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(54) Improvements in or relating to printing presses.

(57) An ink rail (11) for a printing machine is proposed which provides a ink chamber (25) extending longitudinally of the rail, a multiplicity of feed passages (28) supplying ink from the chamber (25) to a common concave surface (16) of the rail, an adjustable key (31) in each respective feed passage (28), and adjustment means (39) operable on said keys to control the position thereof within the respective feed passage thereby to control flow of ink therethrough. The adjustment means includes stepping motors (41) for the individual keys (31).

In an alternative embodiment a second ink chamber is provided, there being a second multiplicity of feed passages connecting that ink chamber with the common concave surface each with a respective adjustable key, the adjustable keys of corresponding feed passages of the two multiplicities thereof being adjustable by a common control means.

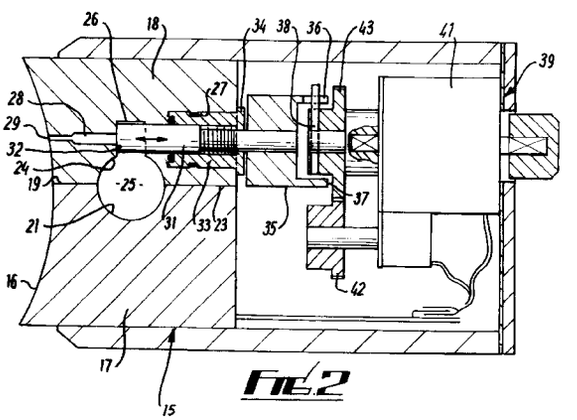

Fig 2

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The invention concerns improvements in or relating to printing machines, and has particular reference to means for supplying ink or other fluid to the printing roller thereof.

It is common practice, in printing machines, to supply ink to a delivery roll by means of a doctor blade which is adjustable as to its distance from the roll at closely spaced intervals along its length, thereby to control the rate of take up of ink by the roll. Ink taken up by the delivery roll is then transferred in succession to a series of rolls moving in contact one with another and is evenly applied to the printing roll.

The degree of control of the known arrangement as regards rate of application of ink and the uniformity of such application across the machine falls far short of what is required in present day high speed printing machines as used in printing news papers and the primary object of the invention is to provide an improved means for supplying ink to the printing rollers.

According to one aspect of the present invention there is proposed in or for means for supplying ink or fluids to the printing roller of a printing machine a regulator comprising a movable key selectively engageable with a feed passage in flow restraining relationship therewith and stepping motor means drivingly connected with said key to effect motion of the key relative to the passage and thereby vary the rate of flow therethrough.

Preferably the key is arranged coaxially with the flow passage and said key is movable axially relative to the end thereof in adjusting the rate of flow.

According to another aspect of the invention there is proposed, in or for means for supplying ink or fluids to the printing roller of a printing machine, a structure comprising an elongate ink rail, an ink or fluid chamber in said rail and extending in the longitudinal direction thereof, a multiplicity of spaced parallel feed passages in said rail having respective outlet orifices at a common surface of said rail, a corresponding multiplicity of adjustable keys, one for each feed passage, operable to control flow of ink or fluid to and through the respective feed passages, and control means operable on said keys to effect controlled adjustment thereof, the said common surface being cylindrically concave at least in that region thereof whereat said feed passages exit the rail.

Preferably the feed passages extend between the flank of a channel contiguous with the fluid chamber at the upper region thereof and the said common surface and the inner end of each key is selectively engageable with the said flank to overly the end of the respective said passages so as effectively to close the same.

According to a further preferred feature, each key is adjustable in the axial direction of the respective feed passage and the control means includes a stepping motor operatively connected with the key and adapted upon actuation axially to displace said key.

According to a still further preferred feature each key is screw-threadedly engaged with a respective bush seated in the rail and adjustment of the key is achieved by rotation of said key relative to its bush on actuation of the related stepping motor.

The invention will now be described further, by way of example, with reference to the accompanying drawings in which : -

Fig. 1 is a diagrammatic front elevation of an arrangement for supplying ink to a roller of a printing machine;

Fig. 2 is a section on line A-A of the printing rail of Fig. 1;

Fig. 3 is a section on line B-B of the density control valve shown in Fig. 1; and

Fig.4 is a view corresponding to Fig.2, and shows a printing rail adapted to supply two colours of ink.

Referring now to the drawings, and particularly to Fig. 1 thereof, an ink supply arrangement for a printing machine comprises an ink rail 11 of a length in excess of the intended printing width and feed means 12 for supplying ink to the rail, the feed means 12 including an ink reservoir, a positive displacement pump 13 and a density control valve 14 to which ink from the reservoir 13 is fed by the pump 14 and from which ink is supplied to the rail 11.

The ink rail 11, see now Fig. 2, comprises an elongate, generally rectangular body 15, that face of the body intended for disposition in closely spaced opposed relationship with the roller to which the ink is to be applied being of concave, part-cylindrical form of a curvature approximating to that of the said roller. The body 15 is conveniently of aluminium and is split along its horizontal centre line to give upper and lower body parts 17, 18.

The upper face 19 of the lower body part 18 includes a channel 21 of semi-circular transverse cross-section to which ink is fed from the density control valve 15 through the feed pipe 22.

The lower face 23 of the upper body part 18 has a channel 24 of like semi-circular transverse cross section to that provided in the lower body part 17, the channels 21, 24 in the respective body parts being in superimposed register to define an ink chamber in the body. In contra-distinction to the lower body part, the upper body part 18 further includes a groove 26 longitudinally thereof and as an extension of the channel 24 into the body part, the groove 26 being of rectangular transverse cross section and being for a purpose hereafter to be made apparent.

A multiplicity of stepped holes 27 is provided in side-by-side disposition in the upper body part, the said holes extending parallel to the lower face 23 of the body part and throughout the full extent of such body part. The stepped holes 27 are so positioned as to pass through and transversely of the groove 26 and are each such as to provide an outer section, an intermediate section and an inner section of succes-

sively reducing diameters.

The concave face 16 of the upper body part 18 is slotted in register with the inner section 28 of each stepped hole, the slots 29 preferably being of arcuate section when considered in the longitudinal direction thereof with the slots of the successive stepped holes 28 being in alignment and merging one with another to give a continuous slot at the surface of the body part of cyclically varying depth longitudinally of the body part.

Each stepped hole 27 receives a cylindrical key 31 into engagement therewith, the key 31 being movable axially of the stepped hole 27 and being engageable with a flank 32 of the groove 26. The key is mounted in a bush 33 seated in sealed relationship in the outer section of a respective stepped hole 27 and is screw-threadedly engaged therewith so as to be movable to or from engagement with the said flank 32. The bush 33 has an hexagonal flange 34 at its outer end which seats against the upper body part 18, thereby to ensure accuracy of location of the bush 33 axially of the stepped hole 27. Outwardly of the bush the key 31 is secured to cylindrical collar 35 of sleeve-like form, there being a control slot 36 in the annular end face 37 of the collar 35 to receive a radial pin 38 carried by a displacement means 39.

The displacement means 39 consists of a stepping motor 41, moving in 200 increments per revolution, drivingly connected with the key 31 through gearing 42, 43, the stepping motor 41 being electronically controlled by means which form no part of this invention but which adjust the key 31 longitudinally of the bush 33, and thus relative to the step formed by flank 32, and thereby vary the cross-sectional dimensions of the flow passage between channel 26 and the inner section 29 of the stepped hole 27.

The density control valve 15, see now Fig. 3, comprises an aluminium body 44 of rectangular form having a through passage 45 therein to receive a shuttle valve member 46 into sliding engagement therewith, an inlet passage 47 in the body 44 in fluid flow relationship with the through passage 45 through an inlet port in the region of the shuttle restrictor 48 and two outlet ports in the wall of the through passage symmetrically positioned with respect to the shuttle restrictor 48 in the mid-position thereof and leading to outlet passages 49, 51 in fluid flow relationship with the ink rail 11 and ink reservoir 13, respectively. The relationship between the outlet ports and the flow restrictor is such that adjustment of the shuttle valve member in the axial direction thereof will vary the proportion of ink fed to the ink rail and that returned to the reservoir.

The density control valve 15 further includes an automatic adjustment means therefor, said adjustment means comprising a linear stepping motor 52 drivingly connected with the shuttle valve member 46 and operating under the control of a sensing means (not shown) sensitive to print density of the printed sheet.

In use, ink is delivered to the ink chamber 25 in the ink rail 11 from the reservoir 13 by the positive displacement pump 14, a proportion of the ink delivered by such pump 14 passing to the chamber 25 and the balance returned to the reservoir 13 according to the setting of the density control valve 15.

Ink fed to the ink chamber 25 fills such chamber from the bottom, and thus no ink can be applied to the roller until such chamber is full and the ink therein is under pressure.

From the ink chamber 25 ink passes to the roller through the inner section 29 of the respective stepped holes 27 in the upper body part 18, the rate of feed at each position being variable according to the position of the respective key 31 relative to the adjacent end of such inner hole section.

As will be appreciated, each key is individually controllable as to rate of feed according to the setting of that key whilst the rate of delivery of the ink rail as a whole, and thus the keys considered collectively, is variable by adjustment of the shuttle valve member.

By using stepping motors for adjustment of the keys and the density control valve we are able to achieve optimum operating conditions according to the specific circumstances obtaining in a ready and rapid manner.

By a modification of the structure the ink rail can serve to feed two different inks.

Thus, referring now to Fig. 4, a further ink chamber is provided in the lower body part, such chamber including a part-cylindrical section to which the ink is first fed and a groove extending from the upper region of such section. A stepped hole is provided as before, and a key is engaged with that stepped hole. However, the screw-threaded engagement between the key and bush is of opposite hand to that of the first key/bush combination and the keys are drivingly connected by gears secured to the respective keys. A common stepping motor serves both keys, and thus both keys are operated simultaneously and in a like sense. Delivery of ink by one or other array of keys can be selectively adjusted, and by having independent feed systems for the two arrays the arrangement can be used for delivery of one or other of the inks supplied to the ink chambers. There will be no leakage of the ink of the non-elected system in the absence of feed to the relevant chamber.

The invention is not restricted to the detail of the arrangements hereinbefore described, since alternatives will readily present themselves to one skilled in the art.

Thus, for example, whilst in the arrangements herein disclosed a manual override is provided for key adjusment and for adjustment of the density control valve, the provision of such facility is not essential.

Furthermore, whilst the structures proposed are

intended primarily for delivering ink to a roller in a printing machine in a readily controllable manner, such structures will be of application in applying controlled quantities of water to the printing roller as is required in the printing process.

The ink rail hereinproposed is, of course, readily capable of adjustment to supply ink to a restricted width only of the printing roller or, by isolating sections of the rail and providing a respective ink supply to the different sections, simultaneously to supply different ink to different sections of the printing machine.

It is preferred that the inner end of the key be at right angles to the axis thereof for sealing engagement with the opposing flank of the channel. However, in some instances it might be found preferable for such inner end to be of tapered form and for the corresponding end of the stepped bore to be of conical form.

Claims

1. In or for means for supplying ink or fluids to the printing roller of a printing machine, a regulator comprising a movable key selectively engageable with a feed passage in flow restraining relationship therewith and stepping motor means drivingly connected with said key to effect motion of the key relative to the passage and thereby vary the rate of flow therethrough.

2. The regulator as claimed in claim 1, wherein the key is movable axially relative to the end thereof in adjusting the rate of flow.

3. In or for means for supplying ink or fluids to the printing roller of a printing machine, a structure comprising an elongate ink rail, an ink or fluid chamber in said rail and extending in the longitudinal direction thereof, a multiplicity of spaced parallel feed passages in said rail having respective outlet orifices at a common surface of said rail, a corresponding multiplicity of adjustable keys, one for each feed passage, operable to control flow of ink or fluid to and through the respective feed passages, and control means operable on said keys to effect controlled adjustment thereof, the said common surface being cylindrically concave at least in that region thereof whereat said feed passages exit the rail.

4. A structure as claimed in claim 3, wherein the feed passages extend between the flank of a channel contiguous with the fluid chamber at the upper region thereof and the said common surface and the inner end of each key is selectively engageable with the said flank to overly the end of the respective said passages so as effectively to close the same.

5. A structure as claimed in claim 2 or 3, wherein each key is adjustable in the axial direction of the respective feed passage and the control means includes a stepping motor operatively connected with the key and adapted upon actuation axially to displace said key.

6. A structure as claimed in any one of claims 3 to 5, wherein each key is screw-threadedly engaged with a respective bush seated in the rail and adjustment of the key is achieved by rotation of said key relative to its bush on actuation of the related stepping motor.

7. A structure as claimed in claim 3, wherein the individual feed passages in the rail terminate in elongate slots at the said common concave surface, the slots extending in the longitudinal direction of the rail and the slots of the successive feed passages merging one into another to give a continuous slot of cyclically varying depth longitudinally of the body part.

8. A structure as claimed in claim 3, further including feed means for supplying ink to the rail, the feed means including an ink reservoir, a positive displacement pump and a density control valve from which and to which ink is fed by the pump and from which ink is supplied to the rail.

9. A structure as claimed in claim 8, wherein the density control valve comprises a body, a though passage in said body, a shuttle valve member in said through passage, an inlet port, first and second outlet ports in selective fluid flow connection with the inlet port according to the position of the shuttle valve member, the first and second outlet ports being in fluid flow connection with the rail and reservoir, respectively, and adjustment means sensitive to print density of a sheet printed by the structure and adapted to control the position of the shuttle valve member in accordance therewith.

10. A structure as claimed in claim 3, including a further ink chamber in the ink rail and extending longitudinally thereof, a second multiplicity of spaced parallel feed passages in said rail, the individual feed passages having respective outlet orifices at said common surface, and a second corresponding multiplicity of adjustable keys, one for each feed passage, the said second multiplicity of adjustable keys being operatively connected with said control means.

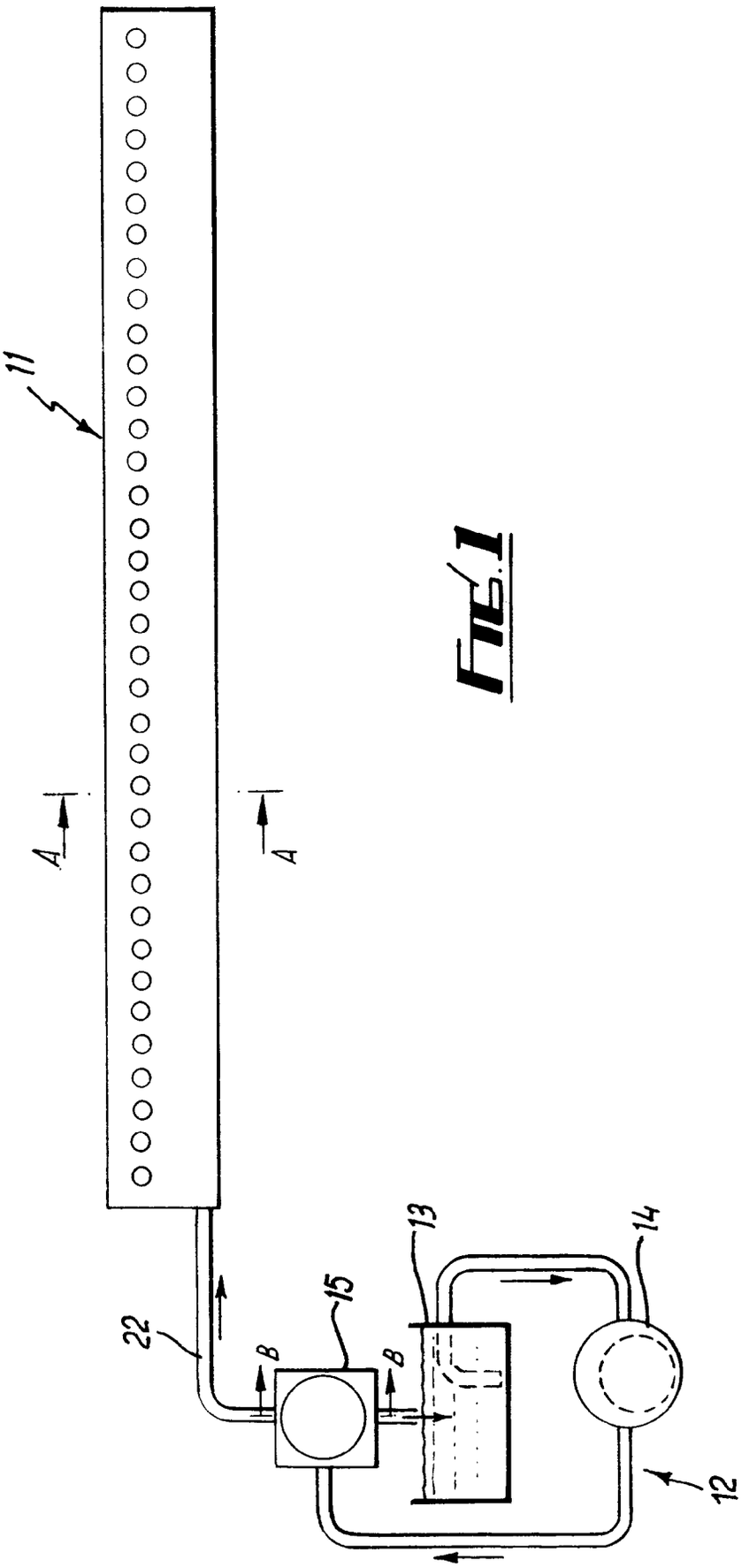

Fig.1

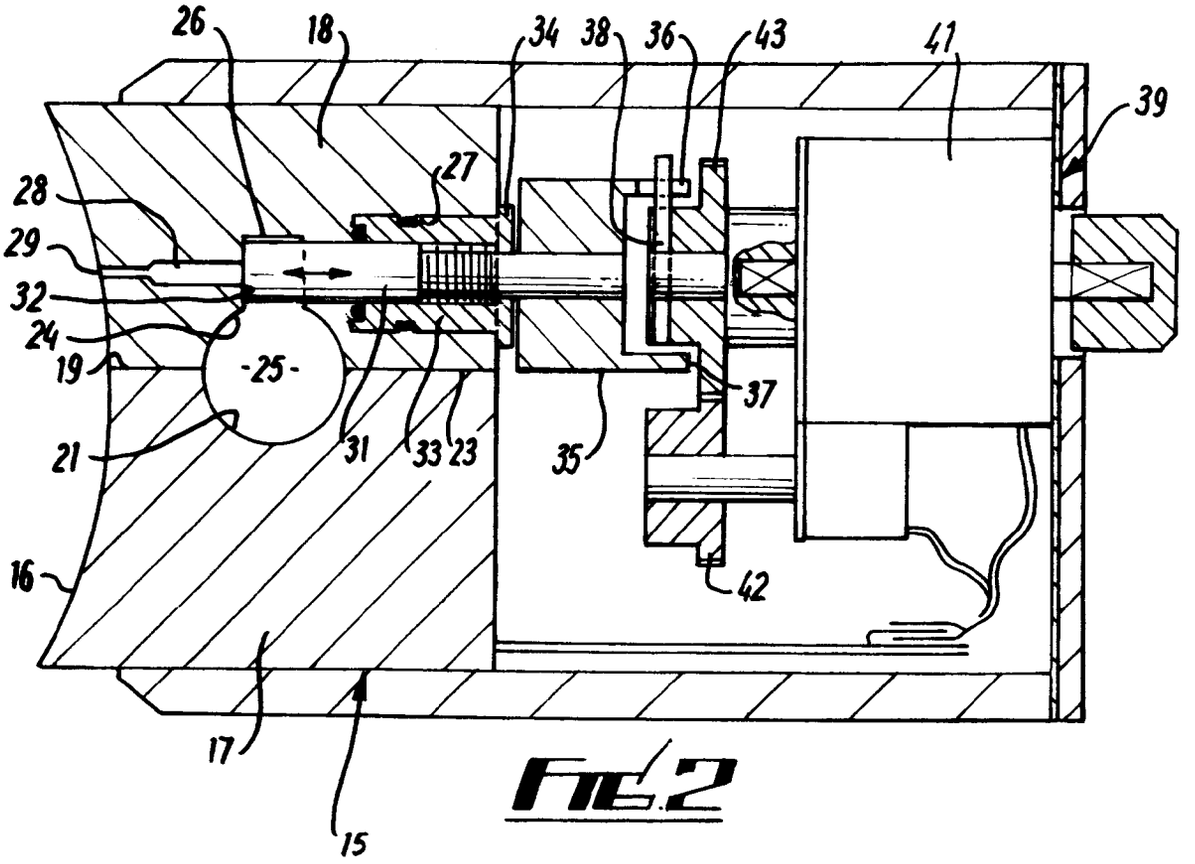
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FIG.2

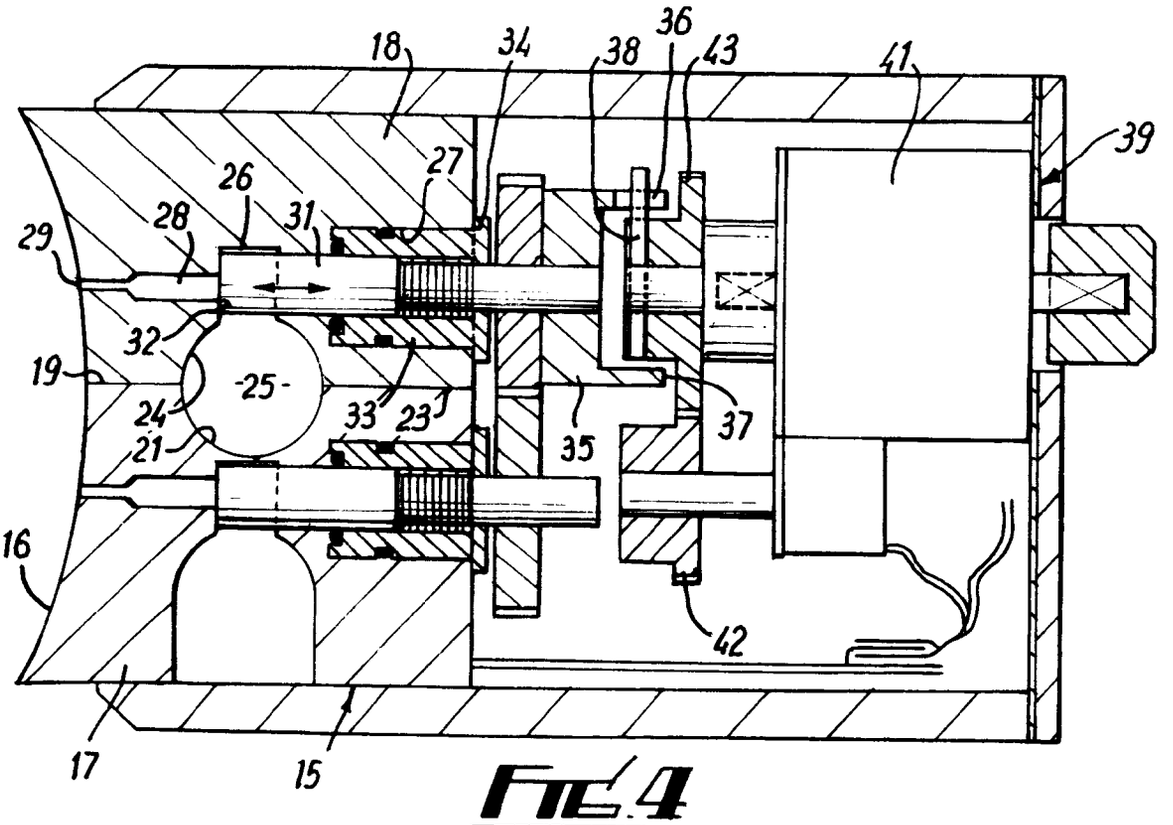
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FIG.4

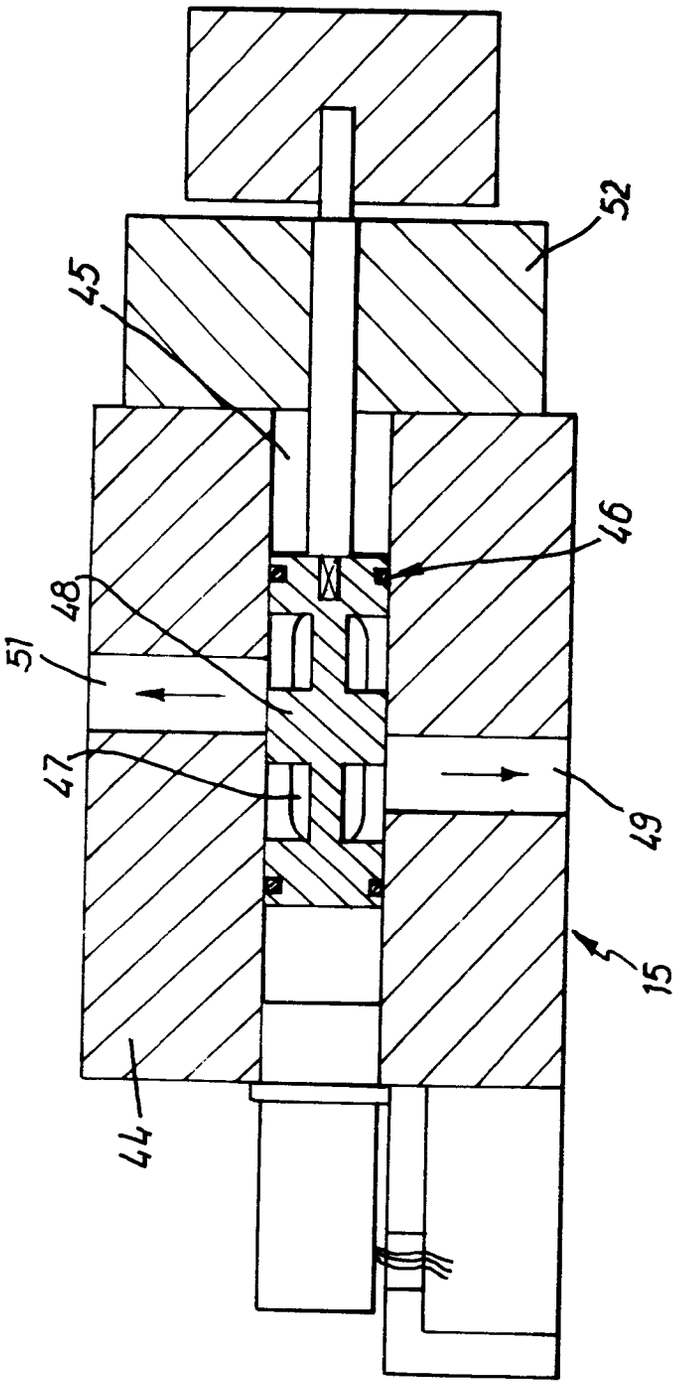

FIG.3

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EUROPEAN SEARCH REPORT

Application Number
EP 92 30 6500

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.5)
A	US-A-2 130 659 (H. WEDEMEYER) * page 1, left column, line 43 - right column, line 32 * * page 2, left column, line 17 - line 60 * * claim 1; figures 1,2,4,7-9 *	1-10	B41F31/02 B41F31/08
A	GB-A-434 107 (SCHNELLPRESSENFABRIEK KOENIG & BAUER, AG) * page 2, line 54 - line 74 * * page 2, line 105 - page 3, line 11 * * page 3, line 70 - page 4, line 16 * * figures *	1-10	
A	US-A-3 439 609 (J. P. DORR)		
A	DE-A-3 743 646 (TOSHIBA AUTOMATION CO., LTD.) * column 2, line 9 - line 50 * * column 4, line 17 - line 52 * * column 7, line 46 - column 8, line 26 * * figures 1-3,5-7 *	1	
A	EP-A-0 350 569 (ROCKWELL INTERNATIONAL CORPORATION) * claim 1; figure 1 *	1,3,8-10	TECHNICAL FIELDS SEARCHED (Int. Cl.5) B41F
A	US-A-3 046 885 (F. NEAL) * column 2, line 13 - line 23 * * figures 1,2 *	7	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	02 NOVEMBER 1992	BOURSEAU A.M.

CATEGORY OF CITED DOCUMENTS

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