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PNEUMATIC WEFT INSERTION CONTROL IN LOOMS

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Fig. 1.

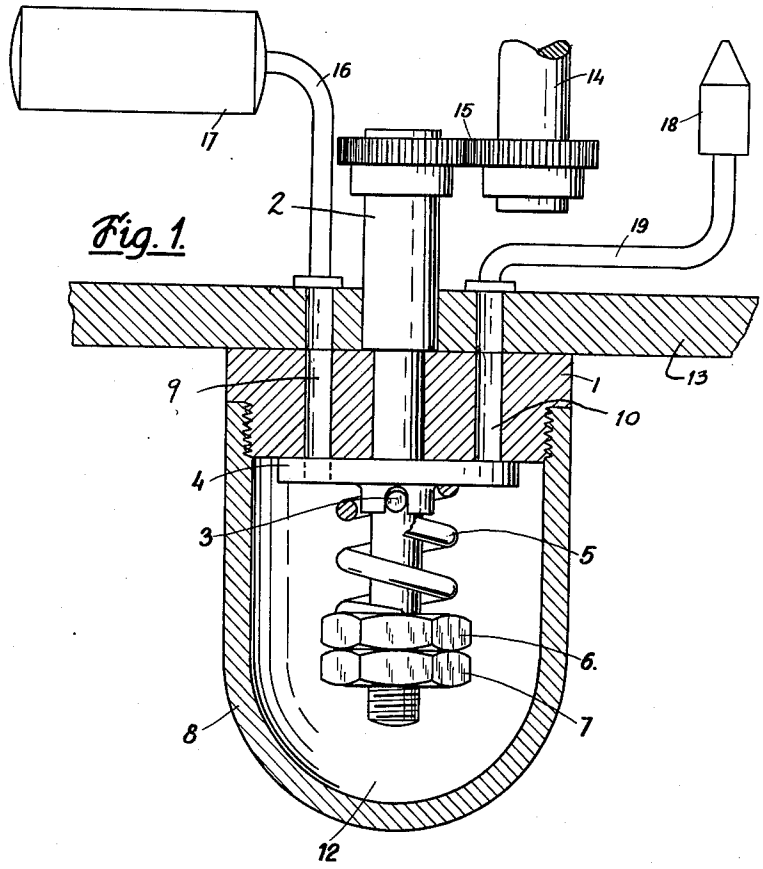
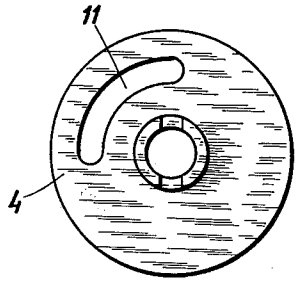


Fig. 2.



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PNEUMATIC WEFT INSERTION CONTROL IN LOOMS

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The present invention relates to a method and apparatus for controlling the discharge of compressed air into a weft inserting nozzle of a loom.

Considerable difficulties are encountered in pneumatic looms when the machine comes to a standstill. In such a moment it is necessary to stop the stream of air discharged from the nozzle so that the weft which is inserted into a warp shed, is not affected by a long lasting air stream and so that wasting of the energy consumed by the escaping air is presented.

Devices ensuring the stopping of the air current of pneumtaic looms are controlled by means of delayed action oil valves, and are not quite reliable in spite of their rather high price. Among the disadvantages inherent in delayed action oil valves is the fact that the time required for closing the valve cannot be exactly determined.

One object of the device according to the invention is to eliminate the aforesaid disadvantages by measuring the amount of air required for one weft insertion. A chamber is connected alternatingly with the compressed air supply or with the nozzle. The alternating connection of the metering chamber with the compressed air supply is effected with the aid of a single rotary slide value. The thus measured amount of compressed air is discharged through the nozzle.

Further advantages and features of the present invention will appear from the following description with reference to the accompanying drawing, wherein

FIG. 1 is partly a schemtaic view on a reduced scale and partly an elevational sectional view of one embodiment, and

FIG. 2 represents the rotary slide valve member in a plan view.

A drive shaft 2 passes through a main control block 1 which is secured to the side wall 13 of the loom, shaft 2 rotating in synchronism with the main shaft 14 of the weaving loom, the movement being transmitted by a suitable transmission 15. The movement of the shaft 2 is transmitted by means of a pin 3 to a rotary slide valve member 4 which is pressed by a spring 5 against the main control block 1.

The pressure of spring 5 can be adjusted by means of an adjusting nut 6 which is locked in position by a locking nut 7. The whole device is air-tightly enclosed in a pressure casing 8, which is air-tightly fitted to the main control block 1 and which forms a chamber 12 having a predetermined volume. The control block has an inlet 9 which is adapted to connect chamber 12 in the casing 8 with a source of compressed air 16 through a hose 17. Further arranged in the control block 1 is an outlet orifice 10, which permits the compressed air to be discharged from chamber 12 in the casing 8 into the weft-inserting nozzle 18 of a pneumatic loom. The rotary slide valve 4 is provided with an arcuate slot 11 sliding over the ports of inlet and outlet passages 9, 10 and constituting a passage connecting alternatingly first the inlet 9 with chamber 12 and then chamber 12 with the outlet 10 and thus with weft-inserting nozzle 18.

The device operates as follows:

Compressed air is admitted through the supply conduit 16 from the source of compressed air 17 to the

inlet passage 9 in control block 1 and flows, provided the rotary slide valve 4 is in the corresponding position, through the arcuate slot 11 into the chamber 12 until the pressure in chamber 12 equals the pressure in the supply conduit 16. After a predetermined time the rotary slide valve 4 closes the port of inlet while the arcuate slot 11 opens the outlet passage 10 through which the amount of compressed air, which was enclosed in the chamber 12, expands into the conduit 19 leading to the weft-inserting nozzle 18.

If for any reason the loom comes to a standstill, for instance in the beat-up position, which means that the rotation of shaft 2 with slide valve 4 is discontinued while valve 4 is in position in which chamber 12 is connected with the outlet 10 through the arcuate slot 11, a full expansion of the compressed air in chamber 12 takes place, but no further compressed air is admitted into the chamber, because the inlet 9 is closed by the rotary slide valve 4.

If the loom comes to a standstill in any other position, the inlet 9 may well be connected with the chamber 12, but the compressed air can not escape from this space, since the rotary slide valve 4 keeps the outlet 10 closed and the admission of compressed air into chamber 12 is automatically discontinued after the above mentioned equalization of pressures in chamber 12 and in the supply conduit 16 has taken place.

In the normal operation of the loom only a partial pressure drop takes place in chamber 12. The degree of such pressure drop can be controlled by suitably dimensioning the volume of the chamber 12, preferably by an exchange of the casing 8 for another casing having a more suitable volume. In practical operation such an exchange is advantageous only when the loom operates at a substantially different speed, because the exchange exerts a considerable influence on the compressed air consumption and thereby on the total performance of the loom.

The arrangement complies also with the requirement for a drop in air pressure during the operation.

I claim:

1. The method for controlling the discharge of compressed air through a weft inserting nozzle of a loom, comprising the cyclically repeated steps of admitting compressed air into a chamber having a selected volume for holding a quantity of compressed air sufficient for a weft insertion operation by the nozzle; closing said chamber so that said quantity of compressed air is confined in said chamber; and connecting said chamber with the nozzle so that the compressed air in said chamber expands through the nozzle to produce a weft inserting jet whereby, irrespective at which step the operation of the loom is stopped, no more than said quantity of compressed air can be discharged from the nozzle.

2. In a loom, an apparatus for controlling the discharge of compressed air through a weft inserting nozzle, comprising, in combination, a weft inserting nozzle; a source of compressed air; and a control device formed with a chamber having a selected volume for holding a quantity of compressed air sufficient for a weft insertion by said nozzle, and including inlet means connected with said source of compressed air, outlet means connected with said nozzle, and means for alternately connecting said chamber with said inlet means and with said outlet means so that successive quantities of compressed air are first admitted to said chamber, then confined in said chamber and finally permitted to expand through said nozzle in a weft inserting jet whereby no more air than a quantity of compressed air confined in said chamber can be discharged through said nozzle when the loom is stopped.

3. In a loom, an apparatus for controlling the discharge of compressed air through a weft inserting nozzle, com-

prising, in combination, a weft inserting nozzle; a source of compressed air; and a control device including a first member formed with a chamber having a selected volume for holding a quantity of compressed air sufficient for a weft insertion by said nozzle, a second member having inlet means connected with said source of compressed air and outlet means connected with said nozzle, and valve means for alternately connecting said chamber with said inlet means and with said outlet means so that successive quantities of compressed air are first admitted to said chamber, then confined in said chamber and finally permitted to expand through said nozzle in a weft inserting jet whereby no more air than a quantity of compressed air confined in said chamber can be discharged through said nozzle when the loom is stopped.

4. In a loom, an apparatus for controlling the discharge of compressed air through a weft inserting nozzle, comprising, in combination, a weft inserting nozzle; a source of compressed air; and a control device including a first member formed with a chamber having a selected volume for holding a quantity of compressed air sufficient for a weft insertion by said nozzle, a second member having inlet means connected with said source of compressed air and outlet means connected with said nozzle, said inlet means and outlet means having ports on the surface of said second member, and rotary control valve means sliding on said surface of said second member and having a passage passing over said ports for alternatively connecting said chamber with said inlet means and with said outlet means so that successive quantities of compressed air are first admitted to said chamber, then confined in said chamber and finally permitted to expand through said nozzle in a weft inserting jet whereby no more air than a quantity of compressed air confined in said chamber can be discharged through said nozzle when the loom is stopped.

5. In a loom, an apparatus for controlling the discharge of compressed air into a weft inserting nozzle, comprising, in combination, a weft inserting nozzle; a source of compressed air; a drive shaft; a control block having an inlet connected with said source of compressed air and an outlet connected with said nozzle, said inlet and outlet having ports on the surface of said control block; a pressure casing airtightly fitted on said control block and forming with the same a chamber into which said ports open, said chamber having a selected volume for holding a quantity of compressed air sufficient for a weft insertion by said nozzle; a rotary slide valve driven from said drive shaft and being located in said chamber, said slide valve having a portion sliding on said surface of said control block and being formed with a passage having one end passing over said ports and another end opening into said chamber so that during rotation of said slide valve successive quantities of compressed air are first admitted into said chamber, then confined in said chamber, and finally permitted to expand through said

nozzle in a weft inserting jet whereby no more air than a quantity of compressed air confined in said chamber can be discharged through said nozzle when said drive shaft and the loom are stopped.

6. In a loom, an apparatus for controlling the discharge of compressed air into a weft inserting nozzle, comprising, in combination, a weft inserting nozzle; a source of compressed air; a main drive shaft for the loom; a control block having an inlet connected with said source of compressed air and an outlet connected with said nozzle, said inlet and outlet having ports on the surface of said control block; a control shaft passing through said control block and being rotatably mounted in the same; transmission means connecting said control shaft with said main drive shaft; a pressure casing airtightly fitted on said control block and forming with the same a chamber into which said ports open, said chamber having a selected volume for holding a quantity of compressed air sufficient for a weft insertion by said nozzle, said control shaft having a portion projecting into said chamber; a rotary slide valve located in said chamber and connected to said portion of said control shaft to be rotated by the same during operation of the loom by said main drive shaft, said slide valve having a portion sliding on said surface of said control block and being formed with a passage having one end passing over said ports and another end opening into said chamber so that during rotation of said slide valve successive quantities of compressed air are first admitted into said chamber, then confined in said chamber, and finally permitted to expand through said nozzle in a weft inserting jet whereby no more air than a quantity of compressed air confined in said chamber can be discharged through said nozzle when said drive shaft and the loom are stopped.

7. An arrangement as set forth in claim 6 wherein said passage in said slide valve is arcuate; and including biasing means for pressing said portion of said slide valve against said surface of said control block; and means for adjusting said biasing means.

8. An arrangement a set forth in claim 6 and including means for detachably securing said pressure casing to said control block to permit exchange of said pressure casing for another pressure casing adapted to form with said control block a chamber having a different volume and adapted to confine a different quantity of compressed air.

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