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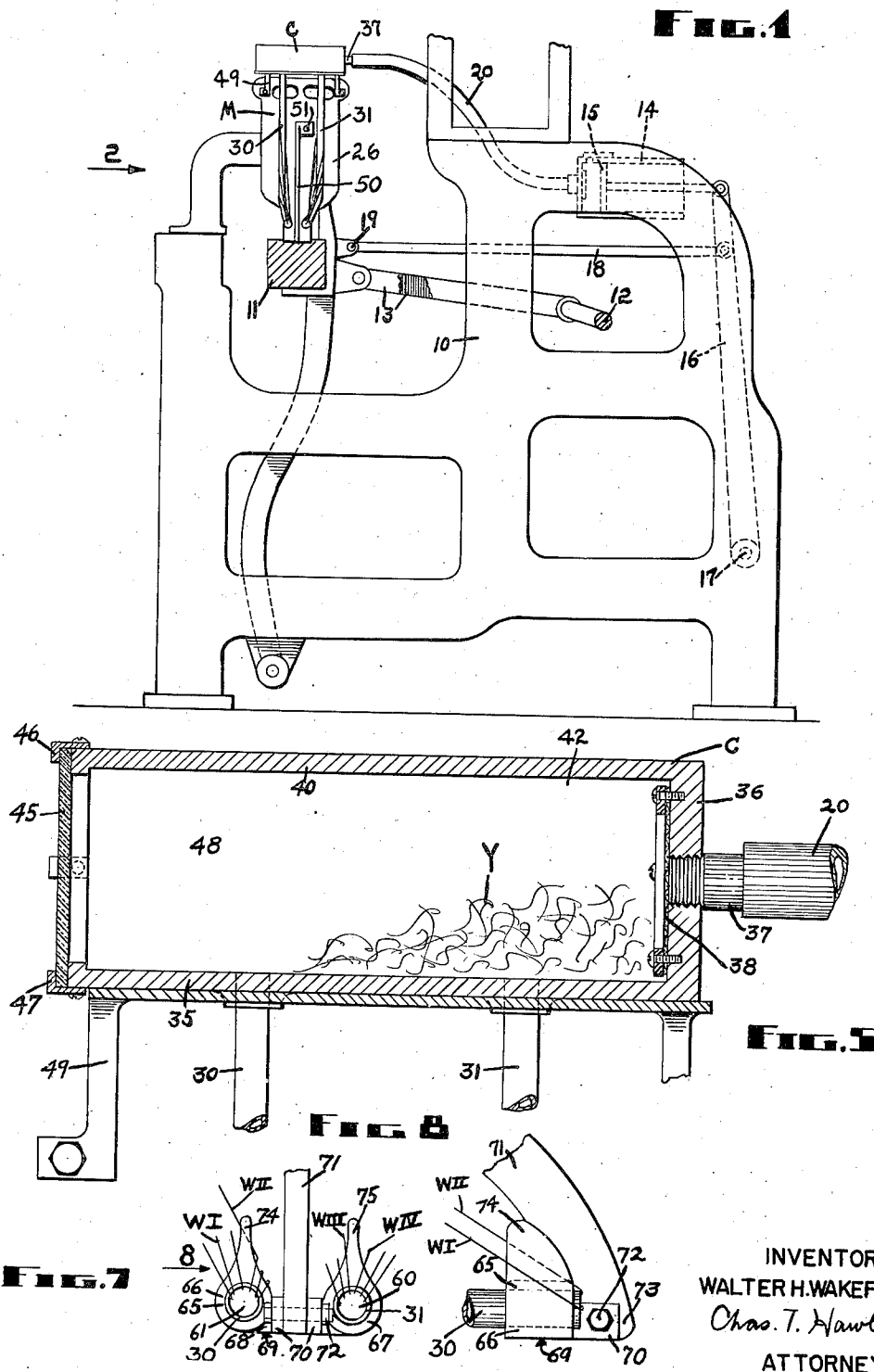
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PNEUMATIC THREAD HOLDER FOR WEFT REPLENISHING LOOMS

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2 Sheets-Sheet 1



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**FIG. 6**

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## UNITED STATES PATENT OFFICE

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PNEUMATIC THREAD HOLDER FOR WEFT  
REPLENISHING LOOMSWalter H. Wakefield, Worcester, Mass., assignor  
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This invention relates to improvements in pneumatic weft end or thread holders for weft replenishing looms more particularly of the multi-stack type and it is the general object of the invention to utilize pneumatic tubes not only for the purpose of tensioning and removing weft ends but also to separate the weft ends into groups as they are led from the bobbin magazine.

Multicolor weft replenishing looms ordinarily operate with a magazine having a plurality of vertical stacks of reserve bobbins from which weft ends extend to some form of thread holder. It is customary in a four-color magazine to make the outside end plate with two thread slots, one for the thread of one pair of stacks of bobbins and the other for the threads of the other pair. In order to prevent entanglement of the threads or weft ends of the bobbins at one stack with those of the other stack of a pair of stacks it is customary to employ a separating rod parallel to the thread slot, one group of threads being in front of and the other group behind the rod.

It is an important object of my present invention to replace the aforesaid rods with tubes connected to a pneumatic thread control system and arrange the tubes in such manner that they will have intake mouths to receive and tension the weft ends. These tubes therefore serve the dual purpose of separating the weft ends into groups at the magazine and also pneumatically control the weft ends at the thread holder.

The four groups of weft ends should preferably be kept separate in view of the fact that the bobbins of one stack may be consumed more rapidly than bobbins of the other stacks, and descent of the more rapidly consumed bobbins would result in slackness of their weft ends should the latter become entangled with weft ends of other groups. It is another object of my invention to provide a guard or guide at the outer or intake end of the aforesaid tubes the effect of which will be to preserve the separation of the weft ends established by the tubes adjacent the magazine acting in their capacities as thread separators.

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 two forms of the invention are set forth,

Fig. 1 is a side elevation of a loom having the preferred form of my invention applied thereto,

Fig. 2 is an enlarged front elevation of the magazine and associated parts including my invention looking in the direction of arrow 2, Fig. 1,

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Fig. 3 is a horizontal section on line 3—3 of Fig. 2,

Fig. 4 is an enlarged side elevation looking in the direction of arrow 4, Fig. 2,

Fig. 5 is an enlarged vertical section on line 5—5 of Fig. 2,

Fig. 6 is a diagrammatic view illustrating the relation of the improved thread holder to the weft end of a transferred bobbin in a shuttle,

Fig. 7 is a view similar to Fig. 4 but showing a modified form of the invention, and

Fig. 8 is a front elevation looking in the direction of arrow 8, Fig. 7.

Referring particularly to Figs. 1 and 2, I have shown a loom frame 10 supporting a lay 11 reciprocated by a crank shaft 12 and lay connectors 13. A pneumatic pump 14 is mounted in fixed position on the loom and has a piston 15 connected to an upright lever 16 pivoted as at 17 to the loom frame and caused to reciprocate by a connector 18 attached to the lay as at 19. A pneumatic pipe or tube 20 extends forwardly from the pump 14 and the latter operates in such manner as to create subatmospheric pressures within the tube 20 during backward strokes of the lay. The pump is shown as one means for creating the aforesaid subatmospheric pressures, but the invention set forth hereinafter is not limited in its use to the pump 14.

The magazine M comprises inner and outer bobbin guiding end plates 25 and 26, respectively, between which extend stacks of bobbins I, II, III and IV as indicated in Fig. 3. The outer end plate 26 is provided with two thread slots 27 and 28, the former being for the front pair of stacks I and II while the latter is for the rear pair of stacks III and IV.

All of the bobbins in the magazine have extending from them weft ends which must be held taut for proper operation of the loom. There are four groups of weft ends, one for each stack, and are designated at WI, WII, WIII and WIV. The weft ends WI and WII pass through the forward thread slot 27 and descend in that slot as their respective bobbins move downwardly toward a transfer position at the bottom of the magazine. In a similar manner weft ends WIII and WIV extend through and descend in slot 28.

As successive replenishing operations occur bobbins will be drawn from one or another of the stacks and with each transfer there will be a descent of the bobbins and weft ends of the stack corresponding to the bobbin involved in the transfer operation.

The parts thus far described of themselves form

no part of my present invention and reference may be had to prior Patents Nos. 1,030,748 and 2,199,353 for a further understanding of their structure and operation.

When a pattern calls for one color more than another the bobbins of one stack will be used up more rapidly than the bobbins of other stacks, with the result that weft ends of such rapidly consumed bobbins will descend more quickly than will the remaining weft ends. Such rapidly descending weft ends, however, should be kept taut and substantially free from entanglement with weft ends of the other stacks, and to effect this general purpose it has been proposed heretofore to use separating rods or the like, one for each of the slots 27 and 28. See Patent No. 1,495,717 to Ryon.

In carrying both forms of my present invention into effect I effect separation of the weft ends of the several stacks at the magazine by means of two tubes 30 and 31, each tube having an elongated vertical run indicated at 32 and having a horizontal part 33. The vertical part 32 of each tube closely parallels its associated slot 27 and 28 and serves as a separator for the weft ends of the corresponding pair of bobbins. Thus, the weft ends WI will be in front of and weft ends WII will be behind tube 30, and likewise weft ends WIII and WIV will be in front of and behind, respectively, the tube 31.

The upper end of each of the tubes 30 and 31 is fastened into the bottom 35 of an inclosed thread collector designated generally at C. This collector has a rear wall 36 into which extends a pipe fitting or the like 37 connected to the aforesaid tube 20. A screen 38 may be used to prevent the yarn Y within the collector from passing into the tube 20. The collector comprises top and right and left side walls 40, 41 and 42, respectively, see Figs. 2 and 5, and has a transparent sliding door 45 at the front end thereof. The door slides between top and bottom guide angles 46 and 47, respectively, appropriately held in position on the top and bottom walls 40 and 35, respectively. When in closed position the door 45 cooperates with the aforesaid parts of the compartment C to preserve subatmospheric pressures within the thread collector. The door can be opened from time to time to remove the accumulated yarn Y.

The upper ends of the tubes 30 and 31 open into the interior or thread compartment 48 of said collector C, hence whenever subatmospheric pressures exist within the thread collector similar pressures exist within the tubes 30 and 31. A bracket 49 may be used to support the thread collector on the magazine.

The horizontal outwardly extending ends 33 of the tubes 30 and 31 are connected together by thread guiding means, two forms of which are shown, the preferred form in Figs. 3, 4 and 5, and the modified form in Figs. 7 and 8. In the preferred form an arm 50 is secured at its upper end to the magazine plate 26 as at 51 and extends downwardly for attachment as at 52 to a block 53 provided with front and back upstanding horns 54 and 55, respectively. Each horn is formed with a hub 56 integral with the block and in which is secured the horizontal end 33 of the associated tube. As shown more clearly in Figs. 2 and 4 each horn extends upwardly from its corresponding tube sufficiently high to be able to engage the weft ends of the highest bobbins in the associated stacks in the magazine.

When bobbins are placed in a magazine it may

be assumed that the rearmost stack will be charged first, in which case the weft ends WIV will pass through the slot 28 and behind the vertical part of tube 31 and then downwardly behind the horn 55 and enter the rear part of open intake mouth 60 in tube 31. Due to subatmospheric pressures within the tube these weft ends will be drawn upwardly into it and the ends should preferably be long enough to extend into the collector to become entangled with the yarn Y. Stack III will then be filled and the weft ends from its bobbins pass through slot 28 and in front of the vertical part of tube 31 and thence downwardly in front of horn 55 and enter the front part of intake mouth 60, as indicated in Fig. 4. Likewise, the weft ends WII from the second stack will be led behind tube 30 and horn 54 and enter the rear part of intake mouth 61 in tube 30, after which the front stack will be charged and its weft ends will be in front of tube 30 and horn 54 and enter the front part of mouth 61. The arm 50 is shaped as shown in Fig. 2 to prevent the weft ends WIII and WIV from getting into a position from which they might be drawn into mouth 61.

As successive transfers occur the weft ends will descend and their slackness due to descent of the bobbins will be taken up by the subatmospheric pressures existing within the tubes 30 or 31. Each group of weft ends is separated from the weft ends of the other groups at the end plate 26 and also at the thread holder by reason of the horns 54 and 55. If it be assumed for instance that bobbin deliveries for transfer occur more rapidly from stack I than from any other stack, the weft ends WI will descend at times when the weft ends WII will be stationary, but due to separation of these two groups of weft ends by horn 54 the weft ends WI can be kept taut, and will not become entangled with ends WII. A similar condition exists whenever the bobbins of any other stack are consumed more rapidly than the bobbins of the remaining stacks.

A modified form of the invention shown in Figs. 7 and 8 provides a type of thread guide at the intake ends of the tubes so constructed as to allow the weft ends WI and WIV to slide under the guide and approach a central position to facilitate threading of the shuttle after transfer. This guide, designated generally at 65, has front and back hubs 66 and 67, respectively, in which the tubes 30 and 31, respectively, are sweated. The hubs are joined by a web 68 formed with a smooth continuous thread engaging under surface 69. Extending outwardly from each hub is a lug 70 and a support arm 71 similar to arm 50 fits between the lugs and is held to them by a bolt 72. The end of arm 71 adjacent to the lugs is extended outwardly as at 73 to serve as a guard or separator to prevent the weft ends from being drawn into the wrong intake mouth. Horns 74 and 75 extending upwardly from hubs 66 and 67 are similar to horns 54 and 55.

The arrangement of the weft ends with respect to horns 74 and 75 and the intake mouths are as shown in Fig. 7. When a bobbin from either the front or rearmost stack is transferred its weft end will slide down along surface 69 toward a point under the arm 71. When a bobbin is transferred from one of the inner stacks its weft end WII or WIII will move down toward the arm 71, hence in this modified form of the invention all the weft ends tend to move toward a common central point when their bobbins are transferred. This condition facilitates threading of a shuttle

into which a bobbin has been freshly transferred.

From the foregoing it will be seen that I have provided simple means by which the weft ends of reserve bobbins can be separated into groups according to their corresponding stacks, this separation taking place not only at the magazine but also at the thread holder. This result is accomplished by having the pneumatic tubes formed in part as vertical thread separators paralleling the slots 27 and 28, and in part by the horns 54 and 55. The latter permit weft ends WI and WII to enter the front parts of intake mouths 61 and 60, respectively, while ends WII and WIV enter the rear part of their corresponding intake mouths. Furthermore, in the modified form of the invention the holder is so constructed that certain of the weft ends can slide along surface 69 toward a central position when their bobbins are transferred.

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 provided with a pair of stacks of reserve bobbins the weft ends of which extend through an elongated slot in the magazine, hollow means within which subatmospheric pressures exist, and a combined weft end separator and pneumatic holder comprising a tube communicating with the interior of said hollow means and having an intake mouth into which the weft ends are drawn pneumatically, part of said tube extending along said slot and separating the weft ends of one stack of bobbins from the weft ends of the other stack of bobbins.

2. In a weft replenishing loom having a magazine provided with a pair of stacks of reserve bobbins the weft ends of which extend through an elongated slot in the magazine, a tube within which subatmospheric pressures exist extending along said slot and separating the weft ends of one stack of bobbins from the weft ends of the other stack of bobbins, said tube being formed with an intake mouth into which the weft ends are drawn by reason of the subatmospheric pressures within said tube.

3. In a weft replenishing loom having a magazine provided with a pair of stacks of reserve bobbins the weft ends of which extend through an elongated slot in the magazine, a tube within which subatmospheric pressures exist extending along said slot adjacent to the magazine and separating the weft ends into two groups, one for each stack of bobbins, said tube having a part thereof extending away from the magazine and formed with an intake mouth spaced from the magazine and into which the weft ends are drawn due to the subatmospheric pressures within the tube.

4. In a weft replenishing loom having a magazine provided with a pair of vertical stacks of reserve bobbins the weft ends of which extend through a vertical slot in the magazine, a tube within which subatmospheric pressures exist having a part thereof extending vertically along said slot adjacent to the magazine and separating the weft ends of one stack of bobbins from the weft ends of the other stack, the lower end of said tube extending away from the magazine and having an intake mouth in the end thereof into which the weft ends of both stacks of bobbins are drawn

due to the subatmospheric pressures within said tube.

5. In a weft replenishing loom having a magazine provided with a pair of vertical stacks of reserve bobbins the weft ends of which extend through a straight vertical slot in the magazine, a tube within which subatmospheric pressures exist having a straight part thereof extending vertically along and parallel to said slot adjacent to the magazine and separating the weft ends of one stack of bobbins from the weft ends of the other stack, the lower end of said tube extending in a horizontal direction away from the magazine and having an intake mouth in the end thereof spaced from the magazine and into which the weft ends of both stacks of bobbins are drawn due to the subatmospheric pressures within said tube.

6. In a weft replenishing loom having a magazine provided with a pair of vertical stacks of reserve bobbins the weft ends of which extend through a slot in the magazine, inclosed means supported on top of the magazine and within which subatmospheric pressures exist, and a tube the interior of which communicates pneumatically with the interior of said inclosed means, said tube having a part extending downwardly from said means along said slot and dividing the weft ends of one stack of bobbins from the weft ends of the other stack of bobbins, the lower end of said tube being spaced from the magazine and having an intake mouth into which the weft ends of both of said stacks of bobbins are drawn due to subatmospheric pressures within said inclosed means and tube.

7. In a weft replenishing loom having a magazine provided with a pair of stacks of reserve bobbins the weft ends of which extend through a slot in the magazine, a tube within which subatmospheric pressures exist extending along said slot and separating the weft ends of one stack of bobbins from the weft ends of the other stack of bobbins, said tube having one end thereof spaced from the magazine and formed with an intake mouth for the weft ends, and a weft end separator adjacent to said intake mouth so positioned as to guide the weft ends of one of said stacks of bobbins toward one part of said intake mouth and guide the weft ends of the other stack of reserve bobbins toward another part of said intake mouth.

8. In a weft replenishing loom having a magazine provided with a pair of vertical stacks of reserve bobbins the weft ends of which extend through a vertical slot in the magazine intermediate said stacks, a tube within which subatmospheric pressures exist having a part extending along said slot and separating the weft ends of one stack of bobbins from the weft ends of the other stack of bobbins, said tube having the lower end thereof spaced from the magazine and formed with an intake mouth for the weft ends, and a thread separator adjacent to said intake mouth and extending upwardly therefrom in position to engage the weft ends from both of said stacks of bobbins, the weft ends of one of said stacks of bobbins lying on one side of said separator and being guided by the latter toward one part of the intake mouth, and the weft ends of the other stack of bobbins lying on the opposite side of the separator and being guided by the latter toward another part of the intake mouth.

9. In a weft replenishing loom having a magazine provided with a pair of stacks of reserve bobbins the weft ends of which extend through a slot in the magazine, a tube within which sub-

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atmospheric pressures exist extending along said slot and separating the weft ends of one stack of bobbins from the weft ends of the other stack of bobbins, said tube having one end thereof spaced from the magazine and formed with an intake mouth for the weft ends, and separator means adjacent to the intake mouth preserving the separation of said weft ends by said tube and causing the weft ends of one stack of bobbins to enter said intake mouth in one direction and cause the weft ends of the other stack of bobbins to enter said intake mouth in a different direction.

10. In a weft replenishing loom having a magazine provided with a pair of vertical stacks of reserve bobbins which move downwardly toward transfer position, said magazine having a vertical slot through which the weft ends of the bobbins extend, a tube within which subatmospheric pressures exist having a vertical part extending along said slot and dividing the weft ends into two groups, one group for each stack, the lower end of the tube being spaced from the magazine and having an intake mouth into which the weft ends are drawn due to subatmospheric pressures within said tube, and separator means extending upwardly from said intake mouth in position to preserve the separation of said groups of weft ends caused by said vertical part of the tube.

11. In a weft replenishing loom having a magazine provided with a pair of vertical stacks of reserve bobbins which move downwardly toward transfer position, said bobbins having weft ends extending through a slot in the magazine, a tube within which subatmospheric pressures exist supported at the upper end thereof and extending downwardly along said slot and separating the weft ends into two groups, one group for each stack of bobbins, the lower end of said tube being bent away from the magazine and provided with an intake mouth spaced from the magazine and into which the weft ends are drawn due to the subatmospheric pressures within said tube, a support for the lower end of said tube mounted on the magazine, and a horn on said support extending upwardly from said intake mouth and preserving the separation of said weft ends into said groups and causing one of said groups to enter one side of the intake mouth and causing the other group to enter the other side of said intake mouth.

12. In a weft replenishing loom having a magazine provided with a pair of vertical stacks of reserve bobbins which move downwardly toward transfer position from which the bobbins are transferred one at a time, said bobbins having

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weft ends extending through a slot in the magazine, a tube within which subatmospheric pressures exist supported at the upper end thereof and extending downwardly along said slot and separating the weft ends into two groups, one group for each stack of bobbins, the lower end of said tube being bent away from the magazine and provided with an intake mouth spaced from the magazine and into which the weft ends are drawn due to the subatmospheric pressures within said tube, a support for the lower end of said tube mounted on the magazine, a horn on said support extending upwardly from said intake mouth and preserving the separation of said weft ends into said groups by said tube and causing one of said groups to enter one side of the intake mouth and causing the other group to enter the other side of said intake mouth, and a hub on said support surrounding the lower end of the tube and having said horn integral therewith and provided with a smooth thread guiding under surface for engagement with a weft end of one of said groups when the corresponding bobbin is transferred.

13. In a weft replenishing loom having a magazine provided with a pair of stacks of reserve bobbins the weft ends of which extend through an elongated slot in the magazine, a tube within which subatmospheric pressures exist extending along said slot adjacent to the magazine and separating the weft ends into two groups, one group for each stack of bobbins, said tube having a part thereof extending away from the magazine and formed with an intake mouth spaced from the magazine and into which the weft ends are drawn due to the subatmospheric pressures within the tube, and a guide adjacent to said intake mouth separating said groups of weft ends from each other as said weft ends approach the mouth.

14. In a weft replenishing loom having a magazine provided with a pair of stacks of reserve bobbins the weft ends of which extend through an elongated slot in the magazine, a tube within which subatmospheric pressures exist extending along said slot adjacent to the magazine and separating the weft ends into two groups, one group for each stack of bobbins, said tube having a part extending away from the magazine and formed with an intake mouth spaced from the magazine and into which the weft ends are drawn due to the subatmospheric pressures within the tube, and a guide in fixed position with respect to the intake mouth causing said groups of weft ends to approach said intake mouth along different paths.

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