

[54] **RAPIER IN THE DEVICE FOR
INSERTING WEFT THREAD INTO THE
LOOM WARP SHED**

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[58] Field of Search..... **139/122 R, 127 P**

[56]

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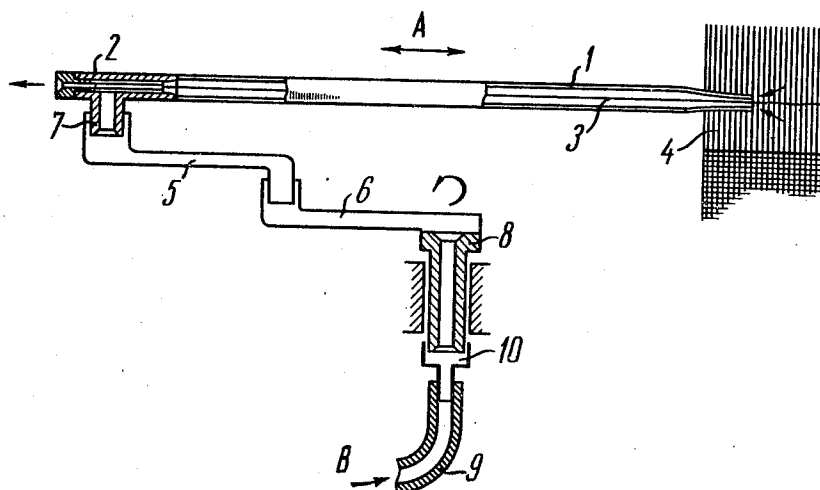
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[57]

ABSTRACT

A rapier in devices for inserting weft thread into the loom warp shed, in which one end of a tube is connected to a jet pump generating therein a suction flow to take up the end of the weft thread. The suction flow is directed by a sleeve serving for the passage of air from the shed, and by a bushing located behind this sleeve in the direction of air movement therein, and partially embracing the sleeve, so as to form an annular slit for the passage of compressed air supplied from a pressure source.

2 Claims, 4 Drawing Figures



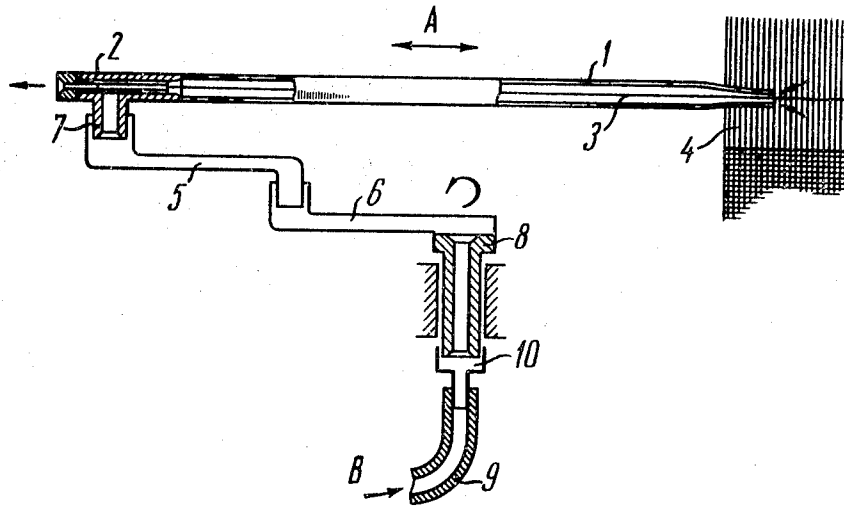


FIG. 1

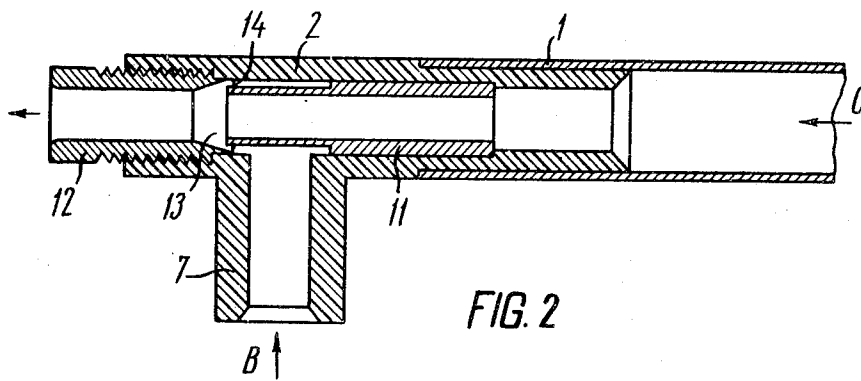
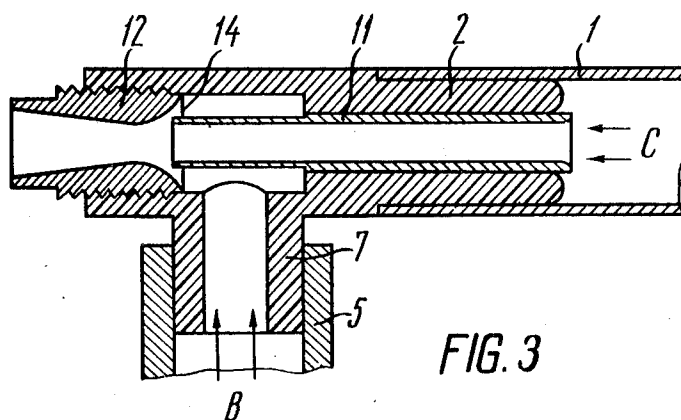
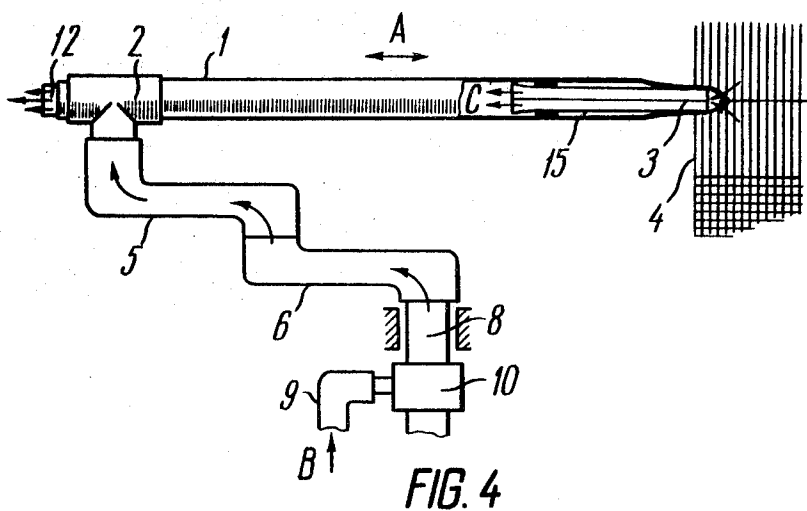


FIG. 2



RAPIER IN THE DEVICE FOR INSERTING WEFT THREAD INTO THE LOOM WARP SHED

BACKGROUND OF THE INVENTION

The present invention relates to devices for inserting a weft thread into the warp shed of a weaving loom, and more specifically to rapiers used in these devices.

The most successful use of the present invention can be made in manufacturing fabrics from intensely linting threads. However, it can equally be used in any looms, wherein weft thread is inserted by means of rapiers.

Widely known in the present art are rapiers for receiving the end of the weft thread from the shed formed by the warp threads, comprising a tube connected to an arrangement made as a vacuum system to build up vacuum in this tube, with the end of the tube opposite to its receiving end being plugged.

During the operation of such rapiers all the air flow from the shed together with the fibers and dust passes through the air ducts of the vacuum system and soon clogs them. This leads to defects (short flights of weft threads), and necessitates quite frequent cleaning, which reduces the efficiency of the loom, and positively requires a filter to be installed in the vacuum system, thus complicating the loom design.

SUMMARY OF THE INVENTION

The basic object of the invention is to provide a rapier in devices for laying weft thread in the loom warp shed with such an improvement in the arrangement for creating a suction flow in the rapier, that this rapier ensures reliable insertion of the weft thread into the warp shed, completely ruling out the clogging of the air ducts, and is simple in design and servicing.

With this object in view, in a rapier used in the device for inserting weft thread into the loom warp shed, which rapier is made as a tube connected to an arrangement generating therein a suction flow to take up the end of the weft thread located in the shed, said arrangement, according to the invention, consists of a jet pump formed by a sleeve serving for the passage of air sucked from the shed, and a bushing located behind such sleeve in the direction of movement of this air and partially embracing the sleeve so as to form an annular slit, which is adjoined by a pipe from a source of compressed air, the latter building up a vacuum inside the sleeve while passing through said slit, in order to such air from the shed and eject it through the bushing into the atmosphere. Such a design makes possible the delivering to the rapier of clean air from the source of pressure, excluding a filter from the design, and generally simplifying the pneumatic system, with air pressure being used both to project the weft thread into the warp shed, and to take it up.

Advantageously, the inside wall of the bushing in the place where it embraces the sleeve, should be shaped as a constricter with a curved surface, which at its exit passes into a diffuser. This significantly raises the efficiency of ejection with the same supplied pressure, and respectively increases the intensity of the suction flow in the rapier, which affects the accuracy of the weft thread insertion into the warp shed.

For a better understanding of the invention, given below is a particular exemplary embodiment thereof with references to the appended drawings, wherein:

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 illustrates schematically the rapier according to the invention;

FIG. 2 illustrates in section the jet pump used in the rapier shown in FIG. 1;

FIG. 3 illustrates in section another version of the jet pump; and

FIG. 4 illustrates schematically the rapier with an additional tube.

DETAILED DESCRIPTION OF THE DRAWINGS

The rapier comprises a tube 1 (FIG. 1), one end of which is connected to an arrangement 2 that creates in this tube a constant flow for receiving and gripping the end of a weft thread 3 from the supply rapier (not shown) in the middle of the shed formed by warp threads 4.

Tube 1 reciprocates from a drive in the direction of arrow A, such drive consisting of a system of hollow levers 5 and 6, of which lever 5 is connected at one end thereof to arrangement 2 through pipe 7, and lever 6 communicates at one end with the free end of lever 5, and at its other end is mounted on a rotating hollow shaft 8.

Compressed air is fed into arrangement 2 from a source (not shown) along hose 9 with nipple 10 joining the free end of the hollow shaft 8 (compressed air movement is shown by arrow B).

Arrangement 2 consists of a jet pump formed by a sleeve 11 (FIG. 2) serving for the passage of air sucked from the shed, and a bushing 12 disposed behind sleeve 11 in the direction of movement of the sucked air (air movement from the shed is shown by arrow C). Bushing 12 has on one side thereof a tapered expansion portion or shoulder 13 and partially embraces therewith sleeve 11, so as to form an annular slit 14 adjoined by pipe 7 for the passage of compressed air fed from the pressure source. As a consequence, a vacuum is built up in sleeve 11, owing to which air from the shed is sucked and ejected through bushing 12 into the atmosphere. This completely rules out clogging of the air ducts.

Shown in FIG. 3 is another version of the jet pump. In this case the inside wall of bushing 12 in the place where it embraces sleeve 11, is shaped as a constrictor, which at its exit merges into a diffuser. The constrictor walls are smoothly curved, while the diffuser walls follow a tangent to this curve. Such a design raises the operating efficiency of the jet pump, thus increasing the intensity of the suction flow in the rapier and securing accurate insertion of the weft thread into the warp shed.

To organize the air flow sucked from the shed, mounted inside tube 1 in its front part (i.e., upstream from the jet pump) is an additional tube 15 (FIG. 4), the length of which is determined by the length of the end of the sucked weft thread 3, and which constructionally may extend the entire length of tube 1, merging with sleeve 11.

To insert the weft thread 3 into the warp shed, tube 1 is brought into reciprocatory movement from the rotating shaft 8 through the system of hollow levers 5 and 6. At the same time clean compressed air is fed through hose 9, nipple 10, hollow shaft 8, and hollow levers 5 and 6, to pipe 7. The compressed air passes at a great velocity through the annular slit 14, thus generating a vacuum in sleeve 11. The vacuum in the sleeve spreads all along tube 1, which produces a suction flow in its end projecting into the warp shed. The end of the delivered weft thread 3 is sucked into the tube and laid in the shed to be then beaten by a reed (not shown). The air filled with fibers and dust sucked from the warp shed passes through tube 1, sleeve 11, and bushing 12, and is ejected into the atmosphere without clogging the air ducts.

In the second version of the jet pump, the air fed to pipe 7 also passes through the annular slit 14 formed by the constrictor of bushing 12, and sleeve 11. Due to the smooth shape of the constrictor walls, and the use of the diffuser, there is provided a greater ejection effect, thus with the same pressure of the supplied compressed air securing stronger suction flow in tube 1. When inside tube 1 there is mounted an additional tube 15, the weft thread 3 is sucked into this tube, and thus a more organized airflow is formed in tube 14, which causes a stronger tension of the weft thread 3 during its laying.

It should be pointed out that the air stream functions at all times of loom operation and the weft end is picked up by the rapier tube in the shed at weft insertion.

We claim:

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1. A rapier in a device for inserting a weft thread into a shed
formed by warp threads, comprising: a tube reciprocating
from a drive; a sleeve located at one end of said tube and serv-
ing for the passage of air sucked in by said tube from the shed
formed by warp threads; a bushing located behind said sleeve 5
in the direction of air movement therealong, and partially em-
bracing said sleeve, so as to form an annular slit for passage of
compressed air supplied from a pressure source; a pipe adjoin-
ing the side of said sleeve in the place where the annular slit is
formed, and serving to guide compressed air into said slit, this 10

air passing through the annular slit and thus building up a
vacuum inside said sleeve, whereby air from the shed is sucked
in by said tube and ejected through said bushing into the at-
mosphere, and the end of the weft thread located in the shed is
sucked into said tube.
2. The rapier as claimed in claim 1, wherein the inner wall
of the bushing in the place where it embraces the sleeve, is
shaped as a curved constrictor, which at its exit merges into a
diffuser.

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