Feb. 11, 1941. C. D. BROWN 2,231,356

FILLING END HOLDER FOR LOOMS

Filed Nov. 18, 1939 2 Sheets-Sheet 1

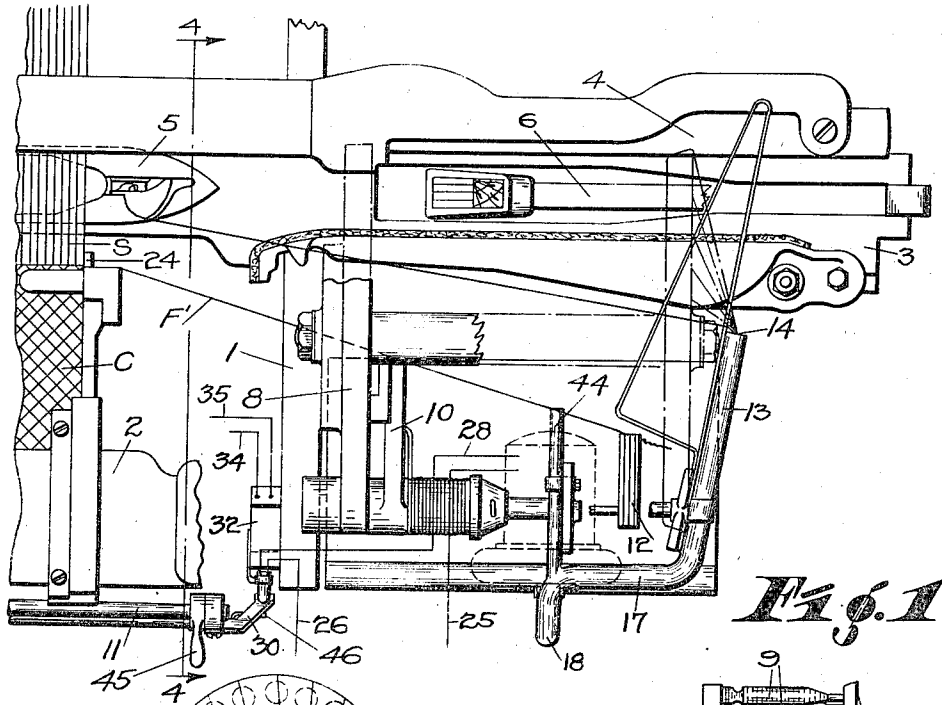


Fig. 1.

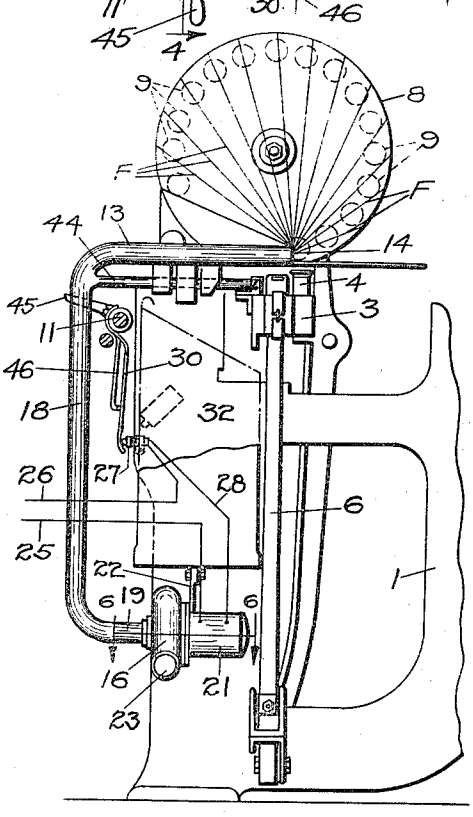


Fig. 2.

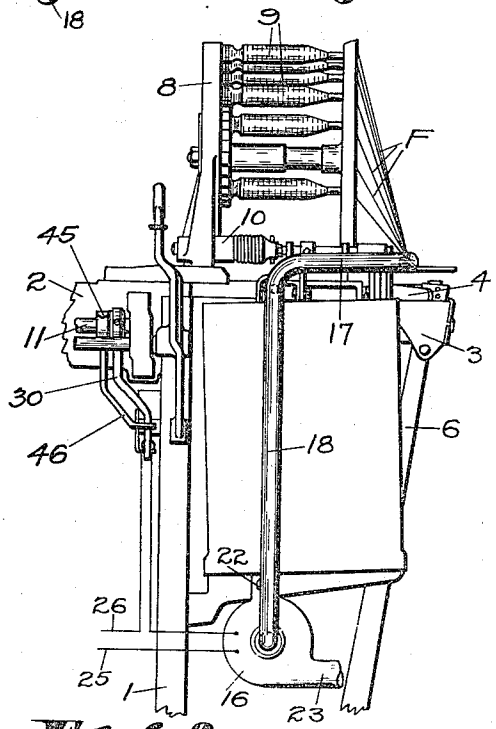


Fig. 3.

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Filed Nov. 18, 1939 2 Sheets-Sheet 2

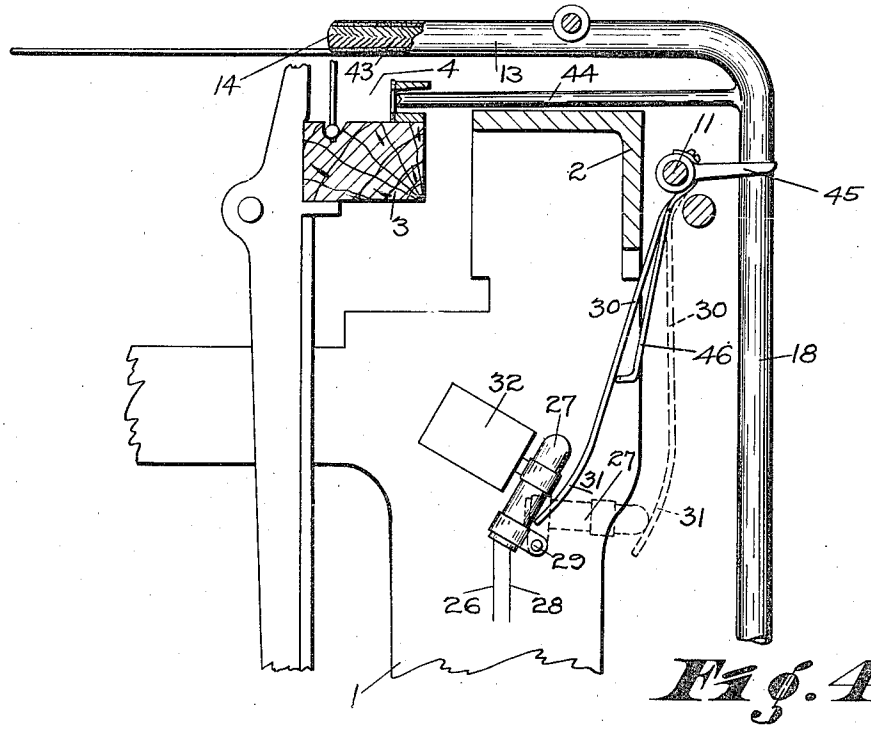


Fig. 4.

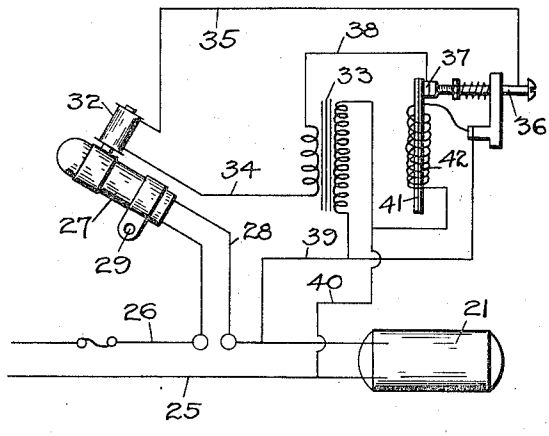


Fig. 5.

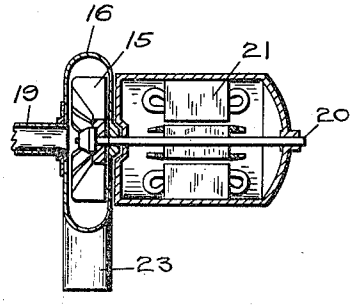


Fig. 6.

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UNITED STATES PATENT OFFICE

2,231,356

FILLING END HOLDER FOR LOOMS

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Application November 18, 1939, Serial No. 305,153

16 Claims. (Cl. 139—257)

The present invention pertains to automatic filling replenishing looms, and more particularly relates to filling thread holding and tensioning means for such looms.

The usual automatic filling replenishing loom includes a reciprocating lay, a shuttle, and filling replenishing mechanism for automatically replenishing the filling supply whenever the supply in the shuttle becomes substantially exhausted. Such replenishing mechanism includes a magazine for holding a multiplicity of reserve filling carriers. The ends of the filling thread on the reserve carriers are extended and retained by a holder. In prior looms, the filling end holder mentioned usually consists of a fixed spindle or the like about which the filling ends are wrapped, although a prior pneumatic filling end holder has been used to a limited extent.

The aforesaid pneumatic holder comprises a conduit having an opening located in position to receive the filling ends from the reserve filling carriers, and pneumatic means for inducing a current of air to flow into said opening to thereby draw the filling ends into the conduit and to hold and tension such ends. The pneumatic means has been arranged to operate continuously. Such pneumatic filling end holder is possessed of a number of substantial advantages over the aforesaid prior fixed holder. It is particularly noted that the pneumatic holder saves time in filling the magazine by eliminating the manual operation of winding the ends on a fixed holder, provides a yielding tension on the filling end during the replenishing operation and the first pick of the shuttle after filling replenishment, and serves to remove the filling end from the loom after the filling end is parted at the cloth selvage. However, the said pneumatic holder has not been acceptable commercially because the continuous air current whips and frays the filling ends, thereby causing the ends to break during the replenishing operation or the first pick thereafter.

A principal object of the present invention is to provide an automatic filling replenishing loom having replenishing mechanism including a magazine as aforesaid, and which shall have a holding member, such as a conduit, associated with said magazine for receiving the filling ends from the reserve filling carriers, pneumatic means for drawing the filling ends within the holding member and for holding and tensioning the filling ends therein, means whereby said pneumatic means shall be operative only at the time of and for an interval after each replenishing operation, and means for frictionally holding the filling ends in said holding member during the periods of non-operation of the pneumatic means, whereby fraying of the filling ends by said pneumatic means shall be substantially eliminated.

Incidental to the operation of the replenishing mechanism outgoing and incoming filling ends are formed. These filling ends extend from the cloth selvage and when severed at the cloth selvage form loose pieces of filling thread. It is necessary that these loose pieces of filling thread be removed from the loom to prevent their being caught and woven into the cloth.

Accordingly it is a further object of the present invention to provide an automatic filling replenishing loom of the type aforesaid, and which shall have pneumatic means for holding and tensioning the reserve filling ends and for removing loose pieces of incoming and outgoing filling ends, said pneumatic means comprising a conduit arranged to receive the filling ends, a pump for inducing a flow of air into the conduit, electrical means for operating the pump and a circuit supplying electrical energy to the electrical means only during and for a predetermined interval after each operation of the replenishing mechanism.

The foregoing and other objects of the invention are accomplished in the construction illustrated on the accompanying drawings, of which:

Fig. 1 is a plan view of part of a loom having the preferred embodiment of my invention applied thereto;

Fig. 2 is a view in elevation of one corner of said loom;

Fig. 3 is a front view of the same;

Fig. 4 is a view in cross-section taken approximately on line 4—4 of Fig. 1 but to a larger scale;

Fig. 5 is a wiring diagram of certain electrical apparatus on said loom; and

Fig. 6 is a view in cross-section taken approximately on line 6—6 of Fig. 2 but to a larger scale.

The loom shown on the drawings is but fragmentarily illustrated, the parts and mechanisms not shown being of any suitable usual construction and not of the present invention. In addition, certain of the parts shown are not new, they being of the present invention only to the extent that they comprise parts that may be used as elements in the combination defined in the appended claims.

The aforesaid old parts include a loom frame of which the right hand loom side 1 and breast beam 2 are shown, and also include the lay, shut-

tle box, shuttle, and picking mechanism as hereinafter mentioned. The lay includes a lay beam 3 mounted to reciprocate toward and from the front of the loom and carrying a shuttle box 4 at one end thereof. The shuttle box 4 is located at the replenishing side of the loom and is adapted to receive a shuttle 5 which carries a supply of filling thread. The shuttle is picked from side to side of the loom, along the lay beam 3, by picking mechanism which may include a picker stick 6. As the shuttle is thus picked, it lays filling thread in the shed S which filling thread is beaten into place in cloth C.

The filling supply in the shuttle 5 is automatically replenished whenever it becomes substantially exhausted. To this end, the loom is provided with filling replenishing mechanism which in the embodiment shown is of the bobbin changing type. The bobbin changing mechanism shown includes a rotary magazine 8 adapted to hold a multiplicity of reserve filling carriers such as bobbins 9. The filling ends F of the filling on the bobbins 9 are extended beyond the end of the magazine 8 and held by a holding mechanism to be described in detail. The replenishing mechanism also includes a transferrer 10 and a rod 11.

The substantial exhaustion of the filling supply in the shuttle 5 is detected by usual means, not shown, which thereupon causes the rod 11 to be turned in a clockwise direction as the rod is shown on Fig. 4. When the rod 11 is thus turned, suitable connections therefrom cause the transferrer 10 to transfer the lowermost bobbin 9 from the magazine 8 into the shuttle, and to expel the exhausted bobbin from the shuttle. This replenishing operation occurs as the lay beam 3 approaches its forwardmost position on the next beat-up after the turning of the rod 11. Promptly after the transferring operation, the rod 11 is returned to its idle position, and the replenishing operation is then complete. The replenishing mechanism as thus far described is old and well known in the art and accordingly is but fragmentarily shown and described.

At the time of each transferring operation, the filling thread is parted between the ends of the shuttle, and the branch F' of such thread which projects from the cloth selvage is clamped and withdrawn forwardly out of the shuttle box 4. The end F' is known as the outgoing filling end. The drawings show parting and clamping blades 12 for parting, clamping and withdrawing the outgoing filling end F'. The blades 12 and the operating mechanism therefor, not shown, may be substantially the same as in patent to Stafford, No. 1,552,388, granted Sept. 1, 1925, to which patent reference may be had for a more complete disclosure.

The present invention provides a novel pneumatic mechanism for holding and tensioning the filling ends F. Such mechanism includes a suitable holding member, preferably in the form of a conduit 13 having an opening 14 therein. The opening 14 may consist of the open end of the conduit 13. The filling carriers 9 are held parallel to the lay beam 3 above the shuttle box 4. When the filling carriers are manually inserted in the magazine 8, the filling ends F are unwound and extended outwardly, beyond the outer end of the magazine 8. The opening 14 in the conduit is so located that it may receive or contain the ends of all of the filling ends F. Thus, in the embodiment shown, the opening 14 is located above the shuttle box 4 adjacent the outer end of the magazine 8, but below and slightly back of the axis of rotation of the magazine.

The filling ends F, extended as above described, are manually presented to or adjacent the opening 14 at the time when the reserve filling carriers 9 are inserted in the magazine. The loom is provided with means for inducing currents of air to flow into the opening 14 to thereby draw the ends F into the holder or conduit 13. The particular pneumatic means shown includes a rotary suction fan or pump 15 which is enclosed within a housing 16. The conduit 13 extends, from its open end 14, forwardly and thence horizontally inwardly of the loom as at 17, thence downwardly as at 18 and thence rearwardly as at 19. The rearward end of the portion 19 of the conduit connects with the center or intake opening in the housing 16. The fan 15 is electrically operated, and to this end it may be fixed on the end of the rotor shaft 20 of an electric motor 21. The housing of the motor 21 may be bolted directly to the housing 16 and the unit thus formed may be supported on a fixed bracket 22. The exhaust conduit 23 of the housing 16 may lead to any suitable point remote from the moving parts of the loom.

It will be apparent that when the motor 21 and fan 15 are in operation, all of the filling ends F within the opening 14 will be tensioned simultaneously by the currents of air flowing into the opening. The yielding tension thus provided is particularly desirable during actual operation of the replenishing mechanism and during the first pick of the shuttle 5 after each replenishing operation. It is also desirable that the pneumatic means, such as fan 15, be in operation at the times when, after each replenishing operation, the incoming filling end is parted adjacent the cloth selvage. The parting of the incoming filling end is effected by any suitable means such as the usual temple thread cutter 24, and is usually accomplished within an interval of a few picks after completion of the replenishing operation. With the pneumatic means in operation, the parted incoming filling end is promptly carried through the conduit 13 and out the exhaust 23 and is thereby removed from the loom.

According to the present invention, the pneumatic end holding means is to be operative intermittently. More specifically, means are provided which normally supply electric energy to the motor 21 only during and for an interval of a plurality of picks after each replenishing operation. The preferred means for this purpose includes an electric circuit of which one lead 25 is directly connected to the motor 21 and the other lead 26 is connected to a switch 27 which, in turn, is connected to the motor 21 by a lead 28. The particular switch 27 is a commercial form of mercury switch which is pivoted at 29 and so arranged that it is closed when tilted up as in Figs. 4 and 5 and open when tilted down as in Fig. 2. When the switch 27 is closed, the circuit to the motor 21 is complete and the motor, of course, then operates.

The switch 27 is normally retained, by gravity, in its open position and is closed, by a suitable part of the replenishing mechanism, each time that the replenishing mechanism operates. As shown, the switch 27 may be closed by the rod 11, this rod having a spring arm 30 fixed thereto and extending downwardly and rearwardly at 31 in position to prevent the switch from dropping materially below its open position. When the rod 11 is turned to cause operation of

the transferrer 10 as above described, the arm 30 moves from its dotted line position to its full line position, Fig. 4, thereby tilting the switch 27 to closed position.

The rod 11 and arm 30 return to normal position upon completion of each replenishing operation, whereas it is desirable that switch 27 remain closed for an appreciable interval after each such operation. There is accordingly provided a holding means, in the form of an electro-magnet 32, for holding the switch 27 closed and a timing device for effecting the opening of the switch after an interval of a few seconds. The magnet 32 is energized from the secondary winding of a transformer 33. One lead 34 extends from the transformer to the magnet. Another lead 35 extends from the magnet to a contact member 36 which normally engages a contact 37, the latter being connected to the transformer by a lead 38. The primary of the transformer 33 is connected in parallel with the motor 21 by leads 39 and 40 so that the transformer, and thereby magnet 32, is energized whenever switch 27 is closed.

The preferred timing device shown includes a heat-responsive element 41 consisting of a bi-metal strip adapted to change its shape when heated. One end of the strip 41 is fixed and the other end thereof carries contact 37. The strip 41 is so arranged that when it is heated for the desired interval it will move contact 37 away from contact 36, thereby de-energizing the transformer 33 and magnet 32. This allows the switch 27 to fall to open position. Heat is applied to the strip 41 by a coil 42 which is electrically connected to the leads 39 and 40. As thus connected, the coil 42 is heated only while the switch 27 is closed. The timing device as thus described, including the transformer 33 and certain of the electrical connections or leads, may be housed within a container mounted at any convenient place of the loom. These parts are accordingly not shown except diagrammatically on Fig. 5.

The present invention further provides means for frictionally holding the filling ends F during the periods of non-operation of the pneumatic means above described. Preferably, such additional holding means consists of a friction material so constructed and located as to engage the filling ends F that are in opening 14. The particular form shown comprises a lining 43 of pile material in the conduit 13 adjacent the opening 14. The lining 43 may consist of a piece of fur or the like having hairs, or other pile elements, which are inclined away from the opening 14. Such material will frictionally prevent the ends F from becoming slack, but will not prevent the pneumatic means from imparting additional yielding tension to the ends at the time of filling replenishment. This holding means permits the pneumatic means to be operated intermittently, and the fraying of the ends F thereby substantially eliminated.

A branch conduit 44 extends rearwardly from the part 17 of conduit 13, in position to remove loose pieces of outgoing filling ends F' from the loom. The conduit 44 together with conduit 18, fan 15, motor 21 and the means for controlling the operation of the motor forms a pneumatic filling end remover. This combination of parts is disclosed and claimed in my co-pending application S. N. 304,095 filed Nov. 13, 1939, and is not claimed herein except broadly in combination with the filling end holding and tensioning device.

While the devices described above for controlling the motor 21 and fan 15 cause such fan to operate only at and for an interval after each replenishing operation, it is, nevertheless, desirable that such fan operate at certain other intervals. More specifically, the operator may fill the magazine 8 with reserve bobbins 9 at a time when the fan 15 is not operating. In this case, the operator should not be required to wait until the next replenishing operation before presenting the ends F to the opening 14, and the fan 15 accordingly should be operable at the will of the operator.

It will be noted that the mounting of switch 27 is such that the switch can be manually tilted to closed position at any time, independent of operation of the filling replenishing mechanism. The switch is not, however, conveniently located for manual operation. I accordingly provide a bell crank lever 45 loosely pivoted on rod 11 and having an arm 46 engaging the spring arm 30. The other arm of the lever 45 extends forwardly and constitutes a handle. This handle may be quickly depressed by the operator at any time, whereupon the arm 46 bends the spring arm 30 rearwardly sufficiently to close the switch 27, thereby causing operation of the motor 21 and fan 15 independent of the replenishing mechanism. The magnet 32 and bi-metal strip 41 will, of course, effect the opening of the switch 27 after the same predetermined interval, regardless of whether the switch is closed by manual device 45 or the replenishing mechanism.

Having fully disclosed the preferred embodiment of my invention, I claim:

1. An automatic filling replenishing loom having a reciprocating lay, a shuttle, filling replenishing mechanism including a magazine adapted to hold reserve filling carriers, said carriers having filling ends extending therefrom, and filling end holding and tensioning means associated with said magazine, said means comprising a holding member, pneumatic means for drawing said filling ends within said member, means for operating said pneumatic means only during and for a predetermined interval after each operation of said replenishing mechanism, and means for frictionally holding said ends and preventing the same from becoming slack during the intervals of non-operation of said pneumatic means.

2. An automatic filling replenishing loom having a reciprocating lay, a shuttle, filling replenishing mechanism including a magazine adapted to hold a multiplicity of reserve filling carriers, said carriers each having a projecting filling end, a holding member located adjacent said magazine and adapted to receive all of said filling ends, pneumatic means for simultaneously tensioning all of said filling ends within said holding means, means for operating said pneumatic means intermittently, the periods of operation thereof being during and for a plurality of picks after each replenishing operation, and means for frictionally holding said filling ends during the periods of non-operation of said pneumatic means.

3. An automatic filling replenishing loom, said loom having filling replenishing mechanism including a magazine adapted to hold a multiplicity of reserve filling carriers, said carriers each having a filling end projecting therefrom, a conduit having an opening located adjacent the outer end of said magazine in position to receive all of said filling ends, pneumatic means for drawing said filling ends into said conduit and for simultaneously tensioning all of said ends, means for

operating said pneumatic means only during and for a plurality of picks after each operation of said replenishing mechanism, and means for frictionally holding said filling ends in said conduit during the periods of non-operation of said pneumatic means.

4. An automatic filling replenishing loom, said loom having filling replenishing mechanism including a magazine adapted to hold a multiplicity of reserve filling carriers, said carriers having filling ends projecting therefrom, and means for holding and tensioning said filling ends, said means comprising a conduit having an opening adapted to receive all of said filling ends, pneumatic means for simultaneously tensioning all the filling ends within said conduit, an electric motor for operating said pneumatic means, means supplying electric energy to operate said motor only during and for a predetermined interval after each replenishing operation, and means for frictionally holding said filling ends in said conduit during the periods of non-operation of said motor.

5. An automatic filling replenishing loom, said loom having filling replenishing mechanism including a magazine adapted to hold a multiplicity of reserve filling carriers, said carriers having filling ends projecting therefrom, pneumatic means for simultaneously holding and tensioning all of said filling ends, an electric motor for operating said pneumatic means, an electric circuit for supplying electric energy to said motor, said circuit including a switch, means for closing said switch each time said replenishing mechanism operates, means for opening said switch after each said replenishing operation, and means for frictionally holding said filling ends while said switch is open.

6. An automatic filling replenishing loom, said loom having filling replenishing mechanism including a magazine adapted to hold a multiplicity of reserve filling carriers, said carriers having filling ends projecting therefrom, a conduit having an opening located in position to receive said filling ends, pneumatic means for holding and tensioning the filling ends within said conduit, an electric motor for operating said pneumatic means, an electric circuit for supplying electric energy to said motor, said circuit including a switch, means operated by some part of said replenishing mechanism for closing said switch, heat-responsive means operative when heated to effect the opening of said switch after a plurality of picks of the loom, means for applying heat to said heat-responsive means only when said switch is closed, and means for holding said filling ends in said conduit while said switch is open.

7. An automatic filling replenishing loom having a reciprocating lay, filling replenishing mechanism including a magazine adapted to hold a multiplicity of reserve filling carriers above and parallel to said lay, said filling carriers having filling ends extending beyond the outer end of said magazine, a conduit having an opening located adjacent the outer end of said magazine in position to receive the ends of all of said filling ends, pneumatic means for holding and tensioning all of the filling ends within said conduit, means for operating said pneumatic means only during and for a predetermined interval after each replenishing operation, and friction material located adjacent said opening in positon to engage and hold said filling ends in said opening during the periods of non-operation of said pneumatic means.

8. An automatic filling replenishing loom having a reciprocating lay, filling replenishing mechanism including a magazine adapted to hold a multiplicity of reserve filling carriers, said carriers having filling ends extending beyond the outer end of said magazine, a conduit having an open end located adjacent the outer end of said magazine in position to receive all of said filling ends, a lining of pile material in said conduit adjacent said open end for frictionally holding said filling ends, pneumatic means for drawing said filling ends along said pile material away from said open end, to thereby tension said filling ends, and means for operating said pneumatic means only during and for a plurality of picks after each replenishing operation.

9. An automatic filling replenishing loom having a lay, filling replenishing mechanism including a magazine adapted to hold a multiplicity of reserve filling carriers, said carriers having filling ends projecting therefrom, a conduit having an opening for receiving and holding said filling ends, pneumatic means for drawing said filling ends within said conduit and for tensioning the same, means for effecting operation of said pneumatic means only during and for a predetermined interval after each replenishing operation, and manually operable means for effecting operation of said last named means at any time independent of operation of said replenishing mechanism.

10. An automatic filling replenishing loom having a lay, filling replenishing mechanism including a magazine adapted to hold a multiplicity of reserve filling carriers, said carriers having filling ends projecting therefrom, pneumatic holding and tensioning mechanism for holding and tensioning said filling ends, means operated by some part of said replenishing mechanism for rendering said pneumatic mechanism operative each time that said replenishing mechanism operates, manually operable means for rendering said last named means operative at any time independent of operation of said replenishing mechanism, and control means including a timing device for rendering said pneumatic mechanism inoperative a predetermined interval after the same is rendered operative as aforesaid.

11. An automatic filling replenishing loom having a lay, filling replenishing mechanism including a magazine adapted to hold a multiplicity of reserve filling carriers, said carriers having filling ends projecting therefrom, a conduit having an opening for receiving and holding said filling ends, electrically operated pneumatic means for drawing said filling ends within said conduit and for tensioning the same, an electric circuit supplying electric energy to said means, said circuit including a switch, means operated by some part of said replenishing mechanism for closing said switch, manually operable means for closing said switch at any time independent of operation of said replenishing mechanism, and control means including a timing device arranged to effect the opening of said switch a plurality of picks after each closing thereof.

12. In an automatic filling replenishing loom the combination of pneumatic means for holding and tensioning the reserve filling ends and removing loose pieces of incoming and outgoing

filling ends from the loom, said pneumatic means comprising a conduit arranged to receive said filling ends, a pump for inducing a flow of air into said conduit, an electric motor for operating said pump, a circuit supplying electric energy to said motor, means for closing said circuit at the time of each replenishing operation and for opening said circuit a plurality of picks after each said replenishing operation is completed.

13. In an automatic filling replenishing loom of the type incidentally forming loose pieces of incoming and outgoing filling ends, said loom having filling replenishing mechanism including a magazine adapted to hold a multiplicity of reserve filling carriers having filling ends projecting therefrom, the combination of pneumatic means for holding and tensioning the reserve filling ends and for removing loose pieces of incoming and outgoing filling ends from the loom, said pneumatic means comprising a conduit arranged to receive said filling ends, a pump for inducing a flow of air into said conduit, electro-motive means for operating said pump and a means including an electric circuit supplying electrical energy to said electro-motive means only during and for a relatively short interval after each operation of said replenishing mechanism.

14. In an automatic filling replenishing loom of the type incidentally forming loose pieces of incoming and outgoing filling ends, said loom having filling replenishing mechanism including a magazine adapted to hold a multiplicity of reserve filling carriers having filling ends projecting therefrom, the combination of pneumatic means for holding and tensioning the reserve filling ends and for removing loose pieces of incoming and outgoing filling ends from the loom, said pneumatic means comprising a conduit arranged to receive said filling ends, a pump for inducing a flow of air into said conduit, an electric motor for operating said pump, a circuit supplying electric energy to said motor, means including a part operated by a moving part of the loom to close said circuit at the time of each replenishing operation and for opening said circuit a plurality of picks after each replenishing operation is completed.

15. In an automatic filling replenishing loom, the combination of pneumatic means for holding and tensioning the reserve filling ends and removing loose pieces of incoming and outgoing filling ends from the loom, said pneumatic means comprising a conduit having a pair of spaced apart inlets, one of said inlets being adapted to hold and tension the reserve filling ends and remove loose pieces of incoming filling ends from the loom, the other inlet being adapted to remove loose pieces of outgoing filling ends from the loom, a pump for inducing a flow of air into said conduit, an electric motor for operating said pump and a means including an electric circuit supplying electric energy to said motor only during and for a relatively short interval after each operation of said replenishing mechanism.

16. In an automatic filling replenshing loom of the type incidentally forming loose pieces of incoming and outgoing filling ends, said loom having filling replenishing mechanism including a magazine adapted to hold a multiplicity of reserve filling carriers having filling ends projecting therefrom, the combination of a conduit having a pair of spaced apart inlets, one of said inlets being arranged to hold and tension the filling ends of the reserve filling carriers and remove loose pieces of incoming filling ends from the loom, the other inlet being arranged to remove loose pieces of outgoing filling ends from the loom, a pump for inducing a flow of air into said conduit, electro-motive means for operating said pump, a circuit supplying electric energy to said electro-motive means, and means for closing said circuit at the time of each replenishing operation and for opening said circuit a plurality of picks after each said replenishing operation is completed.

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