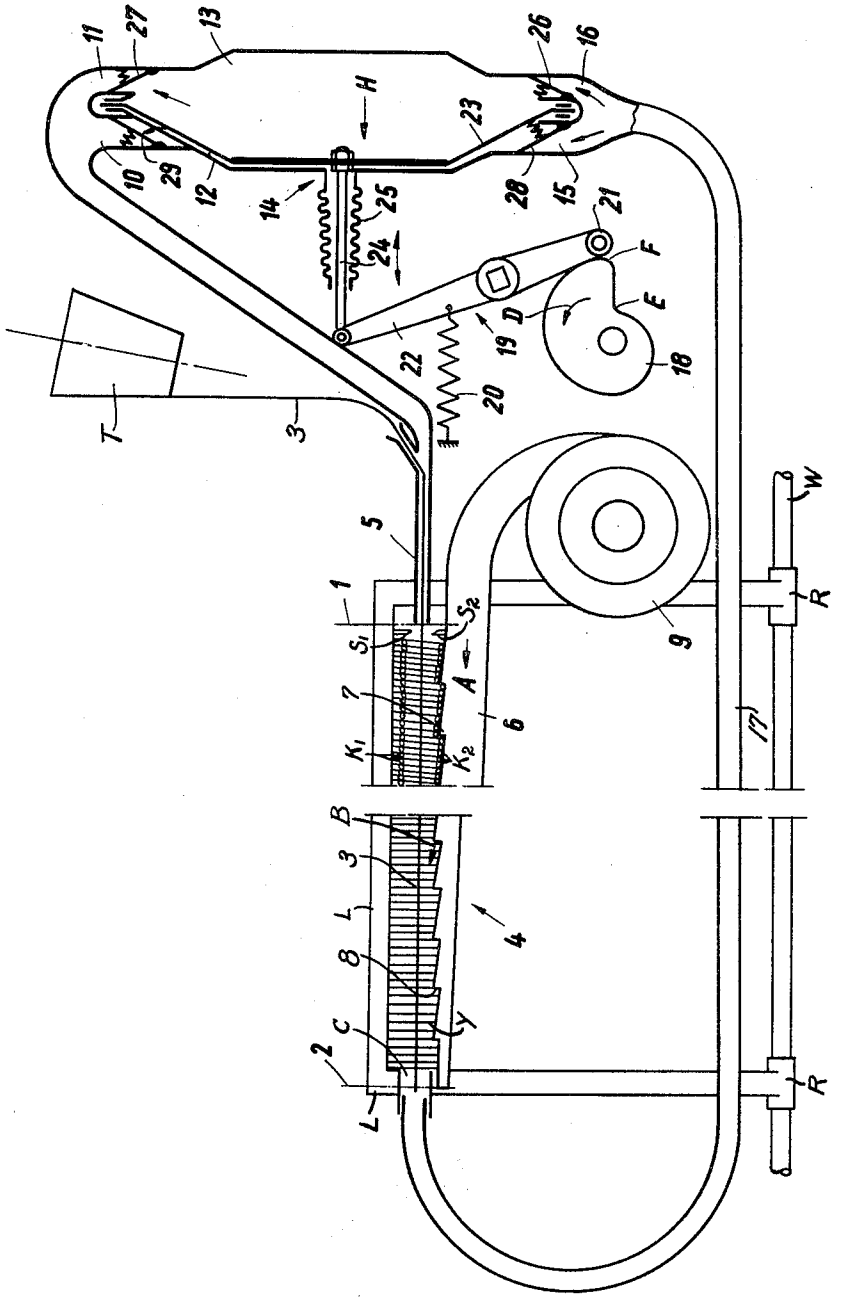
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PNEUMATIC WEFT INSERTING MEANS

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PNEUMATIC WEFT INSERTING MEANS

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This invention relates to textile looms, particularly to looms having pneumatic picking systems. In certain of these looms, air supply members which run outside the warp threads, transversely thereto, serve for the pneumatic picking of the weft threads. In this case, the air supply members are formed from tubes on which air outlet members are provided, the outlet aperture of which faces in the direction of the path of flight of the weft threads. A uniform current of air flows continuously through the tubes with their outlet members. As soon as the particular weft thread to be picked is released, the current of air emerging continuously from the air supply members catches it and carries it through the shed.

Furthermore, according to my co-pending U.S. application S.N. 30,476, it is proposed that blast pipes and suction pipes should be provided in addition at the margins of the fabric to be woven, air being continuously blown out or drawn in through these.

If the loom is to be operated at high speed with such a device, then it must be borne in mind that the friction between the weft thread and the current of air carrying it into or through the shed is slight in consequence of which there is much slip. In order to obtain a high picking speed despite this, a considerably quantity of air would have to be continuously supplied. Thus a considerable expenditure of energy would be necessary which would only be converted to a small extent into useful work.

It is the object of the invention to provide a remedy for this and to improve the device according to the above-identified co-pending application. Accordingly, the invention consists in a device of the aforesaid type in an installation by means of which a high initial acceleration is imparted by means of an air impulse to the particular weft thread to be picked so that on entering the shed it has a velocity which lies within the range of the velocity of flow of the air flowing continuously in the air supply members. The initial acceleration may be selected so high that the weft thread entering the shed has substantially its full velocity. In consequence, the weft thread entering the shed scarcely needs to be further accelerated by the continuously flowing current of air which is flowing out of the air outlet members. If the initial acceleration is sufficiently high, further acceleration can be dispensed with entirely. The only purpose of the continuously flowing current of air is then to take over the weft thread arriving substantially at the mean speed of flight and to carry it through the shed.

If the continuously flowing air nevertheless has to accelerate the incoming weft thread, the additional acceleration necessary for this is so little that it practically does not render necessary any larger design of the source of energy for the continuously flowing current of air. Thus the source of energy for the carrier air, that is to say the air which is supplied continuously through the supply members to the path of flight, can be comparatively small. The energy needed to produce the air blast causing the initial acceleration may also be comparatively low.

In the device according to the invention two currents of air are effective, one of which takes over the imparting of the initial acceleration and the other the carrying

through the shed. Wide webs can easily be woven with the device according to the invention.

It is a particular advantage if a diaphragm pump is used for the acceleration unit which pump is actuated from the loom, in synchronism therewith, through a gear. In this case it is advisable to construct the transmission in the form of a cam mechanism of which the engagement member, which is formed by a double lever, is subject to the action of a spring which forces it to bear with one end against the cam carrier, the cam being so shaped that the spring is gradually tensioned and suddenly released. By this means, three quarters of the time needed for one revolution of the shaft of the loom can be used for tensioning the spring and at the same time for drawing in the air through the diaphgram pump. The relaxing of the spring is effected within the remaining quarter of the revolution time. The spring is released in such a manner that it can relax in the minimum time. On the relaxation of the spring, the air previously drawn into the diaphragm pump is abruptly delivered into the blast pipe. In the course of this it seizes the weft thread to be inserted and imparts a high initial acceleration thereto.

It is advisable to connect the diaphragm pump, at the intake side, to a line which leads to a point situated opposite the blast pipe. By this means the effect is obtained that the diaphragm pump not only applies an air blast but at the same time exerts a suction action from the side opposite the blast pipe. The blast pipe should be so dimensioned in cross-section that it permits the passage of weft threads of different thicknesses and even knotty yarn.

The device according to the invention is particularly advantageous when the air supply members are provided only below the shed and are formed by a single tube with its air outlets.

In order that the present invention may be more readily understood reference will now be made to the accompanying drawing which illustrates diagrammatically and in cross-section apparatus according to this invention.

The fabric to be produced is formed in the direction of the plane of the drawing. In width it extends from the boundary line 1 to the boundary line 2. A sley *y* and a batten L, which is positioned on the spindle W by means of the bearing bushing R, moves from the front of the drawing to the back thereof. Weft thread 3 which is derived from stationary crossed spool T is picked into the shed formed by means of carrier air emerging continuously from an air supply member 4 and by means of a blast of air from a blast pipe 5 at the moment of introduction. This blast pipe is so dimensioned in width that it permits the unhindered passage of weft threads of various thickness and knotty yarn. The shear parts S_1 and S_2 are positioned on the side of the reed *y* and serve to cut the weft when the shed is properly filled.

The air supply member 4 runs below the shed extendingn transversely to the warp threads *y*. It is formed by a tube 6 with air outlet members 7 in the form of saw-teeth. Their apertures lie at the faces 8 of the teeth so that the air flowing in the tube 6 in the direction of the arrow A flows substantially in the direction of the arrow B to the path of flight which coincides in the drawing with the direction of the weft thread 3. The carrier air is continuously conveyed into the tube 6 from a blower 9 and accordingly emerges continuously from the air outlet members 7.

The blast pipe 5 is connected through the sockets 10, 11 to the outlet sides of the compartments 12, 13 of the diaphragm pump 14. At the intake side, the pump is connected through sockets 15, 16 to the conduit 17 which

leads to the point C. The latter is opposite the blast pipe **5** in the direction of the path of flight of the weft.

The diaphragm pump **14** is actuated from the loom by means of a cam mechanism. The latter comprises a cam **18** which is driven in the direction of the arrow D from the loom in synchronism therewith, and the double lever **19** which forms the engagement member of the transmission gear. Acting on the double lever is the spring **20** through which it is forced to bear through the roller **21** against the cam **18**. The arm **22** of the double lever acts on the diaphragm **23** of the pump. The point at which the rod **24** passes to the pump housing is sealed by means of a bellows **25**.

When the cam **18** rotates, the spring **20** is steadily tensioned during the time when the roller **21** follows the cam from E to F. When the roller **21** reaches the point F, then on the further movement of the cam the spring can suddenly relax as the roller **21** passes from F to E. The construction is such that about three quarters of the distance of one revolution of the loom are available for the tensioning of the spring. The relaxation then takes place within the remaining quarter.

During the tensioning of the spring **20**, the diaphragm **23** has been moved in the direction of the arrow H. In the course of this, air has been drawn through the valve **26** and the conduit **17** into the chamber **13**. On the sudden relaxation of the spring **20**, the diaphragm **23** is abruptly displaced in the opposite direction to the arrow H. In consequence, the air which was previously drawn into chamber **13** is delivered through the valve **27** and the socket **11** into the blast pipe **5**. This blast of air which reaches the blast pipe seizes the weft thread **3** which has not yet been carried into the shed and imparts a high initial acceleration to it. As soon as the weft thread enters the shed, the carrier air acts additionally on it. Since the weft thread has been given a high initial acceleration, the carrier air only needs to accelerate it to a small extent. Then the only function of the carrier air is to carry the weft thread through the shed and to maintain the initial velocity.

While the diaphragm pump is delivering the blast of air into the blast pipe **5**, it simultaneously draws air through the valve **28** and the conduit **17** into the chamber **12**. In consequence, for the duration of the air blast, a suction in the direction of the path of flight is exerted at the side opposite to the blast pipe and reinforces the carrying of the weft thread through the shed. As soon as the spring **20** is tensioned again and the diaphragm **23** is displaced in the direction of the arrow H, the air previously conveyed into the chamber **12** through the valve **28** is forced towards the socket **10** and hence into the blast pipe **5**. During this time, therefore, a suction is exerted at C and at the same time air flowing in the direction of the path of flight is delivered through the blast pipe **5**. Thus a blowing and sucking action is exerted by the diaphragm pump even after the particular air blast, although the velocity of the flow is considerably below that of the air blast because the cam **18** is now cooperating with the double lever **19** through its flat cam portion.

If the velocity of the air blast delivered into the blast pipe by means of the diaphragm pump is selected at about 1000 feet per second for example, then, with a slip of 90%, such an acceleration is imparted to the weft thread that it assumes a velocity of about 100 feet per second. If the carrier air coming continuously from the blower **9** has a velocity of 130 feet per second, then the weft thread retains at least the speed of 100 feet per second over the whole weaving width. Thus the weft thread flies through the shed at this speed. A loom equipped with the device according to the invention can be operated at a speed of 300 r.p.m. with the assumed weft thread velocity of 100 feet per second and a fabric width of 60 inches.

In a modification of the example described, the device may, of course, also be operated with a simple-acting diaphragm pump or a piston pump or displacement means.

It is also perfectly possible to arrange the air supply members which run transversely to the warp threads both above as well as below the shed. It is a particularly advantage, however, if an air supply member is arranged only below the shed as is the case in the example described.

I claim:

1. In a loom for producing woven fabrics of considerable width having a pneumatic picking system comprising a blast pipe located adjacent the side of the warp, means for admitting a weft thread to said blast pipe, air-supply means located below the shed adjacent to the shedding point for providing a stream of air within said shed capable of carrying said weft thread through said shed and means independent of said air supply means for imparting a high initial acceleration to said weft thread in said blast pipe prior to its entrance into the shed so that upon entering the shed said weft thread will have a velocity which is comparable to the velocity of said air stream provided by said air-supply means.

2. In a loom for producing woven fabrics of considerable width having a pneumatic picking system comprising a blast pipe located adjacent the side of the warp, means for admitting a weft thread to said blast pipe, an air-supply member located below the shed adjacent to the shedding point and extending transversely to the warp threads having air outlet members spaced across the width of the fabric and facing in the direction of motion of the weft thread, means for supplying compressed air to said air-supply member whereby said weft thread is propelled through the shed, and means independent from said means for supplying compressed air to said air-supply member for imparting a high initial acceleration to said weft thread in said blast pipe so that said weft thread upon entering the shed has a velocity which lies within the range of the velocity of flow of the air emitted by said air outlet members.

3. A loom according to claim 2, wherein the high initial acceleration imparted to said weft thread results from the application of an air impulse to said blast pipe.

4. A loom according to claim 2, wherein said means for imparting a high initial acceleration to said weft thread comprises a diaphragm pump capable of applying an air impulse to said blast tube and which may be driven by said loom in synchronism therewith.

5. In a loom for producing woven fabrics of considerable width having a pneumatic picking system comprising a blast pipe located adjacent one side of the warp and a conduit located adjacent the other side of the warp and opposite to said blast pipe in the direction of the trajectory, means for admitting a weft thread to said blast pipe, an air-supply member located below the shed being formed by an air pipe extending outside of the warp threads and transversely thereto adjacent the shedding point, said air pipe including a plurality of air outlet openings spaced across the width of the fabric for directing air toward the trajectory of said transversing weft thread to generate an air current in the direction of the motion of the traversing weft thread, means for supplying compressed air to said air-supply member, and a diaphragm pump independent from said compressed air-supplying means having its output connected to said blast pipe and its input connected to said conduit so that the weft thread in said blast pipe is given a high initial acceleration.

6. In a loom for producing woven fabrics of considerable width having a pneumatic picking system comprising a blast pipe located adjacent one side of the warp and a conduit located adjacent the other side of the warp and opposite to said blast pipe in the direction of the trajectory, means for admitting a weft thread to said blast pipe, an air-supply member located below the shed being formed by an air pipe extending outside of the warp threads and transversely thereto adjacent the shedding point, said air pipe including a plurality of air outlet openings spaced across the width of the fabric for directing air toward the trajectory of said transversing weft thread to

generate an air current in the direction of the motion of the traversing weft thread, means for supplying compressed air to said air-supply member, and a diaphragm pump independent from said compressed air-supplying means having its output connected to said blast pipe and its input connected to said conduit so that the weft thread in said blast pipe is given a high initial acceleration, said diaphragm pump being driven in synchronism with said loom by a transmission means comprising a cam driven by said loom, a double lever, spring means for biasing one end of said double lever against said cam and means for connecting the other end of said double lever to the diaphragm of said diaphragm pump thereby effecting motion in said diaphragm in accordance with the shape of said cam.

7. A loom according to claim 6, wherein said cam is provided with an ascending cam piece which extends over three-fourths of the cam surface and a sharply dropping cam piece located adjacent said ascending cam piece which extends over the remaining one-fourth of the cam surface thereby providing a cam which is so shaped that the said spring means is gradually tensioned and then suddenly released during a complete revolution of said cam.

8. In a loom for producing woven fabrics of considerable width having a pneumatic picking system comprising a blast pipe located adjacent one side of the warp and a conduit located adjacent the other side of the warp and opposite to said blast pipe in the direction of the trajectory, means for admitting a weft thread to said blast pipe, an air-supply member located below the shed being formed by an air pipe extending outside of the warp threads and transversely thereto adjacent the shedding

point, said air pipe including a plurality of air-outlet openings spaced across the width of the fabric for directing air toward the trajectory of said traversing weft thread to generate an air current in the direction of the motion of the traversing weft thread, means for supplying compressed air to said air-supply member, and a diaphragm pump capable of producing an air impulse in said blast pipe so as to impart to said weft thread in said blast pipe a high initial acceleration, said diaphragm pump having its input connected to said conduit so as to produce a suction at a point opposite said blast pipe simultaneously with the application of said air impulse to said blast pipe.

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