May 10, 1966 W. SCHEFFEL 3,250,299

LOOM WITH PNEUMATIC PICKING MEANS

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Fig. 1

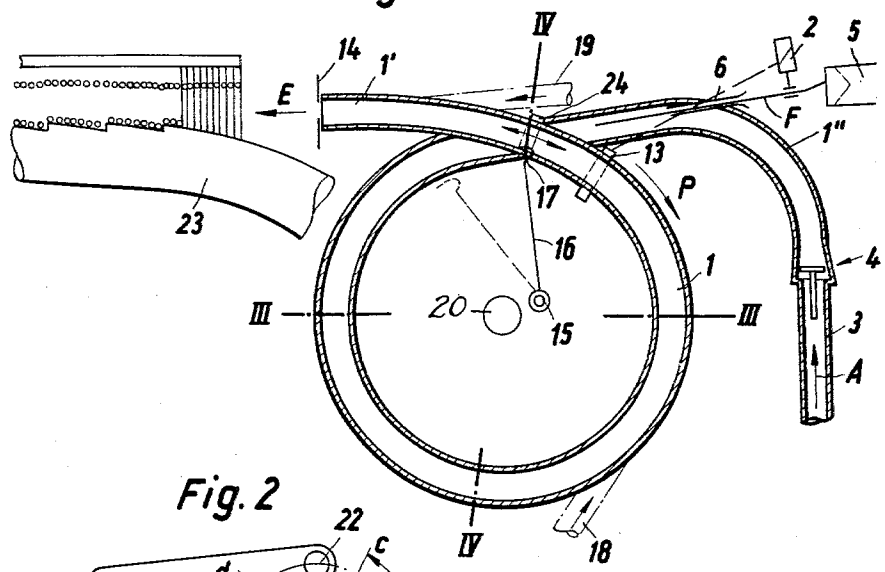


Fig. 2

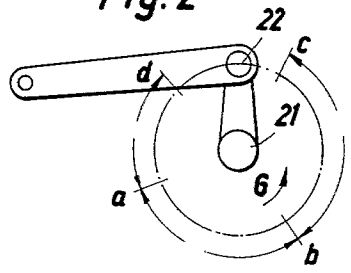


Fig. 3

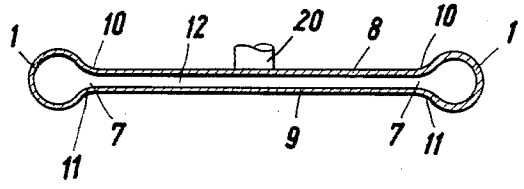
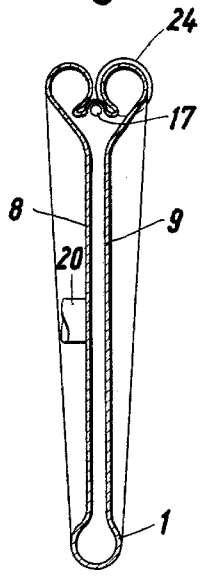


Fig. 4



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LOOM WITH PNEUMATIC PICKING MEANS

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Fig. 5A

I - I

II - II

Fig. 5B

Fig. 5

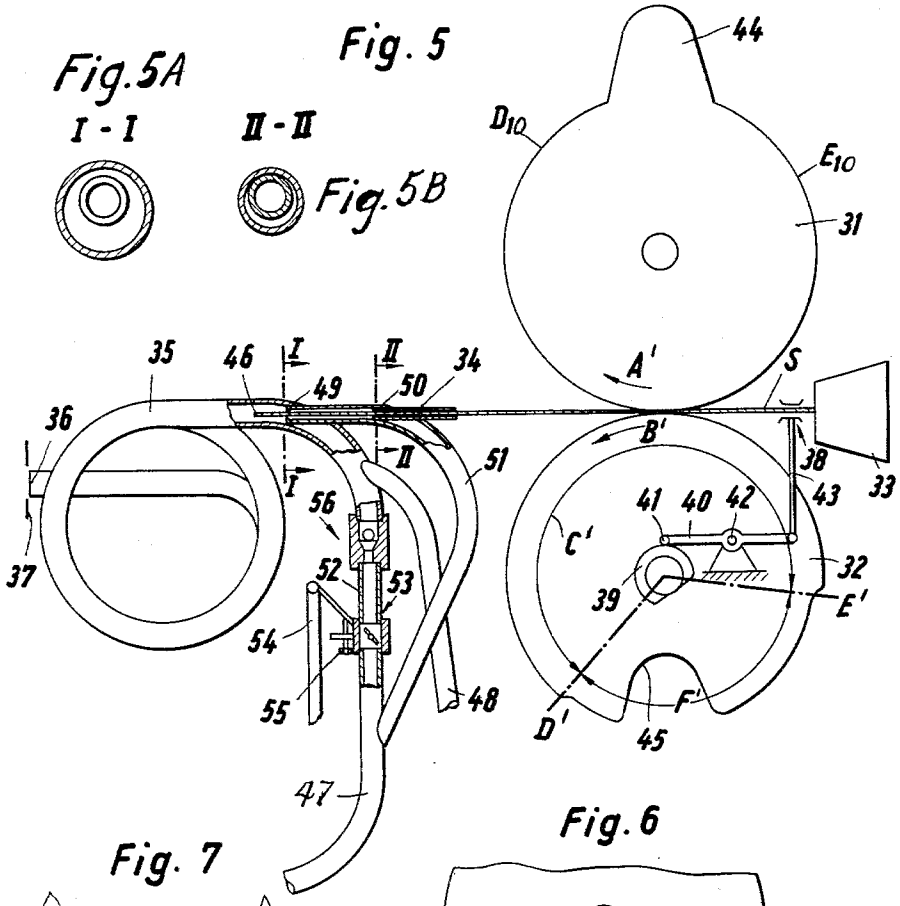


Fig. 6

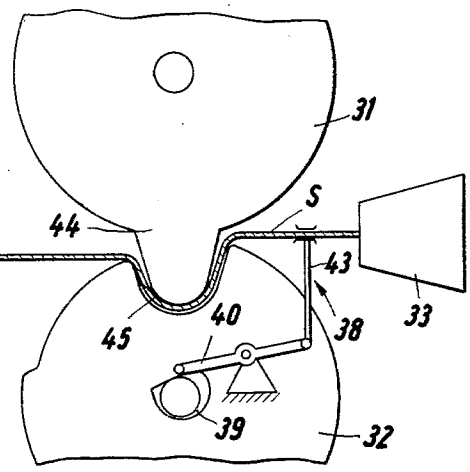
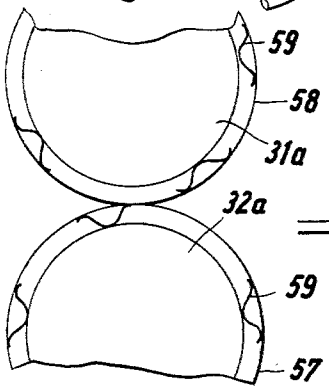


Fig. 7



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LOOM WITH PNEUMATIC PICKING MEANS

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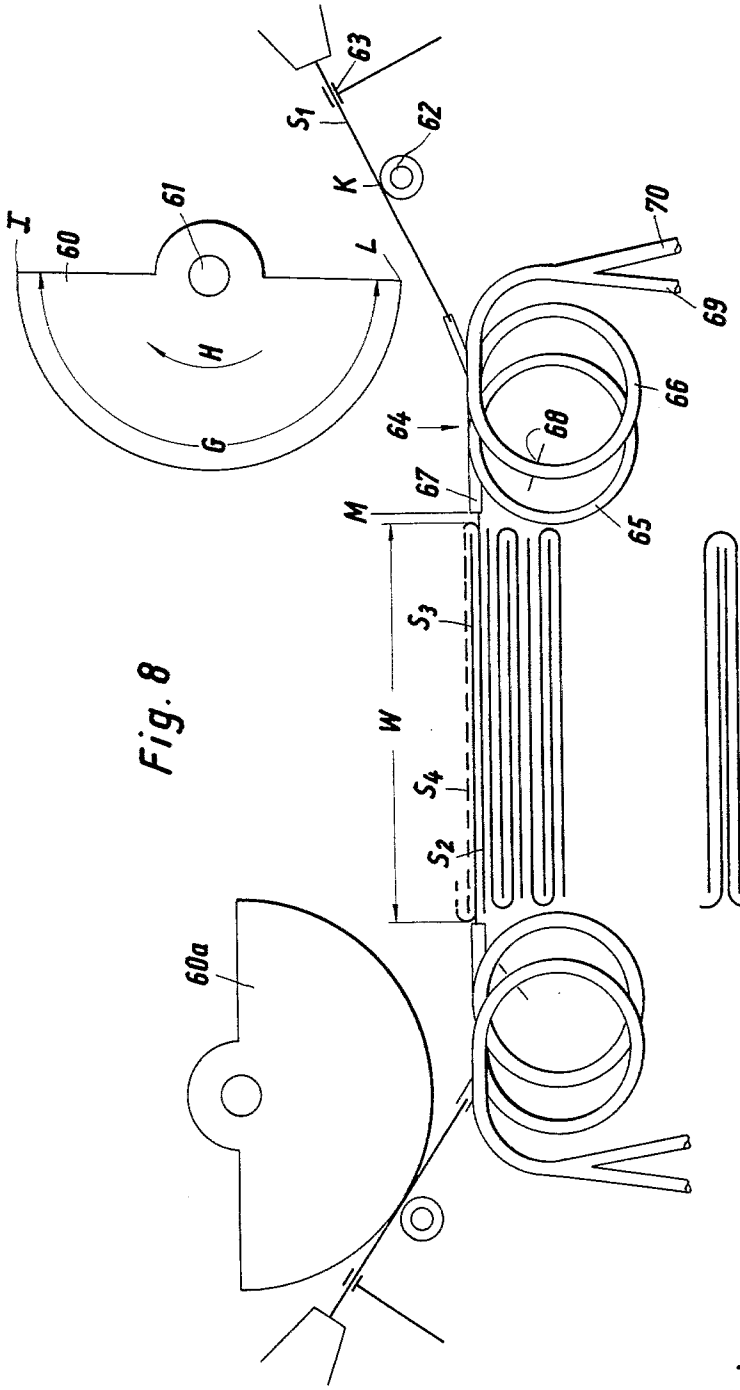

Fig. 8

Fig. 9

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LOOM WITH PNEUMATIC PICKING MEANS

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Fig. 10

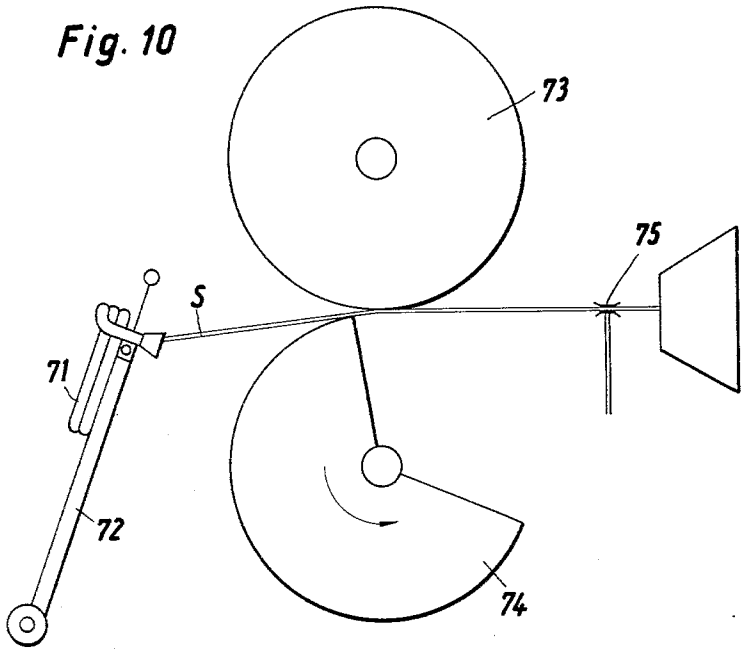
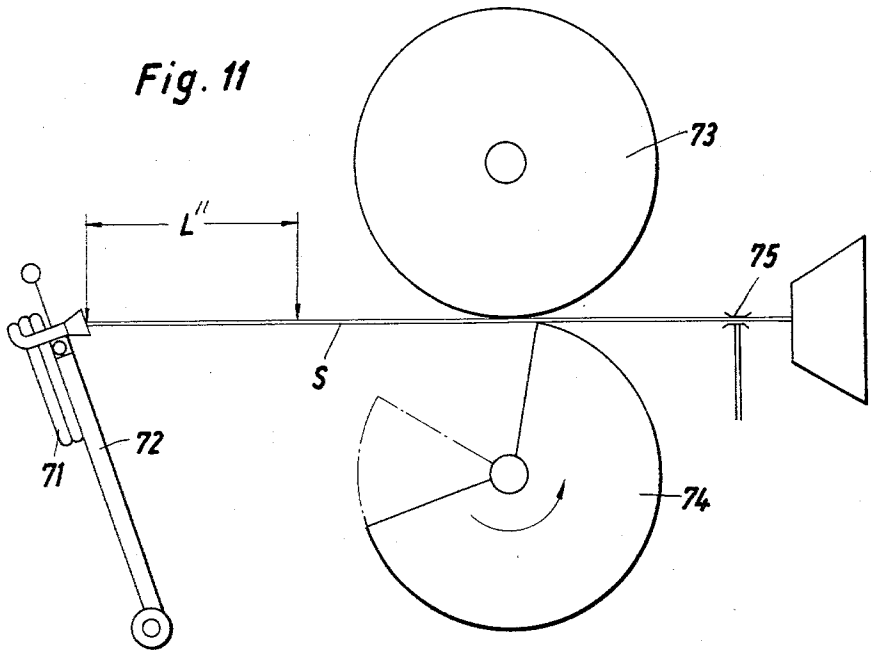


Fig. 11



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3,250,299

LOOM WITH PNEUMATIC PICKING MEANS

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15 Claims. (Cl. 139—127)

This invention relates to a loom with pneumatic picking.

The invention has as its main object to accelerate pneumatic picking of weft threads on appropriate looms. To this end, the invention uses a device which pre-accelerates the weft thread as it brings it to that edge of the fabric from which the weft is picked.

Heretofore, the weft had to be accelerated from a stationary state at the moment of picking in order to reach its picking speed. The invention, however, enables the weft thread to have practically the full picking speed, or at least a substantial proportion of such speed, at the beginning of picking. The weft thread is already being picked, when the picking impulse is transmitted. Consequently, at that time, it does not first have to be accelerated from rest. This has the advantage that picking is much more rapid than was previously the case.

In a preferred embodiment, the accelerator device comprises an annular tube through which compressed air flows and which is formed with a continuous slot towards the area enclosed by the ring, and which co-operates with a weft thread brake before the entry point. The compressed air, continuously flowing in the crossed annular tube, engages the weft thread at the entry point and blows it through the tube, so that on the one hand it is drawn off the feed bobbin and on the other hand reaches the tube exit. Steps are taken to ensure that the picking of the weft thread can begin when the free end of the weft thread is situated at the exit from the annular tube. A control system ensures that the thread brake is closed as soon as the free weft thread end is at the annular tube exit. The compressed air which continues to flow in the annular tube has the effect that the weft thread in motion flies through the tube exit, the loop formed by the weft thread inside the crossed annular tube being pulled open. This is possible because the tube is slotted over its entire length.

As soon as the weft thread has been picked, a thread cutter is actuated to cut the picked portion of the weft thread from the remainder thereof at the edge. The weft thread portion situated in the exit section of the tube is returned to the entry section by a thread returner specially provided for the purpose inside the duct formed by the end plates. When the brake is re-opened, a weft thread portion of a specific length is again drawn off from the feed bobbin and paid out inside the annular tube.

After the weft thread has been cut and the required length has been measured off, the weft thread can be returned by a unit comprising two rotating roller elements, the surfaces of which contact one another and between which surfaces the weft thread extends from the feed bobbin to the slotted tube, at least one of the roller elements governing the length of the weft thread to be drawn off, while a thread brake is provided, which is controlled in dependence on the peripheral travel of said roller element and which is opened at the beginning of the weft thread storage process and closed at the end thereof.

By the use of such a device, practically the entire interval between two weft thread picking operations can be utilised for drawing off and measuring a length of weft thread. During the drawing off process, the weft

thread is paid out inside the slotted tube as a result of the continuous injection of compressed air into the latter. After the required length of weft thread has been measured and stored in the slotted tube, the brake is closed. The machine operation is so adapted to this procedure that a new shed has been formed with the closing of the thread brake. Consequently, the beginning of the weft thread which immediately after the closure of the thread brake leaves the slotted tube with pre-acceleration, can enter the shed. As soon as it has passed through the latter, the picked portion of the weft thread is separated from the remainder of the weft thread by appropriate actuation of the thread cutter.

A photoelectric cell system may be used to control the thread brake. It is very advantageous, however, to use a control cam rotating synchronously with the roller element governing the length of the weft thread, and a follower which co-operates with the cam and acts on the thread brake. A lever transmission may also be provided between the follower and the brake and actuate the latter directly.

To ensure that a weft thread portion of a specific length is drawn off and measured, it is advisable for the surface of at least one of the roller elements to be adapted to yield with respect to the other roller element at the place where the thread draw-off is to terminate, by an amount at least such as to prevent any entrainment of thread, and for this yielding to be operative as far as the place where the thread draw-off is to begin. Thus the arc at which the roller elements are in contact is of a length equal to the length of the thread portion to be drawn off.

After a weft thread has been picked and has been cut off at the slotted tube exit end, the cut weft thread must return from the exit to the entry end of the slotted tube to ensure storage of the next weft thread portion in the said tube. To this end, an externally projecting cam is provided on the surface of one roller element and a recess exactly fitting the cam is provided on the other roller element over that roller element arc which is situated between the contact arcs. The weft thread portion left in the slotted tube after the picking of a weft thread and after its cutting at the slotted tube with the thread brake closed is thus withdrawn to a certain extent. The cam is so constructed that on the withdrawal of the weft thread its cutting zone returns from the slotted tube exit end to the entry end.

If the measuring and accelerator device is modified slightly, it can be used at each edge of the fabric so as to form a fixed weaving edge. To this end, it is advantageous for the storage tubes to be of a length such that a weft thread equal to twice the weaving width can be accommodated therein. It is advantageous so to construct the actual measuring element that it draws from the feed bobbin portions of thread equal to twice the weaving width. To this end, it is advantageous for the roller element which governs the length of the weft thread for drawing off to be constructed as a semi-circular disc which is disposed opposite a pressure roller, the length of the half arc coinciding with the length of the thread portion to be drawn off. The slots in the storage tube in this case are of a length such that their length coincide with the actual weaving width, said lengths beginning after the non-slotted part of the tube and extending to the weft thread exit end.

With such a system, weft thread portions of twice the weaving width are paid out in a storage tube during the measuring process. If the thread brake belonging to the storage tube is then closed, the thread portions stored in the slotted tube part is stretched and picked. After the weft thread has been beaten up and another shed formed, a weft thread is picked in the new shed from the other

side of the fabric in the same way. This new weft thread is then also beaten up, whereupon the weft thread of the length of the actual weaving width left in the storage tube at the initial picking side is cut off so that the compressed air entering the storage tube picks the cut weft thread portion in another new shed. The procedure is thereupon the same from the other side. The weft thread portion equal to the weaving width remaining in the storage tube after the picking of the first portion of the weft thread of double the weaving width stored in a storage tube is turned over through 180° at the edge during its picking, so that a fixed weaving edge is obtained at the edges. The picking sequence from the edges may of course be amended, for example by performing two picking operations consecutively from one edge of the fabric.

Further advantages and features are explained in the following description of the drawing which illustrates one example of embodiment of the invention and wherein:

FIG. 1 diagrammatically illustrates a weft thread accelerator.

FIG. 2 shows the timing of the drawing off and picking by means of the device shown in FIG. 1.

FIG. 3 is a section on the line III—III in FIG. 1.

FIG. 4 is a section on the line IV—IV in FIG. 1.

FIG. 5 shows another device according to the invention.

FIG. 5A is a section on the line I—I in FIG. 5.

FIG. 5B is a section on the line II—II in FIG. 5.

FIG. 6 shows the roller elements of the device according to FIG. 5 at the moment when the weft thread is withdrawn.

FIG. 7 is a detail of a roller element showing the yieldable construction of the roller element surface.

FIG. 8 shows the operation of a modified device according to the invention in a twofold arrangement to produce fixed edges at the fabric.

FIG. 9 shows the position of the weft thread for double weft thread picking from the edges.

FIG. 10 is a modified embodiment of the invention with the sley in the rear end position.

FIG. 11 illustrates the embodiment according to FIG. 10 with the sley moving forward.

In the exemplified embodiment according to FIGS. 1 to 4, the accelerator consists essentially of an annular tube **1** and a thread brake **2**. The tube **1** is connected to the compressed air pipe **3**, into which the air flows continuously in the direction of the arrow A. A valve **4** is provided between the compressed air supply pipe **3** and the annular tube **1**. The outer free end portion **1'** of tube **1** will be observed to cross the inner free end portion **1''** connected to compressed air supply pipe **3** so as to provide an intermediate looped portion of the tube.

From the feed bobbin **5**, the weft thread F passes through the brake **2** and enters the annular tube **1** at **6**. The beginning of the weft thread, which initially only enters the tube **1**, is engaged by the continuous flow of air and is paid out inside the annular tube to the exit point thereof at the outer end of free end portion **1'**. The tube **1** is slotted over the length of its turn or loop towards the area enclosed by said tube. The slot is denoted by reference **7**. The said enclosed area is covered by the end plates **8** and **9**. These plates are spaced and directly abut the edges **10** and **11** so as to form a duct **12** between the plates.

If the brake **2** is closed as soon as the tip of the weft thread reaches the exit point at the outer end of free end portion **1'**, the weft thread continues to move in the direction of the arrow E, the loop which it has formed inside the annular tube **1** being pulled open as it passes through the slots **7** and the duct **12**. When the loop has been pulled open the weft thread F extends directly from the beginning of the tube **1''** to the end **1'** thereof.

A photoelectric cell system **13** inclusive of the appropriate circuitry therefor is provided on the tube **1** to control the brake **2** in the example illustrated. Each portion of weft thread to be paid out passes through this system. The control is such that, when the weft thread arrives, the photoelectric cell system gives the order for closure of the brake **2**. During the interval from the control order until closure of the brake, the weft thread covers the distance from the photoelectric cell system **13** to the said exit point.

The photoelectric system **13** can be adjusted in and in opposition to the direction of the arrow P so that the length of the portion of weft thread to be picked can be exactly determined. Consequently, the accelerator can at the same time be used as a measuring device.

After a weft thread has been picked, the picked portion of thread is separated from the rest of the weft thread by the thread cutter **14**. The weft thread portion in the tube end portion **1'** is then pulled into the tube **1** by a thread returner. In the exemplified embodiment illustrated, the latter is constructed as a lever **16** mounted for pivoting at **15**. Its free end **17** engages the portion of weft thread and pulls it into the tube **1** on movement from the solid-line position shown in FIG. 1 into the broken-line position.

Other air supply pipes can be connected to the accelerator or measuring device for the transmission of an air pulse mainly at the moment of picking. Such additional air pipes are denoted by references **18**, **19** and **20**. They may be connected to the same compressed air source as the pipe **3**. In such a case, the pressure inside the accelerator will close the valve at the moment of picking so that all the air pressure available is then utilised solely for picking the weft thread.

In FIG. 2 reference **21** denotes the crankshaft from which the sley is moved by means of the pin **22**. It will be assumed that the crankshaft is rotating in the direction of the arrow G. As soon as it reaches the point *a* the brake **2** is opened. Consequently the weft thread F is drawn off the feed bobbin **5** and payed out inside the tube **1**. When the pin reaches *b*, the brake **2** is closed; the weft thread F has in the meantime reached the said exit point and is picked while the pin reaches *c*. While the pin **22** moves from *c* to *d*, the picked thread is beaten up and cut off. When the pin **22** reaches *d*, the thread returner **16** begins to withdraw the remainder of the thread from the tube end **1'**. The return operation is completed as soon as the pin **22** reaches *a*.

If desired, the end plates **8**, **9** may be dispensed with. In such a case, of course, additional air can be supplied only through the pipe **19**.

The tube **1** need not necessarily be annular but may be bent into any shape. The only important factor is that the bend should be in the form of a loop.

The returner could also have a different construction from that illustrated, for example it may be rotating. The thread end could also be returned from the tube end **1'** pneumatically by deflection of the stream of air from the tube **1''**.

In the example illustrated, the accelerator is used on a loom having elements which extend transversely to the warp threads and through which air is fed to the picking path, the air feed elements being provided outside the warp threads at the zone where the shed is formed, and which are constructed as tubes extending across the warp threads and having air exit elements disposed thereon and directed towards the picking path. The air exit elements may project from the tube in the form of sawteeth. A sawtooth tube of this kind is shown in FIG. 1, at **23**.

Although the description of the exemplified embodiment places the main emphasis on its operation as an accelerator, the device according to the invention is also intended particularly as a measuring device. To enable a required length of weft thread to be selected and determined, at least one limiting means **24** is provided to vary the length of the measuring slot **7**. The limiting means **24** is slidable, for example, and covers the slot **7** at the place to which it has been slid. The total length

of the free slot can thus be varied and finely adjusted even during operation. The movability of photoelectric cell system **13** is intended only for adjustment of its distance from the said exit point so that the beginning of the weft thread precisely reaches the exit point within the interval between the transmission of the pulse by the photoelectric cell system **13** until the actuation of the brake **2**.

In the embodiment shown in FIGS. 5 to 7, the weft thread S is drawn from the feed bobbin **33** by means of the roller elements **31, 32**. The thread enters the storage tube **35** via the inlet tube **34**, the thread cutter **37** being disposed after the exit point **36**.

The two roller elements **31, 32** shown in FIG. 5 are of discoid construction and contact one another over an arc corresponding to the length of the weft thread to be measured. As will be apparent from the drawing, the weft thread itself passes between the roller elements so that during the rotation of the latter the weft thread is entrained by the contact between said elements. The direction of rotation of the roller elements is shown by the arrows A′ and B′. In the embodiment illustrated, there is contact over an arc C′ between the discs **31, 32**, said arc extending from point D′ to E′ on disc **32**. The contact on disc **31** extends from **D10** to **E10**. The thread brake **38** precedes the roller elements **31, 32**. It is controlled by the cam disc **39** which rotates in synchronism with the disc **32**, for example by being rigidly connected thereto. The double lever **40** co-operates with the cam and at its free ends bears a roller **41** bearing against the control cam, said lever being fixed at **42** while its other end actuates the brake **38** directly via the rod **43**.

The roller element **32** has a smaller diameter over the arc F′ than over the arc C′. Consequently, when the disc **32** moves with its surface along the arc F′ in relation to the disc **31**, the weft thread is not transported. As soon as the cam **44** on the disc **31** enters the recess **45** the weft thread is withdrawn as will be seen in FIG. 6.

On rotation of the roller elements **31, 32** in the direction of the arrows A′ and B′, the brake **38** is opened by the cam **39** as soon as the points D′, **D10** contact one another. The weft thread S is consequently drawn from the feed bobbin **33** and paid out in the storage tube **35**. As soon as the discs **31, 32** have rolled on one another to such an extent that they contact one another at the points E′, **E10**, the beginning of the weft thread reaches the exit point **36**. At the next moment, the contact between the discs **31, 32** is over, since the disc **32** yields to a smaller diameter at the point E′. The cam **39** at the same time closes the thread brake. Consequently, the weft thread portion paid out in the storage tube **35** leaves the latter through the slot and its beginning **46** leaves the storage tube exit **36**. The thread is brought into a stretched position inside the storage tube from its looped position. The individual movements of the associated loom and of the measuring device and brake are so adapted to one another that, on the closure of the brake **38**, a new shed is ready opposite the exit **36**. Consequently, the weft thread leaving the storage tube enters this shed and, as soon as this has been done, it is separated from the rest of the weft thread by the cutter **37**.

After the contact at E′, **E10** has been discontinued, the discs **31, 32** continue to move in the direction of the arrows A′, B′, the weft thread not being transported and the brake **38** being closed. The cam **44** finally reaches the recess **45**, enters the latter and then leaves it. In these conditions, when the brake **38** is closed, the weft thread S is pushed into the recess **45** so that the weft thread end still remaining in the storage tube **35** is withdrawn from the exit tube **36** to the level **46**. On further rotation of the discs **31, 32** they will finally contact one another again at the point D′, **D10**, the brake **38** being simultaneously opened by the control cam **39** so that a weft thread portion of a length corresponding to the arc C′ is again drawn from the feed bobbin **33** and paid out in the storage tube **35**. The process then repeats itself.

The length of the arc over which contact takes place can be variable for adjustment of the length of thread to be measured off.

Air is supplied to the storage tube **35** via the blower pipe **47** and the pump pipe **48**. Blower air of a pressure of, for example, 0.06 atmosphere gauge continuously flows through the pipe **47**. In order that the weft thread to be stored may not leave the slot during storage and yet be subjected to sufficient suction, it is subjected to suction via two Venturi intake nozzles **49, 50**. The air reaching the nozzle **50** is fed via pipe **51** from pipe **47**, while the air reaching nozzle **49** is fed from pipe **47** via pipe **52**. The nozzles **49, 50** may be interchangeable to enable different suction effects to be exerted on the weft thread to be introduced into the storage tube **35**.

Pipe **52** also contains a rotary valve **53** which can be mechanically adjusted via lever **54** from a cam (not shown). The valve **53** is intended to meter the air coming from the blower to the quantity required for storage in the storage tube **35** during the storage of the weft thread in the latter. Valve **53** is provided with a fine adjustment screw **55** which limits the closing movement of the valve so that just as much air can pass through the valve as is necessary to store the weft thread. The flow cross-section of the valve is varied according to the weight and nature of the surface of the weft material used. After completion of the storage process, an air pulse originating from a pump (not shown) at a pressure of 2 atmospheres gauge, for example, is additionally fed via pipe **48** and the valve **53** is opened further at the same time. Consequently, the weft thread paid out in the storage tube is so accelerated that it leaves the latter via the slots, its loop being pulled open. Pipe **52** also contains a ball valve **56** to prevent the pressure building up in the storage tube **35** from having any effect on the lower blower pressure via the pipe **47**.

As will be seen from FIG. 7, the surface of the roller elements **31, 32** is of resilient construction at least over the zone where there is contact between the discs. To this end, for example, a thin sheet steel cylinder **57, 58** forming the outer surface may be applied to the solid roller elements **31***a* and **32***a* respectively, the cylinders being borne by springs **59** with respect to the cores **31***a* and **32***a*. As a result of the resilient construction of the roller surface, the discs **31, 32** contact one another not just at a point, but over a relatively long surface. This ensures that any weft thread passing between the discs **31, 32** is reliably engaged. Since the engagement surface is relatively large, even sensitive threads can be drawn off or measured by means of the roller elements **31, 32**.

To produce a fast edge on the fabric, a measuring and accelerator device is provided at each edge of the fabric, and may have the construction shown by way of example in FIG. 8. In this case the roller element **60** governing the length of the weft thread S is constructed as a semicircular disc, with a diameter such that the surface length over the arc G′ coincides with twice the weaving width W. The roller element is driven by a shaft **61** in the direction of the arrow H. Roller **62** co-operates therewith and comes into contact with it as soon as the edge I has moved to K. From that moment on the weft thread running through the brake **63** is transported to the storage tube **64**, whose length is such that it can accommodate a portion of thread equal to twice the weaving width W. The storage tube **64** has a slotted part **65** and a non-slotted part **66**. The slotted part begins at the exit end **67**. The length of the slot coincides with the actual weaving width W. The cutter **68** is provided at the storage tube entry. The device shown on the left-hand side of the drawing coincides completely with that on the right, as described above.

As soon as edge I reaches point K and brake **63** has opened, weft thread S1 is transported to the storage tube

64. Here it is paid out inside the tube by compressed air flowing through pipes 69 and 70, and as soon as edge L leaves point K, the beginning of the thread reaches the level M. At that moment, the brake 63 is closed. Consequently, the weft thread portion in the slotted part of the tube is compelled to leave the slot and enter the new shed. This state of affairs is shown in FIG. 8. The weft thread which has just been picked from the right-hand device has been given the reference S2. After picking of this weft thread, it is beaten up in known manner, whereupon a weft thread S3 is then inserted into the next shed from the left-hand side. As soon as this weft has been beaten up and a new shed has been formed, the portion of weft thread still remaining in the storage tube is cut off by the cutter 68. This portion is therefore engaged by the compressed air from the pipes 69, 70 and picked in the new shed as shown by the broken line S4. The procedure is similar from the left. As will be clear from the drawing, the second part of the weft thread portion of twice the weaving width is folded around the fabric at the edges so as to form a fast edge. The roller elements 60, 60*a* are so offset in respect of their angular positions that the weft thread picking is alternately from right and left. The arrangement of the angles of the roller elements 60, 60*a* with respect to one another and the control of the other parts may alternatively be such that two weft threads are picked consecutively from one side of the fabric as shown in FIG. 9.

The advantage of the measuring devices described is that the measuring operation begins at a time when the shed into which the weft is to be picked has not yet been formed. There is therefore relatively considerable time available for the measurement, because the thread is initially stored in the storage tube. The draw-off speed can thus be kept relatively low and this protects the material and enables waste yarns or other yarns having low tearing strength to be used. In the embodiment according to FIGS. 5 and 6, the measurement takes place during an interval greater than the interval required for 200° of a machine revolution. The interval available for an actual picking operation is below the time required for 90° machine revolution.

The relatively slow rotation of the roller elements means that there is much less risk of slip than with high-speed rollers. The use of a steel band to form the roller surface has the advantage that the smooth surface prevents any adhesion of the weft thread as it runs off the surface.

In the embodiment according to FIG. 8, the weft thread no longer has to be withdrawn.

In the embodiment according to FIGS. 10 and 11, a storage tube 71 is rigidly connected to the sley 72. Consequently, the end separated from the picked weft is withdrawn simply by the sley movement to the level 46 in FIG. 5.

After the weft thread S has been introduced into the storage tube 71 by the action of the rollers 73, 74 and the sley has assumed its rear end position shown in FIG. 10, a new shed being formed, the brake 75 is closed, and in conjunction with the pump pulse, this has the effect that the weft thread is introduced into the shed in the manner already described. On completion of the picking operation, the weft thread is cut off and the sley moves out of the position shown in FIG. 10 into the front end position in FIG. 11. The last weft thread picked is thus beaten up. On the sley movement from the right (FIG. 10) to the left (FIG. 11), the storage tube 71 has moved away from the thread end by the distance L so that the thread is withdrawn to the level 46 in FIG. 5. Consequently, the weft thread can be re-stored in the storage tube 71 on a new feed by the roller elements 73, 74.

The invention is not limited to the application to pneumatic looms but can be used to the same advantage wherever picking is performed mechanically, for example by means of a projectile, and the weft thread feed is performed pneumatically.

What I claimed is:

1. In a loom of the type capable of forming a shed and having a feed bobbin and a thread brake cooperant therewith, a pneumatic weft thread feed for the pre-acceleration of the weft thread comprising, a looped tube having an entry end and an exit end and through which the weft thread passes, said tube being positioned between the thread brake and the entry-point of the weft thread into the shed, said tube being provided with an elongated slot facing toward the circular space defined by the loop thereof, and a control means positioned relative to said tube for effectuating closure of the thread brake as the weft thread moves therepast en route to the exit end of said tube.

2. In the weft thread feed as set forth in claim 1, and further including a pair of spaced duct defining discs within the loop space, each being connected to said tube at one side of the elongated slot.

3. In the weft thread feed as set forth in claim 2, including a thread return mechanism disposed in the space between said discs for conveying the weft thread from the exit end of said tube returnably to the entry end of said tube.

4. In the weft thread feed as set forth in claim 3 with said thread return mechanism being in the form of a pivotable lever having a free end swingable into position for engaging the weft thread and pulling same into said tube.

5. In the weft thread feed as set forth in claim 1 including an air conduit communicating with said tube for the continuous flow of air therethrough.

6. In the weft thread feed according to claim 5, characterized in that said tube is connected to and communicates with a secondary air conduit for the flow of additional air during the weft thread feed.

7. In the weft thread feed according to claim 5, characterized in that a valve is fitted between said air conduit and tube.

8. In the weft thread feed according to claim 1, characterized in that said control means controlling the thread brake is constituted by a photoelectric cell and circuitry therefor.

9. In the weft thread feed according to claim 8, said control means being adjustable relative to said tube for the predetermination of the length of the weft thread to be inserted.

10. A weft thread feed according to claim 1 characterized by an adjustable limiting means for the control of the length of the slot in said tube for synchronizing the length of the thread loop with the length of the weft tread being inserted.

11. In a loom of the type capable of forming a shed and having a feed bobbin and a thread brake and a picking means cooperant therewith, a weft thread accelerating device for passing the weft thread before insertion and accelerating the same during its passage therethrough comprising, a tube configured into loop form intermediate its opposite entry and exit ends, a source of compressed air connected to the entry end of said tube for continuously flowing air therethrough, said tube being formed with a longitudinal slot facing toward the area bounded by the loop, control means for closing the thread brake as the weft thread has been paid out a predetermined length within said tube, and limiting means for varying the length of the slot in said tube and adapting the length of the thread loop to the length of the weft thread to be inserted.

12. In the accelerating device as set forth in claim 11 characterized by a pair of spaced plates disposed within the area bounded by the loop of said tube, each plate abutting said tube adjacent one side of the slot thereof.

13. In the accelerating device as set forth in claim 12 characterized by a thread returner disposed within the

space between the plates of said pair thereof for returning a weft thread from the exit end of said tube to the entry end of said tube.

14. In the accelerating device as set forth in claim **13**, said thread returner constituted by a pivoted lever having a free end adapted for movement into the path of and engagement with the weft thread in the exit end of said tube and for movement out of the path of the weft thread for returning the entrained beginning of the weft thread to the entry end of said tube.

15. In the accelerating device as set forth in claim **11**, said control means constituted by a photoelectric cell system and supporting circuitry operative in dependence on the arrival of the leading end of the weft thread at the photoelectric cell system.

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