

O. COSSERAT.
SHUTTLE CHANGING MECHANISM FOR LOOMS.
APPLICATION FILED MAR. 8, 1907.

953,779.

Patented Apr. 5, 1910.

3 SHEETS—SHEET 1.

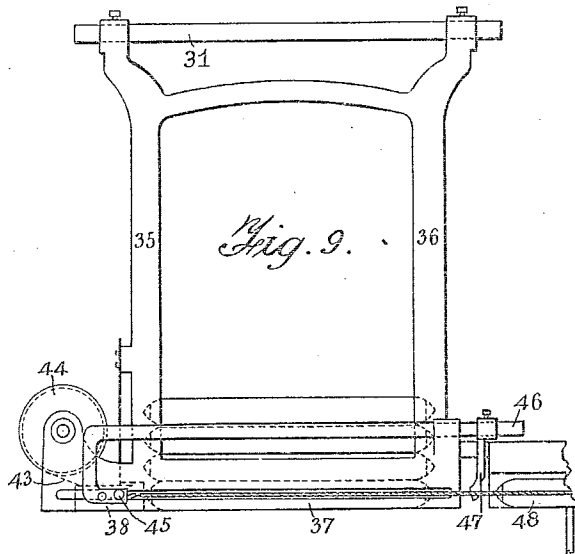


Fig. 9.

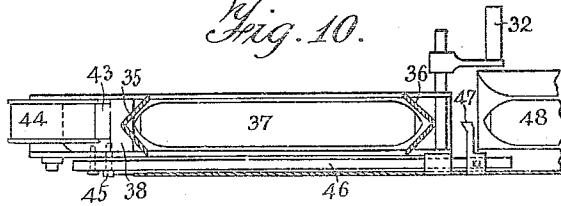


Fig. 10.

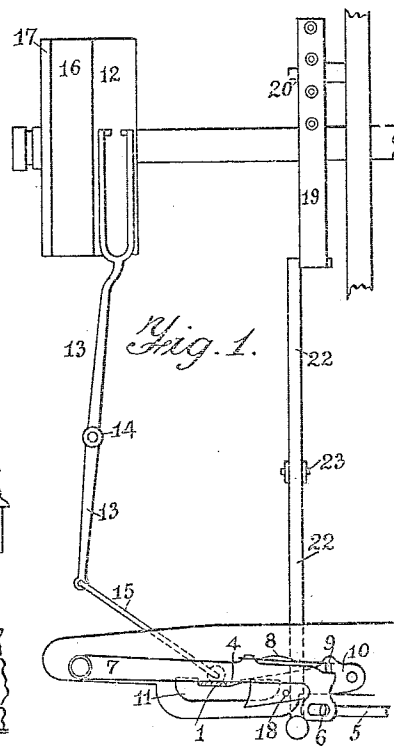


Fig. 1.

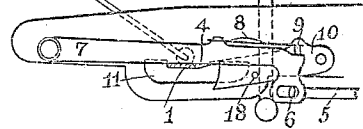


Fig. 14.

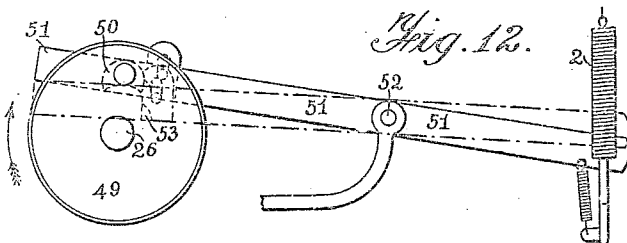


Fig. 12.

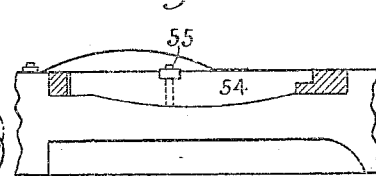
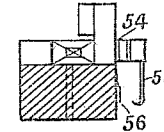
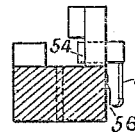
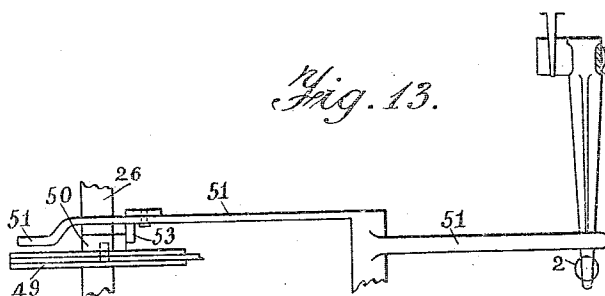


Fig. 15. Fig. 16.

Fig. 13.



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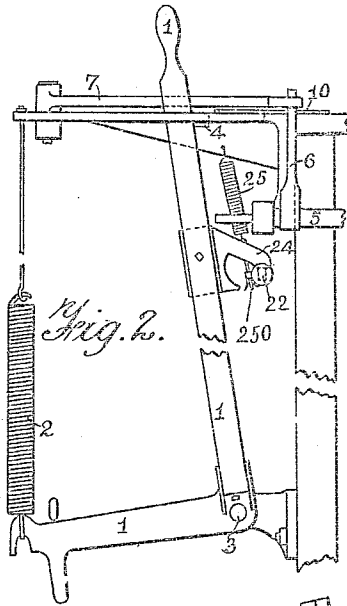


Fig. 2.

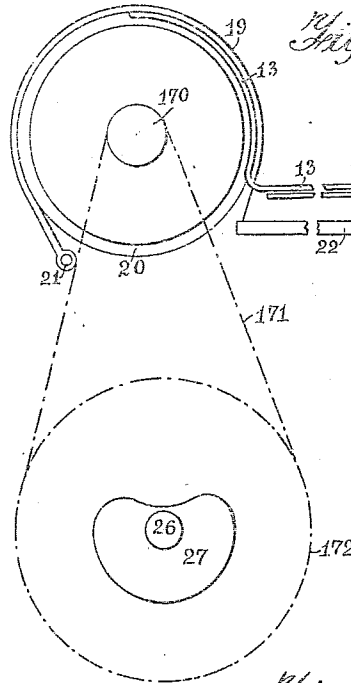


Fig. 3.

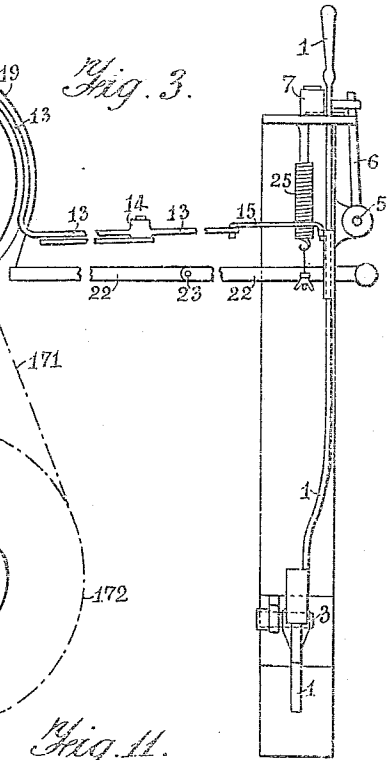


Fig. 11.

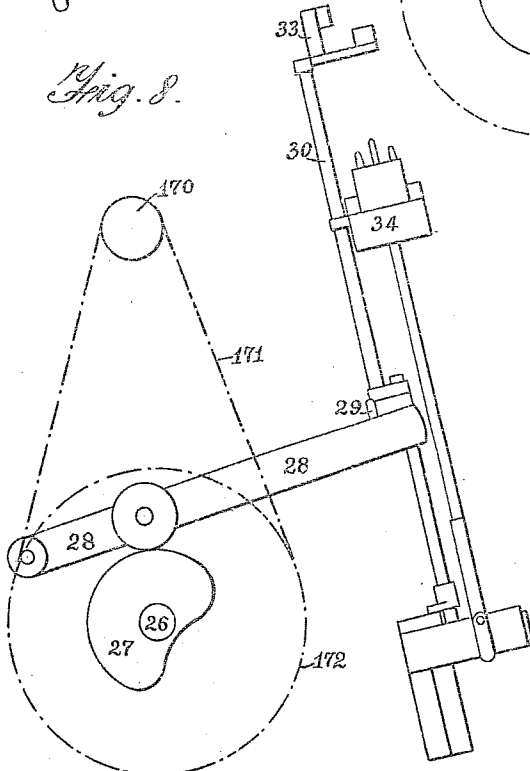
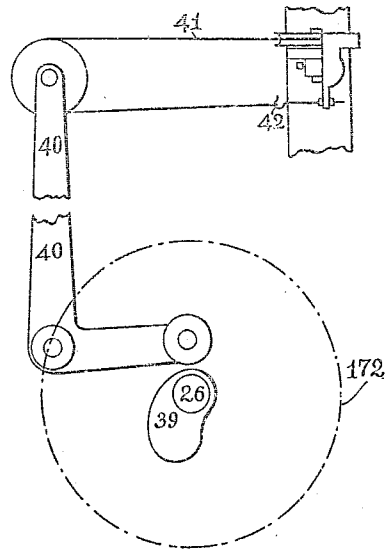


Fig. 8.



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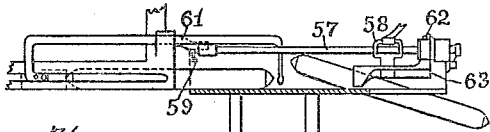


Fig. 17.

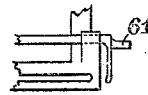


Fig. 19.

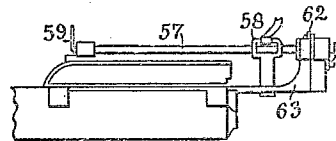


Fig. 18.

Fig. 4.

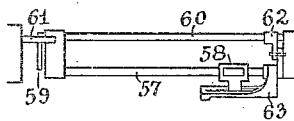


Fig. 6.

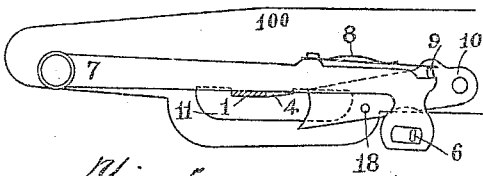


Fig. 5.

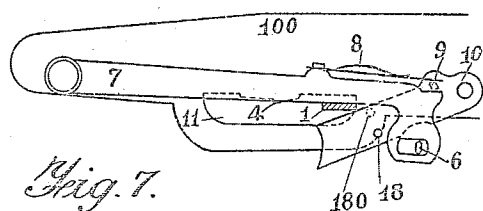
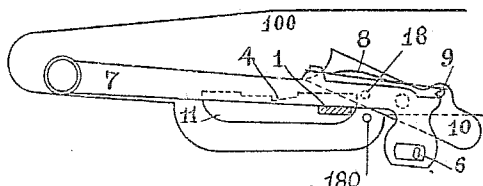
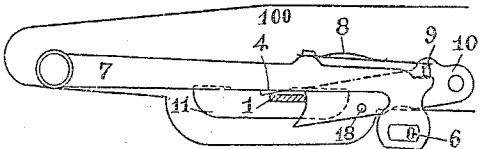


Fig. 7.



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OSCAR COSSERAT, OF AMIENS, FRANCE.

SHUTTLE-CHANGING MECHANISM FOR LOOMS.

953,779.

Specification of Letters Patent.

Patented Apr. 5, 1910.

Application filed March 3, 1907. Serial No. 361,400.

To all whom it may concern:

Be it known that I, OSCAR COSSERAT, a citizen of the French Republic, residing at Amiens, France, have invented a Shuttle-Changing Mechanism for Looms, of which the following is a specification.

This invention relates to automatic shuttle-changing mechanism for looms, the said mechanism being adapted to stop the loom and re-start it when the shuttle has been changed.

An embodiment of the invention is illustrated in the annexed drawings, in which—

Figures 1, 2 and 3 are respectively a plan view, front view and side view of that part of the mechanism by which the loom is stopped at a predetermined moment and by which the shuttle-changing device is operated. Figs. 4, 5 and 6 illustrate means for preventing the actuation of the shuttle-changing device when the loom is stopped by hand or by any agency other than that which normally causes a change of shuttles to take place. Fig. 7 illustrates a modification of these means. Fig. 8 illustrates the mechanism which lifts the shuttle-box to the shuttle-magazine. Figs. 9 and 10 are respectively a front view and plan view of the shuttle-magazine. Fig. 11 illustrates the mechanism which actuates the device for removing shuttles from the magazine. Figs. 12 and 13 illustrate the mechanism for re-starting the loom when the shuttle has been changed, and the special construction by which the movement of the cams for actuating the principal parts of the shuttle-changing mechanism is restricted to one revolution. Figs. 14, 15 and 16 illustrate means for preventing the introduction of a fresh shuttle into the shuttle-box when the shuttle in use is not in the box. Figs 17 and 18 illustrate a special arrangement which allows of using the shuttle-changing mechanism in connection with fly-cords, and Fig. 19 illustrates the device which prevents the lifting of the box from the lay during the working of the loom.

The mechanism executes four distinct operations, which will for simplicity be separately described. These operations may be stated as follows:—Firstly, the stopping of the loom at a certain moment, and actuation of the shuttle-changing mechanism. Secondly, displacement of one of the shuttle-boxes. Thirdly, substitution of a filled shut-

tle for an empty shuttle. Fourthly, re-starting the loom.

(1) *Stop motion and change of shuttle.*—While the loom is working one arm of the bell-crank-lever 1 pivoted at 3 and connected to the spring 2 is thrust toward the right against the abutment 4 (Fig. 2). (In the case of a left-handed loom the thrust would be toward the left). The weft-detecting mechanism also actuates the shaft 5, which is parallel with the fixed breast-beam 100, so that the vertical arm 6 actuates the horizontal lever 7, and the spring 8, which is fixed to the said lever and abuts against the boss 9 of the lever 10, rotates the latter out of the path of the lever 1. (See Fig. 6). At the same time the lever 1 is disengaged from the abutment 4 and moves to one end of the slot 11 in the fixed breast-beam 100. On being thus released from the abutment 4 the lever 1 actuates the belt shifter fork 13 pivoted at 14 and connected to the lever 1 by the rod 15. The said fork shifts the driving-belt from the main driving pulley 12 to the loose pulley 16, and at the same time places the belt on the pulley 17 which actuates the shuttle-changing mechanism (Figs. 1, 2 and 3). Figs. 4, 5, 6 and 7 illustrate also the mechanism which prevents the placing of the belt on the pulley 17 when the loom is stopped by any agency other than the action of the weft detecting mechanism. Since this mechanism is directly connected to the mechanism already described, and is essential to the proper working of the loom, its construction and action will be described before other parts of the apparatus are referred to in detail.

As stated above, the lever 10 is only withdrawn by the action of the shaft 5; this action being transmitted by the levers 6 and 7 giving free passage to the lever 1, which places the belt on the pulley 17. If the loom is provided with a stop motion and the latter operates or if the loom jams, or again if for any reason the operator desires to stop the loom by hand, the lever 10 which is displaced only by the action of the shaft 5 remains in place and the belt cannot pass on to the pulley 17, since the lever 1 is blocked and held by the lever 10.

In some cases it is necessary to prevent the change from taking place, even under the action of the weft detecting mechanism, for example, during the regulation or adjust-

ment of the loom, or the mounting of a new fabric or the like. For this purpose it is sufficient to place a pin in the hole 18 in lever 10, this pin entering a corresponding hole 180 in the warp beam, the lever being thus locked when the disengagement is effected. The spring 8 acting on said lever 10 is tensioned without displacing the said lever against which the lever 1 is stopped and the belt remains on the loose pulley 16 (Fig. 5). When the loom is regulated or the new fabric mounted, the operator completely removes the pin and the lever 10 is withdrawn immediately it receives movement from the detecting apparatus, and thus allows the changing of the shuttles to be effected each time the weft is exhausted, without intervention on the part of the operator. The use of the pin therefore has only one purpose, viz: to prevent the changing of the shuttle either at the will of the operator in certain cases, for example, in order to prevent accidents if he notices that the mechanism is not working normally, or to allow said operator to regulate the loom in the ordinary way.

The brake 19 at the circumference of the fly-wheel 20 fixed to the main shaft of the loom is pivoted at 21 (Fig. 3) to the loom frame and fixed at its other end to the lever 22 pivoted at 23. The arm 24 (Fig. 2) fixed to the lever 1 normally depresses the lever 22, so that while the loom is working the brake 19 is removed from the fly-wheel 20. When, however, the lever 1 is disengaged from the abutment 4 and rocks toward the right the lever 22 is released and is actuated by the spring 25, so that the brake is applied to the fly-wheel and quickly stops the loom. A fly nut 250 is provided for regulating the tension of the spring 25, in order to stop the loom in a predetermined position.

(2) *Displacement of one of the boxes.*—To the hub of the pulley 17 is fixed a small chain pinion 170 which transmits rotation by means of a chain, or the like, 171 to a larger wheel 172 on the cam shaft 26 at the side of the loom (Figs. 3 and 8). The cam 27 on shaft 26 is adapted to lift the lever 28, (Fig. 8) which engages the cross bar 29 connecting two parallel rods 30. The latter work in slots and are adapted to be lifted by the lever 28. To the ends of the rods 30 is fixed the box 33 of the loom, and when lifted by means of the lever 28 the rods place the box 33 at the level of the shuttle-magazine 35, 36 (Fig. 9). The shuttle-magazine, which comprises several important improvements and will be described hereinafter, is adapted to oscillate on the axle 31. When ascending the box 33 comes into contact with the guide 32 (Fig. 10), which moves the magazine and places it directly in front of the box, so that when the cam 27 has reached its highest position the magazine filled with shuttles

and the box 33 containing the empty shuttle are at exactly the same level and in line with each other as in Fig. 9, the empty shuttle 48 being opposite a filled shuttle 37. The latter is then moved, so that it displaces the empty shuttle and takes the place thereof in the box, as will be explained hereinafter.

Before the third operation is described it may be stated that the two parallel rods 30 which carry the box 33 are carried by the lay 34 and rock with the latter. These rods only lift that part of the box 33 which contains the shuttle. The picker remains on the lay during the ascent of the box. When the box has been removed from the picker it is open at both ends so that shuttles can pass into and out of the box.

(3) *Replacement of the empty shuttle by a filled shuttle.*—The shuttle magazine (Figs. 9 and 10) comprises a cast-iron frame made in one piece, the two uprights 35 and 36 of which have V-shaped recesses adapted to receive the points or noses of the shuttles. These uprights are connected at the top by a cross bar 350 and at the bottom by a kind of trough 360 of rectangular cross-section. This trough is provided with a longitudinal slot 361 at the side farthest removed from the workman, and is open at both ends. The magazine is suspended in front of the loom from the axle 31, on which it is rotatable. When a series of shuttles are placed in the frame one above the other the bottom shuttle, which will be designated 37, is in the trough 360. The driver 38 entering at the left-hand end of the trough pushes this shuttle out at the right-hand end, so that the shuttle enters the box 33, which has been lifted in the manner already described. The driver 38 is then moved back and the space previously occupied by the shuttle 37 is filled by the next shuttle of the series. The movement of the driver is produced by the following means. To the shaft 26 is fixed the cam 39 (Fig. 11), which is adapted to actuate the bell-crank-lever 40 in order to pull the cord or chain 41 which passes along a series of grooved pulleys at the level of the shuttle-magazine or driver 38. One end of this cord is attached to the stationary hook 42, and the other end is attached at 45 to the driver 38, to which is also attached the ribbon 43 wound on the spring barrel 44. When the cord is pulled to operate the driver the empty shuttle is pushed out of the shuttle-box by the finger 47 fixed to the rod 46; the latter is arranged in front of or behind the magazine, parallel to the shuttles, and is fixed at 45 to the driver. The removal of the empty shuttle therefore takes place without coöperation of the shuttle 37, and can also be effected in the manner indicated when the magazine is empty. After the shuttle 37 has been thrust by the driver 38 into the place previously occu-

pied by the empty shuttle 48 the spring or finger 43 advances and supports the next shuttle of the series in order to allow the driver to return to its original position. When the shuttle-box has been supplied with a filled shuttle the cam 27 allows the said box to descend and resume its position on the lay, and the finger 43 is pulled back to its normal position by the spring barrel 44 when the cam 39 has ceased to actuate the lever 40. The loom can then be re-started.

(4) *The re-starting of the loom.*—To the disk 49 (Figs. 12 and 13) keyed to or integral with the cam shaft 26 there is fixed a crescent-shaped cast-iron block 50, which rotates with the cam shaft and acts on the bent end 511 of the lever 51 fulcrumed at 52. The part 50 is so adjusted that it actuates the lever 51 immediately after the changing of the shuttle. The part 50 lifts the end 511 of the lever 51 and the other end of the latter is thus lowered and depresses the horizontal arm of the lever 1, against which it abuts. The lever 1 is thus rotated on its fulcrum 3, removes the brake by means of the arms 24 (Fig. 2), and removes the belt from the pulley 17 and loose pulley 16 on to the fixed pulley 12, the lever 1 being then engaged by the abutment 4, until the shuttle in use is empty, whereupon the cycle of operations described is repeated. If after these operations the rotation of the cams were not stopped, the latter continuing to rotate by inertia or being driven by the loom-mechanism, considerable damage would be caused. To prevent this, mechanism is provided to restrict the movement of the cams to one revolution and to lock the cam shaft during the normal working of the loom, so that the cams can only be rotated when the shuttle-changing mechanism comes into action. The device used for this purpose will now be described.

Fig. 12 is a side view in which the lever 51 is shown in its two end positions, and Fig. 13 is a plan view of the device. While the loom is working, the abutment 53 fixed to the lever 51 is in its upper position and arrests the crescent-shaped block 50. When the shuttle-changing mechanism is actuated the lever 51, which is held against the lever 1 by a spring, is rocked and removes the abutment 53 from the block 50. The latter is then able to clear the abutment, and the disk 49 and cam shaft can make one revolution in the direction indicated by the arrow. During this revolution the block 50 abuts against the lever 51, rocks the latter and lifts the abutment 53, against which the block 50 thereupon again abuts. The block 50 thus itself actuates the device by which its rotation is checked at the moment at which the loom is re-started.

Device for preventing the ascent of the
65 shuttle-box without the shuttle in use.—If

through inadvertence on the part of the weaver or through an accident to the weft-detecting mechanism the shuttle-changing mechanism is operated while the empty shuttle or the partly filled shuttle in use is not in the shuttle-box, two shuttles would be placed on the lay and would cause damage to the warp unless means were provided to prevent the insertion of a fresh shuttle under these circumstances. A simple device which entirely fulfils this purpose will now be described.

To the shuttle binder 54 Figs. 14 to 16 which is present in all looms and bears against the shuttle for the purpose of checking it during the weaving operation, there is fixed a hook 55 (Figs. 14, 15 and 16) which takes part in the movements of the part 54. When the shuttle is in the shuttle-box this hook is removed from the catch 56 fixed to the lay, but when the shuttle-box is empty the hook engages the catch. Since the parts 54 and 55 are connected to the vertically movable part of the box, whereas the catch 56 is fixed to the lay, it is obvious that unless the shuttle is in the box the latter cannot ascend, owing to the engagement of the hook with the catch, and a fresh shuttle cannot, therefore, be inserted. The pulley 17 which controls the shuttle changing mechanism being very narrow, the belt furnishes exactly the necessary power for effecting the change of shuttle. If from any cause the box is prevented from rising, the belt slips on said pulley 17, or, if this is insufficient to prevent accidents, the large wheel 72 can be loosely mounted on the cam shaft 26, and connected by a tightening collar adjustable on the plate 49 fixed to the cam shaft and this collar which produces friction and the regulation of which can be effected with precision will slide on the plate instead of the belt on the pulley, as aforesaid.

Use of the shuttle-changing mechanism in connection with a loom having fly-cords. (Figs. 17 and 18).—To allow of operating the shuttle-changing mechanism in connection with a loom having fly-cords, it is necessary that the driver leave open the end of the shuttle-box, so that the change of shuttle can take place as in the case of a loom having pickers. In order that the end of the box should be free, to allow of the shuttle passing out, the driver 58 is made rotatable on the guide-rod 57. The arm 59 fixed to the rod 60 is adapted to abut against the projection 61 fixed to the magazine, so that the upward movement of the box causes the rod 60 to be rotated, and the latter by means of the arm 62 rotates the slotted guide 63, which normally retains the driver in a vertical position. By the rotation of the guide and driver the shuttle is enabled to pass out of the box.

Figs. 17 and 19 illustrate a device which prevents the upward movement of the shuttle-box by the action of the lay during the working of the loom. While the loom is normally working a hook at one end of the bell-crank-lever 64 engages the fixed stud 65 and thus prevents the upward movement of the box (Fig. 19). To allow of lifting the box for the purpose of changing the shuttle the lever 66 which lifts the box abuts against the arm 641 of the lever 64 and rocks the latter so as to disengage its hook from the stud 65 (Fig. 17). When the shuttle has been changed and the box is lowered a spring causes the lever 64 to re-engage the stud 65 for the purpose of holding the box down.

What I claim as my invention and desire to secure by Letters Patent of the United States is:—

1. In a shuttle-changing mechanism for looms the combination of a driving shaft, a fast and a loose pulley thereon, a third pulley mounted alongside said loose pulley, shuttle-changing mechanism, operative connections between said shuttle-changing mechanism and said third pulley, a belt-shifter, a lever, means tending to move said lever to throw the belt-shifter to the third pulley, a detent for said lever adapted to hold it so that the shifter is on the fixed pulley, a removable abutment in the path of said lever adapted to restrain its travel so that the shifter does not reach the third pulley, means for releasing the lever from the detent and means for removing the abutment when the changing-mechanism is to be operated.

2. In a shuttle-changing mechanism for looms the combination of a driving shaft, a fast and a loose pulley thereon, a third pulley mounted alongside said loose pulley, shuttle-changing mechanism, operative connections between said shuttle-changing mechanism and said third pulley, a belt-shifter, a lever, means tending to move said lever to throw the belt-shifter to the third pulley, a detent for said lever adapted to hold it so that the shifter is on the fixed pulley, a removable abutment in the path of said lever adapted to restrain its travel so that the shifter does not reach the third pulley, means for releasing the lever from the detent, means for removing the abutment when the changing mechanism is to be operated, a brake operable on said shaft and means for holding the brake off when the lever is engaged by the detent.

3. The combination with the breast-beam of a loom of a detent and a fixed stop thereon, a lever pivoted to the breast-beam, means connected with the weft mechanism for operating said lever, an abutment pivoted to the breast-beam, belt-shifting gear

comprising a lever adapted to be held in three positions respectively by said detent, abutment, and fixed stop, fixed pulley, loose pulley, and shuttle mechanism operating pulley corresponding to said three positions respectively, means connected with said lever for carrying the abutment out of operative position, and means for preventing this movement of the abutment when no shuttle change is to take place.

4. The combination with the breast-beam of a loom of a detent and a fixed stop thereon, a lever pivoted to the breast-beam, means connected with the weft mechanism for operating said lever, an abutment pivoted to the breast-beam, belt shifting gear comprising a lever adapted to be held in three positions respectively by said detent, abutment, and fixed stop, fixed pulley, loose pulley, and shuttle mechanism operating pulley corresponding to said three positions respectively, tensional means connected with said lever for carrying the abutment out of operative position and a hand-operated lock for holding the abutment in operative position.

5. In a loom the combination with a shuttle magazine and a shuttle box in alinement therewith for change of shuttle, of a rod located parallel to the shuttles in the magazine, a driver on said rod adapted to force the lowermost shuttle from the magazine into the box, a finger also on said rod in advance of said driver for simultaneously ejecting the empty shuttle from the shuttle box without the full shuttle coming into contact with the empty shuttle, and a spring operated ribbon adapted to support the next shuttle in the magazine.

6. The combination with a shuttle-magazine, means for pushing a shuttle therefrom comprising a tension cord, a lever for tensioning said cord, a cam shaft for operating said lever, a block revolving with said shaft, a lever operated by said block and a stop on said lever also coöperating with the block to limit its action to one revolution.

7. In a loom in which the shuttles are operated by fly-cords, the combination with a guide rod, a fly movable on said rod and a slotted guide rotatable on said rod and adapted to normally retain the driver in position, of means connected with the magazine for rotating said slotted guide to release the driver and permit the throwing out of the shuttle.

In witness whereof I have signed this specification in the presence of two witnesses.

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