picking of the shuttle, may cease approximately at the same time as the weft fork motion op- 55 erates on the failure or breakage of the weft,

whereby although the lay may be moved in excess or over-run itself by reason of the momentum of the loom, it will have no effect on the operative parts of the loom which will be ready for starting again immediately the 60 weft is pieced up, or a fresh supply introduced.

65 My invention further comprises means for mechanically turning back the loom to find broken picks, or for other causes, the object of this part of my invention being to relieve the weaver of all strain and minimize labor and time in lagging back.

In the accompanying drawings:—Figure 1 is a front elevation of one side of a loom showing a portion of my improvements applied thereto; Fig. 2 is an end elevation looking in the direction of arrow A Fig. 1. Fig. 3 is an elevation of a portion of the lay and breast beam, showing the connections from the weft fork motion for actuating the parts for disconnecting the picking motion, and the shedding or heddle operating and box mechanism, on failure or breakage of weft; Fig. 4 is a plan of Fig. 3. Fig. 5 is an elevation, seen from the end of the loom, of the picking motion, detached, showing the means I employ for disconnecting the picking motion from the loom on the breakage or failure of weft. Fig. 6 is an elevation of Fig. 5, looking from the rear of the loom, that is, in the direction of arrow B Fig. 5; Fig. 7 is a plan of the lever and shoe for actuating the usual knocking-off rod. Fig. 8 is an elevation of the clutch box mechanism on the 70 75 80 85 90 95 100 105 usual vertical shaft which conveys motion to the shedding mechanism, showing the means for unclutching the clutch members to disconnect the shedding mechanism from the loom on the breakage or failure of weft; Fig. 9 is a detached elevation showing the application of my improved means for mechanically turning back the loom to find broken picks, the parts being in their normal or inoperative positions, as when the loom is weaving; Fig. 10 is a similar elevation to Fig. 9 showing the parts in their operative positions for mechanically reversing the loom; Figs. 3 to 10 are on an enlarged scale.

Referring to the drawings, and to Figs. 1 to 8, 1 represents the near end frame of the loom, 2 the breast beam, 3 the usual stop or knocking-off rod, 4 the lay, 5 the picking shaft, 6 the crank shaft of the doom, 7 the spur gear mounted on one end thereof and 110

meshing with a spur wheel 8 on the front of which is a bevel gear 9 meshing with a bevel gear 10 loose on the vertical shaft 11. The said parts are all as ordinary and form no 5 part of this invention.

The weft fork motion is also as usual but, in this instance, I pivotally connect to the cam slide or cam faced rocking arm 12, a rod or link 13 which receives motion therefrom 10 and whose free end extends through an opening in a lug 14' projecting from a tumbling or locking lever 14, pivoted at 15 on a bracket 16 bolted to the front of the lay, and which is adapted to be oscillated on its pivot by the 15 engagement of a collar or enlargement 13' on the rod or link 13, with the lug 14', as said rod is moved endwise to the left under the action of the cam slide or cam faced arm 12 which, as is well known to those skilled in the 20 art, has a constant oscillatory motion imparted to it to act on the feeler to feel the filling and, on the absence or breakage of the filling, is locked in the position shown at Fig. 1 by the engagement of the outer end 17 of 25 the feeler with a recess in the cam faced arm or slide 12, and the motion of the arm 12 arrested.

The cessation of motion of the cam slide or arm 12 brought about by weft breakage or 30 exhaustion, prevents the rod or link 13 from completing its endwise movement to the left and, consequently, it does not move far enough to bring the collar or enlargement 13' into contact with the lug 14' on the lever 14 35 which, therefore, remains in its lowest position with its hook shaped end resting on the upper edge of a slide 18 supported and guided in ways in the bracket 16, and moved longitudinally of the lay by means of a radius bar 40 or rod 19 pivotally connected at one end to the slide 18 and at the opposite end to a slide 20 supported by a bracket 21 secured to the breast beam and movable thereon against the tension of a spring 22.

45 It will be manifest that so long as the weft is present or intact, the collar on the rod or link 13 will be brought into abutment with the catch lever 14 at every endwise movement of the rod in that direction, and said 50 lever will be moved on its center to place the hooked end or catch thereon clear of a shoulder or projection 18' on the slide 18 as this is moved toward the center of the loom on the beat up of the lay, and allow of the full free 55 movement of said slide to the extent determined by the angle of movement of the radius bar 19 whose point of connection with the slide on the breast beam is maintained in a fixed position by the resistance of spring 22 60 to movement of the slide 20. When, however, the weft breaks or is absent, the locking of the arm 12 by the weft feeler holds the link 13 in inoperative position, whereby the tumbling or catch lever 14 is allowed to re- 65 main down and, as the lay beats up, the pro-

jection 18' on the slide 18 engages with the hooked end of said lever and prevents further movement of said slide.

The locking of the slide 18 causes the thrust of the radius rod 19 to be transferred 70 to the slide 20 on the breast beam, which is forced bodily endwise against the action of the spring 22, a roll or stud 23 on said slide, in its outward movement, abutting against a vertical hand lever 24 mounted on a stud on 75 the breast beam and rocking said lever, the lower end thereof riding over an inclined or cam surface 25' on one end of a centrally pivoted lever 25, and moving it upon its pivot center. One end, namely, the inner 80 end of lever 25, is coupled by rod 26 to a lever or arm 27 fast on a rock shaft 28 parallel with the picking shaft 5 and supported in bearings in brackets bolted to the side frame of the loom, the movement of lever 25 through link 85 or rod 26 rocking the shaft 28 and causing a finger 29 fast thereon to engage a stud or roll 30 on a lever 31 pivoted at 32 to the usual picking arm 33 and to elevate said lever from the position shown in full line to that shown 90 in dotted line in Fig. 6, thereby removing the catch or foot of said lever out of engagement with a shoulder or offset 34' on a segment or locking device 34 fast on the picking shaft 5, and disconnecting the picking arm or lever 95 33 from connection with the picking shaft 5, by which means the picking motion is thrown out of action immediately on the weft breaking or failing. The picking arm or lever 33 is mounted loosely on the projecting hubs of 100 the segment or device 34. A spring actuated lever 35 carried by the picking arm 33 bears upon the stud or roll 30 and serves to hold the latch or locking lever 31 in engagement with the shoulder 34' on the segment when in 105 normal position and the loom weaving, and also acts to insure reinstatement of the parts after being moved as described to inoperative position.

The vertical lever 24 is connected by rod 110 or link 36 to a depending lever 36' pivoted on a stud on the breast beam and having an inclined surface thereon which is adapted to engage an inclined or curved surface on a shoe 37 fast on the usual stop rod 3, the 115 actuation of said vertical lever, as before described, drawing the lever 36' in the same direction, and as it rides over the cam or inclined surface on the shoe, the latter is forced back and rocks the rod 3 accordingly to actuate the shipper to transfer the strap from fast to loose pulley and stop the loom. The opposite movement of the other or outer arm of the centrally pivoted lever 25 caused by the 120 engagement of the vertical lever 24 therewith, as previously explained, serves, through link 38 pivotally connected thereto and to one arm of a bell crank or angle lever 39 mounted on a stud on the side of the loom, and rod 40 pivotally connected at one end to the other 130

arm of said bell crank lever, and loosely connected at its opposite end to two horizontal sliding bars 41, 42, to disconnect a clutch device on the usual vertical shaft 11 conveying motion from the crank shaft 6 to the shedding mechanism, and thus cease to operate said mechanism.

The upper or sliding clutch member 43 carries a depending stud 44 which is adapted to pass through corresponding openings 45' in the other or lower clutch member 45 fast on shaft 11, and enter an opening 10' in the bevel gear 10 to lock the shaft 11 and bevel gear 10 together, said stud having cut or formed in one side thereof a recess or cut out 44' (Fig. 2) having its upper end suitably inclined or curved for the purpose hereafter described.

The lower clutch member 45 has an annular groove 45'' cut or formed therein, to which, when the members 43 and 45 are in clutch, the recess or cut-out 44' or upper part of said recess or cut-out in the depending stud, is exposed.

Opposite to or in alignment with the annular groove 45'' is the horizontal bar or rod 41 which is provided with a laterally inclined nose 41' corresponding to the angle of the upper end of the recess 44' and adapted to engage same to elevate the sliding clutch member. The second bar 42 is arranged above and parallel to the first named bar and in a position to enter the space formed between the two clutch members when unclutched. Each bar is supported and guided horizontally in ways in brackets 46 bolted to the side frame of the loom, and they have confined between shoulders or collars 41', 42' thereon and the enlarged end of the connecting rod 40 through which said head the reduced ends of the bars loosely pass, spiral springs 41'', 42'' against which the head of rod 40 acts when moved to force the bars 41, 42, endwise in their bearings towards the clutch device, said springs serving to take up motion or admit of independent movement of the bars.

The action of the outer arm of the centrally pivoted lever 25 imparts, through the intermediate connections, comprising link 38, angle lever 39 and rod 40, a horizontal or endwise movement to the bars or rods 41, 42, the nose of the rod 41 entering the annular groove 45'' in the lower clutch member 45 whereby on the depending stud 44 on the upper member 43 being brought during the rotation of the clutch box into contact with said bar, the nose thereof engages the inclined or cam surface at the upper end of the notch or recess 44' in the stud 44 and forces the stud and upper clutch member into their highest position and out of engagement with the bevel wheel 10, as shown at Fig. 8, whereupon the heddle or dobby and box mechanism is at once disconnected from the loom

and ceases to operate simultaneously with the disconnection of the picking mechanism, both actions taking place immediately the weft feeler has detected the broken or absent pick.

On the upper clutch member 43 being elevated to its highest position, the spring on the bar or rod 42, which has been put in compression by the inability of said rod to move endwise with the rod 41, expands and forces the rod 42 endwise to place the extremity thereof between the two clutch members to hold them apart until the loom is started again, as shown at Fig. 8.

A cam or tappet 47 or like device mounted, say, on the crank shaft of the loom, acts through a pivoted lever 47', to withdraw the horizontal bar 41 out of engagement with annular groove 45'' after the top bar 42 has moved to its position to hold the clutch members out of gear.

In the annular groove 45'' is secured or formed to the rear of the stud 44, a stop piece 45''' (Fig. 2) which engages the bar 41 after the latter has elevated the upper clutch member to its inoperative position to prevent further rotation of the clutches after disengagement with the bevel gear 10. There is also secured or formed on the upper clutch member 43 an inclined stop piece 43'' (Fig. 8) whose rear edge is to be engaged by a holding lever 48 when the bevel gear has been disconnected from the vertical shaft, to prevent backward movement of the clutch members.

So far as I am aware, it is new to combine with a weft stop motion, auxiliary or supplementary means for self actingly or automatically disconnecting the picking and heddle or dobby operating and box mechanism from the loom in addition to stopping the loom itself, and to perform such functions immediately the feeler acts on detection of the absence or breakage of weft, or on the pick, and it will therefore be understood that I do not confine myself to the details or precise construction of the mechanism herein described or to the connections employed, or arrangement of the parts, as such connections or parts and their arrangement may be varied in many ways to suit the construction of loom to which the same may be applied, without departing from the nature and scope of my invention.

For the purpose of mechanically turning back the loom to find broken picks or for other causes and thus relieve the weaver of all strain, and minimize labor and time in lagging back, I have devised simple means for reversing the motion of the loom, one pick at a time, or any number of picks in succession, by applying a slight pressure of the hand to a lever or starting device situated in any convenient position on the loom to be within easy reach of the weaver.

The actuating hand lever 50 (Fig. 1) may

be located at one side, or centrally, of the loom, and is secured on a rock shaft 51 supported in brackets bolted to the loom framing. On the outer end of said rock shaft is secured an arm 52 to which is pivotally connected one end of a rod 53 pivotally connected at its opposite end to one arm of an angle lever 54 mounted on a stud secured to a bracket bolted to the loom arch or framing 10 of the dobby mechanism. To the other arm of the angle lever 54 is pivotally connected a rod or bar 55 supported vertically in bearings in the loom frame and having its upper end suitably shaped to enter and engage 15 when elevated into the annular groove 56, in a clutch member 56, a recess or cut out 57, in a sliding stud or pin carried by the clutch member 56 loose on the shaft 58 of the cylinder gear or heddle operating and box mechanism, and to force said stud or pin outward, the end thereof abutting against the face of a loose pulley 59 on which is a stud or projection 59' and moving it laterally on its shaft to place said stud or projecting piece 20 59' out of engagement with or clear of the clutch member 56 to disconnect the parts.

The movement of the rock shaft 51 to elevate the bar or rod or plunger 55 may be effected by a strong spring 60 (Figs. 1 and 2) 30 attached at one end to a strap or flexible connection secured to a boss fast on the said shaft and at the opposite end secured to a fixed stud or bracket, the said rod or bar being normally held in such elevated position 35 to maintain the clutch members apart.

It will be obvious that in place of the spring 60 any other equivalent means for holding the rod or plunger 55 normally yieldingly elevated may be employed.

40 When it is desired to reverse the loom or to lag back to find a broken pick, or for any other cause, the weaver depresses the oscillatory hand lever 50 by a slight blow or pressure of the hand, the movement thereof rocking shaft 51, and through rod or link 53 and lever 54, drawing down the rod or bar 55 whose upper end or nose is thus carried clear 45 of the pin or stud 57 and the latter released. As soon as this takes place, a strong spring 50 61 pressing against the hub or outer face of the pulley 59 acts to force such pulley laterally on its axis, whereby the clutching device or projection 59' thereon is brought into engagement with the opposing recess in the clutch member 56 and the opposite end of 55 the sliding stud 57 placed in the path of a lug 562 on the rear of the near bevel wheel of the ordinary head motion gear, whereby the pulley 59 and clutch member 56 are locked 60 to the shaft 58 and the motion of the loom reversed for one pick. The pulley 59 is driven by a strap from the main driving shaft of the loom and independently of the crank shaft 6.

If the oscillatory hand lever 50 is held 65 down instead of being simply struck, the loom will continue its reverse motion for any number of picks until said lever is again released. The moment the lever 50 is released, the rod 55 is moved upwardly by the 70 action of the spring 60 and when the pin or stud 57 is brought round in the completion of a revolution of the clutch members, the nose of said bar again enters the recess or notch 57' and acting against the inclined or 75 curved end thereof, forces the pin or stud endwise against the pulley 59 and forces it laterally on the shaft 58 into its normal or inoperative position.

The head motion gear above referred to, 80 illustrated in Fig. 2, and comprising the shedding or heddle and box operating mechanism, is, or may be, substantially the same as that shown in my Patent No. 469,210, granted Feb. 16, 1892, and in the present invention the shaft 58 corresponds to the shaft 13 of the said patent. In view of the fact that the loom will be stopped when it may be desired to mechanically reverse the head motion gear, the independently driven pulley 90 59 is provided; and when the said pulley is clutched to or in driving connection with the shaft 58 the said shaft will be driven reversely to its normal direction of rotation, for the purpose of reversing the head-motion 95 gear; the driving shaft 11, for the said head motion gear, being at this time, it will be understood, unclutched or disconnected from its driving bevel gear 10.

The mechanical reversing motion above 100 described may be applied to any existing looms of the type illustrated or looms of similar construction, and may be employed apart from the means first herein described for disconnecting the heddle and box operating and picking mechanisms, the two motions 105 acting independently of each other.

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

1. In a loom, the combination with a lay provided with a weft stop-motion device, of a picking motion device, and means, connected with and operated from said weft stop-motion device, whereby, when the latter is 115 operated to stop the loom, the said picking motion device will be automatically disconnected from its operating part.

2. In a loom, the combination with a lay and a weft stop-motion device carried thereby, of a shedding or heddle-operating and box mechanism, a shaft for operating said mechanism, actuating means for said shaft, a clutch intermediate said shaft and its actuating means, and means, connected with 125 and operated from said weft stop-motion device, for controlling said clutch.

3. In a loom, the combination with a lay

and a weft stop-motion device carried by said lay, of a head-motion gear, and means, connected with and operated from said weft stop-motion device, whereby, when the latter is operated to stop the loom, the said head-motion gear will be automatically disconnected from its operating means

5. In a loom, the combination with a lay provided with a weft stop-motion device, of 10 a picking motion device and a shedding or heddle-operating and box mechanism, and means, connected with and operated from said weft stop-motion device, whereby, when the latter is operated to stop the loom, the said 15 picking motion device and the said shedding or heddle-operating and box mechanism will be automatically disconnected from their operating parts.

6. In a loom, the combination with a lay provided with a weft stop motion device, of a 20 picker shaft, a picking arm or lever disconnectably joined to said shaft, a head motion gear comprising parts of a heddle or shedding mechanism and of a box mechanism, 25 means for disconnecting said picking arm or lever from its shaft, means for disconnecting said head motion gear from its driving shaft, a breast beam, means mounted on said breast beam for controlling both of the said 30 disconnecting means, and a radius bar con-

nected the said lay with the said controlling means on the breast beam.

6. In means actuated by or from the weft fork on detection of breakage or failure of weft, for throwing the shedding and box mechanism out of action, the combination of 35 a clutch member fast on the vertical shaft for conveying motion to the box and shedding mechanism and having an annular groove therein, a sliding clutch member provided with a depending stud to clutch the parts together, said stud having a recess or cut out open to the annular groove when the parts are clutched, a bar provided with a spring and means for actuating said bar to place the 40 end thereof in the annular groove to engage with the recess or cut out in the stud and elevate same and the sliding clutch to unclutch the parts, and a second bar provided with spring and actuated by the same means as 45 the first named bar for entering between the clutch members when unclutched to hold them apart until the connections are restored to normal position.

In testimony whereof I affix my signature 50 in presence of two witnesses.

EDWARD HOLLINGWORTH.

Witnesses:

THOMAS H. HIRST,  
JOHN R. SNALAM.