(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 393 336 A1**

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **90104000.6**

(51) Int. Cl.5: **B41F 31/36, B41F 13/40**

(22) Date of filing: **01.03.90**

(30) Priority: **21.04.89 IT 2024789**

(43) Date of publication of application:
24.10.90 Bulletin 90/43

(84) Designated Contracting States:
AT BE CH DE DK ES FR GB GR IT LI LU NL SE

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(54) A flexographic machine.

(57) A flexographic machine (1) which can speed up to an unusual degree the setting operations which become necessary, for instance, in moving from one production to a different one, comprises, on a frame structure (2), an impression roll (3), a printing roll (5) supported at its ends (6) by a slide pair (7) fitting slidably on the frame structure (2) to bring the printing roll (5) into contact with the impression roll (3), a screened roll (8) supported at its ends (9) by a shoe pair (10) wherein each shoe (10) is mounted slidably to a respective one of said slide pair (7) to bring the screened roll (8) into contact with the printing roll (5), and locking means (15,16) for securing the slides (7) and shoes (10) to the frame structure (2) wherein the screened roll (8) and printing roll (5) are shiftable sequentially through respective elevator means (19,20) between a reference operative position and an inoperative position away from the printing roll (5) and the impression roll (3), respectively.

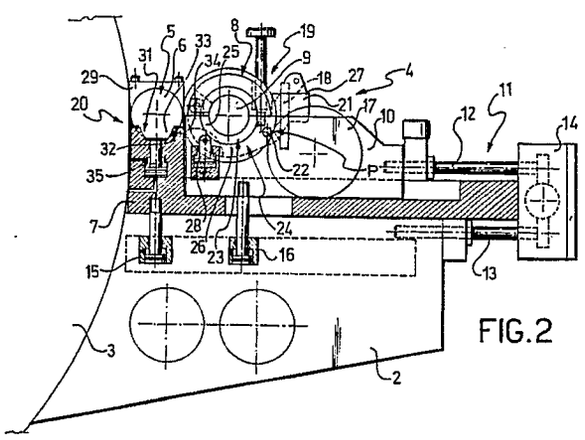

FIG.2

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This invention relates to a flexographic machine of a type which comprises, on a frame structure, an impression roll, a printing roll supported at its ends by a pair of slides fitting slidably on the frame structure to bring the printing roll in contact with the impression roll, a screened roll supported at its ends by a shoe pair wherein each shoe is mounted slidably on a respective one of said slide pair to bring the screened roll in contact with the printing roll, and locking means for securing the slides and shoes to said frame structure.

Such a machine, while performing satisfactorily on the whole and being widely used, still has a well-recognized drawback which becomes apparent every time that the machine requires to be set or on the occurrence of shutdowns due to operational problems.

In the instance of a machine setup, where the end product is to be a multi-color one, and a printing station has been arranged for each color which includes a respective printing roll and screened roll, one is obliged to move from one color to another until all the colors register.

On completion of one color registration, the rolls for that particular color must be moved apart in order to gain access to the next color rolls for registering.

On the occurrence of an operational problem, prior to shutting down the machine, it is again necessary to move apart the rolls.

Each time that rolls relating to one color are moved apart, or for that matter, all the machine rolls are moved apart, it becomes necessary to timely remove residual ink from the printing roll, if the ink residue is not to impair resumption of the printing cycle.

After the machine has been set up, or the problem interfering with the printing course has been removed, production can be resumed, with the rolls brought back toward each other by micrometric setting of the shoes and slides such that the rolls can contact each other in the proper mutual relationship.

Now, both the residual ink removing and re-setting operations are obviously laborious and time-consuming steps that bear on the ultimate cost.

Flexographic machines have been proposed wherein the rolls are moved apart by manipulation of the shoe and slide drive screws to bring about, prior to stopping the impression roll, a rearward movement of the shoes and, with some delay, a rearward movement of the slides as well. In this way, the ink residue left on the printing roll is allowed to deposit onto the impression roll.

That procedure does away, therefore, with the operation of removing the residual ink from the printing roll, but makes for re-setting inaccuracies on bringing the rolls back together as a consequence of the slides and shoes having been loosened and re-tightened on the frame structure. Thus, there still exists a need to go through the micrometric setting procedure for the slides and shoes every time.

Flexographic machines have been proposed wherein the slides and shoes can be re-set, after their releasing, with the intermediary of NC arrangements associated with the screw drives and employing linear position transducers to precisely detect the actual positions of the slides and shoes before tightening back down on achieving the correct setting.

Such machines are somewhat complicated and the degree of accuracy afforded by them is tied to thermal deformations undergone by the machine frame structure, which deformations can only be checked by keeping the temperature constant through appropriate thermal control means.

The problem that underlies this invention is to provide a machine of the type specified above, which has such construction and performance characteristics as to overcome the above-noted drawbacks.

This problem is solved by a machine as indicated being characterized in that the screened roll and the printing roll are movable sequentially by respective elevator means between a reference operative position and an inoperative position respectively away from the printing roll and the impression roll.

Further features and the advantages of a flexographic machine according to this invention will become apparent from the following detailed description of a preferred embodiment thereof, given by way of non-limitative example with reference to the accompanying drawings, where:

Figure 1 is a schematic view of a flexographic machine according to the invention;

Figure 2 is a detail view of the machine shown in Figure 1; and

Figure 3 and Figure 4 are enlarged scale views of a detail of the machine shown in Figure 1, taken at different stages of its operation.

With reference to the drawing views, generally indicated at 1 is a flexographic machine which comprises, on a frame structure 2, an impression roll 3 and a plurality of printing stations, all indicated at 4.

Each printing station 4 includes a printing roll 5 which is supported, at its opposed ends 6, on a pair of slides 7. The slides 7 are mounted slidably on the frame structure 2 to bring the printing roll 5 to contact the impression roll 3 along a substantially radial direction thereto.

Each printing station 4 further includes a screened roll 8 which is supported, at its opposed ends 9, on a pair of shoes 10.

Each shoe 10 is mounted slidably on a respective one of the slides 7 to bring the screened roll 8 to contact the printing roll, substantially along the above-noted radial direction.

A conventional drive 11 includes a pair of drive screws 12 and 13 led to a common drive motor 14 for driving the slides and shoes in a simultaneous and synchronized manner.

Locking cylinders 15 and 16 are arranged to respectively secure the slides 7 and shoes 10 to the frame structure 2 according to necessity.

It should be noted that the shoes 10 also mount, in a removable manner, a rubber-lined ink applicator roll 17 which contacts the screened roll 8 at a point designated P for its inking.

Alternatively, instead of the rubber-lined ink applicator roll 17, an ink applicator blade 18 may be mounted on the shoes 10 as shown in phantom lines on the drawings.

On the flexographic machine 1 according to the invention, the screened roll 8 is shiftable, along a substantially perpendicular direction to said radial direction and with the intermediary of an elevator means 19, between an operative reference position where it is in working contact with the printing roll 5, and an inoperative position where it is held away therefrom by a distance indicated at a in the drawing view.

Sequentially to the displacement of the screened roll 8, the printing roll 5 is also shiftable, along a substantially perpendicular direction to said radial direction and through an elevator means 20, between a position where it is in working contact with the impression roll 3 and an inoperative position where it is held away therefrom by a distance indicated at b in the drawing view.

As a result of the displacement imparted to the printing roll 5, the distance between the screened roll 8 and the printing roll 5 will change: this newly established distance is indicated at c in the drawing view.

The elevator means 19 for the screened roll 8 have at each end 9 of the latter a body 21, which bears said end 9 rotatably therein and is shiftanble angularly about a pivot pin 22 carried on the shoe 10 at a spacing from the axis of the screened roll 8, it being preferably located at the point P.

In this way, the contact of the screened roll 8 with the rubber-lined roll 17 can be maintained even as the elevator means 19 is operated.

Detent means and backing means 23 and 24 are formed on the body 21 and the shoe 10, respectively, which will precision engage with each other, with the screened roll 8 at its reference position.

Preferably, said detent means and backing means, 23 and 24, respectively comprise a circular arc projection 25 formed on the body 21, and a mating circular arc cradle 26 formed in the shoe 10.

A pad 27 is advantageously provided on the body 21 for attaching the doctoring blade 18 to the body 21, thereby the contact between the screened roll 8 and the blade 18 can be maintained even while the elevator means 19 is brought into operation.

The elevator means 19 is completed by an oil-operated cylinder 28 arranged to act on the body 21 to drive it angularly about the pivot pin 22.

The elevator means 20 includes, for each end 6 of the printing roll 5, a body 29 wherein said end 6 is born rotatably and which is shiftable linearly along a track 30 formed on the slide 7.

Detent means and backing means, 31 and 32, are respectively formed on the body 29 and the slide 7 which precision engage each other with the printing roll 5 at its reference position.

Advantageously, said detent means and backing means, 31 and 32, respectively comprise a V-shaped projection 33 formed on the body 29, and a V-shaped recess 34 formed in the slide 7.

The elevator means 20 is completed by an oil-operated cylinder 35 arranged to act on the body 29 to drive it linearly.

Note should be taken of that the oil-operated cylinder 35 itself provides said track 30.

The operation of the flexographic machine according to this invention will be described herein below with reference to a starting condition (see Figure 2) whereby the screened roll and printing roll of a printing station are at their operative positions, in contact with each other.

Under this condition, the slides 7 and shoes 10 will be locked to the frame structure 2, with the required setting precision, by the locking cylinders 15 and 16, respectively. This is a condition which may be met with the printing process in progress, or upon completion of the color setting at that particular printing station.

When the printing process requires to be discontinued on account of any operational problems, or when the color of another station is to be registered, the elevator means 19 for the screened roll 8 is activated. Thus, the latter roll will be caused to move from its operative position to its position away from the printing roll 5, at a distance a therefrom (see Figure 3).

Thereafter, the elevator means 20 of the printing roll is activated.

The latter roll will then move, in turn, from its operative position to the inoperative one both away from the impression roll 3, at a distance b therefrom, and the screened roll 8, at distance c therefrom (see Figure 4). After the operational problem has been remedied, or all the colors have been brought to register, the elevator means 19 and 20

are deactivated, thereby the screened roll 8 and printing roll 5 will be allowed to precisely recover their reference positions; under this condition, in fact, the circular arc projection 25 will precision engage in the circular arc cradle 26, and likewise, the V-shaped projection 33 will precision engage in the V-shaped recess 34.

Under such conditions, the flexographic machine can begin to print.

A major advantage of the flexographic machine according to the invention is that it makes for unusually rapid setting operations and operations to remedy any operational problems, while the setting accuracy is retained because of the slides and shoes being held securely in their locked positions.

A further advantage of the flexographic machine of this invention is that its construction has been kept simple, thereby it is to be expected that long-term reliable operation can be afforded.

In addition, the inventive flexographic machine has proved capable of faultless printing on substrate materials exhibiting local uneveness, such as across short sections of double thickness due to two edges from different materials overlapping and being stuck to each other. In fact, it would then be sufficient to activate the elevator means for just the time required to let the uneven section to move on without problems.

It is also noteworthy that the machine of this invention has proved capable of ensuring smooth inking of the screened roll with either the rubber-lined ink applicator roll or the ink applicator blade. In fact, even upon activation of the elevator means, the rubber-lined ink applicator roll or ink applicator blade will remain in contact with the screened roll as required, since the screened roll would be moved angularly about the point of contact with the rubber-lined roll, whilst the blade would follow the screened roll in said angular movement.

Understandably, the flexographic machine described in the above example may be altered and modified in various ways by the skilled one in the art to meet specific contingent demands, without departing from the true scope of the invention as set forth in the appended claims.

Claims

1. A flexographic machine (1) of a type which comprises, on a frame structure (2), an impression roll (3), a printing roll (5) supported at its ends (6) by a pair of slides (7) fitting slidably on the frame structure (2) to bring the printing roll (5) in contact with the impression roll (3), a screened roll (8) supported at its ends (9) by a shoe pair (10) wherein each shoe (10) is mounted slidably on a respective one (7) of said slide pair to bring the screened roll (8) in contact with the printing roll (5), and locking means (15,16) for securing the slides (7) and shoes (10) to said frame structure (2), characterized in that the screened roll (8) and the printing roll (5) are movable sequentially by respective elevator means (19,20) between a reference operative position and an inoperative position respectively away from the printing roll (5) and the impression roll (3).

2. A flexographic machine (1) according to Claim 1, characterized in that the elevator means (19) for the screened roll (8) comprises, at each end (9) of the screened roll (8), a body (21) wherein said end (9) is born rotatably, said body (21) being shiftable angularly about a pivot pin (22) carried on the shoe (10) in spaced-apart relationship with the axis of the screened roll (8), and detent means (23) and backing means (24) respectively formed on the body (21) and the shoe (10) and being in mutual precision engagement relationship, with the screened roll (8) at its reference position.

3. A flexographic machine (1) according to Claim 2, characterized in that said detent means (23) and backing means (24) between the body (21) and the shoe (10) comprise a circular arc projection (25) formed on the body (21) and circular arc cradle (26) formed in the shoe (10).

4. A flexographic machine (1) according to Claim 3, characterized in that the pivot pin (22) is located substantially at a point (P) of contact of the screened roll (8) with a rubber-lined ink applicator roll (17).

5. A flexographic machine (1) according to Claim 3, characterized in that the body (21) has a pad (27) for the attachment of an ink applicator blade (18).

6. A flexographic machine (1) according to Claim 1, characterized in that the elevator means (20) for the printing roll (5) comprises, at each end (6) of the printing roll, a body (29) wherein said end (6) is born rotatably, said body (29) being mounted to the slide (7) in a shiftable fashion, and detent means (31) and backing means (32) respectively formed on the body (29) and the slide (7) and being in mutual precision engagement relationship, with the printing roll (5) at its reference position.

7. A flexographic machine (1) according to Claim 6, characterized in that said detent means (31) and backing means (32) between the body (29) and the slide (7) comprise a V-shaped projection (33) formed on the body and a V-shaped recess (34) formed in the slide (7).

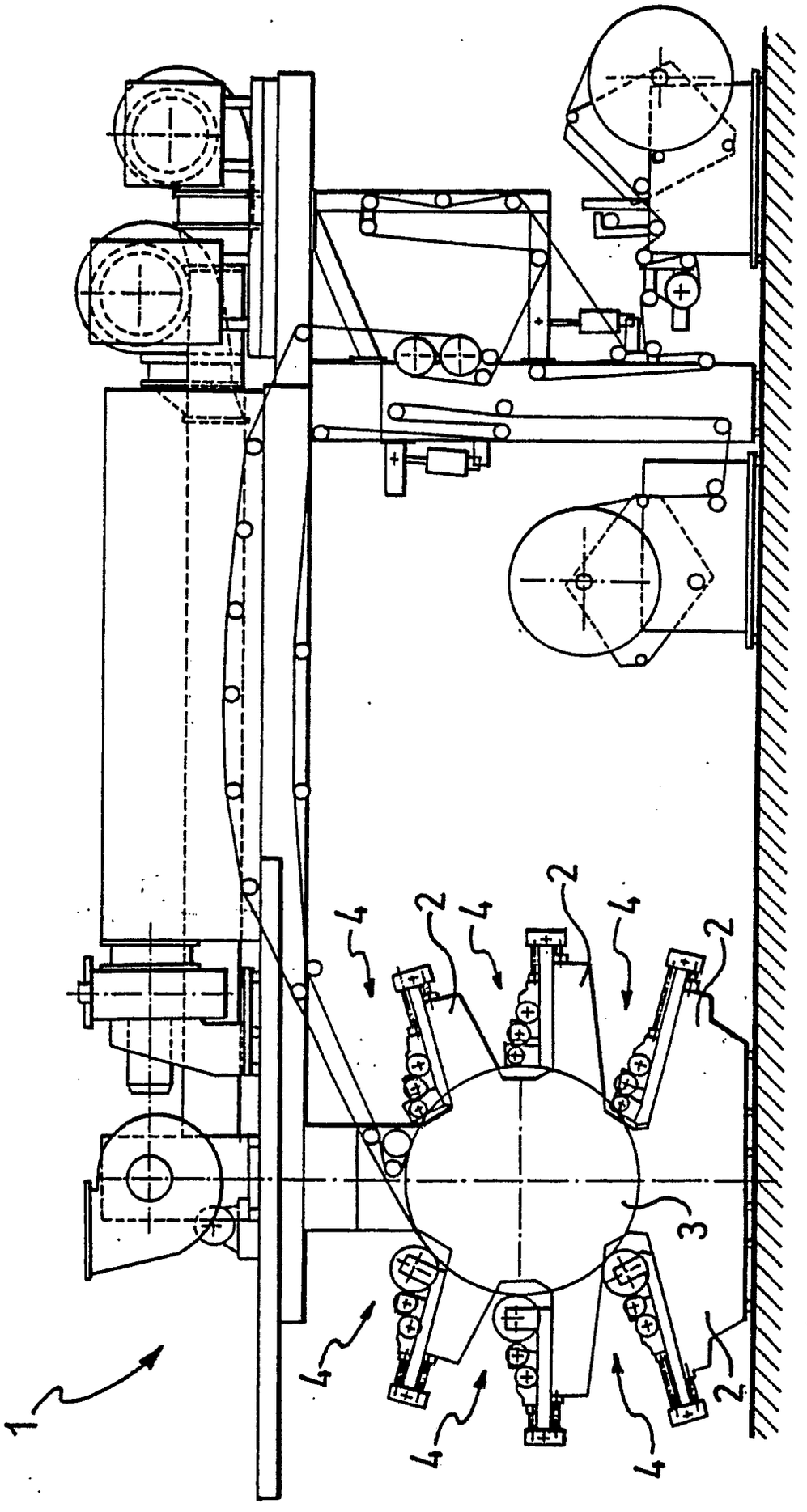

Fig-1

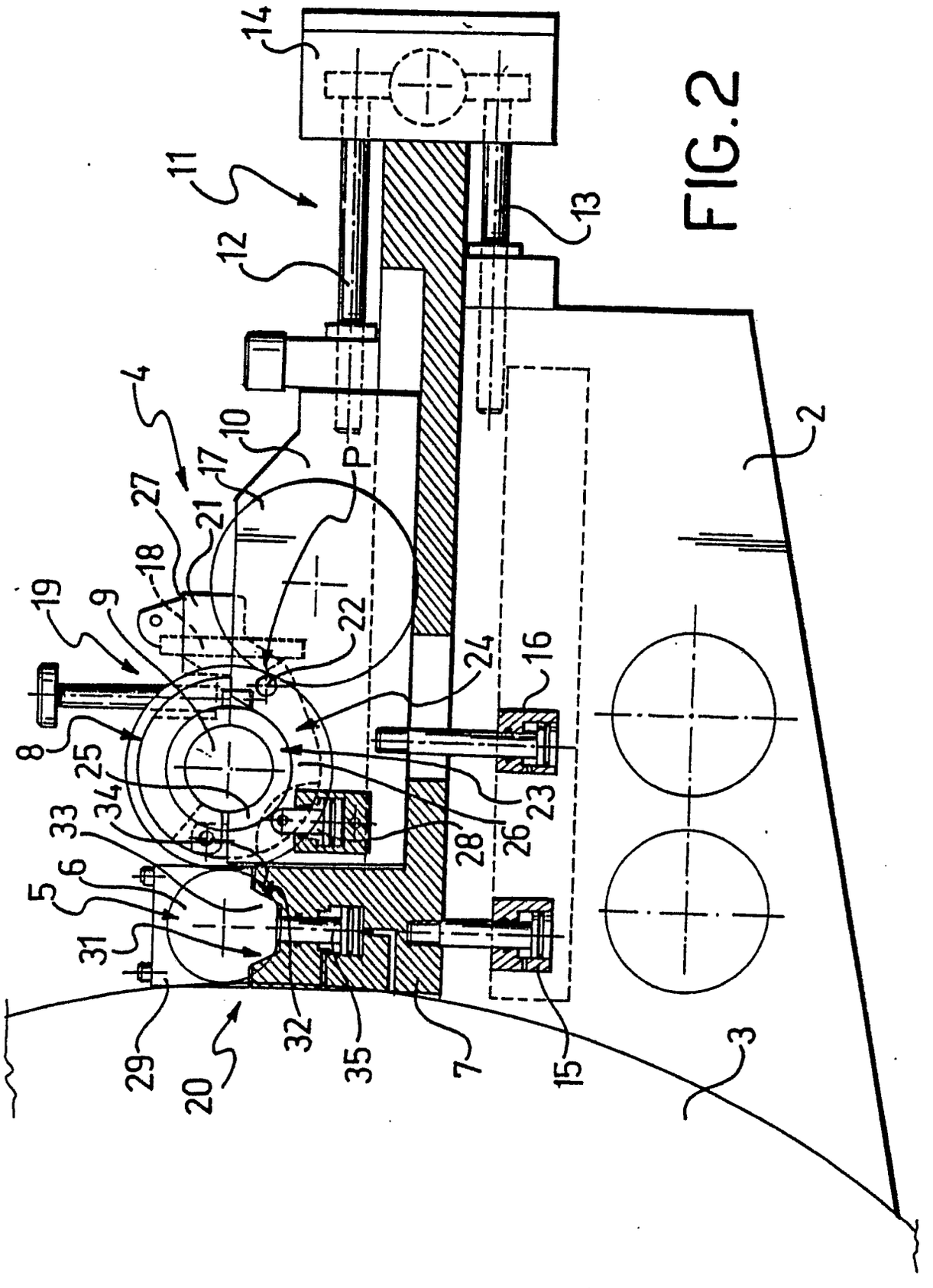
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FIG.2

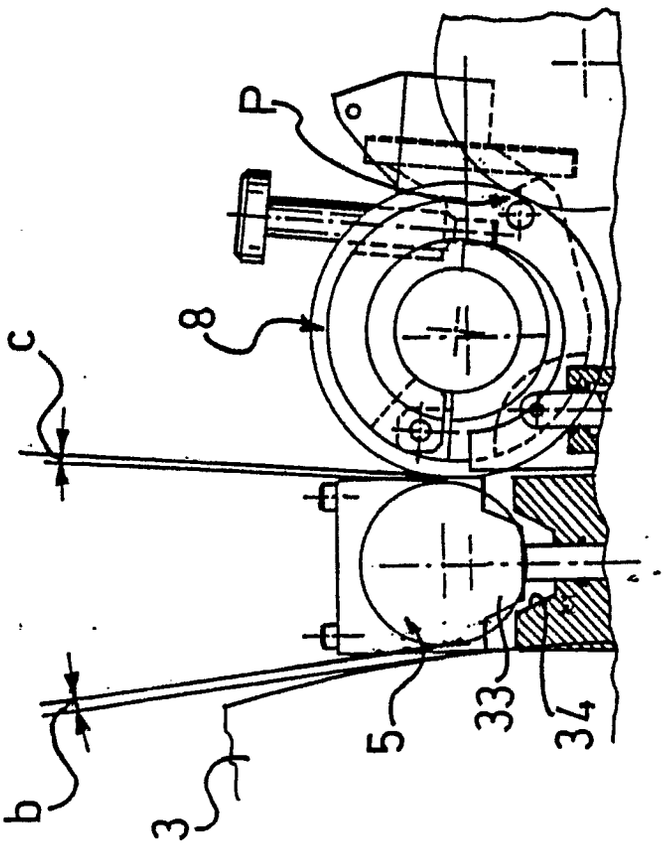

FIG.4

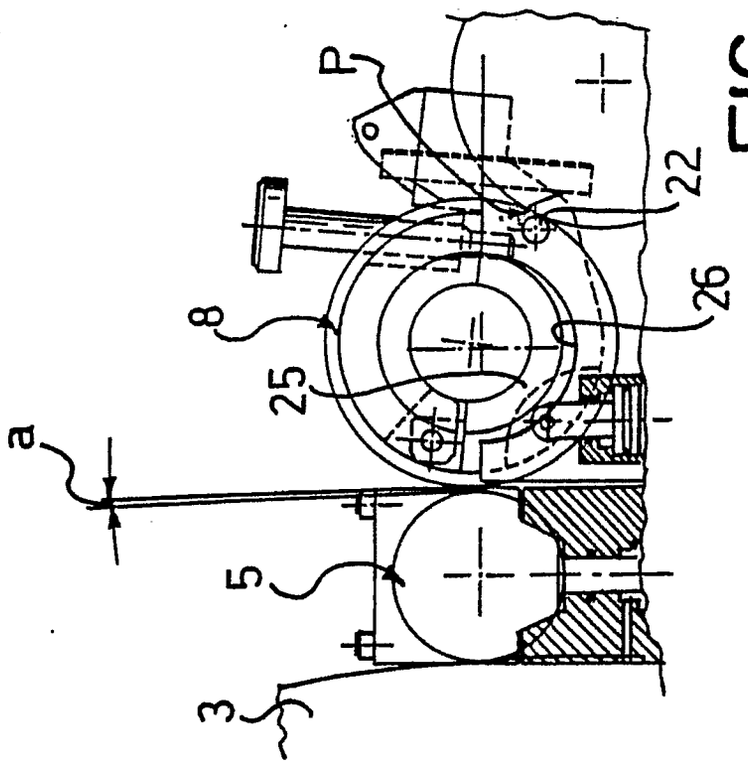

FIG.3

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EUROPEAN SEARCH REPORT

Application Number

EP 90 10 4000

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)
X	FR-A-2485990 (LES ATELIERS DE CONSTRUCTIONS MECANIQUE C. ET A. HOLWEG) * page 4, line 36 - page 5, line 25; figures 1-3 * ---	1, 2, 6, 7	B41F31/36 B41F13/40
A	DE-A-2216514 (WILHELM WEHMEIER) * the whole document * -----	1	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

B41F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	18 JULY 1990	EVANS A.J.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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