March 24, 1970 H. P. VAN MULLEKOM 3,502,253

DEVICE FOR TEMPORARILY STORING A LENGTH OF A THREAD

Filed Jan. 10, 1968 2 Sheets-Sheet 1

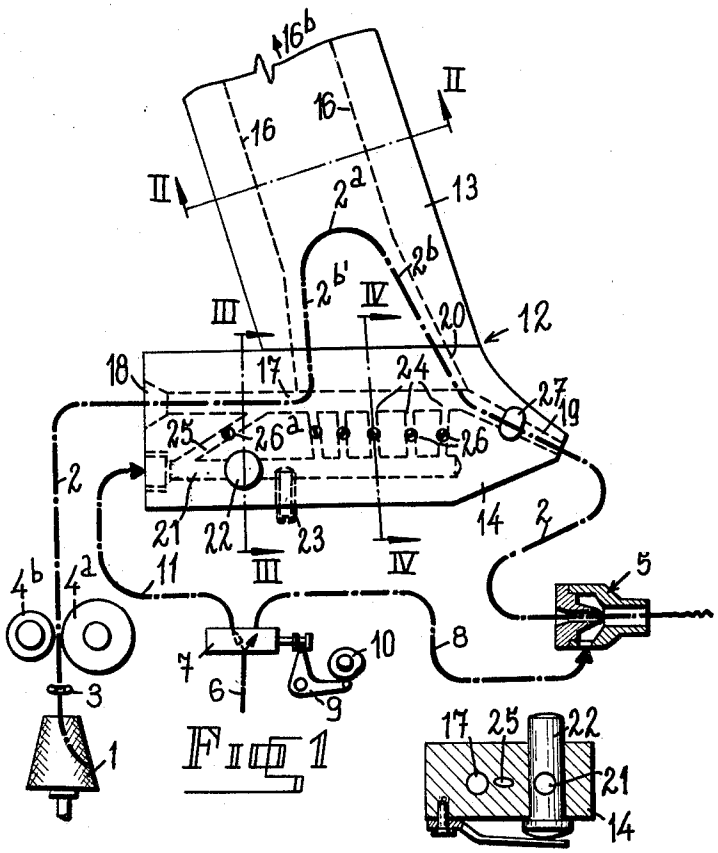

FIG 1

FIG 3

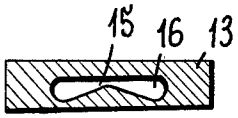

FIG 2

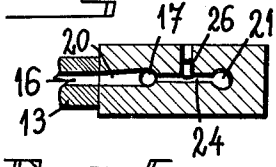

FIG 4

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DEVICE FOR TEMPORARILY STORING A LENGTH OF A THREAD

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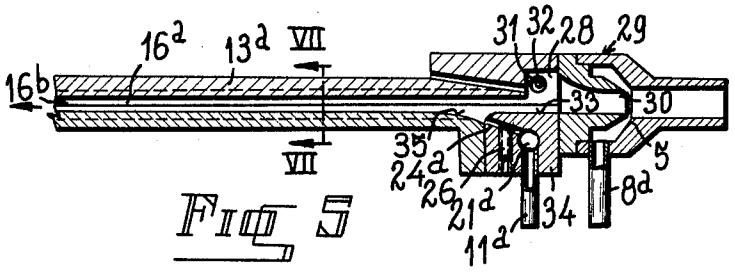

Fig 5

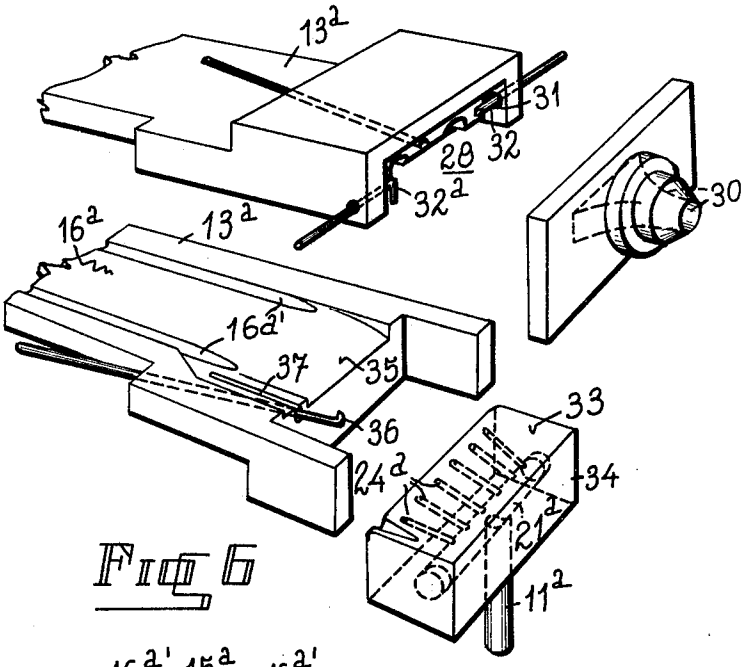

Fig 6

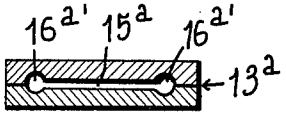

Fig 7

United States Patent Office 3,502,253
Patented Mar. 24, 1970

3,502,253

DEVICE FOR TEMPORARILY STORING A LENGTH OF A THREAD

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Filed Jan. 10, 1968, Ser. No. 696,765
Claims priority, application Netherlands, Jan. 18, 1967, 6700828
Int. Cl. B65h 59/10
U.S. Cl. 226—97 6 Claims

ABSTRACT OF THE DISCLOSURE

The device comprises a relatively wide, thin channel for receiving a length of the thread in the form of an elongated loop, the lateral side walls of the channel being substantially parallel. One or more jet nozzles are arranged adjacent to one end of the channel and extend across substantially the entire width of the channel from one lateral side wall of the channel to the other. The nozzle or nozzles are so directed as to discharge fluid into the channel in a flow which is generally longitudinal and laterally symmetrical with respect to the channel, and which extends across the entire width of the channel so as to draw the elongated loop of thread into the channel while maintaining the two legs of the loop close to the two opposite lateral side walls of the channel in order to prevent the thread from tangling in the channel.

BACKGROUND OF THE INVENTION

The invention relates to a device for temporarily storing a length of a thread, which device possesses a channel shaped space for taking up a length of a thread and a jet assembly for a fluid, which assembly is adapted in such a manner that the jet, leaving a jet nozzle of the assembly flows through the channel shaped space as known per se.

In the known device the channel shaped space is connected to a suction device and the thread can be conveyed through the channel shaped space by an air stream, caused by the suction action of the suction device. The nozzle for porducing a jet of the fluid has an additional function to force the thread quickly into the channel shaped space. The temporary storing of a length of the thread by means of suction action has the drawback, that the thread cannot be inserted quickly enough into the channel shaped space or that a very great suction capacity is required in order to obtain a quick insertion of the thread into the channel.

SUMMARY OF THE INVENTION

The object of the invention is to improve such a device in order to attain a quick storing of a length of a thread in the channel shaped space without using much energy for the conveying medium, such as air.

According to the invention this is attained in that one or more jet nozzles are positioned in such a manner with respect to the cross section of the channel shaped space, that the conveying medium leaving the jet nozzles will cover the entire cross section of the channel shaped space and will convey the thread through the channel, so that the thread will be quickly inserted into the channel shaped space by the jets leaving the nozzles.

It will be evident, that when a narrow channel shaped space is used, less jet nozzles can be provided than in the case when a wide channel shaped space is used, in order to obtain a quick movement of the thread within the channel shaped space. A narrow channel shaped space is to be preferred, as in textile machinery not much room

is available between two thread guides, between which a thread is to be guided. On the other hand a narrow channel shaped space can lead to difficulties, when the length of a thread is to be stored in the shape of a loop and the legs of the loop can easily touch each other, resulting in an entanglement of the thread. When the thread in the shape of a loop is touched by a strong jet the possibility of entanglement of the thread will increase as the legs of the loop in the thread will be forced toward each other by the strong air jet. In the case when a narrow channel shaped space, having a relatively great length is used, it is to be preferred to adapt the device according to the invention in such a manner, that one or more jet nozzles are so situated that an air stream is created within the channel shaped space, which stream of air has a higher velocity at the opposite walls of the channel shaped space than in the central part of this channel shaped space. With regard to the height of the channel shaped space, it need only be slightly larger than the thickness of the thread, whereas the width of this channel shaped space must be sufficient to prevent contacting of the legs of the loop shaped thread to be inserted into the channel shaped space. The length of the channel shaped space is adapted to the length of the loop in the thread, which is to be temporarily stored.

According to the invention it is possible, that one or more jet nozzles for the conveying medium may be arranged over the entire width of the channel shaped space in front of the mouth of same. Such an arrangement is to be preferred, when the device according to the invention is to be used for taking up an excess in the length of a thread which runs between two points. In such a case the thread is guided between the mouth of the channel shaped space and the jet nozzles for the fluid. According to the invention it is also possible, that one or more jet nozzles for the conveying medium may be provided in a lateral wall of the channel shaped space, whereas the jet nozzles are directed longitudinally of the channel shaped space. Such an arrangement is very suitable when the channel shaped space forms a part of a device for weft inserting in a jet operating loom. In channel shaped spaces, having a relatively large porportion between the length and width, it is advantageous that the flow of the conveying medium through the chanel be regulated in such a manner, that the legs of the loop of the thread tend not to move toward each other but to move away from each other. When only one jet nozzle is provided it is advisable, that the opening of the jet nozzle have the shape of a small slot, in which the width varies longitudinally of the slot. When, however, more than one jet nozzle has been provided, it is advisable that a number of the jet nozzles have differently restricted passages so as to discharge different volumes of air into the channel shaped space.

It is advisable that the jet nozzles be positioned in such a manner, that the jets diverge longitudinally of the channel shaped space.

A practical embodiment according to the invention is attained in that the jet nozzles are provided with a restriction valve for regulating the jets, leaving the nozzles.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 shows a diagram of a track of the thread in a textile machine, in which a thread is drawn from a thread package and in which diagram a device for temporarily storing a part of a thread according to the invention is arranged, showing the main parts of this device;

FIG. 2 shows a cross section along the line II—II in FIG. 1 of the channel shaped space of the device according to the invention;

FIG. 3 shows the entrance for the thread and the jet

medium in the device according to the invention in cross section along the line III—III in FIG. 1;

FIG. 4 shows a cross section along the line IV—IV in FIG. 1 at the place of a jet nozzle;

FIG. 5 is a cross section of a modified construction of the device according to the invention, in which this device is adapted to launch a thread, which cross section has been taken longitudinally of the channel shaped space;

FIG. 6 is a perspective view of the parts shown in FIG. 5, however, in an exploded position; and

FIG. 7 is a cross section along the line VII—VII in FIG. 5 from which the shape of the cross section of the channel shaped space appears.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to FIG. 1 a track of a thread in a textile machine is diagrammatically shown and the thread is conveyed by jet action of a fluid. Such an arrangement is applied in looms in which weft insertion is performed by jet action of a fluid. A thread **2** is drawn through a thread guide **3** from a thread package **1** by means of two rollers **4***a* and **4***b*. The rollers **4***a* and **4***b* rotate with a constant velocity and they are e.g. connected to a rotating shaft of the textile machine, on which the device according to the invention is mounted. By means of a jet nozzle **5**, which e.g. operates by air under pressure the thread **2** is further conveyed. A control valve **7** is situated in a supply line **6** for a fluid e.g. air under pressure. The line **8** for the fluid is arranged between the control valve **7** and the jet nozzle **5**. By means of a lever **9**, which is controlled by a cam **10**, rotating synchronously with a shaft of the textile machine, the control valve **7** can be operated in such a manner that the fluid from the supply line **6** either flows through the line **8** or the line **11**. The line **11** is connected to the device for temporarily storing a length of thread, which device has been generally indicated by the reference numeral **12** in FIG. 1.

The device **12** consists in a holder **13** or shaft for a loop of a thread, which holder is provided with an internal channel shaped space, which is connected at one end to a head **14**. The opposite end of the space is open to the surrounding air. The open end is indicated by the reference numeral **16***b*.

The channel shaped space is indicated by a dash line **16** in FIG. 1. The cross section of this channel shaped space **16** is relatively flat as appears from FIG. 2. Preferably the central part **15** of the channel shaped space **16** is less in size than the cross section at the sides of the channel shaped space. The thread is to be inserted in the shape of a loop **2***a* into the space **16** on the side of the head **14**. The head **14** is provided with a channel **17** for the thread. This channel has an entrance **18** and an outlet **19**. In front of the space **16** the channel **17** debouches in a flat slot **20**, whose shape is adapted to the shape of the space **16**. The slot **20** thus can be considered as a part of the channel shaped space **16**.

Further a channel **21** is provided in the head **14** and the line **11** for the fluid has been connected to this channel **21**. A hand operable valve **22** and a restriction valve **23** have been situated in the channel **21**. The valve **22** remains in a position in which the channel **21** is uninterrupted under normal conditions as shown in the cross section of FIG. 3. Further the channel **21** is provided with jet nozzles in the shape of narrow channels **24**, which debouch into the channel **17** in front of the slot **20** and in front of the channel shaped space **16**. The jet nozzles in the shape of the channels **24** are not only shown in FIG. 1 but also in the cross section of FIG. 4.

The channel **21** is provided with a branch **25** upstream of the valve **22**, which branch debouches also into the channel **17**.

The channels **24** adapted as jet nozzles are each provided with a restriction valve in the shape of a screw **26** to regulate the flow of the medium through the channels **24** for a purpose, which will be described later. Preferably the branch **25** is also provided with a restriction valve in the shape of a screw **26***a*. A thread clamp **27** is provided in the outlet part **19** of the channel **17**, which thread clamp can hold the thread in the channel **17**. The purpose of the thread clamp **27** will be described later.

The operation of the device as shown in FIG. 1 proceeds as follows:

Starting from a position in which the control valve **7** connects the line **6** with the line **11**, the leading end of the thread **2**, supplied by the rollers **4***a* and **4***b*, is held at the entrance **18** of the channel **17**. The valve **22** will be pressed down by hand, owing to which the passage of the channel **21** is interrupted. The conveying medium, such as air under pressure will flow only through the branch **25** into the channel **17**, owing to which an injector action is created and the thread will be sucked into the entrance **18** and will be conveyed through the channel **17** to the outlet **19**. The thread can pass the thread clamp **27**, which at this operation is in an open position. Further the thread **2** is inserted into the launching device **5** in the shape of a jet nozzle. Now it is necessary to close the thread clamp **27**, because after the valve **22** is released the channel **21** will be uninterrupted again and the conveying medium can flow through the channels or jet nozzles **24**.

The air jets, leaving the nozzles **24**, force the thread through the slot **20** into the channel shaped space **16**, which thread will take the shape of a loop **2***a*. When the rollers **4***a* and **4***b* continue to supply thread, the loop **2***a* of the thread becomes longer and moves further into the channel shaped space **16**. When now the control valve **7** is switched over in such a manner that the conveying medium from the supply line **6** flows through the line **8** to the jet nozzle **5**, the thread will be drawn out of the outlet **19** and the channel **17**. During the operation of switching over the control valve **7** by means of the lever **9**, the clamping action of the thread clamp **27** is also released. The construction of the thread clamp **27** and its control members need not be described, because such thread clamps are known per se and of common use in textile machinery. When the clamping action of the thread clamp **27** on the thread is released the loop **2***a* of the thread will be entirely drawn out of the channel shaped space **16** by the action of the jet nozzle **5** until the thread is tensioned in the channel **17**. It is evident, that with a correct timing in controlling the valve **7** and the thread clamp **27** with respect to the supplying speed of the thread by the rollers **4***a* and **4***b* an exact measuring of a length in the shape of a loop **2***a* of the thread can be obtained. This is very important when the launching device or jet nozzle **5** is adapted to insert a measured length of a weft into the shed, when the device is used in a loom, provided with a jet operating weft inserting device.

The operation and driving of the rollers **4***a* and **4***b*, of the control valve **7** and the thread clamp **27**, further the operation of the launching device or jet nozzle **5** need not be described because they have been mentioned only in order to describe the operation of the device **12** for temporarily storing a length of a therad, which is the subject matter of the invention. Other means for conveying a thread, as used in textile machinery in general could be mentioned also for this purpose.

The jet nozzles **24** are not parallel, but diverge in the direction of the jets, as appears from FIG. 1. This arrangement is desired, because the legs **2***b* and **2***b'* of the loop **2***a* may not come in touch with each other when the loop **2***a* extends far in the channel shaped space **16**. The quantity of supplied air, flowing out of the different jet nozzles **24** differs also in order to obtain different air jets for the same purpose, that is to say to keep the legs **2***b* and **2***b'* of the loop **2***a* apart from each other. In general, the quantity of conveying air leaving the centrally positioned jet nozzles **24** is less than the quantity of air, leaving the jet nozzles at the sides of the channel shaped space **16**. The

quantity of air, leaving the nozzles **24**, can be empirically adjusted. Although the provision of separate jet nozzles **24** is to be preferred, one single jet nozzle in the shape of a narrow slot can be provided also. The shape of the slot, however, is to be adapted in order to obtain the desired pattern in the sectors of velocity within the air jet, leaving the slot shaped jet nozzle.

It is not strictly necessary that the jet nozzles **24** be positioned in front of the mouth of the channel shaped space **16**. The jet nozzles can be positioned also in a side wall of the channel shaped space and an embodiment of such a construction is shown in FIG. 5. The part **13***a* is provided with the channel shaped space **16***a*, which is open at the end **16***b*. Eventually a filter (not shown) may be positioned at the open end of the channel shaped space **16***a* for the purpose of collecting dust. The mouth of the channel shaped space **16***a* is connected to a chamber **28** for presenting a thread.

The part **13***a*, having the channel shaped space **16***a*, is connected to a device for launching a thread, which device is generally indicated by the reference numeral **29**. The chamber **28** is connected to a hopper shaped channel **30** of the launching device, which is provided with a jet nozzle **5** for a jet medium, which is supplied through the line **8***a*. The thread in the shape of a loop is presented through the opening **31** by means of a presenting needle **32** and further the thread is brought in front of the mouth of the channel shaped space **16***a* by means of a hook **32***a*. In which manner the thread in the shape of a loop is brought in front of the channel shaped space **16***a* will not be described, because the presenting of the thread is not a part of the invention and this embodiment has the only purpose to show in which manner the jet nozzles can be situated in a side wall of the channel shaped space **16***a*.

A part of the wall of the channel shaped space **16***a* is constituted by the upper surface **33** of a block **34**. This block is provided with a channel **21***a* for the conveying medium, which is supplied through a line **11***a*. The channel **21***a* is provided with a number of channels **24***a*, which debouch into the side wall of the block near its upper surface **33**. The channels **24***a* are provided wtih restriction valves in the shape of a screw **26** in the same manner as is provided in the embodiment according to FIG. 1 for the purpose of regulating the flow of air jets, leaving the channels **24***a*. The wall of the channel shaped space is inclined in front of the channels **24***a*, as indicated by the reference numeral **35** in FIGS. 5 and 6. As the chamber **28** for presenting a loop of the thread has been situated at a distance from the mouth of the jet nozzles or channels **24***a* a hook **36** is provided in order to bring the loop of the thread of the chamber **28** in front of the jet nozzles **24***a*. The stem of the hook is inclined with respect to the wall of the channel shaped space **16***a* and the hook **36** disappears in a narrow slot **37** during its movement, owing to which the thread comes free from the hook. When the hook after retraction disappears in its slot **37**, it forms no obstruction in the channel shaped space **16***a*. The hook **36** is driven by a mechanism, which also controls the presenting needle **32** and the hook **32***a*.

In the embodiment as shown in FIGS. 5 and 6 the channel shaped space **16***a* is provided with a reduced central part **15***a*, having its opposite walls parallel to each other, and widened side parts **16***a'* as shown in the cross section of FIG. 7.

The widened parts are also shown in FIG. 6.

The channels **24***a* diverge in the direction of flow of the jets for the same purpose as has been described with reference to FIG. 1.

What is claimed is:

1. A device for temporarily storing a length of a thread, comprising a relatively wide, thin channel for receiving a length of the thread in the form of an elongated loop, the lateral side walls of the channel being substantially parallel, wherein the improvement comprises a jet assembly for discharging a fluid, having one or more jet nozzles which are arranged adjacent to one end of the channel and extend across substantially the entire width of the channel from one lateral side wall of the channel to the other, and which are so directed as to discharge fluid into the channel in a flow which is generally longitudinal and laterally symmetrical with respect to the channel and which extends across the entire width of the channel so as to draw the elongated loop of thread into the channel while maintaining the two legs of the loop close to the two opposite lateral side walls of the channel in order to prevent the thread from tangling in the channel.

2. A device according to claim **1**, characterized in that one or more jet nozzles are adapted in such a manner, than an air stream is created within the channel, which stream of air has a higher velocity at the opposite side walls of the channel than in the central part of this channel.

3. A device according to claim **2** wherein a plurality of jet nozzles are provided which are restricted in different degrees so that the volume of air discharged varies from one jet nozzle to another.

4. A device according to claim **3** wherein each jet nozzle is provided with a restriction valve.

5. A device according to claim **1**, wherein one or more jet nozzles are provided in a laterally extending wall of the channel, adjacent to one end of the channel, and are directed generally longitudinally with respect to the channel, so as to discharge fluid through the channel.

6. A device according to claim **1** wherein a plurality of jet nozzles are provided which are so directed as to produce jets which diverge slightly from one another.

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ALLEN N. KNOWLES, Primary Examiner

U.S. Cl. X.R.

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