Sept. 20, 1949. G. N. PETERSON 2,482,691

PNEUMATIC THREAD REMOVER FOR WEFT REPLENISHING LOOMS

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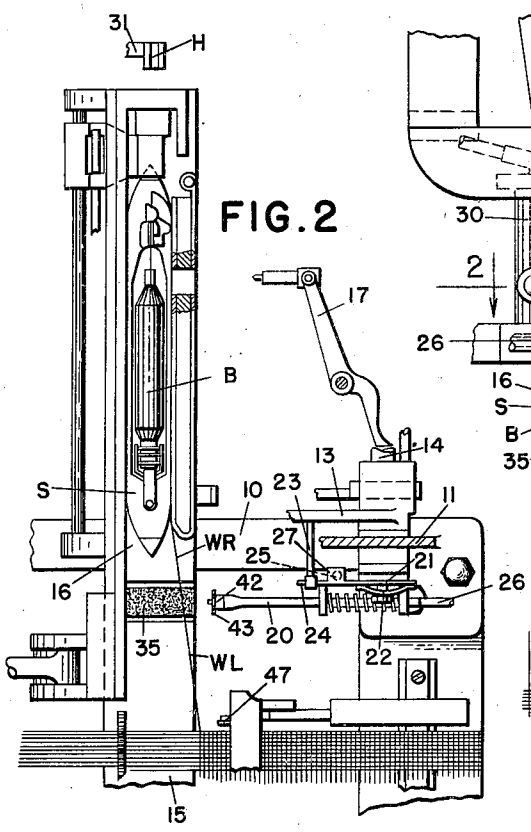


FIG.2

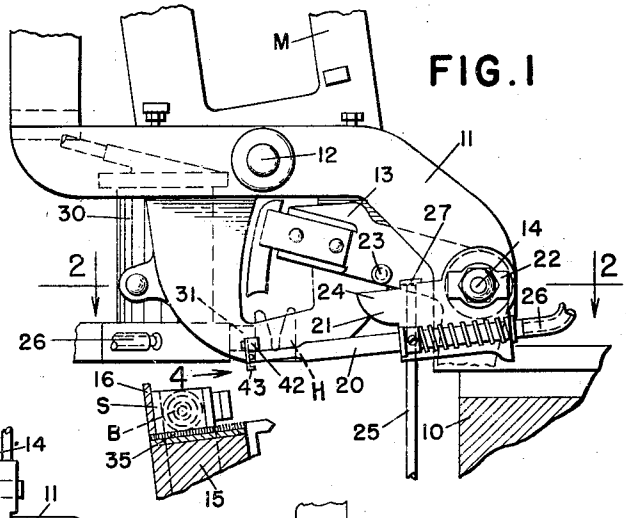


FIG.1

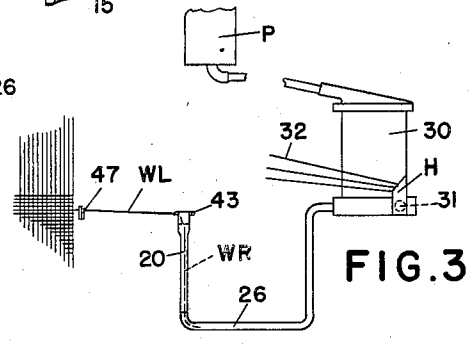


FIG.3

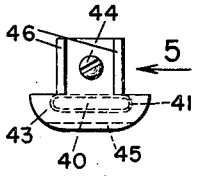


FIG.4

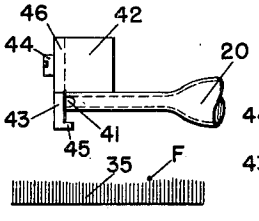


FIG.5

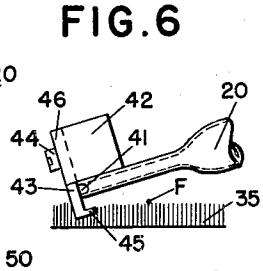


FIG.6

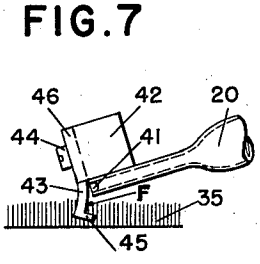


FIG.7

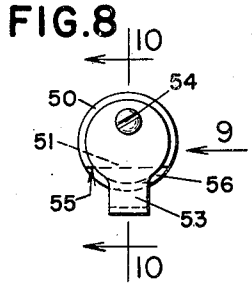


FIG.8

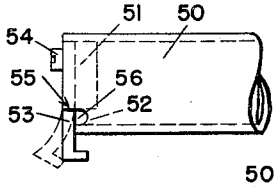


FIG.9

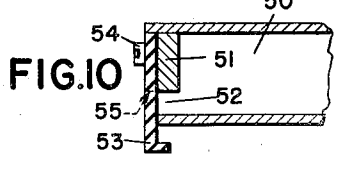


FIG.10

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## PNEUMATIC THREAD REMOVER FOR WEFT REPLENISHING LOOMS

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Application November 8, 1947, Serial No. 784,794

11 Claims. (Cl. 139—256)

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This invention relates to improvements in pneumatic thread control systems for weft replenishing looms and it is the general object of the invention to provide a thread remover so constructed as normally to impose a minimum load on the pneumatic thread control system but effective upon replenishing operation to open an intake mouth sufficiently wide to attract at least one end of the thread to be removed from the loom.

When a weft replenishing operation occurs in a loom the thread connected to the outgoing bobbin is attached to the selvage of the cloth and should be removed to prevent drawing into the warp shed. Heretofore pneumatic devices have been proposed for accomplishing this result, but so far as I am aware they have operated with an intake mouth of fixed size which has been sufficiently large to impose a considerable load on the source of subatmospheric pressures for the control system. Throughout the greater part of loom operation it is not necessary to have air moving into the thread intake mouth of the remover, but it is essential that a sufficient volume of air move into the mouth on weft replenishing beats of the loom to attract the thread and draw it into the remover.

It is an important object of my present invention to provide the thread remover with a valve or the like for the intake mouth normally substantially closed so that a minimum of leakage into the air system will occur on non-replenishing beats of the loom, and provide means for opening the valve to receive the filling thread on replenishing beats.

The filling thread is ordinarily cut at a point near the shuttle eye on the replenishing beat but is not cut from the selvage until several picks later. On the replenishing beat of the loom that part of the thread extending from the shuttle eye to the remover will be drawn into the latter but the remainder of the thread will be attached to the selvage. It is a further object of the invention to provide the thread remover with a relatively large primary intake mouth which is normally closed but open on weft replenishing beats of the loom, and provide a smaller secondary mouth through which a small stream of air is drawn into the remover whenever the loom is operating to attract that part of the thread between the remover and the selvage.

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.

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In the accompanying drawings, wherein I have shown two forms of the invention,

Fig. 1 is a side elevation of a weft replenishing mechanism having my invention applied thereto, the lay and part of the loom frame being shown in cross section,

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

Fig. 3 is a diagrammatic view showing the relation of the thread remover, a weft end thread holder, a thread collector, and the source of subatmospheric pressures and indicating the position of the filling thread after it has been partly removed,

Fig. 4 is an enlarged rear elevation of the thread remover looking in the direction of arrow 4, Fig. 1, and showing the preferred form of the invention,

Fig. 5 is a side elevation looking in the direction of arrow 5, Fig. 4, and showing the remover in its normal raised position,

Fig. 6 is a diagrammatic view similar to Fig. 5 but showing the remover when it is first lowered to filling pick-up position,

Fig. 7 is a view similar to Fig. 6, but representing conditions existing slightly later in the loom cycle and indicating the filling thread about to enter the temporarily opened primary intake mouth of the remover,

Fig. 8 is a view similar to Fig. 4 but showing the modified form of the invention,

Fig. 9 is a side elevation looking in the direction of arrow 9, Fig. 8, and

Fig. 10 is a vertical section on line 10—10 of Fig. 8.

Referring particularly to Fig. 1, the loom frame 10 supports a bracket 11 on which a reserve bobbin magazine M is pivoted at 12. The magazine is shown as of the two-stack type, although the invention is not limited to this particular kind of magazine. A transferrer arm 13 is pivoted on a stationary stud 14 and is normally in the raised position shown in Fig. 1.

The lay 15 reciprocates backwardly and forwardly in usual manner and has a shuttle box 16 which is entered by shuttle S on alternate beats of the loom. The shuttle is provided with a bobbin B which upon exhaustion is replaced by the full bobbin drawn from the magazine due to downward movement of the transferrer arm 13 by well-known mechanism not shown herein. This transferring operation occurs when the lay is at front center and as the lay moves rearwardly the transferrer arm rises to the normal position shown in Fig. 1.

The loom is provided with a thread cutter 17 which upon occurrence of a weft replenishing

operation moves rearwardly to cut the filling thread F extending from the shuttle adjacent to the eye thereof. For convenience in the description to follow, as viewed in Fig. 2, the part of the filling adjacent the shuttle is designated at WR while the part adjacent to the cloth is indicated at WL. A thread remover tube **20** is slidably mounted on a carrier **21** movable pivotally about the transferrer arm stud **14** and held frictionally in any position to which it may be moved by well-known friction means designated herein at **22**.

A stud **23** extends laterally from the transferrer arm and overhangs a finger **24** of the carrier **21** to move the latter and remover tube **20** from their normal raised position to lowered position when the transferrer arm descends. Near the completion of the backward stroke of the lay next following transfer a rod **25** will rise to engage the finger **27** and move the carrier **21** back to its normal raised position. The tube **20** is connected pneumatically to a hose or pipe **26**.

The pneumatic system of the loom is shown diagrammatically in Fig. 3 and includes a source P of subatmospheric pressures which creates subatmospheric pressures within a thread accumulator or collector **30**. A tube or hose **31** leads from the collector **30** to a thread holder H provided for the weft ends **32** extending from the reserve bobbins of the magazine. The hose **26** is also connected to the accumulator **30**, and the latter receives weft ends from both the remover tube **20** and the thread holder H. The source P may supply either intermittent or continuous pressures.

As shown more particularly in Fig. 2 the lay is provided with a transverse pad **35** of pile fabric or other deformable material. This pad is below the shuttle path and between the shuttle box and the cloth being woven.

The matter thus far described is essentially the same as heretofore proposed and may be similar to matter set forth for instance in patent to Turner No. 2,199,354.

In the preferred form of the invention the tube **20** is provided with a primary relatively large thread intake mouth **40** opening rearwardly from the end of the tube and a secondary smaller intake mouth **41** communicating with the primary mouth and facing or opening toward the fabric being woven. A block **42** is secured to the top of the remover tube **20** and has secured thereto a flexible valve or mouth closure **43** held to the block by a screw or the like **44**. The valve **43** may be provided with a forwardly extending toe or thread pick-up **45** if desired located below the primary mouth **40**.

The block is formed with rearwardly extending guards **46** which serve to position the valve **43** which may conveniently be made of soft flexible rubber. The bottoms of these guards are about on a level with the top of the primary mouth **40** and prevent the filling thread from passing upwardly beyond the range of the column of air moving into the primary mouth when the valve is open or swung rearwardly.

In operation, the valve will normally be in the position shown in Fig. 5 when the tube **20** is raised, but when a weft replenishing operation occurs the tube will be lowered to the position shown in Fig. 6 and the bottom of the valve will engage and enter the piles of pad **35**. At this time the filling thread F will be forward of the valve and the lay will be substantially on front center. The tube **20** will remain down because of the friction device **22** after the transferrer arm rises, and as the lay moves rearwardly the pad **35** by its engagement with the valve **43** will move the latter from the position shown in Fig. 6 to that shown in Fig. 7 to open mouth **40**. At the same time the pad will move the filling F rearwardly to a position directly under the primary mouth **40**. The part WR of filling thread which was cut by the thread cutter **17** at transfer will thereupon be drawn into the primary mouth **40** while the tube **20** is still down, but the part WL of the filling thread will remain attached to the cloth and enter secondary mouth **41**. As the lay moves rearwardly rod **25** will return the tube **20** to its normal raised position and as soon as valve **43** leaves the pad **35** it will return to the closed position shown in Fig. 5 due to its own resilience and also due to the fact that it is attracted against the mouth **40** by the subatmospheric pressures existing within the tube **20**. Thread end WR will then be as indicated in dotted lines in Fig. 3.

The end WL of the filling thread will now extend from the cloth through the small secondary mouth **41** and represents only a small leakage of air into the pneumatic system. When this thread is eventually cut at the selvage by the temple cutter **47** it will be drawn into the secondary mouth and the entire piece of thread will then move to the accumulator **30**.

In the modified form of the invention I employ a tube **50** for the remover which is cylindrical throughout its length and not narrowed or flattened at its rear end as is the preferred form of the tube. A block **51** extends part way across the rear end of the tube but is cut away on its under side to leave a primary mouth **52** therebelow. The valve **53** may be made of soft resilient rubber as is the valve **43** and will be held to the block **51** by a screw **54**.

The block **51** is set forwardly of the extreme rear end of tube **50** and leaves a space for the upper part of the valve **53** within the periphery of the upper part of tube **50**. The lower part of the rear end of the tube **50**, however, is cut away by an amount equal substantially to the thickness of the valve **53** and at points in more or less horizontal alignment with the bottom of block **51** and top of the primary mouth **52** to form shoulders **55** serving the same purpose as lugs **46** in limiting upward movement of the thread. Tube **50** is formed with a secondary mouth **56** which opens laterally toward the cloth and serves the same function as the secondary mouth **41** of the preferred form of the invention. The operation of the modified form of the invention is substantially the same as that described for the preferred form, valve **53** when down moving rearwardly as the lay recedes due to engagement with the pad **35** to open primary mouth **52**.

From the foregoing it will be seen that I have provided a simple form of valve for the thread remover of a pneumatic thread control system for a weft replenishing loom, the valve tending normally to remain in position to close the primary thread intake mouth not only by its own resilience but also due to pneumatic attraction growing out of the existence of subatmospheric pressures within the remover tube. There will therefore be little leakage at the remover and source P can supply most of its pressure to thread holder H. It will also be seen that the intake remover is formed with a thread guard or the like over the primary intake mouth to prevent the thread from moving upwardly out of the range of the column

of air moving into the mouth and also prevent the thread from being caught between the valve and the part which supports it, such as the block 42 or 51. These guards also guide the valves as they move. Furthermore, the secondary mouth 41 faces the cloth and is large enough to attract the part WL of the filling thread when the latter is cut at the selvage.

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 pneumatic thread remover for a weft replenishing loom having a filling thread extending along the lay to the cloth, a tube in which subatmospheric pressure exist normally spaced from the thread but moving to a thread pick-up position adjacent to the thread on a weft replenishing beat of the loom, said tube having a thread intake mouth, a valve on the tube closing the mouth due to the subatmospheric pressures within the tube when the latter is in normal position, and means on the lay opening the valve to enable the thread to enter the intake mouth when the tube is in pick-up position.

2. In a pneumatic thread remover for a weft replenishing loom having a filling thread extending along the lay to the cloth, a tube in which subatmospheric pressures exist normally spaced from the thread but moving to a thread pick-up position adjacent to the thread on a weft replenishing beat of the loom, said tube having a thread intake mouth, a valve on the tube normally closing the intake mouth when the tube is in normal position, and means operated by the lay opening the valve to enable the thread to enter said mouth when the tube is in pick-up position.

3. In a pneumatic thread remover for a weft replenishing loom having a filling thread extending along the lay to the cloth, a tube in which subatmospheric pressures exist normally spaced from the thread but moving to a thread pick-up position adjacent to the thread on a weft replenishing beat of the loom, said tube having a thread intake mouth, a resilient valve on the tube normally tending by the resilience thereof to close the intake mouth, and means moving said valve to open said mouth to receive the thread when the tube is in pick-up position.

4. In a pneumatic thread remover for a weft replenishing loom having a filling thread extending along the lay to the cloth, a tube in which subatmospheric pressures exist normally spaced from the thread but moving to a thread pick-up position adjacent to the thread on a weft replenishing beat of the loom, said tube having a thread intake mouth, a resilient valve on the tube normally closing said mouth by the resilience thereof and also due to the subatmospheric pressures within the tube, and means moving said valve to open said mouth to receive the thread when the tube is in thread pick-up position.

5. A pneumatic filling thread remover for a weft replenishing loom comprising a tube having communicating primary and secondary filling thread intake mouths and a resilient valve on the tube normally closing the primary mouth only due to the resilience thereof but capable of flexing away from the primary mouth to open the latter.

6. A pneumatic filling thread remover for a weft replenishing loom comprising a tube in which subatmospheric pressures exist and having communicating primary and secondary thread



intake mouths therein, and a valve on the tube normally closing the primary mouth only due to said subatmospheric pressures but movable against the action of said pressures to open the primary mouth.

7. In a pneumatic thread remover for a weft replenishing loom, a tube in which subatmospheric pressures exist and in which a thread intake mouth is formed, a valve secured to the tube above the mouth and normally closing the latter but movable to open the mouth to receive the thread, and guard means on the tube above the mouth limiting upward movement of the thread relatively to the mouth.

8. In a pneumatic thread remover for a weft replenishing loom, a tube in which subatmospheric pressures exist and in which a thread intake mouth is formed, a valve secured to the tube above the mouth and normally closing the latter but movable to open the mouth to receive the thread, and guard means on the tube above the mouth guiding the valve in its movement away from the mouth and limiting upward movement of the thread relatively to the mouth.

9. In a pneumatic thread remover for a weft replenishing loom, a tube in which subatmospheric pressures exist and in which a thread intake mouth is formed, a valve secured to the tube above the mouth and normally closing the latter but movable to open the mouth to receive the thread, and guard means on the tube above the mouth formed as spaced lugs on opposite sides of the upper part of the valve guiding the latter and limiting upward movement of the thread relatively to the mouth.

10. In a pneumatic thread remover for a weft replenishing loom, a cylindrical tube in which subatmospheric pressures exist, a block secured within the tube spaced forwardly of the rear end thereof and having the lower edge thereof spaced above the bottom of the tube and forming with the latter a thread intake mouth, the lower part of the rear end of the tube being cut away to form an edge on the tube aligned with the rear face of the block, and a valve secured to the block above said mouth normally closing the latter but movable rearwardly to open the mouth, that part of the tube rearward of the block and above the mouth guiding the valve as the latter opens and also limiting upward movement of a thread entering the mouth.

11. In a pneumatic thread remover for a weft replenishing loom having a filling thread extending from a shuttle to the cloth, a tube in which subatmospheric pressures exist and which is located intermediate the shuttle and cloth and having a primary thread receiving mouth facing rearwardly and a small secondary thread mouth facing laterally toward the cloth and communicating with the primary mouth, a valve normally closing the primary mouth but not the secondary mouth, and means operative on a weft replenishing beat of the loom to effect movement of the valve to open the primary mouth to receive the filling thread.

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## REFERENCES CITED

The following references are of record in the file of this patent:

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