(No Model.) 2 Sheets—Sheet 1.

G. O. DRAPER.

LOOM.

No. 527,014. Patented Oct. 2, 1894.

Fig. 3.

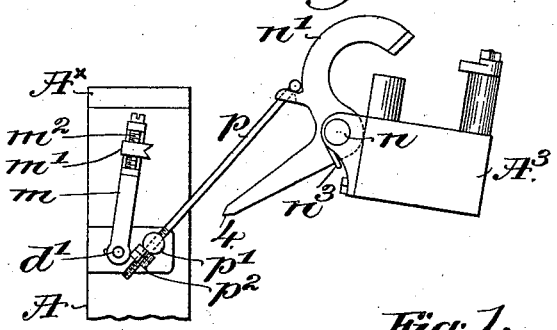


Fig. 2.

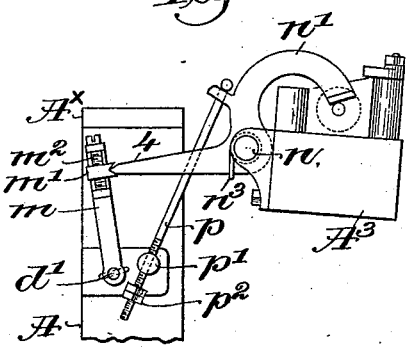


Fig. 1.

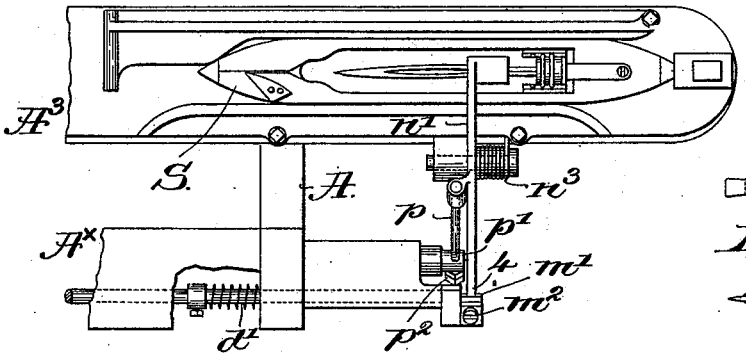


Fig. 4.

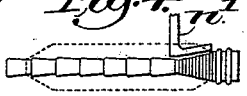


Fig. 5.

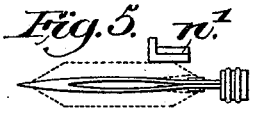


Fig. 19.

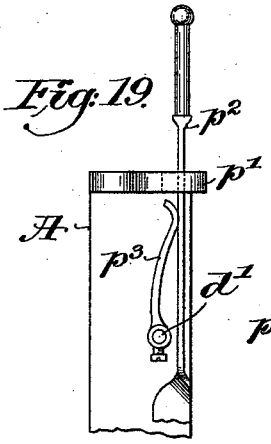
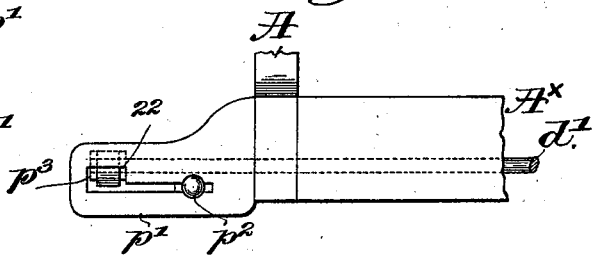


Fig. 18.



Witnesses.
A. C. Harmon
John P. C. Printup

Inventor.
George O. Draper.
by Crosby Gregory Attys.

(No Model.) 2 Sheets—Sheet 2.

G. O. DRAPER.

LOOM.

No. 527,014. Patented Oct. 2, 1894.

Fig. 7.

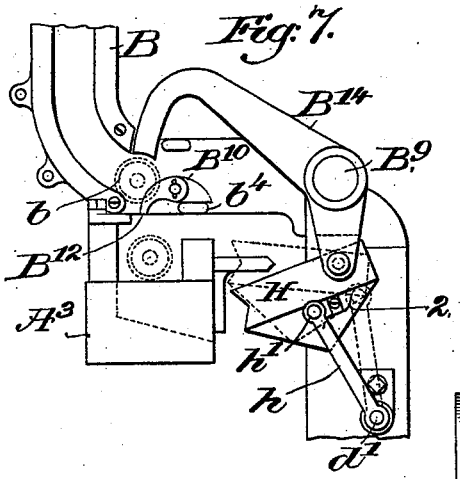


Fig. 6.

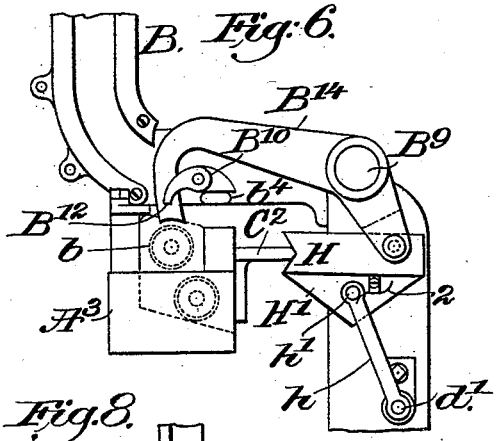


Fig. 8.

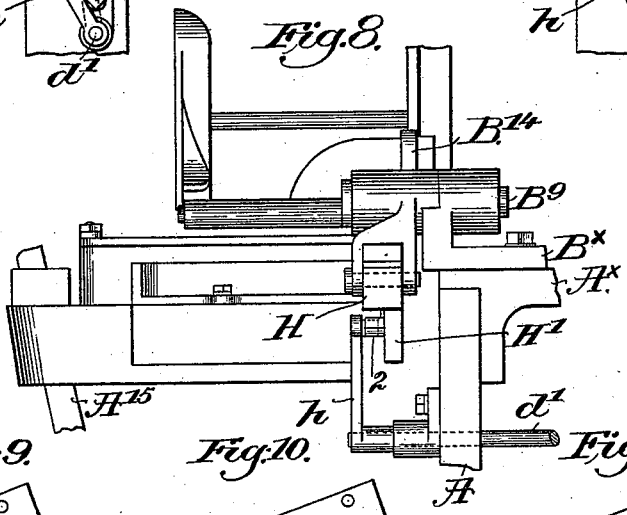


Fig. 9.

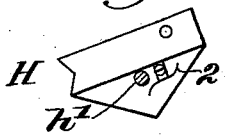


Fig. 10.

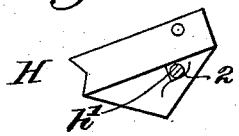


Fig. 11.

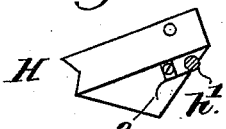


Fig. 12.

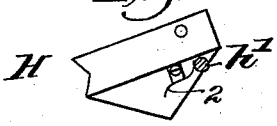


Fig. 13.

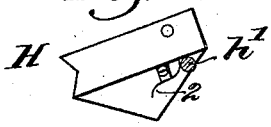


Fig. 14.

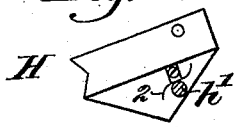


Fig. 15.

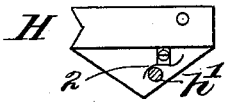


Fig. 16.

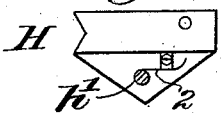
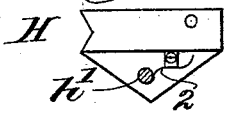


Fig. 17.



Witnesses.
A. C. Harmon
John F. C. Preinkert

Inventor:
George O. Draper.
by Lemuel W. Serrell & Gregory Wtys.

UNITED STATES PATENT OFFICE.

GEORGE O. DRAPER, OF HOPEDALE, MASSACHUSETTS, ASSIGNOR TO GEORGE DRAPER & SONS, OF SAME PLACE.

LOOM.

SPECIFICATION forming part of Letters Patent No. 527,014, dated October 2, 1894.

Application filed March 22, 1894. Serial No. 504,610. (No model.)

To all whom it may concern:

Be it known that I, GEORGE O. DRAPER, of Hopedale, county of Worcester, State of Massachusetts, have invented an Improvement in Looms, of which the following description, in connection with the accompanying drawings, is a specification, like letters and figures on the drawings representing like parts.

In the production of woven fabrics on looms, whenever the filling is exhausted from the bobbin or cop in the shuttle, the end of the filling is woven into the fabric, and in a great majority of instances said end is left at some point between the selvages to show badly and lessen the value of the fabric, especially if of high grade, and, further, this last end of the filling is apt to crinkle because it is not subjected to the action of the usual tension exerted by the shuttle. To guard against leaving these ends between selvages and against the crinkling of the filling, it is customary, in the better grades of fabrics, for the weaver,—the loom having been stopped,—to reverse the pattern mechanism or turn the loom backward to reopen the shed until that shed is open containing the mis-pick or short filling, when the weaver pulls the same out so that a proper shot or filling may be put into that shed.

The difficulties alluded to in the production of high grade goods are the source of much trouble and are overcome only at very considerable expense.

Recently looms have been invented wherein, the filling having been exhausted from the shuttle, or broken, a bobbin or cop of filling is automatically supplied to the shuttle, but in such looms no provision has been made or attempted to be made to prevent a weft end from being left between the selvages, and consequently that loom as now made cannot be used for the formation of high grade goods.

I have aimed by experiment to overcome the difficulties alluded to, so that looms of the class referred to may be used for the production of high grade goods free from mis-picks or crinkles, and as the result of such experiment, I have devised means whereby when the filling in the shuttle has been nearly exhausted, or exhausted to a predetermined point, the pusher or device employed to supply the shuttle with filling is made to act automatically and put a fresh supply of filling into the shuttle, and at the same time remove therefrom the nearly spent bobbin or cop, and it will be remembered that the filling first left in the shed from a first bobbin or cop will leave its free end outside the selvage.

In the practical use of my invention all the filling will not be used, but this waste will be but little comparatively, for I may so time or set the operative parts, to be hereinafter described, as to limit this waste to a very small amount, and the filling left on the partially exhausted bobbins or cops may thereafter be woven off in the production of lower cost goods.

My improvements will cause the movement of the pusher, referred to, to put a new supply of filling into the shuttle only when the filling on the bobbin or cop has been exhausted to a predetermined point, and in case the filling should break, the loom will be stopped through the action of a filling fork, as in ordinary looms.

While my invention to be described is or has been adapted more especially for a loom of the class referred to, yet it will be productive of advantage when applied to any usual loom, and in this latter event the rock-shaft to be hereinafter described under the control of the detector co-operating with the bobbin or cop may be made to knock off the shipper handle and stop the loom when the filling has been exhausted to the required degree.

One part of my invention consists in the combination with a lay, its shuttle-box, and a shuttle therein open at one side, of a detector adapted while the lay is moving forward to enter the said shuttle and contact with the filling on the bobbin or cop therein. I have also combined with the said detector a spring which in moving the detector into the shuttle to contact with the mass of filling therein, may yield more or less, according to the diameter of the yarn-mass, before the said detector becomes operative through other devices to effect the movement of the rock-shaft co-operating therewith and used either

to insure that the shuttle shall be provided with a fresh supply of filling, or that the loom shall be stopped.

Other features of my invention will be hereinafter described and defined in the claims at the end of this specification.

Figure 1 is a plan view of a sufficient part of one-side of a loom and part of a lay and shuttle-box with my improvements added, to enable my invention to be understood. Fig. 2 is a right hand end view of the parts shown in Fig. 1, the detector being represented as resting on the filling in the shuttle and at the time when the filling has been exhausted to the predetermined point so that the detector is made to operate the rock-shaft to be described, and insure either a movement of the pusher, or the stopping of the loom. Fig. 3 is an end view of like parts, but with the lay shown as back from the breast beam, the shuttle being supposed to be in the shuttle-box at the opposite end of the lay or on its flight across the lay. Figs. 4 and 5, show different forms of filling masses, together with parts of a detector, the shape of the detector being suited to the shape of the bobbin or cop, or the device or thing upon which the filling is wound. Fig. 6 is a view of the pusher, one form of hopper or bobbin feeder, and parts at that side of the loom opposite the parts shown in Figs. 1 and 2 and when the lay is in the position shown in said figures. Fig. 7 is a view of the same parts shown in Fig. 6, but in the position they will occupy when the detector in the beat of the lay toward the fell, is not in position to meet the trigger, to be described. Fig. 8 is a partial front view of the end of the loom opposite that shown in Fig. 1. Figs. 9 to 17 inclusive, are diagrams showing the different positions in which the dog connected with the pusher is placed between its inoperative and operative positions; and Figs. 18 and 19, a modification to be described, wherein the arm or device shown in Fig. 6 for operating the dog of the pusher is made to act through a suitable lever or device to release the shipper handle.

I have chosen to illustrate my invention as applied to the class of loom shown in United States Patent No. 454,810, dated June 23, 1891.

In the drawings, A represents part of the frame-work of the loom; A^3, part of the lay, it being provided at each end with a shuttle-box. $A^\times$ indicates the breast beam; $B^\times$, a stand connected thereto, it carrying a stud B^9; B, a hopper guide or feeder for a series of bobbins or cops containing filling; B^{14}, a pusher adapted in its movements to meet a bobbin b and put it into the shuttle S, which is a self-threading shuttle.

B^{10} is a stop or rest having a projection B^{12}; b^4, an ear against which a part of the stop or rest is normally retained; C^2, a bunter carried by the lay; A^{15}, a picker-stick; d', a rock-shaft extended across the loom from side to side under the breast beam.

The parts so far described are all substantially as represented in the said patent, and like letters are therein used to designate the same parts, with the exception that herein the letter $A^\times$ is used for the breast beam which is not marked in the said patent.

In the invention to be herein described, the rock-shaft d' has attached to it at that end of the loom nearest the pusher, an arm h, see Figs. 6 to 8, provided at or near its end with a pin or projection h', which as the said rock-shaft is turned as will be hereinafter described, is made to co-operate with the dog H and its switch to move said dog pivoted upon the pusher, from its normal position, shown in Figs. 7 and 9, through the path designated by Figs. 10 to 15 inclusive, to thus put said dog in the position Figs. 6 and 15 to 17, to enable the bunter C^2 to strike said dog and move the pusher from the position Fig. 7 into the position Fig. 6, such movement of the pusher causing a bobbin or cop to be taken from the hopper and put into the shuttle S then in the shuttle-box below it, the incoming bobbin or cop acting on and ejecting the bobbin or cop then in the shuttle and exhausted to the desired extent.

The dog H has a depending leg or web H', upon which is secured by a suitable screw, see Figs. 6 and 7, a spring switch 2, the same being composed essentially of a thin steel plate having one end turned or curved upwardly and its other end turned or curved downwardly, a central leg or portion of the switch receiving through it the said screw.

The projection h' of the arm h, when the loom is running regularly, stands as in Figs. 7 and 9, but when a fresh bobbin or cop of filling is to be put into the shuttle, then the arm h is moved to the right, viewing Figs. 7 and 9, it riding on said switch as in Fig. 10, and finally passing off the end of the switch just beyond the position Fig. 11, and, having passed off, the springy end thereof rises upward, as in Fig. 12, letting the projection h' get under the end of said switch, as in Figs. 12 and 13, and on its further movement toward the left, viewing Fig. 13, the said projection gets under the central part of the switch and reaching the opposite end of the switch, acts to elevate the dog into the position Fig. 16, the projection finally passing out from under the springy end of the switch, letting the dog drop, but while the dog is in the position Figs. 15 and 16 the bunter acts to operate the pusher, as best shown in Fig. 6.

The rock-shaft d' at its opposite end, see Figs. 1 to 3, has fast upon it a trigger m, shown as an arm provided with a block m' controlled as to its position on said trigger by means of a suitable adjusting device m^2, represented as a screw, the face of said block toward the lay being notched.

The lay A^3 is provided with a suitable stand, upon which, in this instance of my invention, is pivoted at n, a detector n', represented in this instance of my invention as a lever curved at one end and having at its

other end a projection or tail-piece 4, the curved end of said lever being adapted to reach over into the shuttle-box and enter the open top of the shuttle in said box and contact with the filling on the bobbin or cop contained in the shuttle, said detector being normally acted upon by a suitable spring, as n^3, to normally move the curved end of the detector into the shuttle as the lay is moved toward the breast beam or toward the fell of the cloth, said spring while moving the detector enabling it to stop sooner or later according to the quantity of filling upon the bobbin or cop in the shuttle, or, in other words, the spring enables the detector to be self-adapting to varying quantities of filling on the bobbin or cop. When the filling has been exhausted, however, to the predetermined point, then the tail-piece 4 of the detector will meet the block m' of the trigger, turn the rock-shaft, and cause the arm h to be moved to put the dog H into position as described, to be met by the bunter to actuate the pusher.

By adjusting the block m' upon the trigger, it may be put in position to be struck by said trigger when the filling has been unwound from the bobbin or cop to the desired point, that is, all but one or two layers may be unwound before the end 4 of the trigger can rise sufficiently high to meet the block m'.

The detector has loosely jointed to it an arresting device, shown as a link p, which is extended through a guide p' connected to the frame-work of the loom, suitable adjusting nuts on the said link governing its effective length, so that the curved end of the detector will be lifted more or less out of the shuttle-box at each movement of the lay away from the breast beam.

In the operation of the loom herein to be described, the detector reaches into the shuttle-box at each forward beat of the lay, and in case the shuttle is at the opposite end of the lay, the outer end 4 of the detector will be raised so high as to pass above the block m' of the trigger and not turn the same, but if the shuttle is in the box at that end of the lay where the detector is situated, then the detector enters the shuttle and contacts with the filling on the bobbin or cop, and if the said filling has not been unwound to the desired point, the end 4 of the detector will not rise as high as the block m', but will pass under it, and not move the trigger, but in case the filling has been nearly unwound or has been exhausted to the predetermined point, then the end 4 of the detector will meet the block m' and turn the trigger and rock-shaft, as above described, to insure the introduction into the shuttle, when it arrives in the box at the opposite end of the lay, of a fresh bobbin or cop.

In Figs. 4 and 5, I have shown two well known forms of bobbin upon which is wound in usual shapes masses of yarn. This invention is not, however, limited to the exact shape of the bobbin or cop containing the filling.

I have herein shown one form of hopper B, but instead I may employ any other usual, suitable, or known device for presenting properly under the pusher one bobbin after another, to be put into a shuttle.

Believing myself to be the first to combine with a loom a detector which shall come in direct contact intermittingly with the mass of filling on a bobbin or cop in a shuttle, and thus prevent further weaving of cloth by the filling then in the shuttle when the said filling has been nearly exhausted from the said bobbin or cop, I do not desire or intend to limit my invention to the exact shape shown for the detector, nor to the exact position shown for it on the loom, nor to the exact shape of the trigger connected to the rock-shaft for operating the devices at the opposite end of the loom.

In the modification Figs. 18 and 19 I have shown part of a loom frame A, having an attached shipper holding plate p' provided with a slot and a notch 22 to receive the usual shipper handle p^2.

The rock-shaft d', supposed to be the same as hereinbefore described, has at its end a finger p^3 which, when the said rock-shaft has been turned, as described, by the detector, just before the filling has been completely unwound from the bobbin or cop, acts on the shipper-handle and pushes it out of its holding notch 22, and said shipper handle, connected in practice with any usual shipper lever common to looms, but not shown, will effect the change of position of the usual belt and stop the loom.

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

1. In a loom, a shuttle carrying an exposed cop or bobbin of filling, a detector independent of the shuttle to contact with the filling at predetermined intervals to determine its volume, and devices intermediate the detector and a filling supplying mechanism to cause a new supply of filling to be placed in the shuttle when the former supply shall have been exhausted to a predetermined amount, substantially as described.

2. In a loom, a lay having a shuttle-box, and a shuttle therein open at one side to expose the filling on a bobbin or cop within said shuttle, combined with a detector independent of the shuttle to enter the latter and contact with the filling wound on the bobbin or cop, for the purpose set forth.

3. In a loom, the combination with a lay, its shuttle-box, a shuttle therein having an opening at two sides to thus expose the filling on the bobbin or cop and let a cop pass through it from side to side, of a detector independent of the shuttle, and means to cause it to enter the said shuttle and contact with the filling on the bobbin or cop therein, substantially as described.

4. The combination with a lay, its shuttle-box a shuttle therein open at one side, a detector independent of the shuttle, means to cause it to enter the shuttle-box and contact with the filling on the bobbin or cop therein as the lay is moved forward, and a rock-shaft, of a trigger attached to said rock-shaft and having a block or projection which is struck by said detector to turn said rock-shaft when the filling on the bobbin or cop in the shuttle has been exhausted to the predetermined point, substantially as described.

5. The lay, its shuttle-box and shuttle having an open side, and a detector carried by the lay and shaped to enter the open side of the shuttle and contact with the mass of filling therein, combined with a spring to cause the said detector to enter the shuttle while the lay is being moved toward the breast beam, and a device to turn the said detector in a direction to cause it to retire from said shuttle when the lay is being moved away from the breast beam, substantially as described.

6. In a loom, the following instrumentalities, viz:—a shuttle open at its opposite sides; a lay having at one end a shuttle-box open for the passage through it of a bobbin or cop discharged from said shuttle, a holder to contain a series of bobbins or cops; a pusher co-operating with said holder and adapted to act on a bobbin or cop therein and put it automatically into said shuttle while in the shuttle-box under it and cause the incoming bobbin or cop to eject the more or less spent bobbin or cop from the shuttle and shuttle-box; a shuttle-box at the opposite end of the lay; a detector co-operating with that shuttle-box; devices to actuate the detector and cause it to enter said shuttle-box and the shuttle therein and contact with the mass of filling carried thereby, said detector having an arm or extension the position of which during the movement of the lay toward the breast beam is determined by the quantity of filling on the bobbin or cop in said shuttle; a trigger, and a block thereon adapted to be struck by said detector when the filling on the bobbin or cop has been unwound to the predetermined point, and devices between said block and said pusher to effect the operation of the latter when the detector strikes the said block, substantially as described.

7. A rock-shaft; a trigger carried thereby having an adjustable block; a lay having a shuttle-box, and a shuttle therein; combined with a detector independent of the shuttle, means to cause it to enter said shuttle when in said shuttle-box as the lay is being moved toward the breast beam and contact with the mass of filling therein, the said detector having an arm adapted to strike the block of said trigger and turn said rock-shaft when the filling has been exhausted to a predetermined point, substanially as described.

8. A holder to contain a series of bobbins or cops; a lay having a slotted shuttle-box; a shuttle therein open at its opposite sides, a bobbin or cop in said shuttle; a bunter; a pusher to put a bobbin into said shuttle and discharge a bobbin therefrom and through said shuttle-box; and a dog attached to said pusher provided with a spring switch, combined with an arm having a projection to co-operate with said switch and change the position of said dog on said pusher and with relation to said bunter, to operate, substantially as described.

9. A rock-shaft having at one end an arm or finger, and at its other end a trigger having a block; a lay having a shuttle-box, and a shuttle therein; combined with a detector independent of the shuttle, and means to cause it to enter said shuttle when in said shuttle-box as the lay is being moved toward the breast beam and to contact with the mass of filling in said shuttle, the said detector having an arm adapted to strike the block of said trigger and turn said rock-shaft only when the filling has been exhausted to a predetermined point, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

GEORGE O. DRAPER.

Witnesses:
GEO. W. GREGORY,
EMMA J. BENNETT.