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

(11) **EP 2 093 056 A1**

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
26.08.2009 Bulletin 2009/35

(51) Int Cl.:
B41F 13/30 *(2006.01)* ***B41F 5/24*** *(2006.01)*

(21) Application number: **08425104.0**

(22) Date of filing: **21.02.2008**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MT NL NO PL PT RO SE SI SK TR
Designated Extension States:
AL BA MK RS

(71) Applicant: **Bielloni Converting S.p.A.**
20129 Milano (IT)

(72) Inventor: **Viola, Michele**
20031 Cesano Maderno (Milano) (IT)

(74) Representative: **Petruzziello, Aldo et al**
Racheli & C. S.p.A.
Viale San Michele del Carso, 4
20144 Milano (IT)

(54) Printing unit for web printing press

(57) A printing unit (100) for a printing press for web material is disclosed, comprising: a plate cylinder (2) mounted rotatably at its ends (20) on two supports (1) mounted to slide horizontally on linear guides (5) integral with the sides (50) of the press structure, the plate cylinder (2) being designed to press against a drum (7) on which the web material to be printed runs; an anilox roll (4) mounted rotatably at its ends (20) on two supports (3) mounted to slide horizontally on linear guides (5), the anilox roll (4) being designed to press against the plate cylinder (2) to transfer ink from the anilox roll (4) to the plate cylinder (2); drive screws (6) operationally connected to the supports (1, 3) to drive them in translation; at least one handle (8) mounted in at least one of the supports (1, 3) that can be operated by the operator so as to uncouple said support (1, 3) both from the end (20) of the mandrel of the plate cylinder (2) or of the anilox roll (4) and from the drive screw (6).

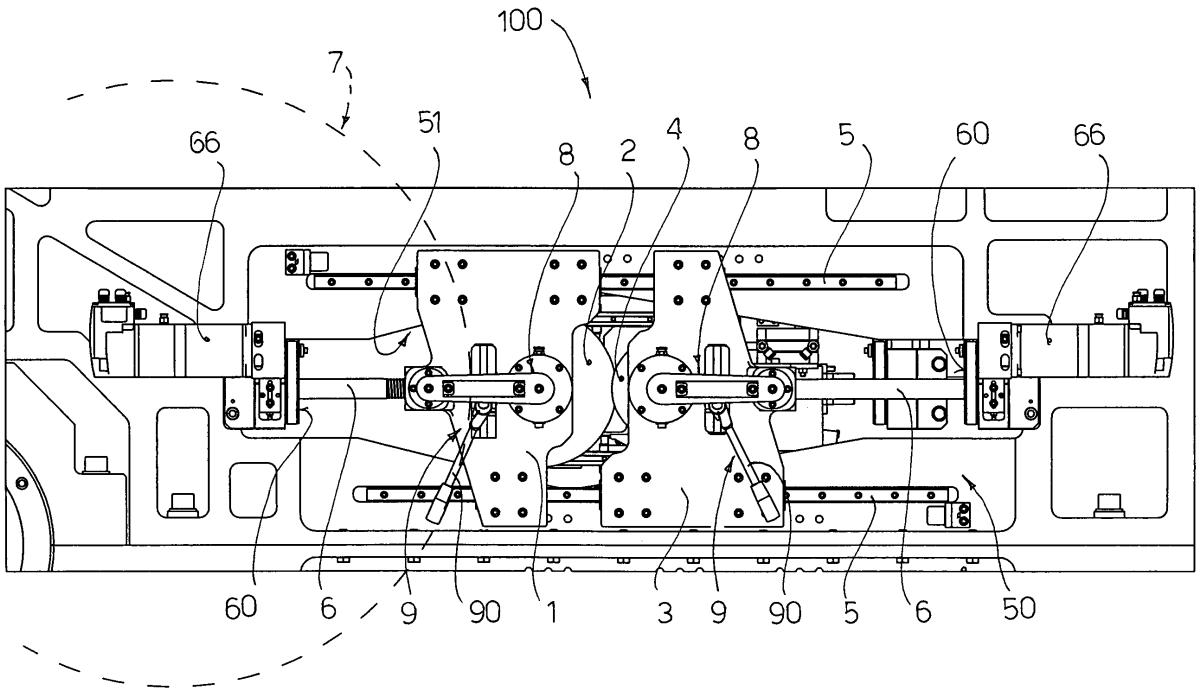


FIG.1

EP 2 093 056 A1

Description

[0001] The present invention relates to a printing unit for a web printing press.

[0002] As is known, a printing press comprises a plurality of printing units through which is fed the web material to be printed, which may be paper, cardboard, self-adhesive paper, plastic, or a composite laminate web.

[0003] Each printing unit serves to apply a colour to the web material, and substantially comprises a set of three rollers between which is fed the web material (henceforth also called film for brevity's sake), onto which the colour is transferred.

[0004] This set of three rollers comprises in particular an inking roller or anilox roll, which has on its outer surface a plurality of cells to retain the ink. The anilox roll collects the ink from a rubber roller that dips into a special pan or directly from a container, called "enclosed doctor blade" adapted to fill the cells of the anilox roll and transfers the ink to a plate cylinder, which in turn applies it to a film that is fed between said plate cylinder and a large-sized impression cylinder or drum.

[0005] The structural details of the various rollers of a printing unit are not further described, in that they are to be considered per se known, and in any case not forming the specific subject matter of the invention.

[0006] The above mentioned three rollers of the printing unit have their axes parallel to each other and generally horizontal. In a printing unit the impression cylinder belongs to the fixed structure of the machine, in that it does not require replacement or changes in position and it is normally common to the various printing units, which are disposed along its circumference, whereas the anilox roll and the plate cylinder are subject to frequent replacement or changes in position; for this reason they are mounted on supports sliding on the frame of the press and driven by means of screws mounted and anchored in the side parts of the frame of the press.

[0007] In particular, in the majority of printing units currently existing, the replacement of the plate cylinder is required each time the format is changed, that is when a change in the length of the outer surface of the cylinder, and therefore a change in diameter, is required.

[0008] At each change of image, which does not require a change in the diameter of the plate cylinder, only the replacement of the plate with the new image is required.

[0009] According to the prior art, the changing of the sleeves of the plate cylinder and of the anilox roll is long and complex. In fact, such a sleeve change takes place in two steps. In the first step the operator must release the end of the cylinder mandrel from its support. In the second step the operator must move the support to create sufficient space to change the sleeve.

[0010] Both these steps are complex. In fact in the first step the operator must work in a tight space because of the presence of the support. In the second step the operator has difficulty in moving the support, in that the drive screw threads in the support and thus the movement of the support is tied to the operation of the drive screw.

[0011] Object of the present invention is to overcome the drawbacks of the prior art by providing a printing unit that is practical, versatile and able to ensure a rapid and easy changing of the sleeves of the anilox rolls and of the plate cylinders.

[0012] In particular, one object of the invention is to release the support of the plate cylinder and of the anilox roll both from the mandrel and from the drive screw to ensure a rapid sleeve changing.

[0013] These objects are achieved with the printing unit according to the invention which has the characteristics listed in appended independent claim 1.

[0014] Advantageous embodiments of the invention are described in the dependent claims.

[0015] The printing unit for a web printing press according to the invention comprises:

- a plate cylinder mounted rotatably at its ends on two supports mounted to slide horizontally on linear guides integral with the sides of the press structure, said plate cylinder being designed to press against a drum on which the web material for printing runs,
- an anilox roll mounted rotatably at its end on two supports mounted to slide horizontally on said linear guides, said anilox roll being designed to press against said plate cylinder to transfer the ink from the anilox roll to the plate cylinder, and
- drive screws operationally connected to said supports to drive them in translation.

[0016] The printing unit according to the invention further comprises at least one handle mounted in at least one of said supports and which can be operated by the operator so as to uncouple said support both from the end of the mandrel of said plate cylinder or of said anilox roll and from said drive screw.

[0017] In this manner the operator, by means of said handle, can move the relative support in translation, without it interfering with the mandrel of the plate cylinder or of the anilox roll or with the drive screw of the support, so as to leave a sufficient space for changing the sleeve.

[0018] The advantages of the invention, which allows a rapid and easy replacement of the cylinders or of the sleeves, are obvious.

[0019] Further characteristics of the invention will be made clearer by the detailed description that follows, referring to a purely exemplifying and therefore non-limiting embodiment thereof illustrated in the appended figures, wherein:

Figure 1 is a diagrammatic side elevation view showing a portion of a side of a printing press in which a printing unit according to the invention is shown in the working state and the print impression cylinder is shown by a dashed line;

Figure 2 is a view like Figure 1 showing the printing

unit in the dismantling position, in which the plate cylinder and the anilox roll are at a distance from each other;

Figure 3 is a view like Figure 1 showing the printing unit in the sleeve changing position, in which the supports have been moved away from the respective plate cylinder and anilox roll;

Figures 4, 5 and 6 are three enlarged views of the plate unit illustrated in Figures 1, 2 and 3, respectively;

Figures 4A, 5A and 6A are three sectional views taken respectively along the horizontal planes of section A-A of Figures 4, 5 and 6;

Figure 7 is a sectional view like Figure 4A, but showing the plate unit of Fig. 4 exploded;

Figure 8 is a perspective view of the plate unit of Figure 4; and

Figure 9 is a perspective view of the handle of the plate unit of Figure 8.

[0020] The printing unit according to the invention, designated as a whole with the reference numeral 100, is described with the aid of the figures. Many parts shown in Figures 1-3, although shown singly, are to be understood as pairs disposed symmetrically on the two opposite sides of the press.

[0021] For the sake of clarity, the side of the press 100 that can be seen in Figures 1-3 is indicated henceforth as the operator side. Furthermore, like reference numerals designate like or similar parts.

[0022] With specific reference for now to Figure 1, the printing unit 100 comprises a first pair of supports 1 adapted to support a plate cylinder 2 and a second pair of supports 3 adapted to support an anilox roll or inking roller 4 provided with a plurality of cells on its outer surface. The supports 1 and 3 are mounted on recirculating ball or roller carriages, in turn mounted slidingly on linear guides 5 arranged horizontally, in the longitudinal direction of the press. The carriages are mounted integrally with the respective supports (1, 3) and the guides 5 are mounted integrally with the sides 50 of the press frame.

[0023] A container called "enclosed doctor blade" (not shown), designed to be filled with paint or with ink and adapted to fill the cells engraved on the anilox roll 4 with paint or with ink, is mounted on the anilox roll 4. In turn, the anilox roll 4 transfers the ink to the plate cylinder 2, which is pressed against a large-sized impression cylinder or drum 7, which is generally motorised. The film of web material (not shown), running on the drum 7, passes in the gap between the drum 7 and the plate cylinder 2 which is responsible for the transferring of the image.

[0024] The supports (1, 3) of the plate cylinder and of the anilox roll are driven by means of respective ball screws 6 driven in translation by respective female screws 60 mounted rotatably in the side 50 of the press. The female screws 60 are made to turn by means of electric motors 66, possibly through a belt transmission. The screws 6 are disposed longitudinally between the two guides 5. The side 50 of the press has an opening 51 through which the screws 6 pass. The opening 51 is sufficiently large to allow the removal and/or the insertion of the sleeve of the plate cylinder 2 or of the anilox roll 4 during the changing of the sleeve.

[0025] According to the invention, a handle 8, which protrudes on the operator side so as to be able to be gripped by an operator, is mounted on each support (1, 3). The handle 8 is adapted to uncouple the respective support (1, 3) both from the drive screw 6 and from the respective plate cylinder 2 or anilox roll 4.

[0026] A locking/unlocking device 9 that can be operated by the operator is also mounted on each support (1, 3) to lock the handle 8 during the operation of the press and to unlock the handle 8 for changing the sleeve.

[0027] Figure 7 shows a sectional view, taken along a horizontal plane of section at the level of the axis of the plate cylinder 2, illustrating one of the two supports 1 of the plate cylinder, that is to say the support 1 disposed on the operator side. However, it must be considered that the support 3 of the anilox roll disposed on the operator side has a substantially similar structure.

[0028] The support 1 has a transverse through hole 10 designed to accommodate the end 20 of a mandrel 21 that supports the sleeve 22 of the plate cylinder. Coinciding with the transverse hole 10, the support 1 has a cylindrical tang 11 which protrudes rearward, that is towards the inside of the machine. As shown also in Figure 8, the tang 11 has a side opening 12 adapted to allow the passage of the end 20 of the mandrel.

[0029] Returning to Figure 7, a longitudinal hole 13 communicating with the transverse hole 10 is formed in the support 1. The longitudinal hole 13 has a smaller diameter than the transverse hole 10 and is adapted to slidingly accommodate the drive screw 6. The longitudinal hole 13 is situated near the rear surface of the support 1.

[0030] A second transverse hole 14 which opens in the front surface of the support 1 and which communicates with the longitudinal hole 13 is formed in the support 1. The second transverse hole 14 has a smaller diameter than the longitudinal hole 13 and is disposed at a certain distance from the first longitudinal hole 10. In particular, the second transverse hole 14 has a tapered end 15 communicating with the longitudinal hole 13.

[0031] The drive screw 6 has at its end a cylindrical block 61, secured by means of an axial bolt 62. The cylindrical block 61 has radially a tapered hole 63 with a taper that is the exact continuation of the tapered part 15 of the second transverse hole 14. A sleeve 68, which provides an abutment surface against the support 1, so as to act as a stop, is mounted on the screw 6.

[0032] With reference also to Figure 9, the handle 8 comprises a plate 80 from which protrudes forward a U-shaped handgrip 81, adapted to be gripped by a hand of the operator. A first tang 82 and a second tang 83 protrude rearward from the two ends of the plate 80.

[0033] The first tang 82 carries at its end a sleeve 84,

which has a circular seat 85 within which the end 20 of the plate cylinder mandrel can rotate. Ball or roller bearings are disposed in the seat 85 of the sleeve to facilitate the rotation of the end 20 of the mandrel. The sleeve 84 of the handle has such a diameter as to be able to be inserted into the first transverse hole 10 of the support 1.

[0034] The second tang 83 of the handle has a tapered end 86 adapted to couple, in a conical coupling relationship, with the tapered holes 15 and 63 formed respectively in the second transverse hole 14 of the support 1 and in the end block 61 of the drive screw 6.

[0035] A locking appendage 87, disposed in a central position between the two tangs 82 and 83, protrudes rearward from the plate 80 of the handle. The locking appendage 87 is in the form of a plate, bent in an L-shape, which has at its end a U-shaped opening 88.

[0036] With reference in particular to Figures 4 and 8, the locking/unlocking device 9 comprises a lever 90 that can be operated by the operator. The lever 90 has an end flange supporting a bolt 91 slidable in a vertical groove 92 formed in a block 93 integral with the front surface of the support 1. The block 93 is disposed between the two holes (10, 14) of the support that accommodate the two tangs (82, 83) of the handle. In this manner, when the two tangs (82, 83) of the handle are disposed in the two holes (10, 14) of the support, the bolt 91 engages in the opening 88 of the locking appendage 87 of the handle, locking the handle 8 integrally to the support 1.

[0037] The sleeve changing operation performed with the printing unit 100 according to the invention will now be described.

[0038] As shown in Figures 1, 4 and 4A, the handles 8 are initially locked integrally to the respective supports 1 and 3 of the plate cylinder 2 and of the anilox roll 4. In particular, the levers 90 of the locking/unlocking devices 9 are disposed so that the bolt 91 engages in the opening 88 of the locking appendage of the handles 8 of the supports 1 and 3 of the plate cylinder and of the anilox roll. In this situation the levers 90 are inclined with respect to a vertical direction.

[0039] Consequently, the ends 20 of the mandrels of the plate cylinder and of the anilox roll are engaged inside the respective sleeves 84 of the handles, so as to rotatably support the mandrels. The truncated conical ends 86 of the tangs of the handles are engaged in the tapered holes 63 of the ends of the respective drive screws 6 so as to make the supports (1, 3) integral with the drive screws 6.

[0040] During the printing, the plate cylinder 2 is in contact with the drum 7 and the anilox roll 4 is in contact with the plate cylinder 2.

[0041] When the sleeve is to be changed, as shown in Figure 2, the female screws 60 of the ball screws 6 are turned, so as to cause the axial translation of the screws 6. The supports (1, 3) of the plate cylinder 2 and of the anilox roll 4 are thus moved together towards the right so that the plate cylinder 2 is moved away from the drum 7. Subsequently, the translation of the screws of the plate unit is blocked and the translation of the screws of the anilox unit continues. As a result, the anilox roll 4 is moved away from the plate cylinder 2 to create a space large enough for changing the sleeve.

[0042] At this point, as shown in Figure 5, the operator turns the unlocking lever 90, in the direction of the arrow F1, so as to loosen the bolt 91 and pulls it downwards, in the direction of the arrow F2, so that the bolt 91 slides in the groove 92, releasing the locking appendage 87 of the handle 8. Then, as shown in Figure 5A, the operator grips the handgrip 81 of the handle, pulling it towards himself in the horizontal direction of the arrow F3, so as to move it away from the support 1.

[0043] As a result, the tangs 82 and 83 of the handle slide in the respective holes 10 and 14 of the support 1. Thus, the end 20 of the mandrel 21 is released from the sleeve 84 and at the same time the truncated conical end 86 of the second tang 83 of the handle is released from the tapered hole 63 of the end block 61 of the screw 6. It should be noted that with a single manoeuvre by the operator, the support 1 is released both from the mandrel 21 and from the screw 6.

[0044] At this point, as shown in Figures 3, 6 and 6A, the operator can move the support 1 towards the left (in the direction of the arrow F4 in Figure 6A) by means of the handle 8, freeing the space for the replacement of the sleeve 22 of the plate cylinder. It should be noted that the end 20 of the mandrel does not interfere with the tang 11 of the support 1, in that it passes through the opening 12 of the tang 11. Furthermore, the screw 6 does not interfere with the support 1, in that the cylinder block 61 at the end of the screw slides freely in the longitudinal hole 13 of the support 1.

[0045] In any case, during its translation the support 1 is supported slidingly on the linear guides 5 of the side of the press. When the support 1 comes to abut against the stop sleeve 68 mounted on the screw 6, enough space is left for the extraction of the sleeve 22 and for the replacement thereof with another sleeve of a different format.

[0046] Once the sleeve has been replaced, the operator, by means of the handle 8, pushes the support 1 towards the right, until the end 20 of the mandrel re-enters the hole 10 of the tang 11 of the support. In this situation, the truncated conical hole 63 of the end block of the screw 6 is in register with the hole 14 of the support 1. At this point the operator pushes the handle 8 towards the support 1. In this manner, the end 20 of the mandrel engages in the sleeve 84 of the first tang 82 of the handgrip and the tapered end 86 of the second tang of the handgrip engages in the tapered hole 63 of the end of the screw. Lastly, the operator operates the locking lever 90, so that the handle 8 is locked firmly to the support 1.

[0047] Even if Figures 4-9 show an embodiment relating to the changing of the sleeve of the plate unit, it is obvious that the sleeve changing on the anilox unit takes place in the same manner; in fact the support 3 of the

anilox unit is made in substantially the same way as the support 1 of the plate unit.

[0048] It is clear, however, that the invention is not limited to the particular embodiment previously described and illustrated in the appended claims, but numerous modifications of detail within the reach of a person skilled in the art can be made thereto and are all to be understood as falling within the scope of the invention, as set forth in the appended claims.

Claims

1. A printing unit (100) for a printing press for web material comprising:

- a plate cylinder (2) mounted rotatably at its ends (20) on two supports (1) mounted to slide horizontally on linear guides (5) integral with the sides (50) of the press structure, said plate cylinder (2) being destined to press against a drum (7) on which the web material for printing runs,
- an anilox roll (4) mounted rotatably at its ends (20) on two supports (3) mounted to slide horizontally on said linear guides (5), said anilox roll (4) being designed to press against said plate cylinder (2) to transfer the ink from the anilox roll (4) to the plate cylinder (2), and
- drive screws (6) operationally connected to said supports (1, 3) to drive them in translation,

characterised in that it further comprises:

- at least one handle (8) mounted in at least one of said supports (1, 3) and which can be operated by the operator so as to uncouple said support (1, 3) both from the end (20) of the mandrel of said plate cylinder (2) or of said anilox roll (4) and from said drive screw (6).

2. A printing unit (100) according to claim 1, **characterised in that** said handle (8) comprises:

- a first tang (82) carrying at its end a sleeve (84) in which is formed a seat (85) adapted to accommodate rotatably the end (20) of said mandrel of the plate cylinder (2) or of the anilox roll (4), and
- a second tang (83), the end of which engages in a seat (63) of said drive screw (6).

3. A printing unit (100) according to claim 2, **characterised in that** said support (1, 3) comprises:

- a first transverse through hole (10) in which said sleeve (84) of the handle (8) can slide,
- a longitudinal hole (13) in which said drive screw (6) can slide, and
- a second transverse hole (14) opening on the outer surface of the support and communicating with said longitudinal hole (13), said second tang (83) of the handle (8) being able to slide in said second transverse hole (14).

4. A printing unit (100) according to claim 2 or 3, **characterised in that** said second tang (83) of the handle (8) has a tapered end (86) adapted to engage, in a conical coupling relationship, with a tapered seat (63) formed radially in a cylindrical block (61) disposed at the end of said drive screw (6).

5. A printing unit according to any one of the claims from 2 to 4, **characterised in that** a ball or roller bearing assembly is disposed in said seat (85) of the sleeve of the first tang (82) of the handle (8) to support the end (20) of the mandrel rotatably.

6. A printing unit according to any one of the claims from 2 to 5, **characterised in that** said support (1, 3) comprises a tang (11) protruding towards the inside of the press and passed through by said first transverse hole (10), said tang (11) having a side opening (12) adapted to allow the passage of the end (20) of said mandrel of the plate cylinder (2) or of the anilox roll (4).

7. A print unit according to any one of the preceding claims, **characterised in that** it comprises a locking/unlocking device (9) that can be operated by the operator to lock/unlock said handle (8) to/from said support (1, 3).

8. A printing unit according to claim 7, **characterised in that** said locking/unlocking device (9) comprises a lever (90) that operates a bolt or pin (91) adapted to engage in a locking seat (88) of said handle (8).

9. A printing unit according to any one of the preceding claims, **characterised in that** it comprises female screws (60) mounted rotatably in the side (50) and operated in rotation by electric motors (66) to cause the translation of said drive screws (6).

10. A web printing press, **characterised by** comprising at least one printing unit (100) according to any one of the preceding claims.

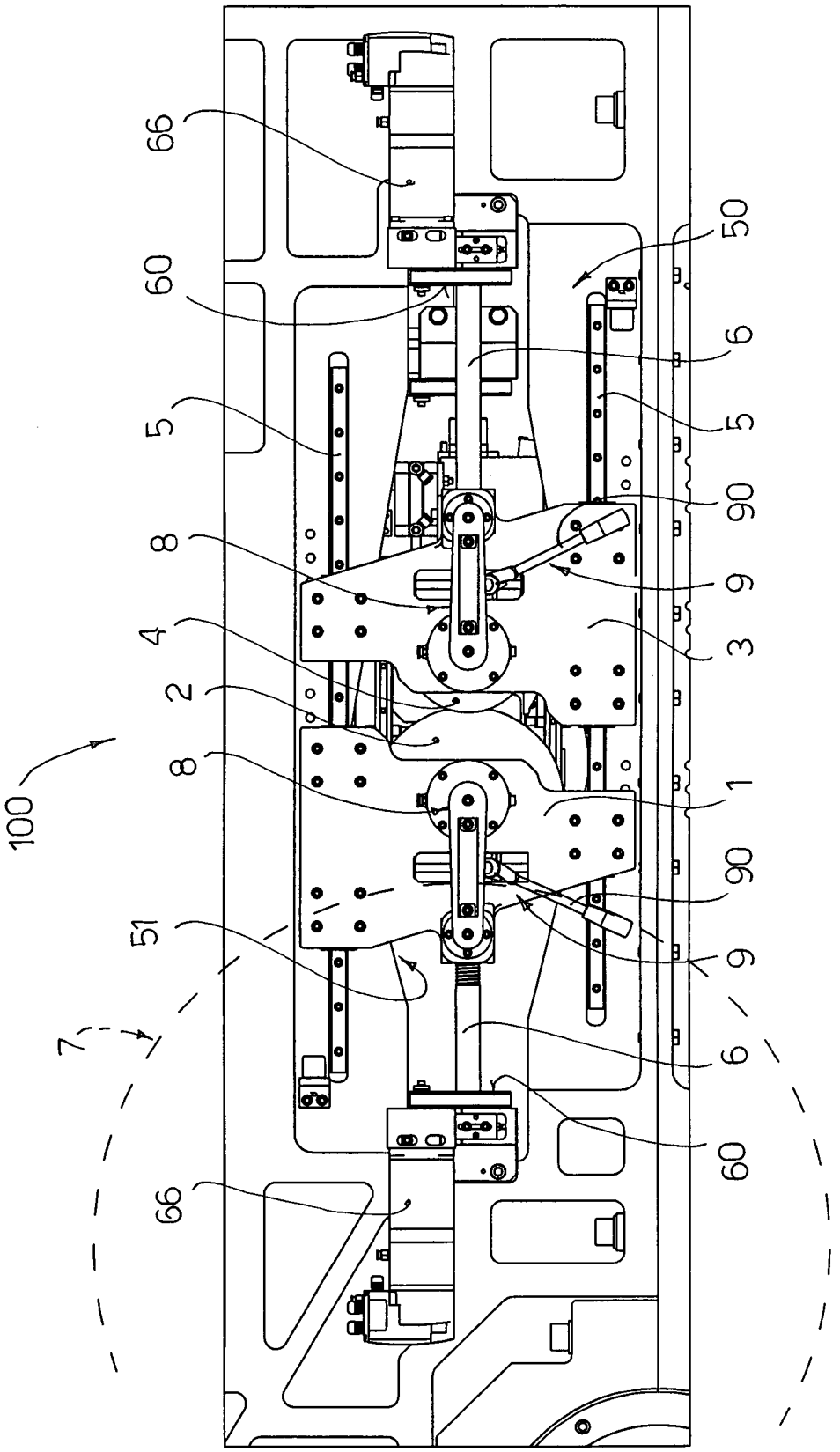


FIG. 1

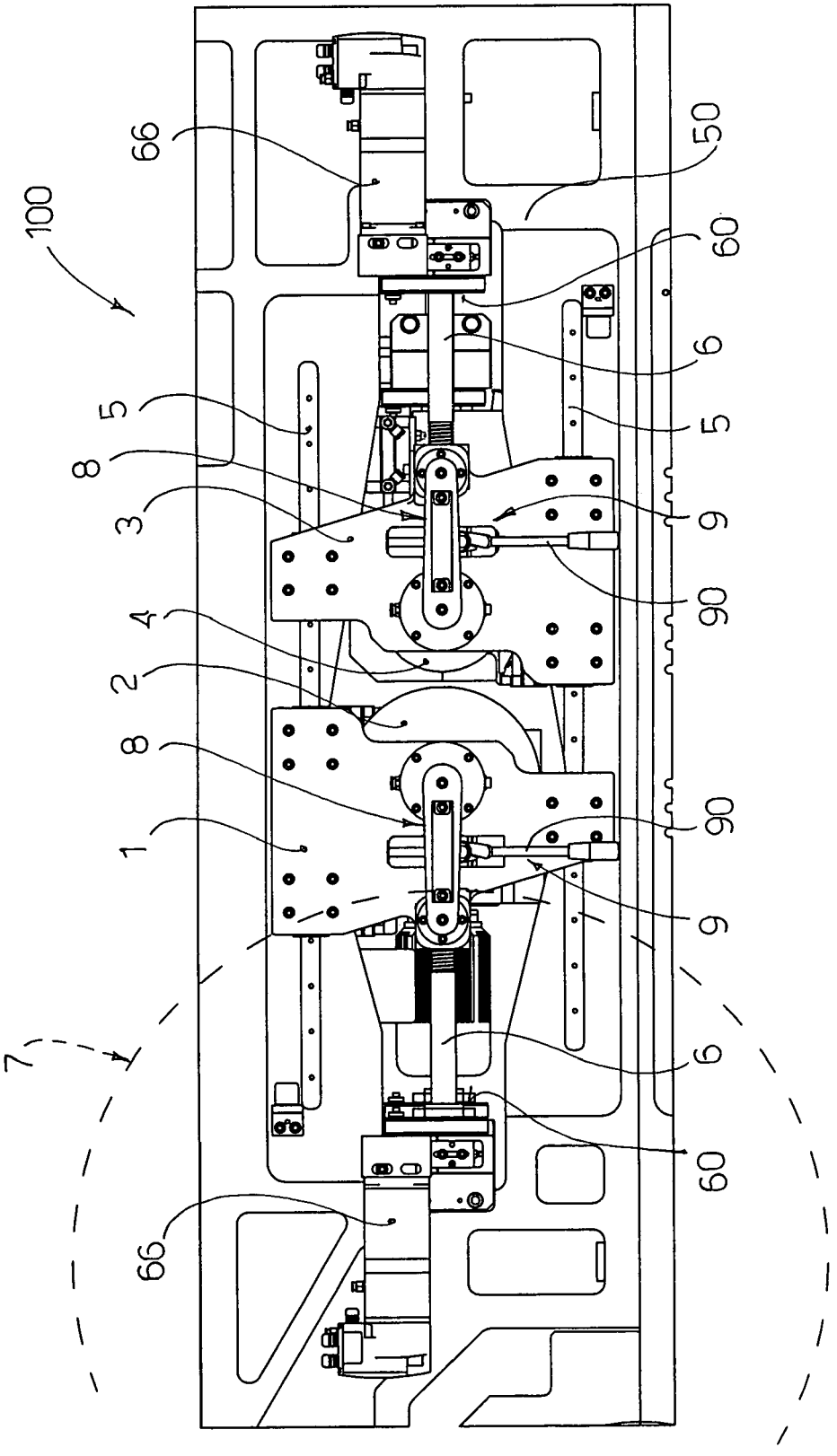


FIG. 2

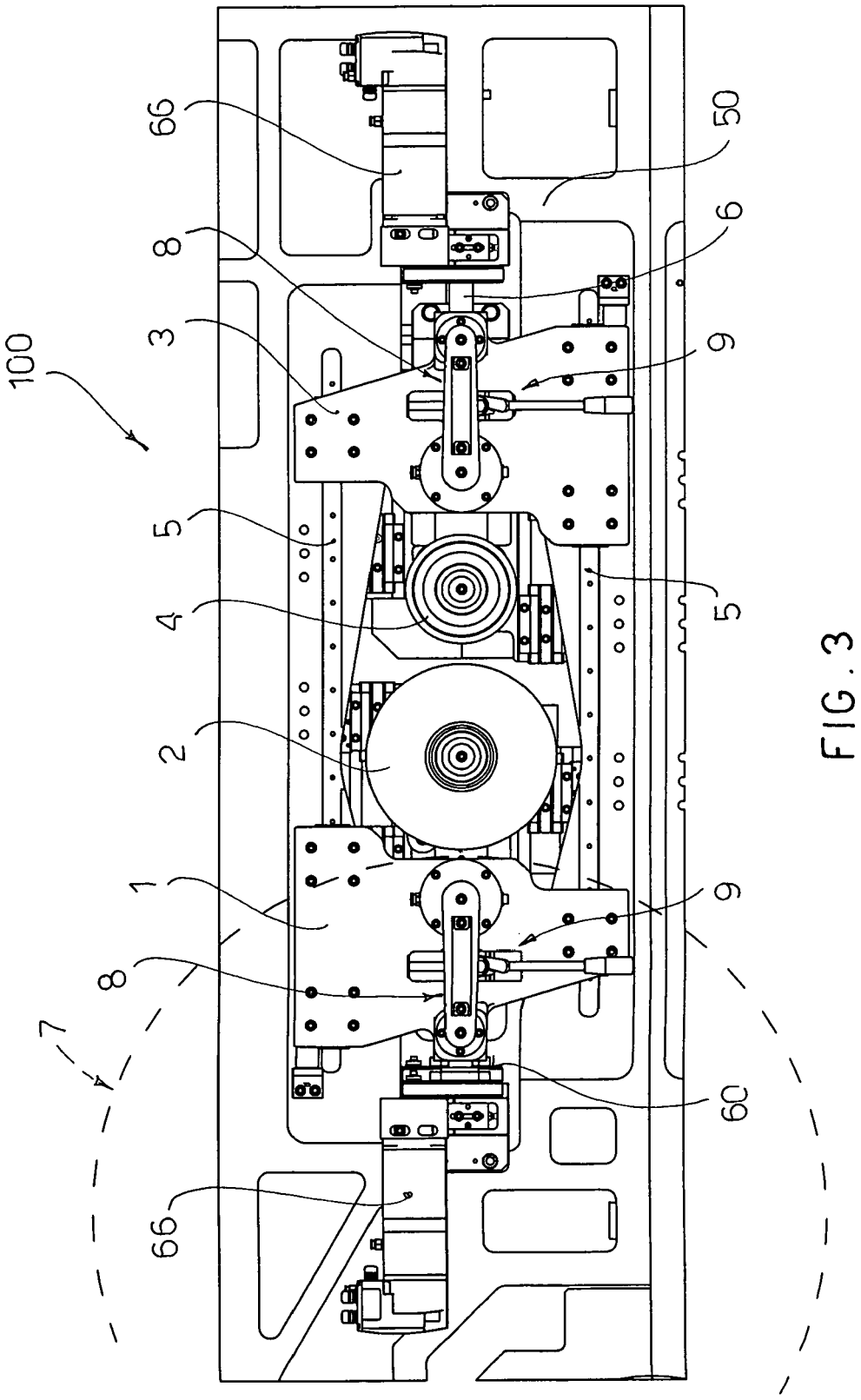


FIG. 3

FIG. 4

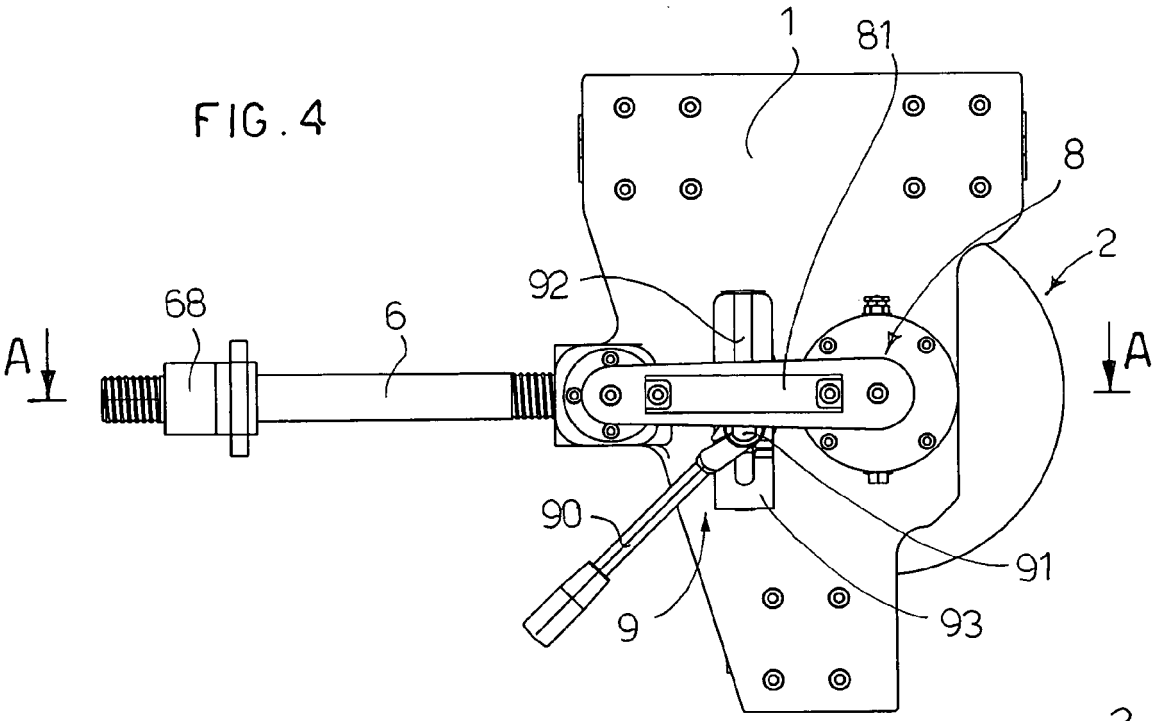


FIG. 4A

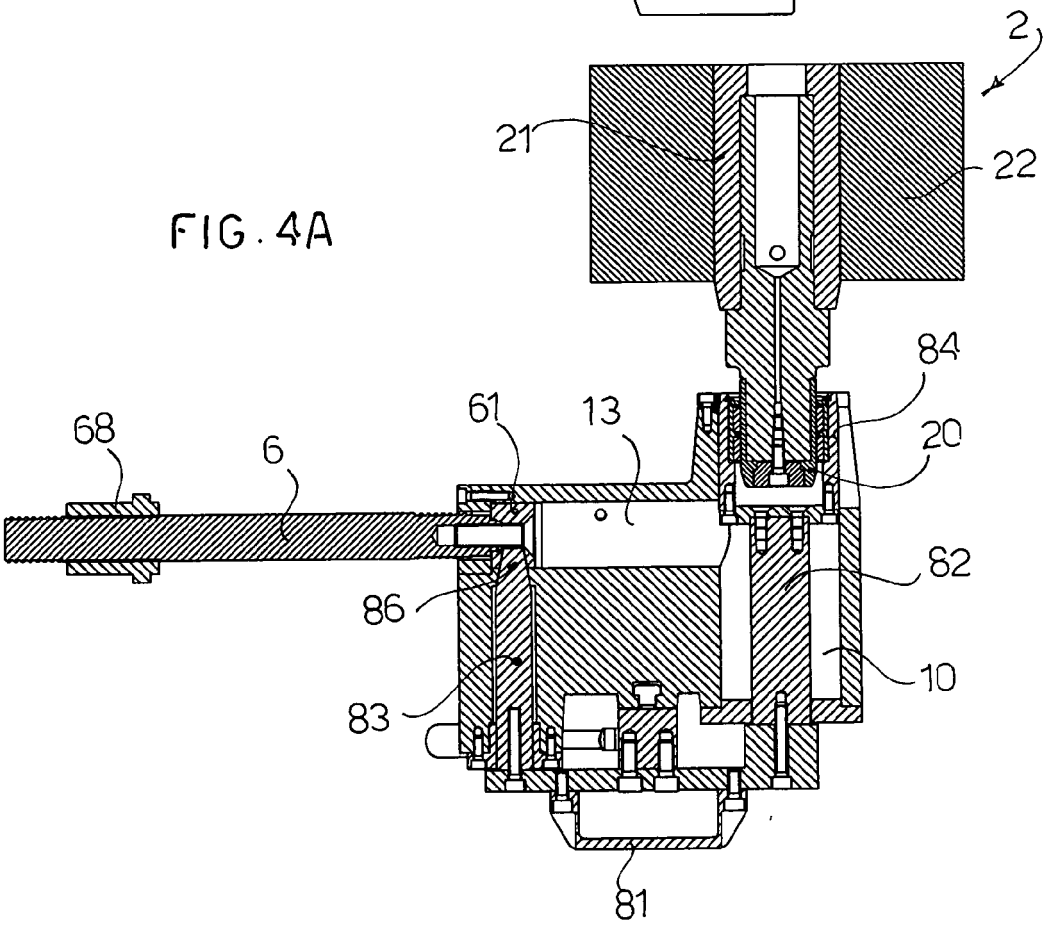


FIG. 5

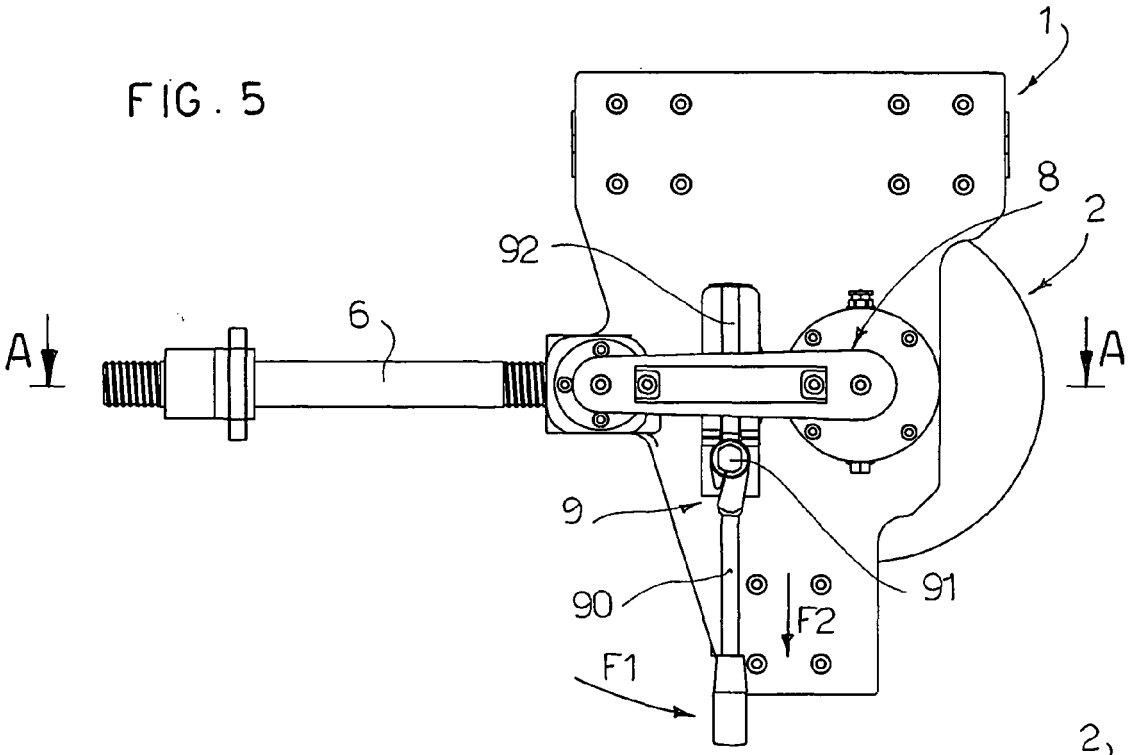

1
8
2
92
6
A
A
9
90
91
F2
F1

FIG. 5A

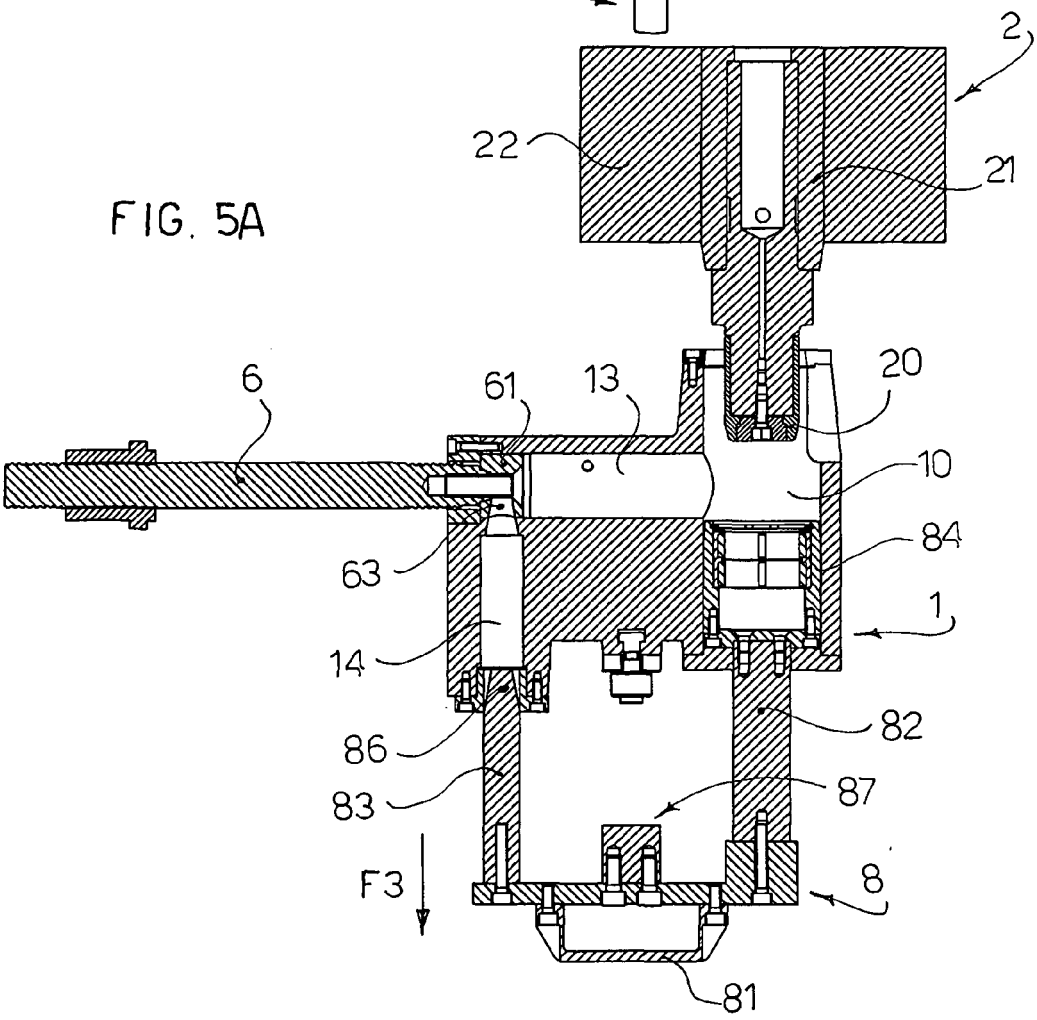
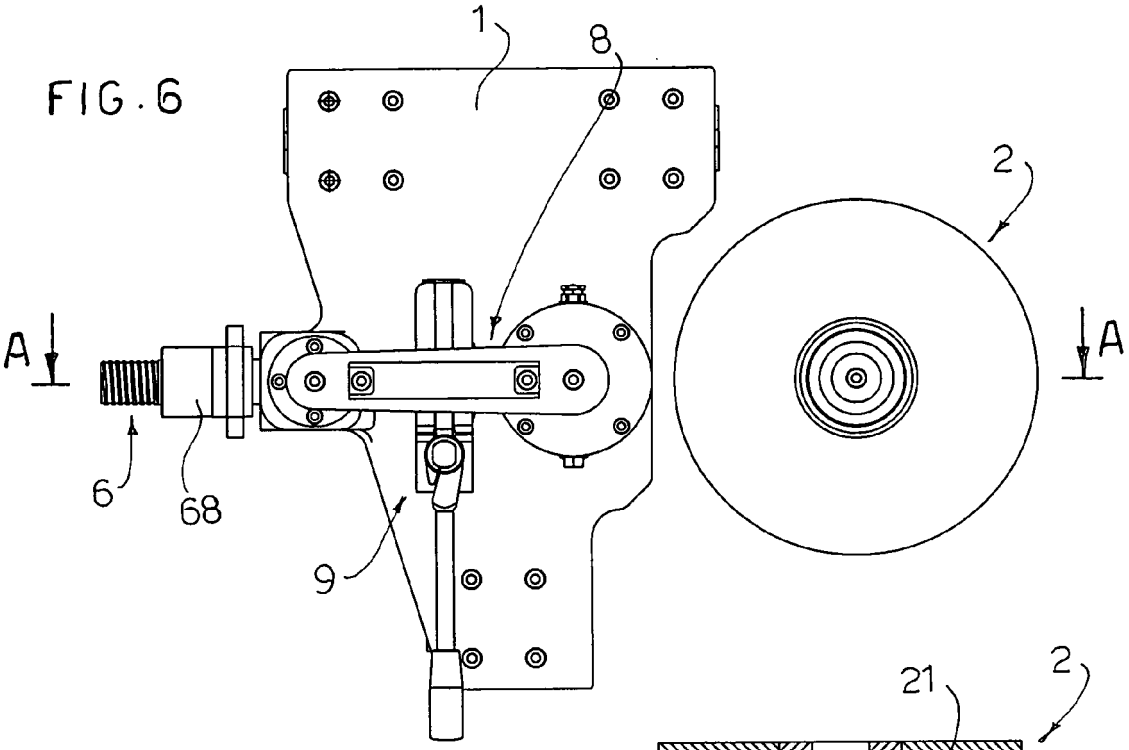

2
22
21
6
61
13
20
10
84
63
1
14
82
86
87
83
F3
8
81

FIG. 6



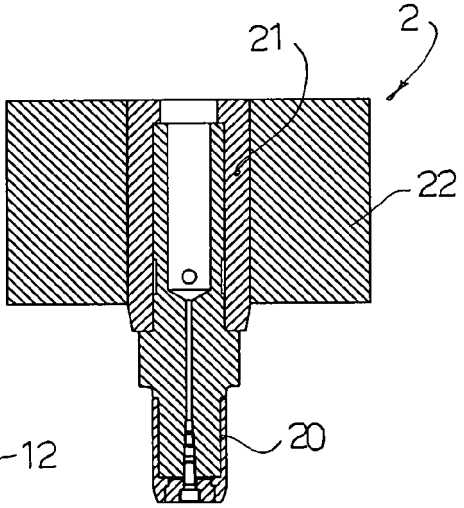


FIG. 6A

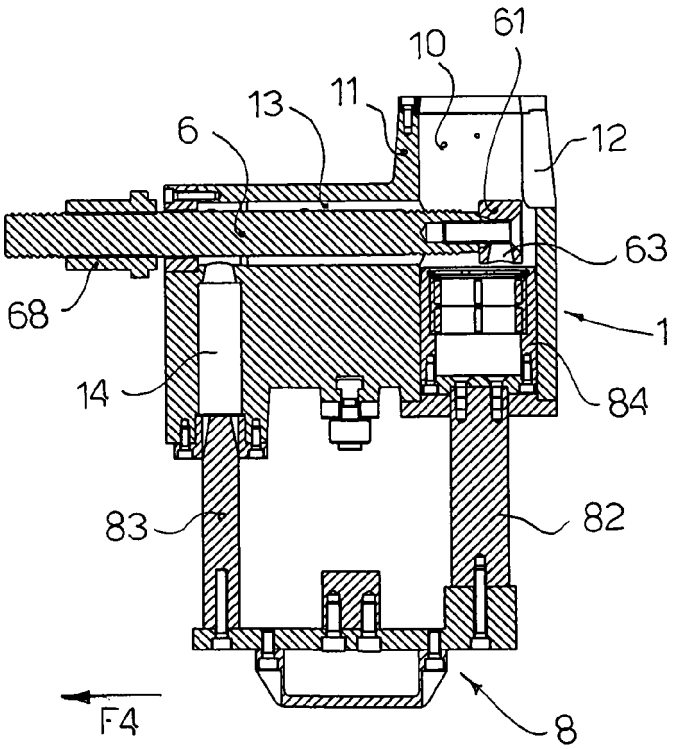


FIG. 7

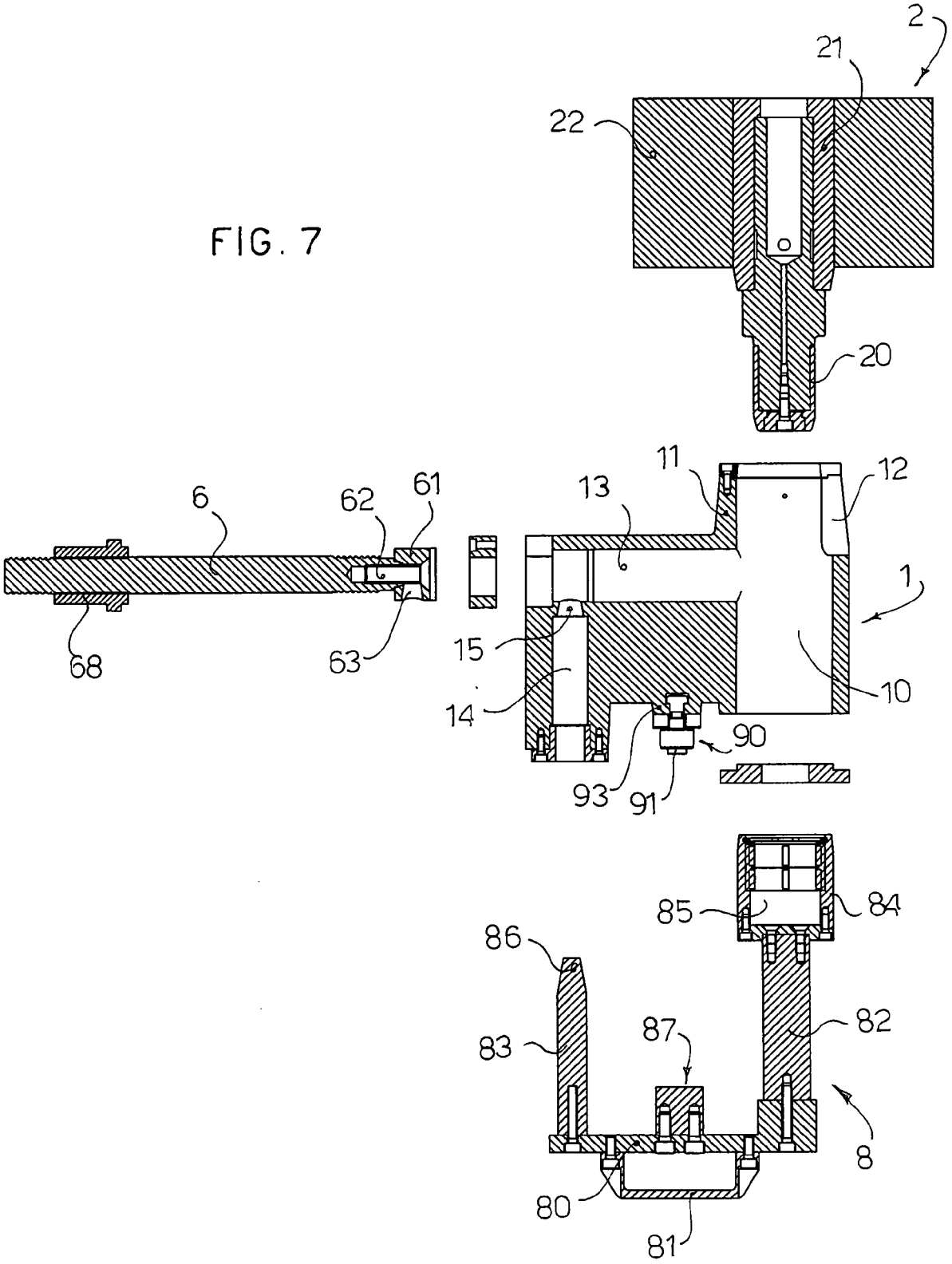

2
21
22
20
11
12
13
1
6
62
61
15
10
14
90
68
63
93
91
85
84
86
82
83
87
8
80
81

FIG. 9

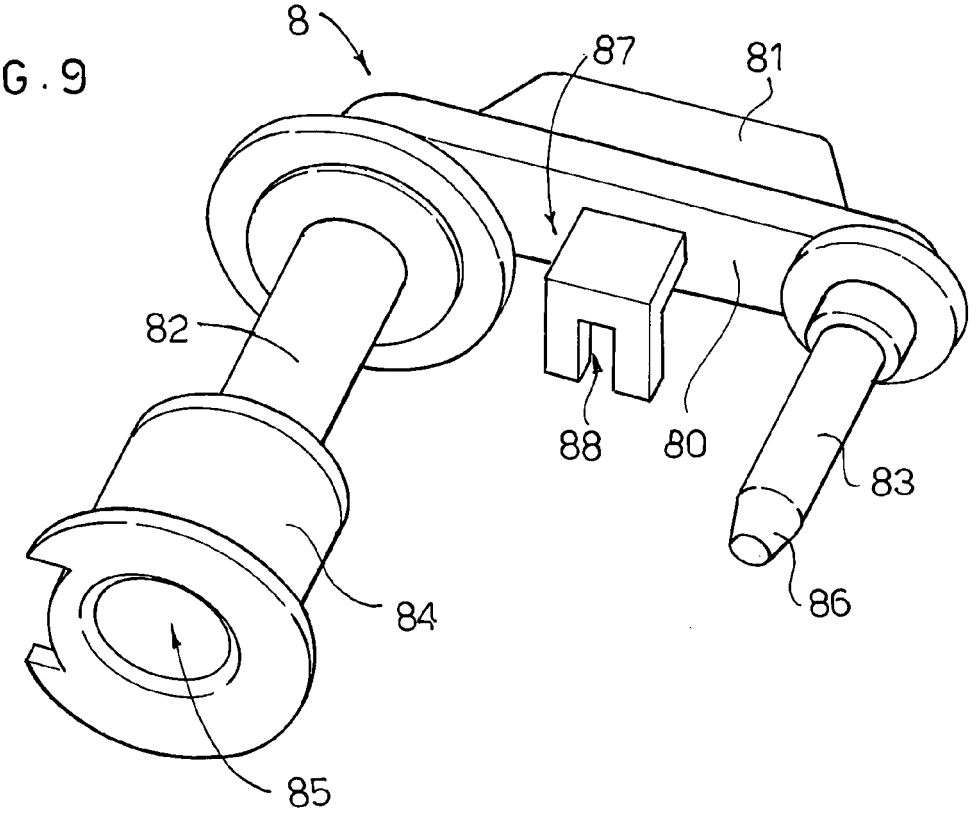
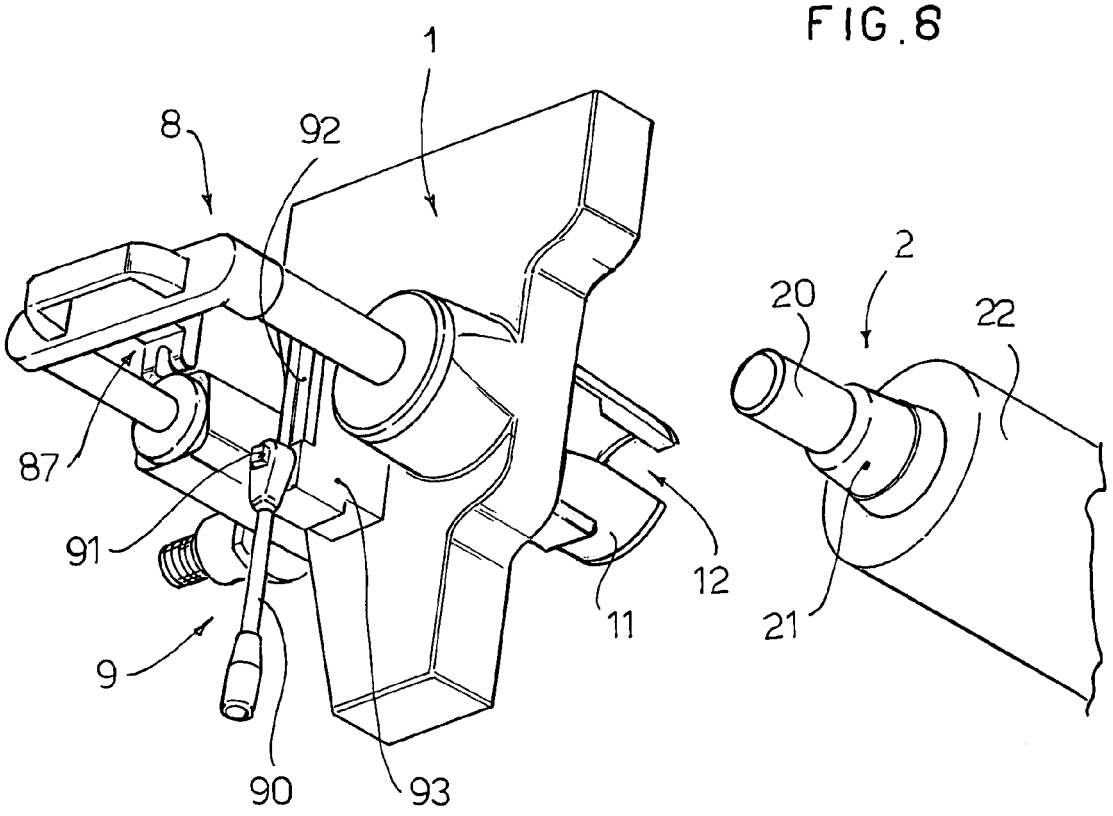


FIG. 8



European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 08 42 5104

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	EP 0 737 569 A (BIELLONI CASTELLO S P A [IT]) 16 October 1996 (1996-10-16) * column 3, line 15 - line 29 *	1,10	INV. B41F13/30 B41F5/24
A	EP 1 318 015 A (OF E M SRL [IT] OFEM S A S DI MERCANTE ANDREA [IT]) 11 June 2003 (2003-06-11)		
A	US 6 142 073 A (ZEMAN DALE E [US] ET AL) 7 November 2000 (2000-11-07)		

TECHNICAL FIELDS SEARCHED (IPC)

B41F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	17 July 2008	Diaz-Maroto, V

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 08 42 5104

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

17-07-2008

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0737569 A	16-10-1996	DE 69600941 D1	17-12-1998
		DE 69600941 T2	12-05-1999
		IT MI950752 A1	14-10-1996
		US 5651312 A	29-07-1997
EP 1318015 A	11-06-2003	AT 393023 T	15-05-2008
		IT VR20010130 A1	06-06-2003
US 6142073 A	07-11-2000	BR 0003458 A	03-04-2001
		CA 2313885 A1	20-02-2001
		DE 1080890 T1	06-03-2003
		EP 1080890 A1	07-03-2001
		JP 2001096716 A	10-04-2001

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82