

April 30, 1940.

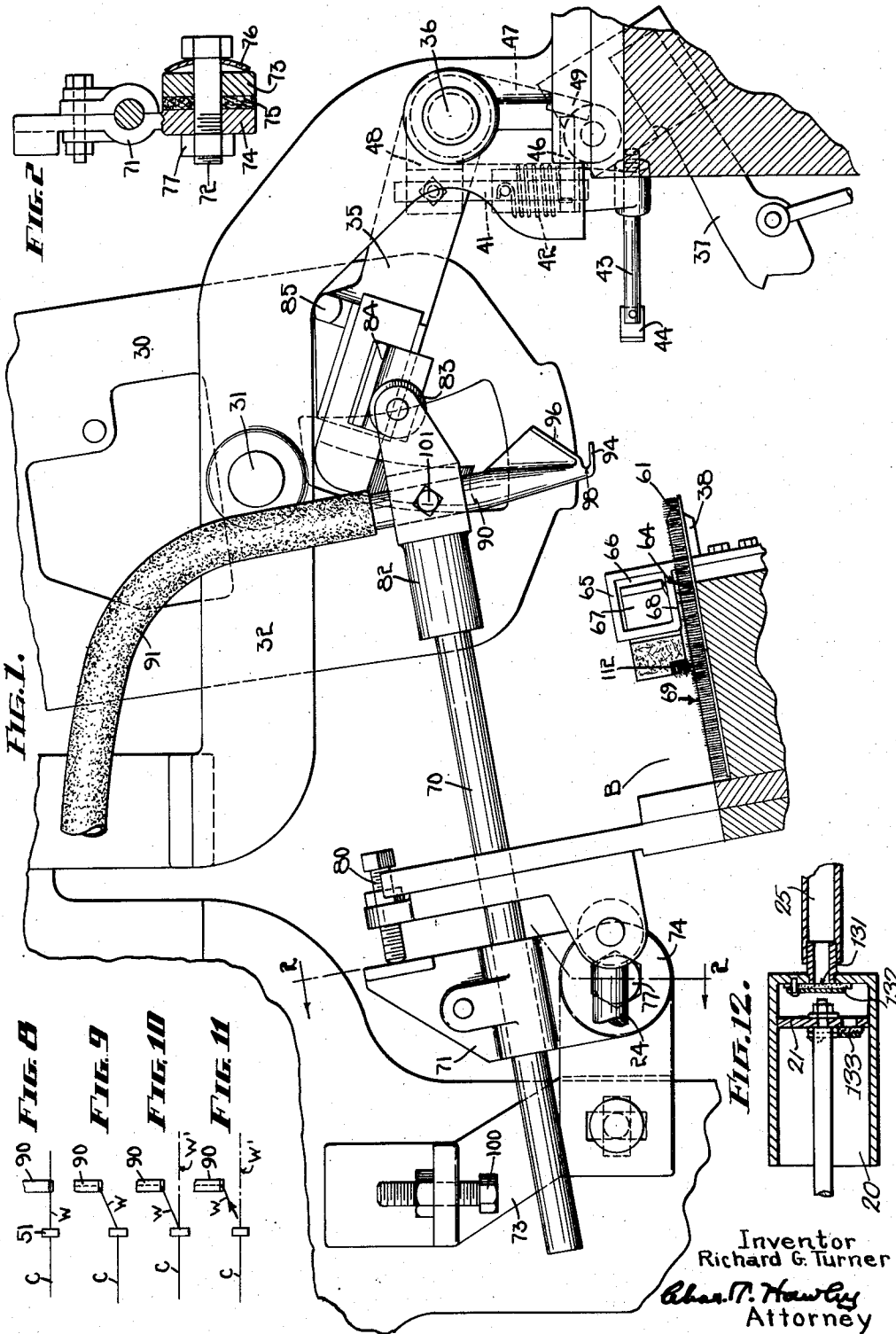
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PNEUMATIC THREAD EXTRACTOR FOR LOOMS

Filed Feb. 10, 1938

2 Sheets-Sheet 1



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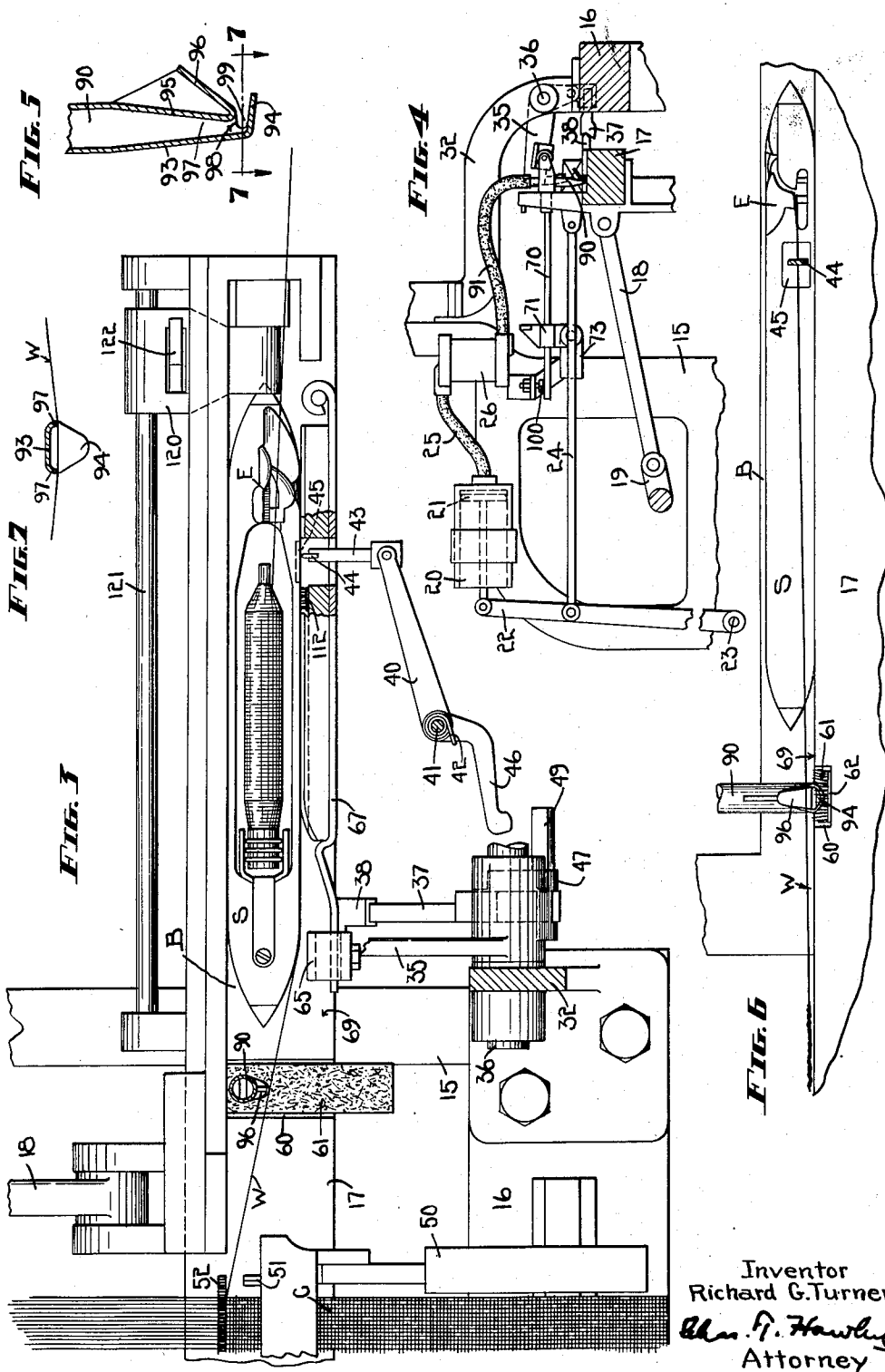
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2 Sheets-Sheet 2



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2,199,296

PNEUMATIC THREAD EXTRACTOR FOR LOOMS

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Application February 10, 1938, Serial No. 190,637

31 Claims. (Cl. 139—256)

This invention relates to improvements in extractors for the thread left by the outgoing bobbin of a weft replenishing loom at the time of transfer and it is the general object of the invention to effect the removal of this thread pneumatically.

At the time of transfer in a bobbin changing loom a thread extends from the selvage to the depleted bobbin in the shuttle and provision must be made for its removal if perfect cloth is to be woven. It is an important object of my present invention to effect the removal of this thread from the path of the shuttle by a pneumatic device the intake mouth of which is behind the thread when the lay is at front center so that rearward motion of the lay moves the thread into the range of the thread extractor. So far as I am aware previously proposed devices of this kind have had the intake mouth in front of the thread, but since the thread is not cut until front center, the lay acts to draw the thread rearwardly away from the extractor as soon as the thread can respond to the extractor. In my present invention, on the other hand, the motion of the lay moves the thread toward the extractor subsequent to cutting and the thread will therefore be in the mouth of the extractor at the time of picking. By maintaining a partial vacuum in the extractor throughout the rearward motion of the lay assurance is given that the extractor will be able to act on the thread at any time during backward motion of the lay when the thread is free to be attracted by the blast of air.

I find that it is necessary to have the thread acted upon by the central portion of the draft of air. A thread which lies entirely at one side of the intake mouth will not respond sufficiently and it is necessary to draw the thread across the mouth so that the inrushing air can act on opposite sides of the thread. To accomplish this result I form the intake mouth with notches into which the thread is directed during rearward motion of the lay, these notches holding the thread directly in the most rapidly moving part of the air stream.

It is a further object of my present invention to move the intake of the thread extractor away from the fell of the cloth for reasons which will appear from a consideration of the threads attached to the selvage during and subsequent to transfer. As shown herein I effect this movement of the extractor by raising it but I do not wish to be limited to this particular means for removing the extractor from the range of the several threads mentioned. Prior to transfer

there will be a thread extending from the selvage to the empty bobbin, while subsequent to transfer there will be a second thread extending from the thread holder of the magazine to the selvage. A temple cutter is provided to cut both of these threads, but it is to be understood that between replenishing operations there will be a thread extending from the selvage on alternate beats of the loom. By raising the extractor after it has received the thread of the outgoing bobbin the latter is moved out of entangling position with respect to the thread attached to the thread holder and laid by the fresh bobbin. In raising the thread holder I also find that the action of the temple cutter is improved, since the thread extends upwardly from the selvage and is held taut enough to respond to the cutter. So far as threads extending from the selvage on alternate beats are concerned, the thread extractor is far enough away from them to have no effect on them. If the thread extractor should remain near the selvage it would tend to draw the weft ends away from the selvage to form undesirable loops on alternate beats of the loom. A still further reason for lifting the thread extractor is that it removes the thread which it holds from the path of the shuttle and the latter can therefore not engage the thread to drive it into the warp shed.

It is another object of my present invention to provide friction means which will hold the thread at a point adjacent to the shuttle eye and in such position as to prevent substantial feeding back of the thread toward the selvage. In this way the thread is held sufficiently taut so that it will be directed into the mouth of the extractor as the lay moves rearwardly. The friction operates as just described until picking at which time outward movement of the shuttle from the box will slacken the thread. By this time, however, the lay has moved back far enough to insure entry of the thread into the extractor mouth, and since the vacuum is maintained during this interval, the thread will be drawn into the mouth as quickly as it is slackened by shuttle motion.

I have found that a vacuum will draw a thread into the mouth more efficiently if the thread extends across the mouth in a path which is more or less straight. If there is any considerable bend in the thread friction against the edges of the mouth interfere with the passage of the thread into the extractor. In the usual type of weft replenishing loom the shuttle box has a mouth defined by a front wall which extends down to the box floor. This wall is sufficiently close to the thread extractor so that rearward

motion of the lay will cause a sharp angle to exist between the thread and the direction which it takes across the inrushing stream of air. In order to avoid this relationship I undercut a

part of the wall so that the thread may extend from a point of contact deep in the shuttle box between the shuttle and the binder toward the extractor mouth, thereby lessening the angle.

It is a further object of my invention to mount the thread extractor so that it is normally out of operating position and is moved to operating position, as by lowering, by some part of the transfer mechanism. The restoration of the extractor to normal or inoperative position is effected in the present instance by a connection with the lay which acts to lift it to normal position when the lay reaches back center. I believe I am the first to move a pneumatic thread extractor from a normally inoperative position to operative position. When raised it will be out of the path of a shuttle which may be improperly boxed. Since the extractor is lowered by the transferrer arm, and since the latter will not descend if a shuttle is misplaced due to action of the shuttle feeler, there is no likelihood that the extractor will ever be struck by the shuttle. By this arrangement the extractor may if desired be operated in connection with a vacuum effective between transferring beats of the loom without danger that threads extending from the selvage to the shuttle box in the normal course of weaving will be drawn into the extractor to form undesirable loops at the selvage.

It is a more specific object of my invention to provide the lay with a friction yielding surface, such as pile fabric, to support the thread and at the same time allow a part of the extractor to pass under the thread by deformation of the piles to present the thread properly to the intake mouth.

In previous pneumatic thread extractors a thread cutter has been employed at the box mouth to cut the thread extending from the selvage to the shuttle into two parts the outer of which was likely to be pinched between the shuttle and the binder. Such arrangements required mechanism to take care of two pieces of thread, the outer of which frequently broke when the shuttle was picked. This broken thread, not being attached to any part of the thread removing mechanism, was likely to be whipped into the shed to form a defective pick. It is an important object of my present invention to allow the thread from the selvage to the shuttle eye to remain intact as one piece and draw the ends thereof into the extractor as they are cut. This not only eliminates the box mouth cutter but places the thread extending into the shuttle box under control of the extractor. I believe I am the first to draw a weft end pneumatically out of the shuttle box toward the center of the loom for the purpose of removing the same from 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 vertical longitudinal section through the upper part of a loom adjacent the replenishing mechanism, the thread extractor being shown in its normally raised position and the lay in rear position,

Fig. 2 is a detailed vertical section on line 2—2 of Fig. 1,

Fig. 3 is a plan view of certain of the mechanism shown in Fig. 1, parts being in section, and the shuttle being shown as provided with a fresh bobbin which has just been transferred,

Fig. 4 is a diagrammatic view similar to Fig. 1 but on a smaller scale and showing the operating connections between the lay, and the extractor,

Fig. 5 is a detailed vertical section through the intake mouth of the extractor,

Fig. 6 is a detailed front elevation of a portion of Fig. 1 showing the extractor in lowered position and a shuttle about to receive a fresh bobbin,

Fig. 7 is a detailed horizontal section on line 7—7 of Fig. 5,

Figs. 8 to 11 are diagrammatic views showing the relation of the thread extractor to the outgoing and incoming threads at the time of transfer, and

Fig. 12 is a sectional elevation of a vacuum pump and associated valve structure.

Referring to the drawings, particularly Fig. 4, I have shown a loom frame 15 having a breast beam 16, a lay 17, connector 18 therefor and top or crank shaft 19 to drive the connector and lay. The shaft makes one revolution for each beat of the loom, being in front center position at the time of transfer, in top center position at the time of picking, and reaching back center position while the shuttle is still in flight.

A vacuum pump 20 is mounted on the loom frame and has a piston 21 driven by an upright lever 22 pivoted as at 23 to the loom frame and actuated by the lay through a connector 24. The pump acts to create a partial vacuum during the backward stroke of the lay, this action starting immediately after front center and continuing to back center. A flexible tube 25 connects the pump with a thread accumulator 26 mounted on the loom frame and serving as a reservoir to receive threads. During backward motion of the lay the air in the accumulator is under reduced pressure.

The two-color rocking reserve bobbin magazine 30 is pivoted as at 31 to a stand 32 fixed with respect to the loom frame. This magazine supplies two distinctive types of weft and may if desired be made and operated according to my Patent No. 2,128,974, issued September 6, 1939. The magazine is shown for illustrative purposes only and my invention set forth hereinafter is in no way restricted in its use and operation to the particular magazine shown. The transferrer arm 35 is pivoted as at 36 to the stand 32 and is attached to a latch 37 to be operated by a lay bunter 38 on a transferring beat of the loom. At the time of transfer the transferrer arm is depressed from the normally raised position shown in Fig. 1 to transfer the lowest bobbin of the selected group in the magazine into a shuttle S located in the shuttle box B on the lay under the magazine.

In order that the invention to be set forth hereinafter may operate satisfactorily I desire to cut the weft thread of the outgoing bobbin at a point adjacent the eye E of the shuttle and have shown for this purpose a form of cutter set forth in Payne Patents Nos. 1,881,920 and 1,932,801. This cutter has a lever 40 pivoted on a fixed vertical stud 41 mounted in a stand 48 and connected by a torsion spring 42 acting normally to turn the lever in a counter-clockwise direction as viewed in Fig. 3. The right end of

this lever is provided with a rod 43 on which is mounted a thread cutter 44 to cooperate with a plate 45 mounted in the front wall of the shuttle close to the eye E, as indicated in Fig. 3. The left arm 46 of lever 40 is positioned for engagement with a projection 49 on the depending arm 47 of the transfer arm and when the latter is raised in normal position it holds the cutter blade 44 forwardly out of the path of the shuttle, but when the transfer arm descends the end 46 moves forwardly under action of spring 42 and the cutter blade 44 is projected rearwardly against a plate 45. The thread from the shuttle eye will normally extend across this plate so that it will be cut by the blade 44 at a time not later than the completion of transfer and preferably a short interval before. This form of cutter is but one of several which might be used and is set forth herein as an example of such mechanism which operates to cut the thread of the outgoing bobbin at a point near the shuttle eye.

The temple 50 is of the usual form and has a cutter 51 adjacent the selvage of the cloth C. As shown in Fig. 3 the temple is set several picks ahead of the reed 52 when the lay is on front center and the thread to be cut will ordinarily not reach cutter 51 until several picks after transfer.

In carrying my invention into effect I provide the lay with a transverse well 60 into which I place a strip 61 of friction material, such as pile fabric indicated in Fig. 1. This fabric may be mounted on any suitable base 62 (Fig. 6) and preferably projects forwardly from the lay as suggested in Fig. 3. The pile fabric is sufficiently low to offer no interference to the normal running of the shuttle but is high enough to engage the weft thread extending along the lay from the shuttle box toward the cloth being woven.

The box mouth 65 may be formed with a rectangular opening 66 into which the binder 67 projects. The lower rear part of the box mouth is under-cut as at 68 so that the lower surface thereof lies somewhat above the box plate 69 to define with the latter a narrow horizontal slot 64 into which the thread may extend. The forward part of the friction material 61 should extend at least as far forward as the slot 64, so that any thread located in the front part of the slot will be able to lie across the pile fabric. When the lay is on front center position as shown in Fig. 3 the weft W extending therefrom will pass diagonally from the front wall of the shuttle rearwardly over the friction material 61 to the adjacent selvage. As the lay recedes the thread will change its angular relation to the lay and enter slot 64 for reasons to be described.

The thread extractor shown more particularly in Fig. 1 comprises a rod 70 held for longitudinal adjustment in a rocking holder 71 pivoted about a bolt 72 shown more particularly in Fig. 2. The bolt is carried by a bracket 73 supported on the loom frame behind the lay. The rocking holder 71 has a bearing 74 through which the bolt extends and I place a washer of friction material 75 between the bearing 74 and the bracket 73. A disk spring 76 under the head of the bolt is used to increase the effect of the friction material and may be set to any desired degree of tension by means of nut 77 on the bolt. The rocking holder 71 will be held by the friction and the disk spring in any position to which it may be moved. The lay carries a resetting screw 80 to engage the upper part of the

rocking holder 71 and turn the latter in a counter-clockwise direction as viewed in Fig. 1 subsequent to a transfer operation.

The forward end of rod 70 is provided with a head 82 carrying a roll 83 to cooperate with a cam plate 84 secured to the transfer arm. The setting of the screw 80 is such that it will move the roll 83 into or almost into engagement with the cam 84 when the lay reaches back center, the screw 80 being adjustable to prevent too much upward pressure of the roll against the cam 84. A stop screw 100 in bracket 73 engages rod 70 to limit down motion of head 82. The upper position of the transfer arm is determined by a stop lug 85 thereon to engage the stand 32.

Extending vertically through the head 82 is a tube 90 the upper end of which is connected by means of a flexible hose 91 to the accumulator 26, as shown in Fig. 4. The lower end of the tube 90 is flattened so that it has an elliptical horizontal cross section the major axis of which extends in the direction of the lay. The particular form of the lower end of the tube is shown in Figs. 1, 5 and 7. The rear wall 93 is bent forwardly to define a downwardly and forwardly inclined lower lip 94, while the front wall 95 has an upwardly and forwardly inclined lip 96. The side walls 97 of the tube project forwardly from the wall 93 and are formed with notches 98 which do not extend to the wall 93 but terminate a sufficient distance in front thereof so that a thread lying across the notches, as suggested in Fig. 7, will be spaced from the rear wall. The opening between the walls 97 and the lips constitutes a mouth 99 into which the thread is drawn and across which the thread is held by the notches 98. I have found this to be an important relation inasmuch as the intruding air is able to pass upwardly both behind and in front of the thread and therefore exert maximum force on it.

In operation, the parts will be normally in the position shown in Fig. 1, the transfer arm and head 82 being raised and the pump acting to create a partial vacuum at the mouth 99 or intake lower end of the tube 90. When a transfer is called the transfer arm 35 descends to perform its major function, which is the insertion of a reserve bobbin drawn from the magazine into the shuttle S. During its descent, however, two additional results are accomplished, first, the cutter is freed so that it cuts the thread from the shuttle near the eye, as already described, and second, the lowering of cam 84 rocks the rod 70 and parts moving therewith from the position of Fig. 1 to that suggested in Fig. 4. The transfer and placing of the parts just described is completed when the lay reaches front center.

The parts are so related that the lip 94 dips into the piles of the friction material 61, as suggested in Fig. 6, and at a point behind the weft W, as shown in Fig. 3. The longitudinal position of the tube 90 in the head 82 is determined by a set screw 101 threaded into the head 82 and bearing against the tube 90. By means of this adjustment the lip 94 can be set to the position indicated in Fig. 6 when the transfer arm is in its lowest position. Screw 100 prevents head 82 from falling too low should the friction devices loosen.

As the lay starts to move rearwardly the transfer arm will rise as usual but the friction connection shown in Fig. 2 will hold the tube 90 down, the resetting screw 80 being at this time considerably in front of the rocking holder 71.

As the lay recedes the lip 94 will move through the piles of the friction material 61 and pass under the weft W to cause the latter to enter the notches 97 as suggested in Fig. 7.

5 In order that the thread may be held taut across the friction material the binder 67 is provided with a small mass of fur or other friction material 112 bearing against the shuttle to clamp the thread at a point near the plate 45. This
10 friction material 112 prevents the thread from snapping toward the selvage at the time of cutting by blade 44 and it is for this reason that the thread is held taut and hence rearward motion of the lay will draw the thread into the
15 notches 97.

When the lay has moved back to picking position the reed line will have moved back far enough to permit the shuttle to pass behind the tube 90. The picking of the shuttle slackens
20 the thread, but at this time a piston 21 is moving rearwardly in the pump at its greatest rate and is therefore creating its highest vacuum. Any slackening of the thread therefore will permit it to be drawn into the tube 90. As soon as
25 the shuttle leaves the binder 67 the thread will be entirely free from restraint so far as the shuttle is concerned and the inrush of air into tube 90 will draw the outer or right hand end of the thread as viewed in Fig. 3 into the tube
30 and up toward the accumulator 26.

During this backward motion of the lay the thread moves forwardly relatively to the lay due to the fact that it is attached to the selvage. Because of the short distance between the box
35 mouth 65 and the tube 90 a line joining these parts quickly becomes oblique with respect to the lay. If the thread were required to follow this line it would not be favorably placed for entry into the mouth 99. It is for this reason that
40 I provide the undercut slot 64 into which the thread passes, and the angle of the thread is therefore less than it would otherwise be since the thread extends in a straight and slightly oblique line from the point of contact between
45 the binder and shuttle to the mouth 99. The thread is therefore drawn into the mouth more easily since the adjacent wall 93 offers little or no resistance to its motion.

From this operation it will be seen that immediately after picking the part of the thread
50 which had been to the right of mouth 99 is drawn into the tube. The left hand part of the thread remains attached to the selvage but is held taut by the pneumatic tension which holds the other end in tube 90.

55 As the lay approaches its rearmost position the resetting screw 80 will engage the rocking holder 71 which has remained in the position shown in Fig. 4 corresponding to the lowest position of the tube 90, and as the lay reaches back center the holder 71 will be rocked in a counter-clockwise
60 direction as viewed in Fig. 1 to reset the extractor to raised position, where it will be held by the friction disk 75. During the subsequent forward motion of the lay, tube 90 will be above the path of the shuttle, so that even though the latter were misplaced it would not contact with the
65 tube 90.

During setting of the holder 71 the tube 90
70 moves up from the position shown diagrammatically in Fig. 8 to a higher position as suggested in Fig. 9. The thread from the selvage thus extends upwardly to the extractor, and the second thread W' of the fresh bobbin indicated in dot
75 and dash lines in Fig. 10, which has been laid

by the shuttle on its first pick after transfer, will extend along the lay below the weft W without becoming entangled therewith. Since the tube 90 is raised there is no chance that the thread W' will enter the tube.

5 At some subsequent beat-up the temple cutter will operate and either cut both of the threads W and W' at the same time or cut thread W first, cutting the other thread later. As soon as thread W is cut at the temple it will be drawn
10 into the tube 90 by the immediately ensuing stroke of piston 21. The thread W will thereupon approach the tube 90 as suggested by the arrow in Fig. 11 and after the thread W' has been cut at the same front center it will be
15 drawn to the right along a path below the thread W by some suitable mechanism, such for instance, as the pneumatic thread holder set forth in my copending application Serial No. 166,571. The thread W is now completely severed from
20 the cloth and passes into the accumulator 26 which holds it confined.

The shuttle is picked by a picker 120 sliding along a picker spindle 121 mounted on the lay and driven by a picker stick 122 after the transfer operation is completed and approximately
25 at top center.

Valve 131 acting against light spring 132 opens toward the pump when a vacuum is created, but closes on the return stroke to prevent the pump
30 from blowing the thread out of the pipe 90. A valve 133 on the piston closes when a vacuum is being formed, but opens on the return stroke so that no power to compress air will be drawn from the loom.

35 From the foregoing it will be seen that I have provided a thread holder operating pneumatically and having an intake mouth located behind the thread of the outgoing bobbin so that rearward motion of the lay moves the filling toward the mouth. It will also be seen that the vacuum pump acts to cause an inrush of air into the
40 mouth 99 during the time that the thread is being placed for reception by the mouth. Furthermore, the mouth is so constructed as to require the thread to lie across the inrushing stream of air. Another feature resides in the fact that the extractor is raised above the path
45 of the shuttle a short time after the transferring operation is completed. This feature has two advantages one of which is that a misplaced shuttle on subsequent beats of the loom will not damage the extractor, and the other of which is the fact that the intake mouth 99 is moved to a position where it cannot receive the thread of the incoming bobbin when the latter is cut by the
50 temple cutter several picks after transfer, or threads laid by the shuttle on subsequent beats. The raising of the tube 90 also places the thread more favorably for cutting at the temple and the pneumatic tension on the thread permits the latter to yield sufficiently during upward movement of the tube 90 to prevent thread breakage. Again, provision is made for gripping the thread
55 between the shuttle and the binder to hold the thread taut during the first part of rearward lay motion for the purpose of causing the thread to enter the mouth 99 and the thread is released at the time of picking due to movement of the shuttle out of the box. While I have shown a pump
60 which creates a vacuum throughout the entire rearward motion of the lay, yet it will be sufficient if the vacuum exists at about the time of picking and continues sufficiently long thereafter to draw the thread into the tube 90. While I have
65 70 75

illustrated raising of the tube 90 as the specific means for removing it from the fell of the cloth, yet I do not wish to be limited to this construction. Furthermore, it will be seen that the box mouth is undercut so that the thread can extend from a point deep in the box to the mouth 99, thereby reducing the angle of the thread relatively to the lay to a minimum and permitting the thread to be drawn around the adjacent wall 93 with negligible resistance. Furthermore, the transferer places the extractor for operation and the lay resets it to normal position. Also, the strip of pile fabric 61 supports the thread on the top thereof but permits the lip 94 to project below the thread to give assurance that the latter will enter the mouth 99.

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 thread controlling mechanism for a loom having a lay and a shuttle thereon from which a thread extends toward the adjacent selvage, means to cut the thread when the lay is in forward position, a pneumatic thread extractor having a mouth behind and located in the path of the thread as the latter is moved rearwardly during backward motion of the lay, and means to induce a draft of air into said extractor as the thread approaches said extractor to draw the thread thereinto.

2. In thread control mechanism for a loom having a lay provided with a shuttle box having a shuttle therein from which a thread extends rearwardly and toward the adjacent selvage when the lay is in forward position, a pneumatic thread extractor, means to move said extractor to a point behind the thread when the lay is in forward position, rearward motion of the lay moving the thread toward said extractor, and means to induce a draft of air into said extractor during rearward motion of the lay.

3. In thread control mechanism for a loom having a lay provided with a shuttle box having a shuttle therein from which a thread extends rearwardly in a diagonal direction toward the adjacent selvage when the lay is in forward position, means to cut the thread in the shuttle box when the lay is in forward position, a pneumatic thread extractor for the thread, means to move said extractor to a point behind the thread when the lay is in forward position, rearward motion of the lay moving the thread toward the thread extractor, and means to induce a draft of air into said extractor to draw the thread into the latter during rearward motion of the lay.

4. In a thread controlling mechanism for a loom having a lay with a shuttle box which contains a shuttle having a thread extending therefrom to the adjacent selvage, means to cut the thread at a point intermediate the ends of the shuttle box, a pneumatic thread extractor having a thread receiving mouth behind the thread when the lay is in forward position, said thread being moved rearwardly toward the mouth by rearward motion of the lay, means to pick the shuttle out of the box and thereby release the thread subsequent to arrival of the thread at the mouth of said extractor, and means to induce a draft of air into said mouth prior to and during picking of the shuttle to draw said thread into the mouth.

5. In a pneumatic thread extractor for a loom having a lay with a shuttle box having therein

a shuttle from which a thread extends between the shuttle and the shuttle box to the adjacent selvage, means to cut the thread in the shuttle box at a point between the ends of the shuttle, a pneumatic thread extractor located behind the thread, rearward motion of the lay moving the thread within the range of operation of the thread extractor, means to pick the shuttle out of the shuttle box during the backward motion of the lay and thereby releases said cut end, and means to induce a draft of air into said extractor during picking of the shuttle to cause the thread to enter said extractor.

6. In a pneumatic thread extractor for a weft replenishing loom having a lay and cloth having a fell, a temple cutter adjacent to the fell, a pneumatic thread extractor having an intake mouth, means to induce a draft of air into the mouth on replenishing beats of the loom, and means to raise the extractor relatively to the temple cutter subsequent to a replenishing operation and after a thread extending from the fell has been drawn into the mouth, the raising of the extractor moving the thread to a position for favorable cutting by the temple cutter.

7. In a thread controlling mechanism for a loom having a lay and shuttle box containing a shuttle from which a thread extends along the shuttle and to the adjacent selvage, friction means on the shuttle box to press the thread against the shuttle and hold said thread taut, so long as the shuttle is in the shuttle box, a pneumatic thread extractor having an intake mouth positioned to receive the thread while the latter is held taut by said friction means, means to pick the shuttle out of said shuttle box, means to induce an inrush of air into said mouth during picking of the shuttle and when the latter has moved away from the friction means with resultant slackening of the thread.

8. In thread controlling mechanism for a loom having a lay provided with a shuttle box containing a shuttle having the thread extending therefrom to the adjacent selvage, a mass of friction material on the shuttle box to engage the adjacent wall of the shuttle and press said thread against the shuttle, means to cut the thread at a point between said mass of frictional material and the outer end of the shuttle, means to pick the shuttle out of the box as the lay moves rearwardly, a pneumatic thread catcher having an intake mouth located behind the thread, means to induce a draft of air into the mouth during picking of the shuttle, backward motion of the lay moving the thread toward said mouth, said thread being held taut between the selvage and said mass of friction material on the shuttle box and picking of the shuttle away from said friction material releasing the thread, whereby the inrushing draft of air sucks said thread into the thread catcher.

9. In thread control mechanism for a loom having a lay and a shuttle box thereon, a bottom for said box, a shuttle resting on said bottom and having a thread extending therefrom to the selvage, a shuttle binder for the box, a guide for the shuttle binder having the rear lower portion thereof extending over the box bottom and forwardly from the rear of said box guide to define an undercut thread slot, means to hold the thread in the shuttle box when the lay is in forward position, means to pick the shuttle out of the box as the lay moves rearwardly, a thread extractor having an intake mouth into which the thread enters, the lay when moving rearwardly causing

the thread to enter said undercut slot prior to picking while the thread extractor is in engagement with the thread, said thread thereby being out of the path of the shuttle when the latter is picked, and means to induce a draft of air into the thread extractor to draw the thread thereinto.

10. In thread control mechanism for a loom having a lay provided with a shuttle box, a shuttle binder, a shuttle in the box having a thread extending therefrom to the selvage in a direction extending rearwardly and diagonally when the lay is in forward position, a guide for the binder having the rear lower portion thereof lying above the bottom of the box to define an undercut thread slot, means to hold the thread in the shuttle box, and a thread extractor located behind the thread and substantially stationary during the rearward motion of the lay, the lay when moving rearwardly changing the diagonal direction of the thread to cause said thread to extend diagonally from the box toward the selvage in a forward direction to cause the thread to enter said undercut thread slot and move said thread toward the thread extractor, and means thereafter to pick the shuttle out of the box, the thread in the thread slot being out of the path of the shuttle when the latter is picked.

11. In thread controlling mechanism for a loom having a lay provided with a shuttle box, a shuttle in the box having a depleted bobbin provided with a thread which extends from the shuttle toward the adjacent selvage, transferring mechanism to replenish the weft in the shuttle when the lay is in forward position, a normally raised thread extractor having a thread inlet mouth, connections from the transfer mechanism to the thread extractor to move the latter down to a position behind the thread during a transferring operation, means to induce a draft of air through said mouth to draw the weft end thereinto during backward motion of the lay while said extractor is in lowered position, and means to raise said extractor as the lay nears the end of its rearward motion.

12. In a thread controlling mechanism for a loom having a lay and a shuttle from which the thread extends toward the selvage, transfer mechanism to replenish the weft in the shuttle, a normally raised pneumatic thread extractor having an inlet mouth for the thread, means to cause the transfer mechanism when operating to place said mouth behind the thread, rearward motion of the lay moving the thread toward said mouth, means to induce a draft of air into said mouth to draw the thread thereinto during backward motion of the lay, and means operated by the lay to return the thread extractor to normal raised position as the lay approaches its rearmost position.

13. In a thread controlling mechanism for a loom having a lay and a shuttle thereon from which the thread extends toward the adjacent selvage, transfer mechanism to replenish the weft in the shuttle, a normally raised pneumatic thread extractor having a thread receiving mouth, a friction mounting for said extractor to hold the latter in any position to which it is moved, means to cause the transfer mechanism when operating to lower the thread extractor to place the mouth behind said thread, rearward motion of the lay moving the thread toward said mouth, means to induce a draft of air into said mouth during rearward motion of the lay

and draw said thread into the extractor, and connections between the lay and the extractor to return the latter to normal raised position as the lay approaches rearmost position.

14. In a thread control mechanism for a loom having a lay provided with a shuttle from which a thread end extends to the adjacent selvage, a mass of deformable material extending across the top of the lay under the thread, the latter being held frictionally on top of said mass of material, a pneumatic thread extractor having a lip extending into and below the surface of the deformable material, rearward motion of the lay causing the deformable material to move the thread on to the lip of the thread catcher.

15. In a thread controlling mechanism for a loom having a lay carrying a shuttle from which a thread end extends to the adjacent selvage, a mass of deformable material extending across the lay under the thread and by which the thread is held frictionally, a pneumatic thread extractor having a thread guide extending into the deformable material to a point below the surface thereof, means to support the thread extractor with the thread guide below the surface of the deformable material, as the lay moves rearwardly, rearward motion of the lay moving the thread toward the thread guide and the latter extending under the thread to direct said thread to the extractor, and means to cause removal of the thread from the lay by a draft of air passing through the thread extractor.

16. In a thread control mechanism for a loom having a lay carrying a shuttle from which a weft thread extends to the adjacent selvage, a mass of deformable fibrous piles carried by the top of the lay under the thread, the latter being held frictionally by said piles, and a thread extractor having a part to extend below the surface of said piles, said extractor effective when in close proximity to said thread to remove the same from the lay, rearward motion of the lay carrying the thread toward said extractor by reason of the frictional contact between the thread and the piles on the lay.

17. In a thread controlling mechanism for a loom having a lay carrying a shuttle from which a thread end extends toward the adjacent selvage, a strip of pile fabric extending across the lay under the thread and having upwardly projecting textile fibers to have frictional contact with the thread, a thread extractor normally above the lay out of the path of the shuttle, means to depress the thread extractor and cause a part thereof to project into the textile fibers below the level of the thread, means rendering said extractor effective to remove the thread from the lay when said thread is in proximity to the extractor, rearward motion of the lay moving the thread into proximity to the extractor by reason of frictional contact between said thread and the textile fibers on the lay.

18. In a pneumatic thread extractor for a weft replenishing loom having a lay and cloth having a fell, a pneumatic thread extractor having an intake mouth normally located above the fell of the cloth, means operative upon a replenishing beat of the loom to lower said extractor to place the mouth substantially in the plane of the cloth, means to induce a draft of air into the mouth when the extractor is lowered tending to draw a thread extending from the fell into the mouth, and means operating subsequent to the weft replenishing operation to raise the extractor to normal position.

19. In thread controlling mechanism for looms having a lay and shuttle box having a shuttle therein from which a thread extends to the adjacent selvage, a pneumatic thread extractor normally above the path of the shuttle, means to lower said extractor to a point behind the thread when the lay is in forward position, rearward motion of the lay thereafter moving the thread toward the thread extractor, means to hold the thread taut during said backward motion of the lay, means to pick the shuttle, and means to induce a draft of air into said extractor to draw the thread into said extractor during picking of the shuttle.

20. In a weft replenishing loom having a lay reciprocating therein and having a shuttle box at one end thereof from which a thread extends to the selvage, a pneumatic thread extractor having an intake mouth, means to place the extractor with the mouth thereof adjacent to the thread on weft replenishing operations of the loom, means to induce a draft of air into the mouth to draw the thread into the extractor on replenishing beats of the loom, and means additional to the lay to move the extractor to move the mouth in a direction away from the thread.

21. In a weft replenishing loom having a thread extending from the fell and selvage of the cloth in a direction away from the cloth, a lay movable back and forth in the loom, a pneumatic thread extractor having an intake mouth normally spaced from the thread when the lay is in forward position, means to move the extractor relatively to the thread to place the mouth adjacent the thread on weft replenishing picks of the loom, means to induce a draft of air into the mouth to draw the thread into the extractor on weft replenishing beats of the loom, and means to move the extractor to move the mouth relatively to the fell and in a direction away from the thread.

22. In a weft replenishing loom having a cloth therein with a fell and selvage from which a thread extends in a direction away from the cloth, a lay movable back and forth in the loom, a pneumatic thread extractor having an intake mouth normally spaced from the thread during the back and forth motions of the lay on non-replenishing beats of the loom, means to move the extractor to place the mouth adjacent the thread on a weft replenishing beat of the loom, means to induce a draft of air into the mouth to draw the thread into the extractor on replenishing beats of the loom, and means to move the extractor to move the intake mouth in a direction away from the thread.

23. In a weft replenishing loom having a cloth with a selvage from which a thread extends in a direction away from the cloth, a lay movable backwardly and forwardly therein, a pneumatic thread extractor having an intake mouth normally spaced from the thread, means operative on replenishing beats of the loom to move the extractor and mouth toward the lay and the thread, means to induce a draft of air into the mouth to draw the thread into the extractor, and means to move the extractor to move the mouth away from the lay.

24. In a weft replenishing loom in which a thread extends from the selvage to an adjacent shuttle box, a pneumatic thread extractor having an intake mouth, means to hold the extractor with the mouth adjacent to the thread on weft replenishing beats of the loom, a lay reciprocating in the loom, a fixed vacuum pump having a

piston, a connection between the lay and the piston to cause reciprocation of the latter in the pump as the lay reciprocates, and a pneumatic connection from the pump to the extractor, the pump acting through the pneumatic connection to induce a draft of air into the mouth of the extractor to draw thereinto the thread extending from the selvage.

25. In a weft replenishing loom having a lay provided with a shuttle box having therein a shuttle from which a thread extends to the selvage, transfer mechanism capable of having a transferring operation to replenish the weft in the shuttle, a thread cutter to cut the thread, a pneumatic thread extractor having an intake mouth normally out of thread extracting position and movable by the transfer mechanism when the latter has a transferring operation to thread extracting position adjacent to the thread, means controlled by the transfer mechanism to cause the thread cutter to cut the thread when the transfer mechanism has a transferring operation, means to induce a draft of air into the mouth to attract the thread into the mouth, whereby the thread cutter cuts the thread and the extractor moves to extracting position jointly when the transfer mechanism has a transferring operation, and means to return the extractor to normal position.

26. In a weft replenishing loom having a lay provided with a shuttle from which a thread extends to the selvage, a transfer arm to have a transferring movement on replenishing beats of the loom, a pneumatic thread extractor having an intake mouth normally spaced from and out of controlling position with respect to the thread, means to cause the extractor to be moved to place the intake mouth in extracting position adjacent to the thread when the transfer arm has a transferring movement, means to induce a draft of air into the intake mouth to draw the thread into the latter, means to hold the thread extractor with the mouth in extracting position adjacent to the thread independently of the transfer arm, and means to return the thread extractor to normal position subsequent to a complete transferring movement to the transfer arm.

27. In a weft replenishing loom having a reciprocating lay provided with a shuttle from which a thread extends to the selvage, the thread being attached to the selvage and being movable relatively to the latter as the lay moves, a thread extractor having an intake mouth normally placed in non-extracting position with respect to the thread, means operative upon a replenishing beat of the loom to move the extractor to place the intake mouth in extracting position and spaced from the thread in the direction in which the lay reciprocates, motion of the lay moving the thread toward the intake mouth, means to induce a draft of air into the intake mouth to draw the thread into the extractor, and means to return the thread extractor to normal position after a replenishing operation of the loom, the relative movement of the thread and intake mouth to effect drawing of the thread into the mouth by the draft of air being due jointly to the motion of the thread caused by motion of the lay and motion of the extractor toward extracting position.

28. In a pneumatic thread extractor for a weft replenishing loom having a lay movable backwardly and forwardly and provided with a shuttle box and a shuttle in the box having a thread

- extending therefrom to the adjacent selvage, means to cut said thread in the shuttle box, a hollow thread extractor, means to move the extractor to a position behind the thread when the lay is in the forward part of its movement, means to move the lay rearwardly to place the thread adjacent to the thread extractor, means to pick the shuttle out of the shuttle box during rearward movement of the lay, means to create an inrush of air into said thread receiver during picking of the shuttle to draw the weft end into said receiver, and means to move the thread receiver away from said position behind the thread.
29. Mechanism for pneumatic thread extraction in a weft replenishing loom having a shuttle, a lay, a shuttle-box on the lay, transfer mechanism and means to cut the weft thread of the outgoing bobbin in the shuttle box, comprising means cooperating with the shuttle to retain in the shuttle box the severed weft end extending to the adjacent selvage until the shuttle is picked on the succeeding rearward movement of the lay, means to pick the shuttle and simultaneously release said weft end, a hollow thread receiver for the severed weft ends provided with an intake mouth in the path of the severed weft ends, and means to induce the inrush of air into said receiver through said intake mouth during picking of the shuttle.
30. Mechanism for pneumatic thread extraction in a weft replenishing loom having a shuttle, a lay, a shuttle-box on the lay, transfer mechanism

and means to cut the weft thread of the outgoing bobbin in the shuttle box, comprising means cooperating with the shuttle to hold the severed weft end extending to the adjacent selvage until after the lay has passed front center and to release said weft end during the completion of the rearward movement of the lay, a hollow thread receiver for the severed weft ends provided with an intake mouth in the path of the severed weft ends, and means to induce an inrush of air into said receiver through said intake mouth during said rearward movement of the lay.

31. In a weft replenishing loom having a lay and a shuttle in a shuttle box on said lay from which the severed weft end of an outgoing bobbin extends to the adjacent selvage, in combination, a pneumatic thread extractor having an intake mouth, means to hold the extractor with the mouth between the shuttle box and the selvage and adjacent and behind said weft end on a weft replenishing beat of the lay, an intermittently operating air pump, a loom part having a regular motion in timed relation to the lay for each two-pick cycle of the loom, a positive connection from said loom part to said pump, whereby said pump is rendered effective to induce suction on each rearward beat of the lay only, and pneumatic connections from the pump to said extractor, said pump acting through said connections to induce a draft of air through the intake mouth to draw said weft end into said extractor as the lay moves rearward after weft replenishment.

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