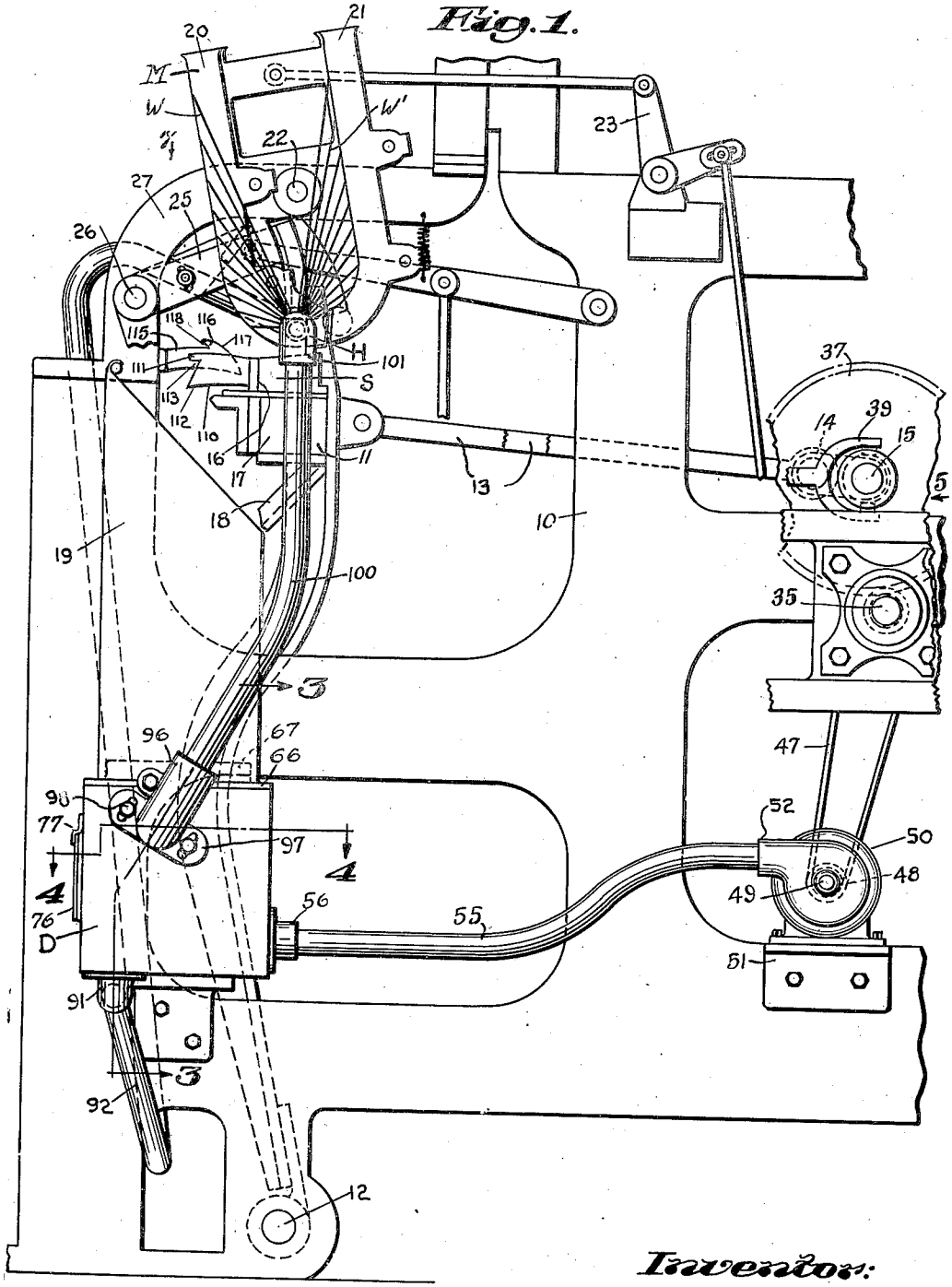
Nov. 27, 1945. R. G. TURNER 2,390,014

PNEUMATIC THREAD CONTROL SYSTEM FOR LOOMS

Filed March 11, 1944 3 Sheets-Sheet 1

Fig. 1.




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PNEUMATIC THREAD CONTROL SYSTEM FOR LOOMS

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Fig. 2.

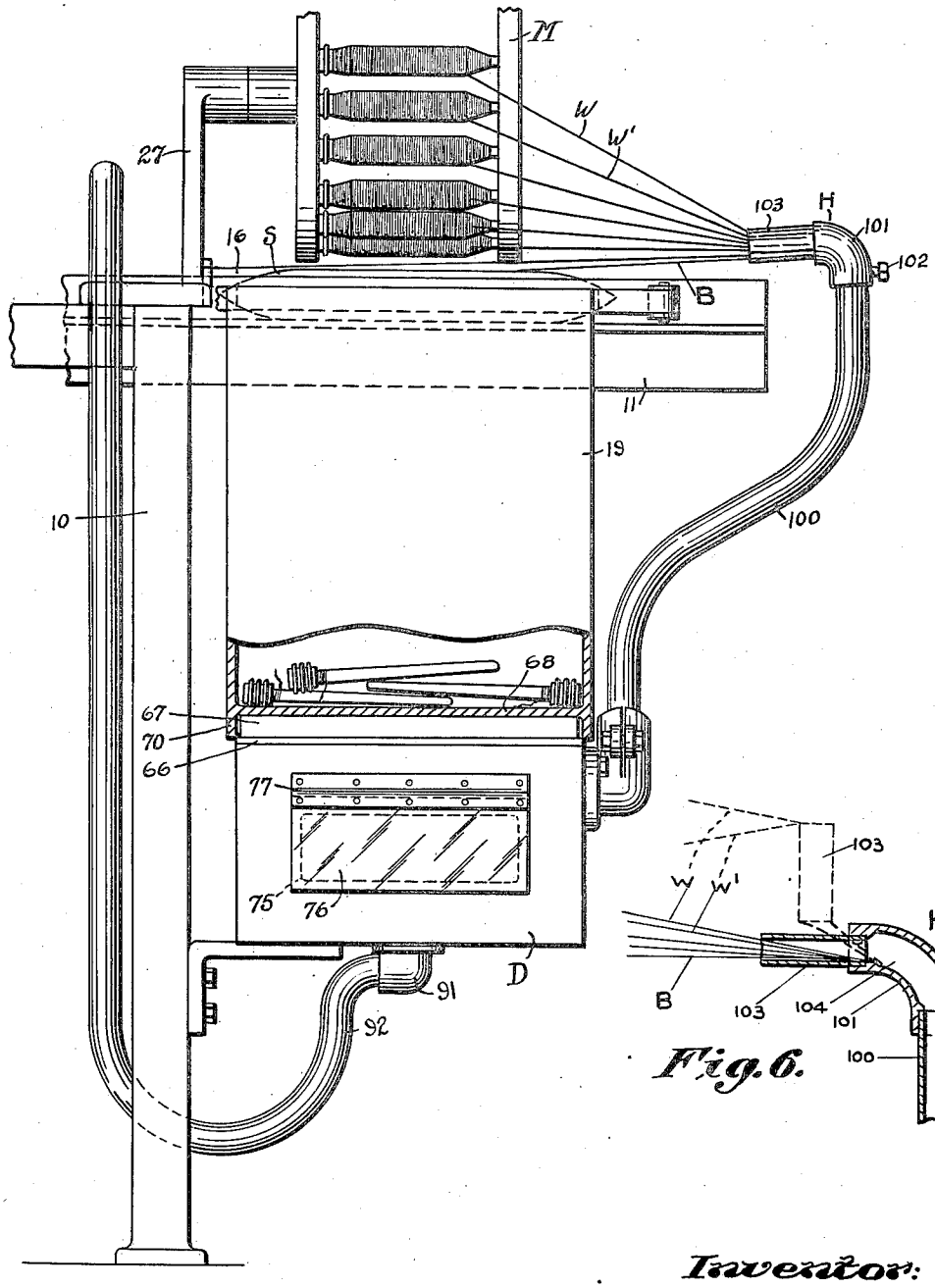






Fig. 6.

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PNEUMATIC THREAD CONTROL SYSTEM FOR LOOMS

Filed March 11, 1944 3 Sheets-Sheet 3

Fig. 3.

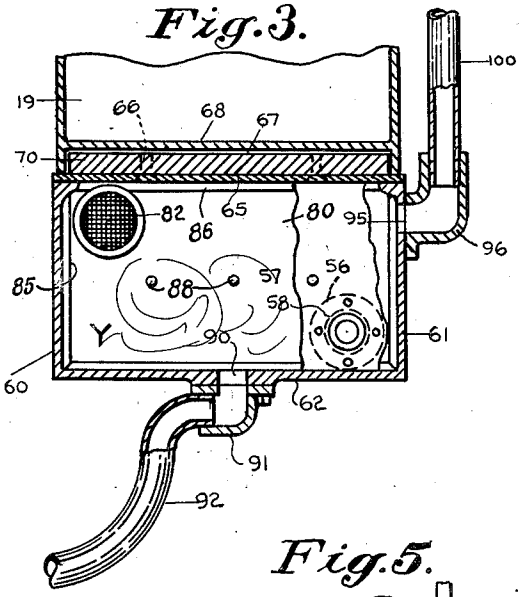



Fig. 4.

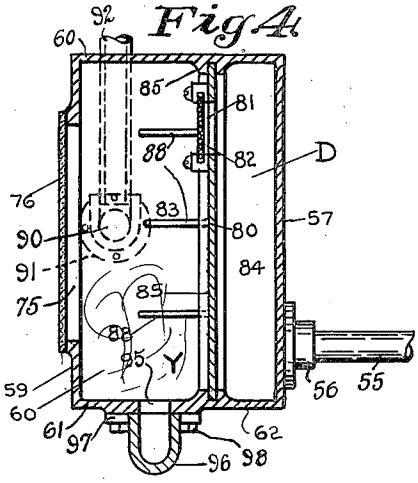
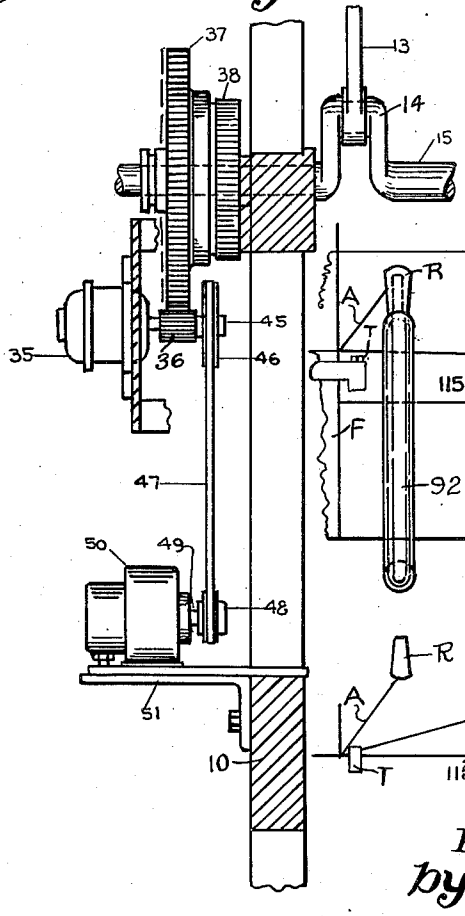



Fig. 5.



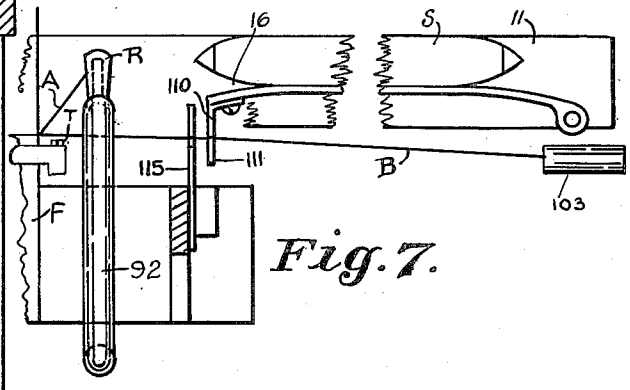




Fig. 7.

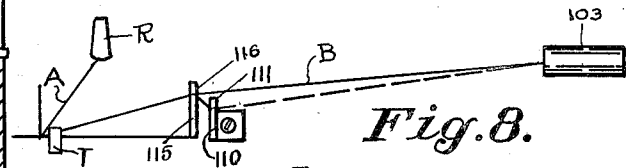



Fig. 8.

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Patented Nov. 27, 1945

2,390,014

# UNITED STATES PATENT OFFICE

2,390,014

## PNEUMATIC THREAD CONTROL SYSTEM FOR LOOMS

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Application March 11, 1944, Serial No. 526,033

6 Claims. (Cl. 139—247)

This invention relates to improvements in a pneumatic thread control system for weft replenishing looms and it is the general object of the invention to make such systems more effective to facilitate removal of weft ends of the outgoing and incoming bobbins.

In weft replenishing looms it is necessary to control two threads at the time of a replenishing operation, one being connected to the depleted bobbin as the latter is ejected from the shuttle, and the other being connected to the incoming bobbin which is transferred from the magazine into the shuttle. The thread of the incoming bobbin generally extends from the thread holder to the selvage of the cloth for several picks until it can be cut by the temple cutter, at which time it is pneumatically drawn into a thread accumulator. In order to hold this thread in a non-interfering position with respect to the lay and parts thereon I provide a placer on the lay which moves the thread onto a hook mounted on some stationary part of the loom in front of the lay, where the thread is held until it is cut. It is an important object of my present invention to construct a pneumatic thread holder with a thread receiving tube which holds the thread taut so that it can be engaged by the placer and moved thereby to the hook which is on or not far from the axis of the tube. By this arrangement the thread extends into the tube without touching the periphery of the intake mouth, and upon being cut the thread is drawn from the hook into the throat of the thread holder. A feature of this part of the invention is so to construct the hook and placer that the latter will be out of interfering position when the thread is cut while the lay is on front center.

At the time of transfer the depleted bobbin is driven downwardly out of the shuttle box into a bobbin can which is in front of the lay, and as previously stated it is desirable to remove the thread from this bobbin. It is a further object of my present invention to support the bobbin can on the thread accumulator and provide the latter with a door or the like which can be opened for the removal of excess weft ends while the bobbin can is in position on the accumulator. The loom attendant can therefore remove the accumulated mass of weft during a replenishing operation without danger of being struck by the outgoing bobbin.

Due to breakage of one or another of the threads of the loom, or for other reasons, the loom occasionally stops, and if the bobbin attendant should be placing new bobbins in the magazine during the period of idleness in the loom it is desirable that the pneumatic thread holder be operated so that it can attract the weft ends of the new bobbin. It is another object of my present invention to provide an air pump driven by the loom motor and effective to create sub-atmospheric pressures during temporary periods of idleness of the loom. This result may be accomplished by driving the air pump directly from the motor independently of the shipper mechanism which connects the motor to the loom so that continued running of the motor after the loom is unshipped will maintain sub-atmospheric pressures at the thread holder.

If for any reason the throat of the thread holder should become clogged with threads it is desirable that they be removed. It is another object of my invention to hold the aforesaid tube to its support near the throat by a friction fit or other readily disconnectable means so that the tube can be shipped toward the magazine to permit clearing of the throat without removal of the threads from the pneumatic attraction at the throat. This operation can be performed while the loom is in operation because the tube can be removed without interfering with the lay.

With these and other objects in view which will appear as the description proceeds, my invention resides in the combination and arrangement of parts hereinafter described and set forth.

In the accompanying drawings, wherein a convenient embodiment of my invention is set forth,

Fig. 1 is a side elevation of a portion of a loom having my invention applied thereto,

Fig. 2 is a front elevation of certain parts shown in Fig. 1,

Fig. 3 is a vertical section on line 3—3, Fig. 1 showing the interior of the thread accumulator and its connections to the thread holder and thread remover,

Fig. 4 is a horizontal section on line 4—4, Fig. 1,

Fig. 5 is a rear elevation in the direction of arrow 5, Fig. 1 showing the driving connection for the air pump,

Fig. 6 is a vertical section through the head of the thread holder,

Fig. 7 is a diagrammatic plan view looking in the direction of arrow 7, Fig. 1, and

Fig. 8 is a diagrammatic front elevation of the parts shown in Fig. 7.

Referring particularly to Figs. 1 and 2, I have shown a loom frame 10 having a lay 11 swinging about an axis 12 and reciprocated backwardly and forwardly by rods 13 connected to crank 14 of the top shaft 15 of the loom. The lay is pro-

vided with a shuttle box 16 for the shuttle S supported by a lay beam 17 through which a depleted shuttle descends at the time of a replenishing operation to be directed by a chute 18 on the lay into a bobbin can 19.

The loom is provided with a magazine M which is preferably though not necessarily of the rocking type and has front and back bobbin guides 20 and 21 from which weft ends W and W', respectively, extend to a thread holder H to be described. The magazine may be caused to rock about its pivot 22 by means of control mechanism designated generally at 23 so that the lowest bobbin in either of the guides 20 or 21 may be moved to transfer position. A transferrer arm 25 is pivoted at 26 to the stand or support 27 of the magazine and operates in usual manner to move a bobbin under it in the magazine into the shuttle S when a replenishing operation occurs.

The matter thus far described operates substantially as shown in my prior Patents Nos. 2,199,354 and 2,222,994. At the time of transfer the depleted bobbin leaves a thread A, see Fig. 7, which is removed by a pneumatic thread remover R, and the incoming bobbin leaves a thread B extending from the thread holder H to the selvage of the fabric F, all to be described in detail hereinafter.

The driving mechanism for the loom comprises an electric motor 35 having a pinion 36 meshing with a driving gear 37 slidable along the top shaft 15 into engagement with a clutch member 38 secured to shaft 15. Any appropriate shipper mechanism indicated at 39, may be employed to move the gear against the clutch member when the loom is to be operated and separate these two parts when the loom is to be stopped. So far as certain features of my invention are concerned I do not wish to be limited to the specific means set forth herein for driving the loom. It is sufficient if the motor continues to run after the loom has been temporarily stopped, as by a warp or weft stop motion.

In carrying my present invention into effect I provide the motor shaft 45 with a pulley 46 which by means of a belt 47 drives a pulley 48 secured to shaft 49 of a fan or other form of air pump 50. The latter may be supported in fixed position on a bracket 51 and is so designed as to create sub-atmospheric pressures at the intake 52 thereof. The fan or pump operates whenever the motor 35 is running regardless of the relation of the gear 37 and the driving member 38.

Connected pneumatically to and extending forwardly from the fan 50 is a pipe 55 connected by means of a fitting 56 to the rear wall 57 of the thread accumulator designated generally at D. Wall 57 has a hole 58 registered with the fitting so that the interior of the accumulator is pneumatically connected to the fan through pipe 55. The accumulator is preferably made in the form of a box having a front wall 59 and right and left side walls 60 and 61, respectively, and a bottom 62. The box is provided with a cover 65 which may be attached as at 66 to the top of the box to form a tight air seal. Secured to the top of the cover is a block 67, preferably formed of wood, on which the bottom 68 of the bobbin can 19 rests. The walls of the bobbin can extend downwardly as at 70 below the bottom 68 to cooperate with the block 67 for the purpose of positioning the bobbin can on the accumulator D.

The front wall of the accumulator is provided with an opening 75 which is normally closed by a door or the like 76 hinged as at 77 to the accumulator. The door is held closed tightly by the difference of barometric pressure inside and outside the accumulator. The door may be made of any suitable transparent material which will permit visual observation of the threads within the accumulator.

Located within the accumulator between its front and rear walls is a partition 80 having an opening 81 across which extends a screen 82 to prevent threads from passing from the forward compartment 83 to the rear compartment 84 of the accumulator. This partition sets between beads 85 formed on the bottom and side walls of the accumulator. Other beads 86 depending from the cover 65 receive the top of the partition. By reason of the beads the partition serves as a substantially tight air seal between the front and back compartments except for the air passage 81. Rods 88 extend forwardly from partition 80 toward the door 76 and serve to hold the mass of yarn Y in compartment 83.

The bottom 62 of the accumulator is provided with an opening 90 connecting compartment 83 with the interior of a fitting 91 secured to bottom 62. A hose or other flexible pipe 92 connects fitting 91 to the thread remover R shown in Fig. 7. The right or outer wall 61 is perforated as at 95 to connect compartment 83 with the interior of a fitting 96 secured to said wall. Fitting 96 has a foot 97, see Fig. 1, connected as at 98 for angular adjustment on wall 61. Secured in the fitting 96 is an upwardly extending pipe 100, the upper end of which as shown in Fig. 6 has secured thereto a head or elbow 101 by means of a set screw 102. A tube 103 fits into the head 101 and is preferably though not necessarily held frictionally in the head with sufficient tightness to remain in position during loom operation but loose enough to permit removal or inspection of the threads in the head 101. The latter has a chamber 104 which in effect is a throat through which the weft ends W and W' pass.

The shuttle box 16 is provided with a forwardly extending thread placer 110 having an upper forwardly extending finger 111 below which extends a forwardly and downwardly inclined thread engaging edge 112 which forms a thread notch 113 with the finger. A rearwardly extending stationary hook 115 is secured in any convenient manner to the loom frame and is located preferably between the placer and fabric F when the lay is on front center. The hook has an upwardly extending hook head 116 and has a forwardly and upwardly inclined rear surface or edge 117. The hook has a thread notch 118 in front of the head 116 and above the path traversed by the placer 110. The reason for this relationship is to prevent the thread placer from striking any thread which may extend from the hook 115 to the thread holder tube 103.

In operation, the fan 50 acts whenever the motor 35 is running to create sub-atmospheric pressures within the accumulator D and therefore cause columns of air to move into the thread remover R and the thread holder tube 103. The weft ends W and W' from the magazine extend downwardly and enter the upper part of the tube 103 and then extend diagonally across the tube and into the throat 104, from whence they extend down pipe 100. When a replenishing operation occurs the lowest bobbin in one or the other of the stacks 20 or 21 will be moved into the shuttle S by the transferrer arm 25 and the associated thread will move to position B below the group of threads W and W'. When the shuttle

is picked to the opposite side of the loom the pneumatic attraction induced by the draft of air moving into the tube 103 holds the thread. During backward movement of the lay the thread placer moves behind thread B and as the lay returns forwardly edge 112 moves the thread up into notch 113. The continuous draft of air moving into the tube 103 holds thread B taut and as the lay beats up to front center position with the thread under finger 111 in notch 113 the placer 110 moves the thread up the inclined rear edge 117 of the hook. During this operation the part of the thread touching the hook is deflected upwardly over the hook to a position in front of the hook head 116. The notch 118 in the hook is slightly above a line drawn from the fell of the cloth to the tube 103, see Fig. 8, and it is for this reason that the thread B will be held in the notch. The notch is also in front of a straight line from the fell to the tube 103 as indicated in Fig. 7. The thread B remains in this position until it is cut several picks later by the temple cutter T, at which time the thread is drawn into the tube 103 by pneumatic attraction.

It is an important feature of my invention to face or point the tube 103 in a direction generally toward the hook 115 so that the thread B will enter the tube at a point slightly above the bottom thereof and out of contact with any part of the intake mouth. By this arrangement the inrushing column of air is able to surround the thread and draw it quickly into the tube 103 from whence it passes downwardly through the pipe 100 into the thread accumulator D.

The thread of the outgoing bobbin is handled much in the same manner as that set forth in the aforesaid Patent No. 2,199,354, the thread A when cut at the temple passing into the thread remover R and along the tube 92 into the compartment 83 of the accumulator.

As will be obvious in Fig. 3 the threads from the thread holder and the thread remover enter compartment 83 at points spaced from the screen 82 and I find in practice that these threads accumulate in a mass which tends to fall to the bottom of the compartment 83 away from the air duct 81 in the partition 80. The screen 82 therefore does not become clogged and the apparatus can operate for a considerable length of time without requiring cleaning of the accumulator. When it is necessary to remove the threads from the compartment 83 the door 76 is lifted and the mass of threads taken out, after which the door will be drawn to closed position by the sub-atmospheric pressures existing within the accumulator D.

As previously mentioned the bobbin attendant may be required to place bobbins in the magazine during a period of temporary idleness of the loom. When placing bobbins in the magazine a sufficient length of weft end is drawn from each bobbin and presented to the intake mouth of the tube 103. If the sub-atmospheric pressures within the system should cease when the loom stops it would be difficult to get the weft ends of the new bobbins in the tube 103, but by having the fan 50 driven by the motor 35 assurance is given that the weft ends of the new bobbins will be attracted and drawn into the tube 103 even though the loom is temporarily at rest.

After continued use a group of threads may accumulate in the head 101 due to the fact that the threads of the transferred bobbins may become entangled with the weft ends W and W'. It is for the correction of this condition that I preferably make the tube 103 of such size that it can be slipped out of the head 101 a sufficient distance to permit the weaver to dislodge any threads which may be matted together and clog the throat 104. This tube can be removed to the dotted line position of Fig. 6 while the weft ends W and W' are extending into the head and the operation for clearing the latter can therefore be effected without stopping the loom or taking the weft ends of the reserve bobbins out of the head. As soon as the tube 103 is reinserted into the head normal conditions will be immediately established. Obviously, these operations can be performed while the loom is stopped, since the fan will still be running.

From the foregoing it will be seen that I have provided a pneumatic thread control system for a loom wherein sub-atmospheric pressures are maintained within the system whenever the motor 35 is running whether or not the loom is in operation. It will also be seen that the tube 103 is pointed generally in the direction of hook 115 so that the thread in position B, held taut by pneumatic tension, can move in a straight line into the intake mouth of the tube 103 without engaging any part of the mouth of the tube into which the weft ends extend. It will also be noted that the thread accumulator serves as a support for the bobbin can and that the latter remains in position when the door 76 is open to remove threads which have accumulated in compartment 83. The can 19 thus protects the operator in the event of a transfer while the mass of weft is being removed from the accumulator. Furthermore, the tube 103 can be slipped out of the head 101 to permit correction of unfavorable thread conditions within the head without removing the weft ends W or W'. Also, the thread placer moves in a path below the thread extending from hook 115 to the thread holder H.

Having thus described my invention it will be seen that changes and modifications may be made therein by those skilled in the art without departing from the spirit and scope of the invention and I do not wish to be limited to the details herein disclosed, but what I claim is:

1. In a weft replenishing loom having a magazine with reserve bobbins from which extend weft ends, the loom having shipper mechanism, a driving motor capable of being connected to and disconnected from the loom by the shipper mechanism, a pneumatic thread holder operative to hold the weft ends when subatmospheric pneumatic pressure exists within the thread holder, mechanism operated by the motor whenever the latter is running and operating whether the loom be connected to or disconnected from the motor by the shipper mechanism to produce subatmospheric pneumatic pressures, and means pneumatically connecting said mechanism to said thread holder.

2. In a weft replenishing loom having a magazine with reserve bobbins from which extend weft ends, the loom having shipper mechanism, a driving motor capable of being connected to and disconnected from the loom by the shipper mechanism, a pneumatic thread holder operative to hold the weft ends when subatmospheric pneumatic pressure exists within the thread holder, pneumatic mechanism operated by the motor whenever the latter is running and operating to create subatmospheric pressures whether or not the loom has driving connection with the motor, and means pneumatically connecting the pneumatic mechanism to the thread holder, whereby

the thread holder is capable of attracting weft ends of bobbins placed in the magazine during loom stoppage provided the motor is running.

3. In a weft replenishing loom, a driving motor therefor, the loom being capable of having running and non-running periods during continued running of the driving motor, the loom having a hollow thread holder capable of drawing thereinto weft ends of bobbins in a magazine whenever subatmospheric pressures exist within the holder, pneumatic mechanism operated by the motor when the latter is running to create subatmospheric pressures during either running or non-running periods of the loom, and means pneumatically connecting the pneumatic mechanism to the thread holder and enabling the latter to draw weft ends thereinto during periods of non-running of the loom provided the motor is running.

4. In a weft replenishing loom having a driven shaft, a driving motor, clutch mechanism movable to one position to connect the motor to the shaft and movable to another position to disconnect the motor from the shaft, a pneumatic thread holder having an intake mouth, and a magazine to hold reserve bobbins the weft ends of which are attracted into the intake mouth of the thread holder when subatmospheric pressure exists within the holder, a pulley turning with the motor whenever the latter is running independently of the position of the clutch mechanism, pneumatic means operatively connected to the pulley and effective during running of the motor to create subatmospheric pressures, and pneumatic connections between the pneumatic means and the thread holder.

5. In a weft replenishing loom having a shipper handle and a driven shaft, a driving motor, clutch mechanism controlled by the shipper handle to cause the shaft to be driven by the motor when the handle is in one position and cause the clutch to disconnect the motor from the shaft when the handle is in another position, a pneumatic thread holder having an intake mouth, the loom having a magazine from which weft ends extend to the intake mouth of the pneumatic thread holder, pneumatic means to create subatmospheric pressures, driving connections between the motor and said pneumatic means effective whenever the motor is running to cause the pneumatic means to create subatmospheric pressures, and pneumatic connections between said pneumatic means and the thread holder.

6. In a weft replenishing loom operating with a driving motor and a clutch mechanism under control of a shipper mechanism to connect the motor to the loom when the shipper mechanism is in one position and disconnect the motor from the loom when the shipper mechanism is in another position, the loom having a magazine from which weft ends extend, a thread holder having an intake mouth into which the weft ends are drawn when subatmospheric pressures exist within the holder, a pulley turning with the motor, means to create subatmospheric pressures, a pulley on said means, a belt connecting said pulleys and causing the means to create subatmospheric pressures whenever the motor is running independently of the position of the shipper mechanism, and pneumatic connections between said means and the thread holder.

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