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(54) Compressed air doctor-blade assembly for printing stations

(57) A doctor-blade assembly for a printing machine surface comprises a doctor blade (11) supported at the end by a pair of carriages (12) moving along guides (23) parallel with the doctoring direction on the surface. The carriages comprise compressed air means (13) for movement of the doctor blade in the direction of approach towards and withdrawal from the surface and compressed air means (14) for inclination of the doctor blade with respect to the surface. A valve assembly (17,18) and a valve assembly (15) supply the compressed air means (13) respectively with a pressure which compensates the weight of the doctor blade and with a predetermined thrust pressure of the doctor blade against the surface. Upon command a valve (21) sends a doctor-blade raising pressure.

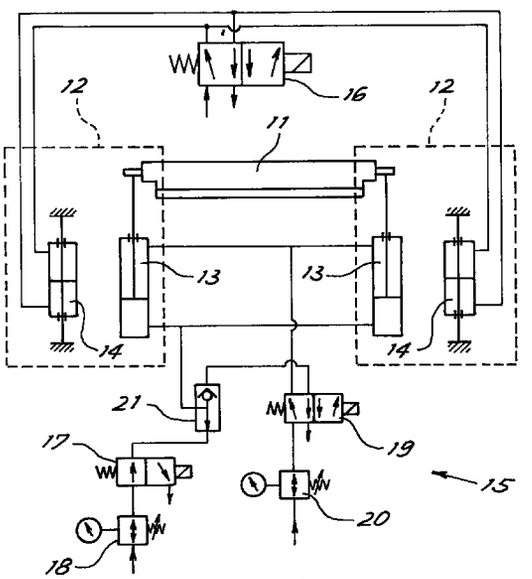

Fig. 1

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Description

The present invention relates to a printing machine of the type having printing frames and a doctor blade for spreading the color.

In these machines the doctor-blade pressure and inclination with respect to the direction of movement are very important. When performing the printing cycle denominated 'high doctoring' it is necessary to execute the printing with a single doctoring stroke and keep the tumbler moist while taking the color back into the doctoring starting position by means of doctoring action with very low pressure and the frame not in printing position, i.e. raised, while the fabric being printed or the printing frame is moving towards the next printing station. The same machine must usually be usable also for printing with several doctoring passes in both directions of movement of the doctor blade. It is therefore necessary that the doctor blade be able to slant on command to keep the correct inclination whatever be the direction of movement. In addition it is important that the doctor blade be pushed against the frame with the right pressure. In the prior art machines the movements are usually realized by means of electric motors and complex electronic control systems. This makes the machine costly and delicate.

The general purpose of the present invention is to obviate the above mentioned shortcomings by making available a printing machine having a more economical, simple and reliable structure.

In view of this purpose it was sought to provide in accordance with the present invention a doctor-blade assembly for a surface in printing machines comprising a doctor blade supported at the end by a pair of carriages moving along guides parallel to the doctoring direction on the surface with the carriages comprising means for moving the doctor blade in the direction of approach towards and withdrawal from the surface and means of inclining the doctor blade with respect to the surface and characterized in that the doctor-blade movement and inclination means are compressed air means.

To clarify the explanation of the innovative principles of the present invention and its advantages compared with the prior art there is described below with the aid of the annexed drawings a possible embodiment thereof by way of non-limiting example applying said principles. In the drawings:

- Fig. 1 shows a diagrammatic view of a printing station in accordance with the present invention,
- Fig. 2 shows a side view of a doctor-blade support of the station of Fig. 1 partially cross sectioned along plane of cut II-II of Fig. 3, and
- Fig. 3 shows a front view of the support of Fig. 2.

With reference to the figures, in Fig. 1 shows schematically a printing station 10. The figure shows only the doctor-blade assembly with the rest of the station (frame holder assembly, doctor blade running color deposit etc) being essentially of the prior art and accordingly readily imaginable to one skilled in the art.

The machine comprises a doctor blade 11 supported at the ends by a pair of supports 12 which control the operating pressure of the doctor blade, its height over the doctoring surface 38 and its inclination.

In accordance with the innovative principles of the present invention each supporting group 12 comprises a double-action compressed air cylinder 13 for vertical lifting of the doctor blade and adjustment of the doctoring pressure and a double-action compressed air cylinder 14 for adjustment of the doctor-blade inclination.

The lift and thrust cylinders 13 are fed by a compressed air control assembly 15 while the cylinders 14 are controlled by a valve assembly 16.

As clarified below, the valve assembly 16 controls supply of the inclination cylinders 14 so that the doctor blade is in one of two specular inclined positions with respect to the normal to the doctoring plane.

In accordance with the exemplifying embodiment described here the compressed air assembly 15 has a first controlling solenoid valve 17 which supplies the lower chamber of the cylinder 13 with a pressure such as to compensate the weight of the doctor blade. This pressure is regulated to a set value by means of a valve 18. A second solenoid valve 19 supplies the upper chamber of the cylinders 13 and thus determines the doctoring thrust. The doctoring pressure is regulated by a valve 20. For example the doctoring thrust can be adjusted between 0 and 400 N.

The pressure balancing circuit must hold constant the counter-pressure value in the lower chamber during the downward movement of the doctor blade because this movement would otherwise cause an increase in the counter-pressure in the lower chamber of the cylinders 13 which could even equal the pressure in the upper chamber.

On the path between the first solenoid valve 17 and the cylinders 13 is arranged a compressed air sequential valve 21 which permits blocking the lower pressure which merely compensates the weight of the doctor blade and let pass the higher pressure to secure raising of the doctor blade in the amount desired.

Figures 2 and 3 show one of the two support assemblies 12 (the other being identical). The assembly comprises a body or carriage 22 running along guides 23 by means of a toothed belt or roller chain 24 to secure the typical forward and backward movement of the doctor blade. The carriage 22 supports a bascule 25 with fulcrum below the carriage at 26. On the bascule are present a pair of guides 27 between which runs a slide 28 which has a U-shaped seat 30 for receiving a supporting end of the doctor blade. A lock lever 31 has a closing tooth 32 for the U-shaped seat to block the doctor blade when it is positioned in the seat.

As may be seen in Fig. 2 the piston 13 for raising and thrust of the doctor blade acts between the bascule 25 and the slide 28 through a manual regulation 33.

The inclination movement of the bascule in the two symmetrical positions with respect to the vertical is obtained by means of the piston 14 provided with a floating casing and double stem fixed to the carriage. The casing of the piston 14 supports a pin connecting it with the bascule for its rotation around the pin 26. To regulate the inclined position there is present a stop slide 35 which moves vertically on the carriage 22 by means of a manual regulation 36. The stop slide has an overturned-V shaped seat 37 in which the pin 34 moves upon operation of the piston 14. Raising or lowering the stop slide limits the travel of the piston 14 to a precise amount to determine the positive or negative angle of inclination of the bascule and hence of the doctor blade with respect to the vertical.

At this point it is clear that the preset purposes have been achieved by supplying a printing station with a compressed air movement for doctor blade raising, thrust and inclination. During operation it suffices to command in the proper sequence the three solenoid valves (for example through a prior art control device with cabled or programmed logic) to secure either 'high doctoring' operation with return movement of the doctor blade in a raised position with minimum pressure on the frame which is also raised, or operational cycles with forward and backward movement of the doctor blade correctly inclined and with the correct printing pressure.

Naturally the above description of an embodiment applying the innovative principles of the present invention is given merely by way of example and therefore is not to be taken as a limitation of the patent right claimed here.

Claims

1. Doctor-blade assembly for a surface in printing machines comprising a doctor blade (11) supported at the end by a pair of carriages (12) moving along guides (23) parallel to the doctoring direction on the surface with the carriages comprising means (13) for moving the doctor blade in the direction of approach towards and withdrawal from the surface and means (14) of inclining the doctor blade with respect to the surface and characterized in that the doctor-blade movement and inclination means are compressed air means.

2. Assembly in accordance with claim 1 and characterized in that on each carriage is mounted a bascule support (25) on which is supported one end of the doctor blade with a first cylinder (14) providing the compressed air inclination means and inclining the bascule support between two positions to supply a positive or negative doctoring inclination.

3. Assembly in accordance with claim 2 and characterized in that the first cylinder (14) is arranged transversely to the bascule support (25) and has its stem connected to the carriage and floating casing connected to the bascule support (25) with a stop slide (35) moving transversely to the first cylinder to define with its V-shaped groove (37) the amplitude of the travel of the casing and accordingly the angle of inclination of the bascule support.

4. Assembly in accordance with claim 2 and characterized in that the doctor blade is mounted on the bascule support (25) with the interposition of a slide (28) moved by a second cylinder (13) and providing the compressed air movement means in a direction transversal to a rotation axis (26) of the bascule support.

5. Assembly in accordance with claim 4 and characterized in that the second cylinder (13) is a double-action cylinder with a first chamber being supplied through a control and regulation valve assembly (17,18) with a pressure which compensates the weight of the doctor blade and the other chamber is supplied through a control and regulation valve assembly (15) with a predetermined thrust pressure of the doctor blade against the surface.

6. Assembly in accordance with claim 5 and characterized in that upon command a valve (21) sends a doctor-blade lifting pressure to the first chamber.

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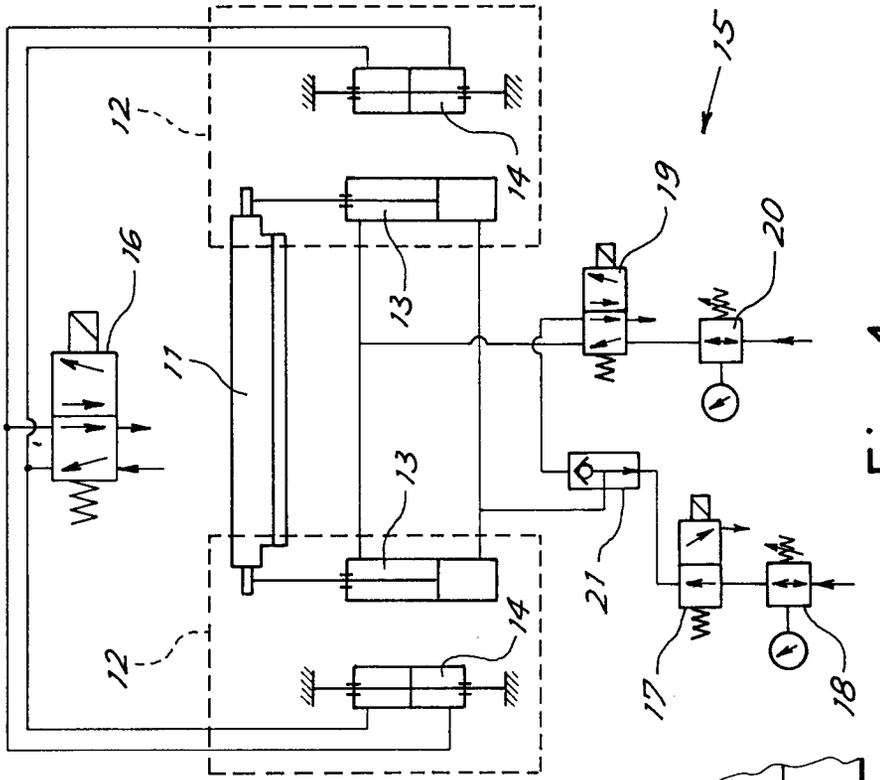

Fig. 1

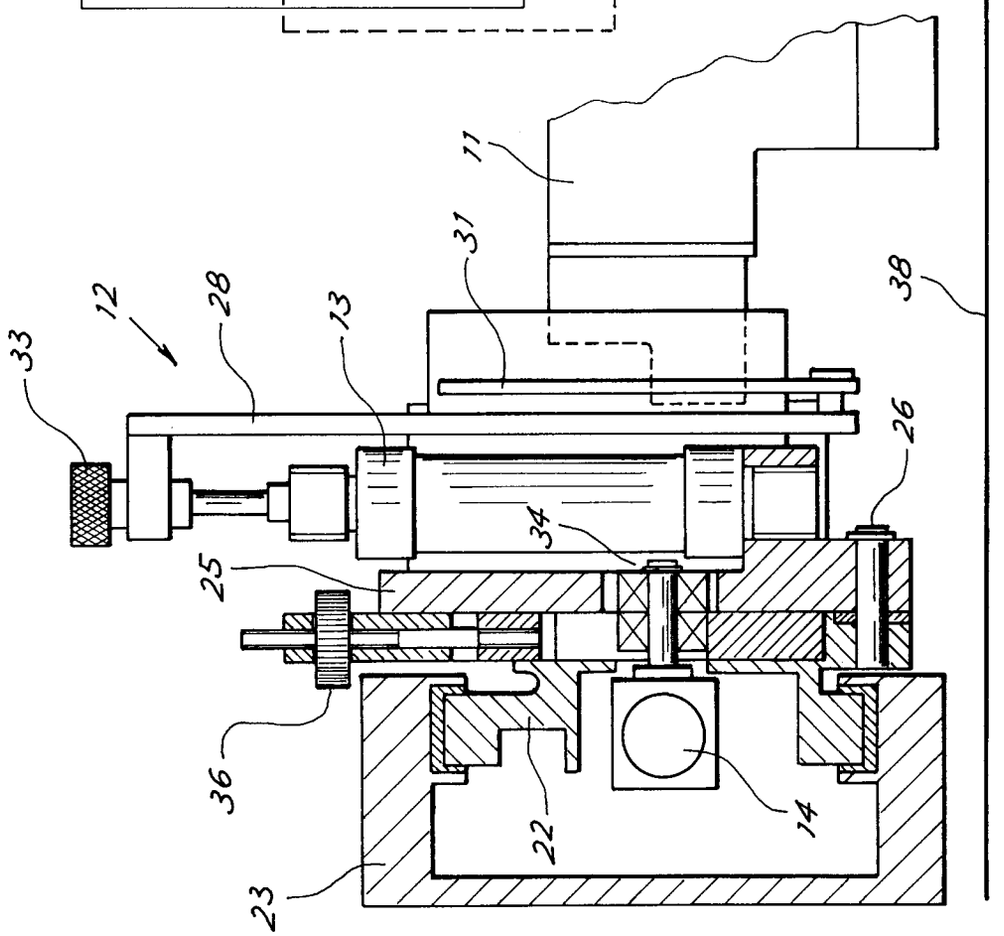

Fig. 2

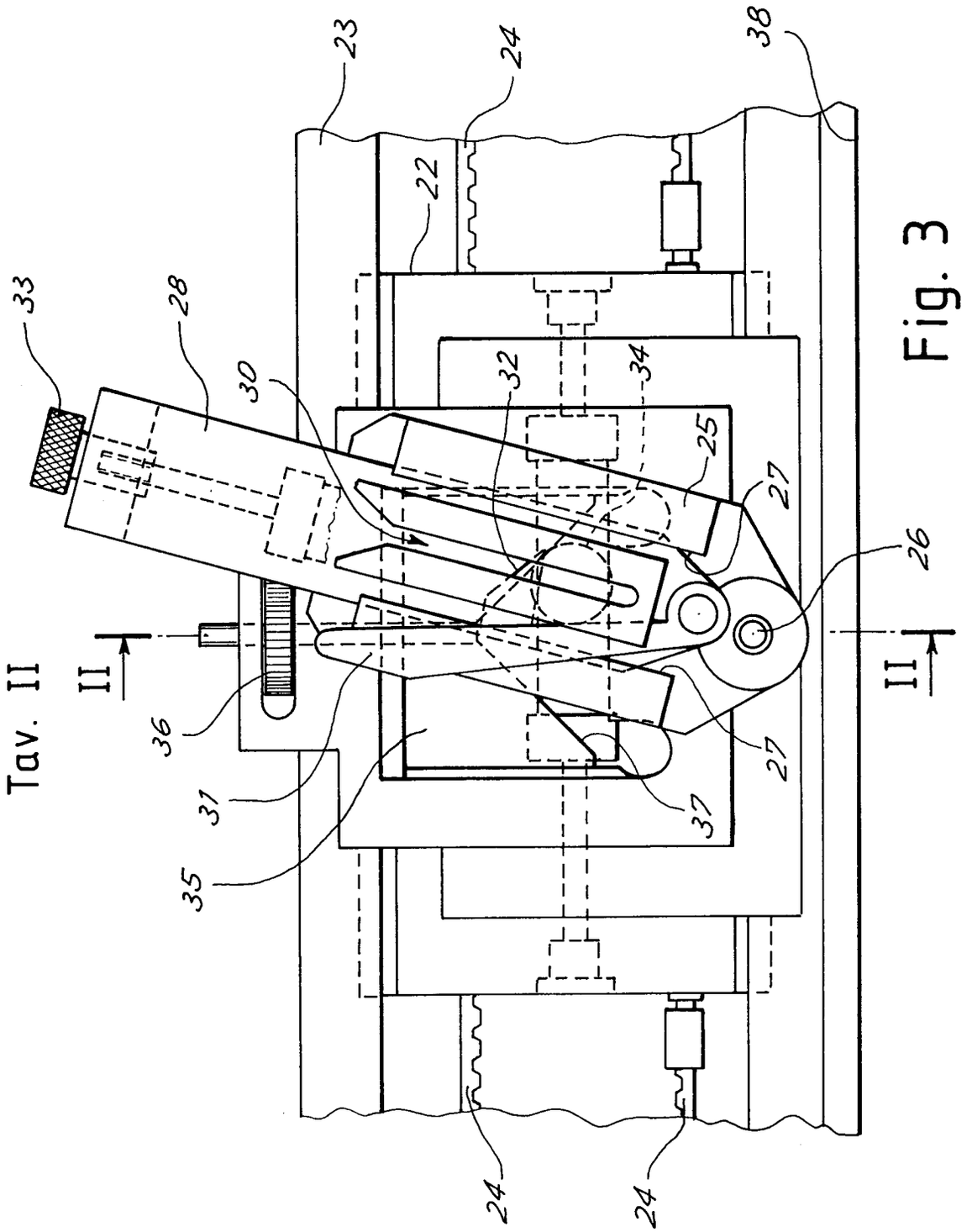

Fig. 3

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EUROPEAN SEARCH REPORT

Application Number
EP 97 20 1297

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A	EP 0 246 209 A (SVECIA SILKSCREEN MASKINER AB) * the whole document * ---	1	B41F15/42
A	CH 440 335 A (ZIMMER) * the whole document * -----	1,2	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

B41F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	25 July 1997	Helpiö, T.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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