 DEVICE ON LOOM

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The present invention relates to a device on looms for pneumatic shuttle control.

From known pneumatic shuttle control mechanisms the device according to the invention is distinguished in that on both sides of the fabric or warp shed there is a guide cylinder joined to a source of compressed air and stationarily mounted on the loom frame, and on which a compressed air cylinder axially slideable within two end positions is supported; further that each guide cylinder is at its projecting end furnished with a stationary plunger closing hermetically in relation to the movable compressed air cylinder and dividing the latter into two pressure chambers, of which the outer chamber serves to propel the compressed air cylinder or the shuttle, and the inner chamber to restore the pressure cylinder from its operative into its inoperative position. Moreover, according to the invention, the hollow space of the guide cylinder communicates via channels with the inner pressure chamber, whereby the hollow space of the guide cylinder can intermittently be brought into connection with the outer pressure chamber through an inlet valve, for the control of which provision is made for a carriage rigid with the movable compressed air cylinder and serving as picker and catcher device for the shuttle. Moreover, according to the invention there is provided an outlet valve which, with the inlet valve open, is closed and, with the inlet valve closed, connects the inner pressure chamber to atmosphere, while for opening the inlet valve there is a cam arranged on said carriage and meeting in its path of movement a roller supported on one end of a toggle lever which, at its other end, engages a control lever fulcrumed on the one hand to a stationary bearing and engaging on the other hand a valve stem carrying the body of the outlet valve and projecting centrally through an air discharge tube arranged coaxially within said guide cylinder. Furthermore, according to the invention, for closing the inlet valve and subsequently opening the outlet valve, provision is made for a second control lever engaging said valve stem and connected through a draw-member to a slide which, by means of a slot extending obliquely to the carriage and a stationary bolt engaging therein, is supported on a fixed part of the loom and projects in one end position into the inner space of the valve seat 14 and forming together with the plate it of the inlet valve, the outlet valve. Th:

to open, so that the air pressure drops in the outer pressure chamber and the air escapes to atmosphere, while the compressed air contained in the inner pressure chamber again brings the compressed air cylinder back to normal which had travelled into the end position.

The accompanying drawing shows by way of example a preferred form of embodiment incorporating the invention.

Fig. 1 is a horizontal section through one device; an identical device being arranged, in mirror-image to that shown, on the other side of the warp shed;

Fig. 2 is a top view of the device shown in Fig. 1, with various parts in a different position, and partly broken away;

Fig. 2a is a view similar to Fig. 2 showing the right hand end of the device;

Fig. 3 is an end view of the device, partly broken away;

Fig. 3a is a view similar to Fig. 3 showing the right hand end of the device;

Fig. 4 is the device seen in direction of the arrow IV indicated in Fig. 2.

Fig. 5 is a detail view of the assembly shown at the left-hand end of Fig. 1 illustrating a further position of the parts, and

Fig. 6 is a view similar to Fig. 5 illustrating another position of the parts.

Stationarily mounted on both sides of the web or warp shed of the loom is a hollow guide cylinder 8 joined to a source of compressed air. Said guide cylinder 8 fits with one (in Fig. 1 left-sided) end in a stop socket 19 mounted in a stationary part of the loom frame. Inserted at the projecting extremity of the guide cylinder 8 is a valve body 14 having a cylindrical extension 13 reduced in diameter with respect to the guide cylinder and having firmly arranged at its extreme end a plunger 15 fitted with a gasket 16. The body 14 is secured on a tube 14a fixed in a stationary part of the loom and the tube 14a is provided with a slot 14b, the function of which will be later described.

The guide cylinder 8 has a compressed air cylinder 7 axially slidably supported thereon. Said compressed air cylinder, closed at its outer end by a cover 7a, is on the one hand supported on plunger 15, 16 and on the other hand, by means of a sleeve, slidable on the guide cylinder 8. The sleeve 6 includes a gasket 16 adapted to close the compressed air cylinder 7 hermetically in relation to the guide cylinder 8. Through said plunger 15, 16 the compressed air cylinder 7 is divided into two pressure chambers 22 and 22a, the inner chamber 22 being of smaller cross-sectional area than the outer chamber 22a.

The hollow space 8a of the guide cylinder 8 communicates via ports 23 with the inner pressure chamber 22. Located in this pressure chamber is a disk 12 guided axially slidably both on the inner wall of the compressed air cylinder 7 and as well on the cylindrical extension 13 of the guide cylinder. Numerical 11 designates the plate, and 14 the seat of an inlet valve arranged within the guide cylinder 8 and which, in its open position, Fig. 2, connects the hollow space of the guide cylinder with the hollow extension 13 to the outer pressure chamber 22a of the compressed air cylinder. Said plate 11 of the inlet valve is seated on the inner end of a tube 9 arranged coaxially to the guide cylinder 8, the other end thereof opening to atmosphere. The valve plate 11 is provided with bores 11a adapted to connect the hollow space of tube 9 to the hollow space of the valve seat 14.

Numerical 10 denotes another valve plate situated within the inner space of the valve seat 14 and forming together with the plate 11 of the inlet valve, the outlet valve. The
an so " . valve plate 10 is seated on a valve stem 10' which protrudes coaxially through the discharge tube 9.

For opening the inlet valve 11, 14 and simultaneously or subsequently closing the outlet valve 10, 11, provision is made for a carriage 29 moving as picker and follower device, the shuttle 30, being guided by means of the rollers 30 on a stationary guide rail 28 of the loom frame and secured to the movable compressed air cylinder 7. Mounted further on said carriage 29 is a cam 27 adapted to engage the path of movement of a roller 26 supported at one end of a toggle lever 39. Said toggle lever 39 is provided at its common joint with a roller 25, is at the other end linked to a control lever 17 which in its turn is oscillatory supported by a bolt 40 on a stationary part 28 of the loom frame. In Fig. 3: the roller 25 contacts the cam 18a of a buffer lever 18 fulcrumed on a bolt 18b anchored in the stationary part 18 of the loom. Numerical 47 indicates a tension spring which at one end engages the buffer lever 18 and at the other end a cantilever 39a of the toggle linkage 39 and tends to keep the buffer lever 18 in contact with an adjustable abutment 48.

For closing the inlet valve 11, 14 and for simultaneous or immediately subsequent opening of the outlet valve 10, 11, there is provided a control lever 42, Fig. 3, engaging the valve stem 10'. Said control lever is at one end pivoted to a link 42a, at the other end to a pull member 43, and furnished with a presser 42b which, in the position as in Fig. 3, bears on the control lever 17 by a pull member 43 and stands in pivotal connection with a slide 36 supported on the stationary loom part 28 by means of a slot 44—which extends obliquely to the path of movement of the carriage 20—and a fixed bolt 45 engaging therein. In its position as shown in full lines in Fig. 3, one end of the slide 36 enters the path of movement of a roller 37 arranged on the carriage 20.

To explain the action of the aforedescribed device let us start from Fig. 1 and also from the supposition that the inner space of the guide cylinder 8 be under pressure which, via ports 23, is also imparted to the inner pressure chamber 22 of the movable compressed air cylinder 7. For starting the pneumatic shuttle control, the control lever 17 is swung anticlockwise in a way not particularly described, in Fig. 1, and thus the valve stem 10' is displaced in the direction of the arrow A indicated in Fig. 1. As a result of this displacement of the valve stem 10' the valve plate 10 is caused to seat onto the valve plate 11 and thus closes the outlet valve 10, 11. Upon further displacement of the valve stem 10' in the direction of the arrow A, the valve plate 11 is moved clear of the valve seat 14, thus opening the inlet valve 11, 14 (Fig. 2) whereby air flows from chamber 8a or 14c, the same being connected by the slot 14b through the opened valve parts 11, 14 and tube 14 into the chamber 22a, the compressed air cylinder 7 being thereby urged forwards into the position apparent from Fig. 2 and picks the shuttle across the warp shed over carriage 20 and buffer 31 connected to cylinder 7. Towards the end of the advance of said cylinder 7, the forward end of the sleeve 6 abuts on the disk 12 and carries same along. Due to over-compression of the thereby arising in chamber 22, the advancing cylinder 7 will be braked. By suitably dimensioning the ports 23 it may be achieved that the compressed air cylinder 7 comes to rest shortly before the disk 12 contacts the plunger 15.

Approximately at the moment in which the sleeve 6 contacts the disk 12, the roller 37 mounted on carriage 20 starts to rise on the inclined face 36c of the slide 36, Fig. 3, whereby the slide 36 is thrust into the chain-dotted line position and simultaneously pushed in the direction of the arrow B in Fig. 3. This displacement is imparted via pull member 43 to the control lever 42, causing this to swing anticlockwise about the fulcrum 42c. Incidentally the presser 42b abuts on control lever 17 causing it to swing clockwise, Fig. 1. Thereby the valve stem 10' gets displaced contrary to the direction of the arrow A, the inlet valve 11, 14 will be closed and the outlet valve 10, 11 opened as illustrated in Fig. 1. On opening the outlet valve 10, 11 the pressure drops immediately in the outer pressure chamber 22a and the air flows through the hollow extension 13, the opened outlet valve 10, 11, thereby the inner chamber 22 continues to remain under pressure, the disk 12 and hence also the compressed air cylinder 7 will be displaced in the direction of the arrow C indicated in Fig. 1, and because of the compressed air entering via disk 12 into the hollow space between guide cylinder 8 and compressed air cylinder 7, the air column is returned to the starting position as shown in Fig. 1. At the end of the resetting of cylinder 7, the sleeve 6 enters the stop socket 19, thus compressing the air therein. Thereby an air cushion will form in the stop socket to brake the resetting movement of cylinder 7.

When the shuttle 3 comes against the buffer 31, the cam 27 on carriage 29 knocks on roller 26, raising this and swinging the control lever 17 anticlockwise via toggle linkage 39. Thereby the valve stem 10' is again displaced in the direction of the arrow A, the outlet valve 10, 11 will be opened and subsequently the inlet valve 11, 14 opened so that compressed air from the hollow space of the guide cylinder 8 enters through the hollow extension 13 into the outer pressure chamber 22a, which again causes the cylinder 7 to propel to shoot the shuttle. As shown in Fig. 1, the ring-flange 3 adapted to connect the compressed air cylinder 7 to the carriage 20 possesses slight axial clearance on the sleeve 6 to allow said carriage, when the shuttle meets the buffer 31, to move in the way of actuating the control lever 17 relative to the cylinder 7. The same purpose is also served by an elastic intermediate disk 32 interposed between ring-flange 3 and attachment eye 33 of the carriage.

In order to damp the knock arising when the cam 27 meets the roller 26, provision is made for the buffer lever 18 being then caused to swing clockwise about the bolt 18b against the action of spring 37 through the intermediary of toggle linkage 39 and roller 25, to be then restored to normal by spring 47, whereby the control lever 17 is swung anticlockwise. With the help of the set screw 38, the path of swing of the buffer lever 18 may be limited to one direction of turning.

What I claim is:

1. A shuttle control for the shuttle of looms, a loom frame, a shuttle, guide cylinders stationarily arranged on the loom frame on both sides of the shed, a source of compressed air in communication with the guide cylinders, a compressed air cylinder axially slidably mounted between guide cylinders and shuttle 7, each cylinder being connected with the hollow space of the guide cylinder and serving to divide the compressed air cylinder into inner and outer pressure chambers, the outer chamber functioning to propel the shuttle and the inner chamber to re-set the compressed air cylinder from an operative to an inoperative position, means defining a hollow space within the guide cylinder, port means connecting the hollow space and the inner chamber whereby the hollow space and inner chamber are in constant communication, an inlet valve means connecting the hollow space and the outer pressure chamber whereby the hollow space can be intermittently connected with the outer pressure chamber, control means for the inlet valve means including a carriage associated with the compressed air cylinder and serving as a picker and follower device for the shuttle, in which when the inlet valve means is open, is closed and, which when the inlet valve means is closed, connects the outer pressure chamber with the atmosphere, means for opening the inlet valve, such opening means including a cam fixed to the carriage, a roller disposed into the path of movement of the cam, a toggle lever carrying the roller at one end thereof, a control lever
fulcrumed at one end to the loom frame, a connection between the other end of the toggle lever and the control lever, a valve stem carrying the outlet valve body engageable with the other end of the control lever, an air discharge tube arranged coaxially within the guide cylinder through which said valve stem extends coaxially, means for closing the inlet valve and the subsequent opening of the outlet valve, such closing means comprising a further control lever engageable with the valve stem, a slide having a slot therein extending obliquely to the path of movement of the carriage, a fixed pin on the loom frame lodged in the slot with the pin and slot providing supporting means for the slide, a draw-member connecting the further control lever to the slide and a roller on the carriage so that in one end position the slide projects into the path of the roller on the carriage whereby the impingement of the shuttle on the picker and catcher device causes the control lever to swing by the action of the cam and toggle lever thus opening the inlet valve whereby compressed air from the hollow space enters the outer pressure chamber thereby moving the compressed air cylinder axially away from the guide cylinder so that the carriage shoots the shuttle and the roller on the carriage prior to reaching the end position of the compressed air cylinder begins to rise on the slide thereby swinging and displacing the slide and causing the further control lever to swing by virtue of the draw-member to effect closing of the inlet valve and the subsequent opening of the outlet valve so that the pressure of the air in the outer chamber will drop and the air escape to atmosphere while the compressed air in the inner chamber will cause the compressed air cylinder to return to its starting position.

2. A pneumatic control as defined in claim 1 wherein a disk is arranged within the inner pressure chamber and is axially slideable along the inner wall of the pressure chamber and a reduced extension of the guide cylinder, respectively.

3. A pneumatic control as defined in claim 1 wherein at the common joint of the toggle is arranged a further roller operatively connected to a cam on a buffer lever pivoted to the loom frame and a tension spring connected to the buffer lever and a cantilever on the toggle tends to maintain the buffer lever in engagement with an adjustable abutment.

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