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Remarks:
Amended claims in accordance with Rule 86 (2) EPC.

(54) Machinery for cutting off and storing parts from pressure casting articles or similar

(57) The machinery consists of an axial robot arm (1), able of programmed rotary movements (X,Y) and able to put a moulded piece (2) in median position between two containment bodies (4A,4B). The machinery includes rods (6) placed with regular spaces according to lines and columns and each of these rods is connected to a translation unit (7) able to actuate a translation motion to the rods (6) and to be programmed by a touch screen.

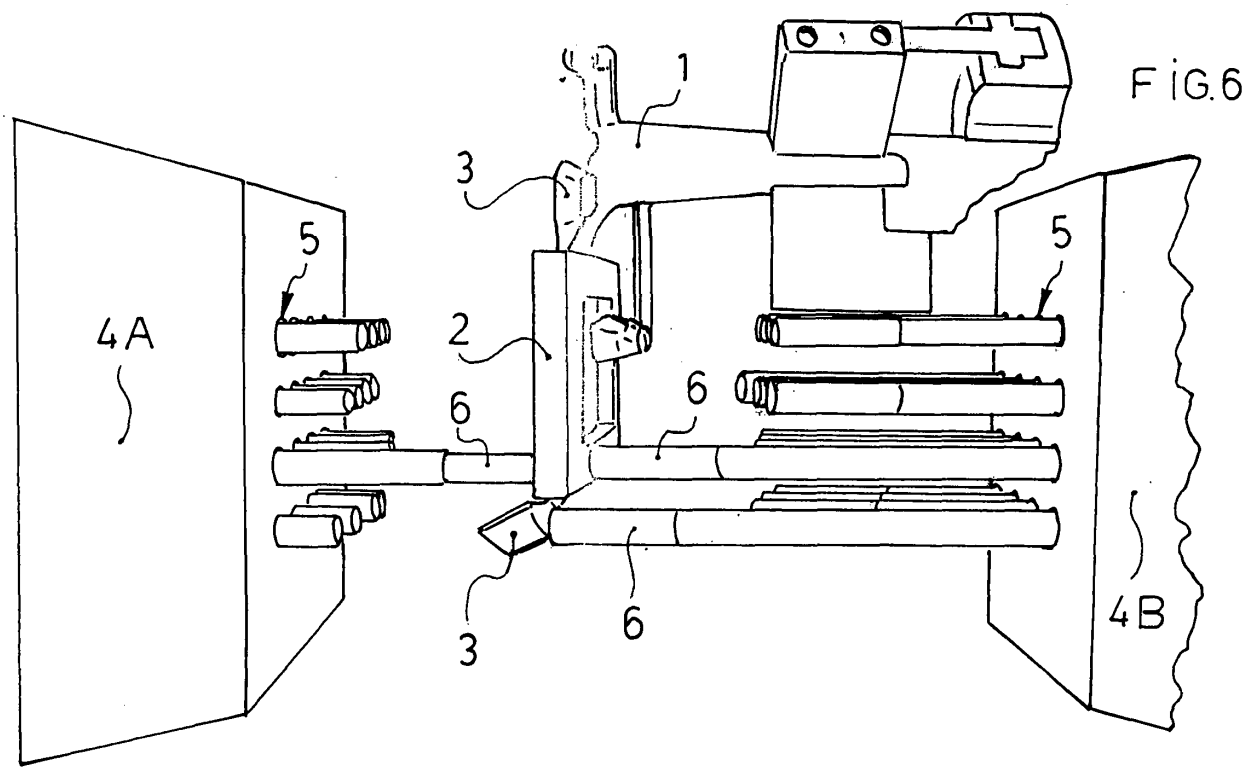

FIG.6

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Description

[0001] It is known that in the melting, in the pressure casting or in any pieces obtained for die forming are present parts of material to be cut off to the dies in getting out to the pressure casting to permit the subsequent storing up of the working products and the recovery of the rejections. These material parts are at present cut off by hand and, always manually, they are stored. In a lot of known workings machineries are used that exploit the centrifugal force. With these machineries the separation of the suitable parts to the discharging ones is not obtained and this separation must be manually made. Then, they have the drawbacks to often determine faulty products. The invention refers to a new and original machinery that, thanks to an axial robot arm and to an intelligent rod system, is able to cut off from the dies in getting out to the melting the different products in working of any shape and dimension and then to automatically separate the same in suitable containers or between the discharging material. The invented machinery consists of a axial robot arm 1, able of programmed movements X, Y and rotatory, that puts the die 2 in working in the more adequate position for the separation of each determined part 3 that must be separated. Said die 2 is placed in median position between two containment bodies 4A and 4B. Said containment bodies are placed frontally and back to the die 2 and they have holes 5 to permit the crossing of the rods 6. Said holes 5 and the corresponding rods 6 are placed with regular spaces according lines and columns. The rods 6 have a motion of translation to be programmed by a touch screen and to be driven to a translation unit 7. Said translation unit 7, in the main version, consists of a timing belt 8 connected to the rod 6 by flask 9. The timing belt 8 is kept parallel to the rod 6 by means of pulleys 10A and 10B. Others pulleys 11 connect the timing belt 8 with a reduction gear 12 and an electric brushless engine 13. The motion to the timing belt 8 is given to the gears of the reduction gear, whereas the rotation in one way or in the other is given to the electric brushless engine 13. Said engine is then connected to a logic card 14 for the driving of the control of the way and of the velocity of the rotations of the electric engine 13 and consequently of the translations of the rod 6. Said logic card has also an electronic storage 15 for the control of the translations and of the translation times of the rods. The logic card 14 is then connected with a touch screen by means of what the operator can program, store and drive the translation of the rods in relation to the shape of each part to cut off. This is actuated by connection of the rods with a P.L.C. 16 or similar. In working phase the invented machinery provides the positioning of the die 2, by the robot arm 1, in median position between the containment bodies 4A and 4B. By means of the electronic drive actuated to the logic card 14 and the P.L.C. 16, the electric engines 13 are started, so to make going on the opposite rods 6 till the contact with the die 2. In this phase are started to the containment bodies 4A and 4B only the rods 6 opposite to a side and to the other so to determine the temporary blocking of the die 2 near the material part 3 to cut off. The disposition of the opposite rods 6 in phase of temporary blocking is automatic and it is determined to the program set out before to the operator on the base of the position of the part 3 to cut off from the die 2. The translation motion of the rods 6 is driven to the electronic devices of the invented machinery. The choose of the rods 6 for the temporary fixing is necessary to avoid flexions of the die 2 in the subsequent phase of cutting of the part 3 to be cut off and consequent damages to the same die. For each single piece is stored into the electronic storage 15 which rods 6 must be used and the motion of advancement of the rods in blocking phase. So there is the blocking of the die 2 by the rods 6 in front and back to the piece. In the subsequent phase the operator determines which rods 6 to make going on in correspondence of the part 3 to cut off. These opposite rods are to be advanced firstly translating to a containment body 4A over the first part of the die 2. Subsequent, returned in initial position the rod 6 of the containment body 4A, the rods 6 opposite to the previous ones are advanced by means of the containment body 4B till over the die 2. So a first phase of folding of the cutting off part 3 is obtained, often already sufficient to determine the cutting from the die of said parts 3. Then, there is a second phase able to obtain the final cutting of the part 3, thanks to the advancement first in one way and then in the other of the rods 6 that go to hit the parts to be cut off. The selection of the rods 6 in correspondence of the part 3 to cut off, the translation and the velocity of advancement of the same rods is decided to the operator by means the electronic components and they are stored for each type of die 2 so to can be recalled in the applications that have working of equal die 2. The number of rods 6 can change from a minimum of four rods (two opposite rods for the blocking and two rods for the folding and the cutting off) to a variable number of rods on the base of the number of parts 3 to cut off. However, the number of rods 6 is always in excess in comparison to which in use in a determined time, such as it is provided the starting of some of them on the base of the use necessity and their number must be able to adapt to the different types of dies 2 from which the cutting off of the parts 3 is provided. The cut off parts fall down into hoppers and from these onto belt conveyors and then in underlying containers different for the different types of products so permitting a quick storing and the recovery of the working rejections. At the end, the die 2, from which parts 3 are being cut off, is freed to the temporary blocking rods 6 to be separately recovered. In other embodiment the translation of the rods is actuated providing in the translation device 7 double effect cylinders 17 connected with flask 9 to the rods so to have the translation of said rods 6. The advancement of the rods is driven also in this embodiment to conventional electronic devices connected to a P.L.C. 16 and controlled to the operator by the touch screen. Other embodiment provides the use of solenoids 18

placed onto the rods with way of the current variable on the base of the wanted translation direction of the rods 6 by means of device 19 to invert the motion of the current and return spring 20 to the initial position. Conventional electronic devices, the disposition and the installation of which are known for an operator of the field, are placed for the driving of the translation motion of the rods 6 so as it is known in the previous art the use of driving and storage electronic cards and are known the necessary connections for the right working of the invented machinery. The invented machinery is illustrated in a merely and not limiting way in the drawings of sheets 1, 2, 3, 4, 5, 6, 7 and 8. In sheet 1 figure 1 is a perspective view of the device 7 for the translation of the rods in the main embodiment. In sheet 2 figure 2 is view of the other embodiment of the device 7 in which the advancement motion of the rods 6 is realized by double effect cylinders 19. In sheet 3 figure 3 is view of further embodiment where the motion of the rods 6 is due to the action of solenoids 18. The other sheets, i.e. the sheets 4, 5, 6, 7and 8, show the function of the different phases of the invented machinery. In particular in the sheet 4 - figure 4 shows the positioning, actuated by means of the robot arm 1, of the die 2 in medium position between the containment bodies 4A and 4B of the rods 6. In sheet 5 - figure 5 shows, always in prospective view, the temporary blocking phase. The sheet 6 - figure 6 is view of the percussion phase by means of the rod 6 onto the part 3 to be cut off from the die 2. In this phase is created the break line or also already the cutting of the part 3. The sheet 7 - figure 7 is view of the second phase of percussion of the part 3 with the rod 6 opposite to the previous one in using phase, while the rod 6 of the first percussion is in rest position. In sheet 8 - figure 8 shows the advancement of the rod 6 over the die 2 with the part 3 already cuts off.

Claims

1. Machinery for cutting off and storing parts from pressure casting dies or similar **characterized in that** to consist of an axial robot arm (1), able of programmed movements X, Y and rotatory and able to put a die (2) in median position between two containment bodies (4A, 4B), and of rods (6) placed with regular spaces according lines and columns and connected to a translation unit (7) able to actuate a translation motion to the rods (6) and to be programmed by a touch screen.

2. Machinery for cutting off and storing parts from pressure casting dies or similar, as for the previous claim, **characterized in that** the translation unit (7) consists of a timing belt (8) connected to the rod (6) by a flask (9) and kept parallel to the rod (6) by means of pulleys (10A, 10B).

3. Machinery for cutting off and storing parts from pressure casting dies or similar, as for the claims 1 and 2, **characterized in that** the timing belt (8) is connected with pulleys (11), with a reduction gear (12) and with an electric brushless engine (13).

4. Machinery for cutting off and storing parts from pressure casting dies or similar, as for claims 1-3, **characterized in that** the electric engine (13) is connected to logic card (14) for the driving of the control of the way and of the velocity of the rotations of the electric engine (13) and consequently of the translations of the rods (6).

5. Machinery for cutting off and storing parts from pressure casting dies or similar, as for claims 1-4, **characterized in that** the logic card (14) has an electronic storage (15) for the control of the translations and of the translation times of the rods (6) and it has a connection to a P.L.C. (16) so to have on a touch screen the possibility for the operator to program, store and drive the translation of the rods (6) in relation to the shape of each part (3) to cut off from the die (2).

6. Machinery for cutting off and storing parts from pressure casting dies or similar, as for claim 1, **characterized in that** the device (7) for the translation of the rods (6) consists of double effect cylinders (17) with advancement of the rods driven to P.L.C. (16).

7. Machinery for cutting off and storing parts from pressure casting dies or similar, as for claim 1, **characterized in that** the device (7) for the translation of the rods (6) provides the use of solenoids (18) placed onto the rods with way of the current variable on the base of the wanted translation direction of the rod and by means of a device (19) to invert the motion of the current and return spring (20) to recall the initial position.

8. Machinery for cutting off and storing parts from pressure casting dies or similar, as for claim 1, **characterized in that** the device (7) of translation of the rods is obtained with gears connected to the rod (6) and with the electric engine (13) and it is driven by a P.L.C. (16).

9. Machinery for cutting off and storing parts from pressure casting dies or similar, as for the previous claims, **characterized in that** the number of rods (6) can change on the base of the parts (3) to cut off.

10. Machinery for cutting off and storing parts from pressure casting dies or similar, as for the previous claims, **characterized in that** the parts (3) cut off to the die (2) fall down into hoppers and from these onto belt conveyors and then in underlying containers different for the different types of products so

permitting a quick storing and the recovery of the working rejections.

Amended claims in accordance with Rule 86(2) EPC.

1. Machinery for cutting off and storing parts from pressure casting dies or similar comprising an axial robot arm (1) able of programmed movements x, y and rotatory and able to put a moulded part (2) in median position between two containment bodies (4A, 4B), **characterized in that**

- the containment bodies (4A, 4B) are placed frontally and back to the moulded part (2), and **in that**
- the containment bodies (4A, 4B) have holes (5) permitting the crossing of rods (6), and **in that**
- the holes (5) and corresponding rods (6) are placed with regular spaces according with lines and columns and each rod (6) is connected with a translation unit (7), and **in that**
- each rod (6) in the first containment body (4A) has an opposing rod (6) in the second containment body (4B) forming pairs of rods able to have that each rod can be moved independently so to obtain that the machinery can operate pieces with different geometry to have flexibility of the machinery and with a reduction of the working time.

2. Machinery for cutting off and storing parts from pressure casting dies or similar, as per claim 1, **characterized in that** the number of rods (6) can change from a minimum of four rods, with two opposite rods for the blocking and two rods for the folding and cutting off, to a variable number of rods (6) on the base of the number of part (3) to cut off.

3. Machinery for cutting off and storing parts from pressure casting dies or similar, as per claims 1 and 2, **characterized in that** for each single piece is stored into the electronic storage (15) which rods (6) must be used and the motion of advancement of the rods in blocking phase.

4. Machinery for cutting off and storing parts from pressure casting dies or similar, as per claims 1, 2 and 3, **characterized in that** the numbers of rods (6) is in excess in comparison to which in use in a determined time.

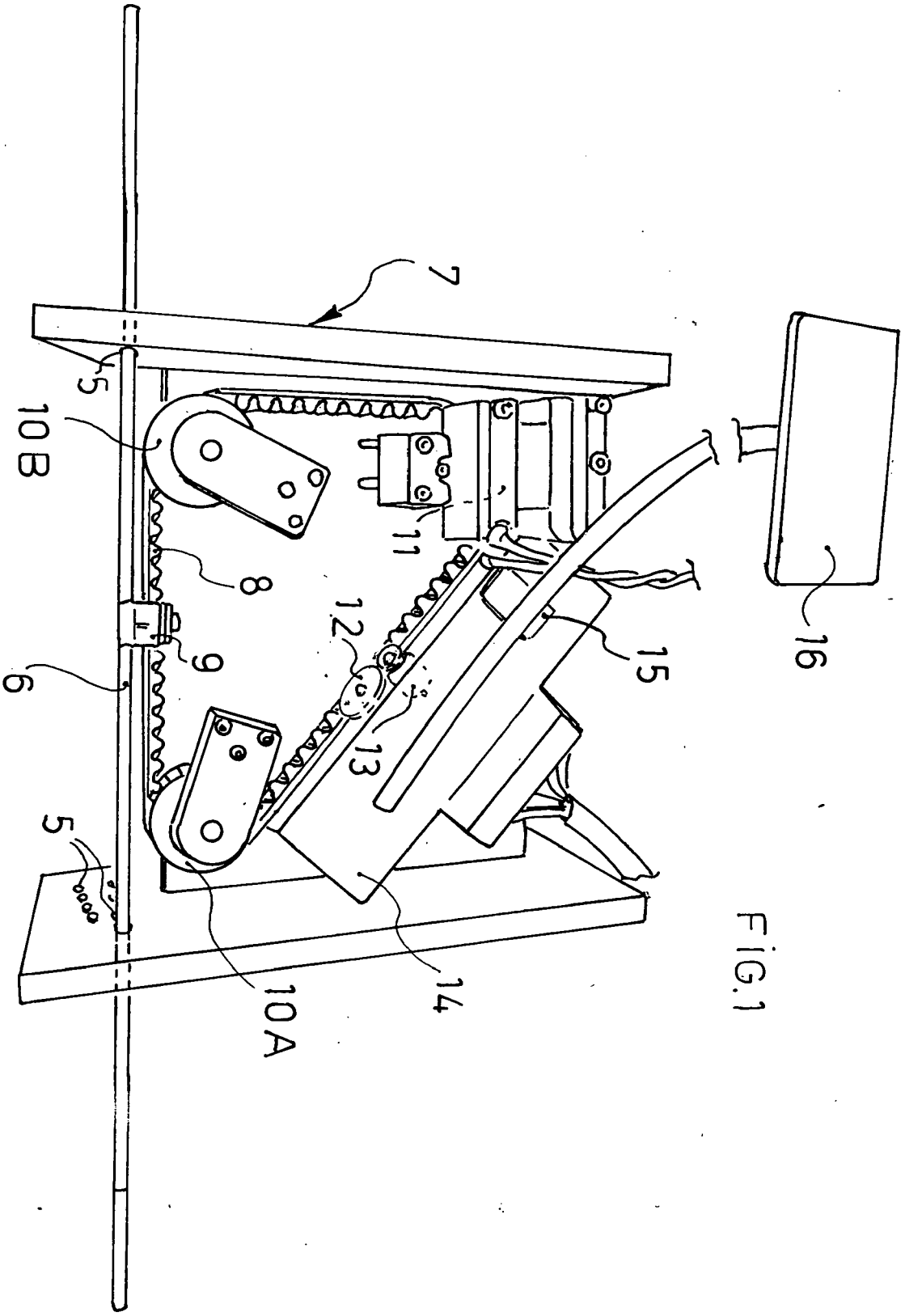

FIG.1

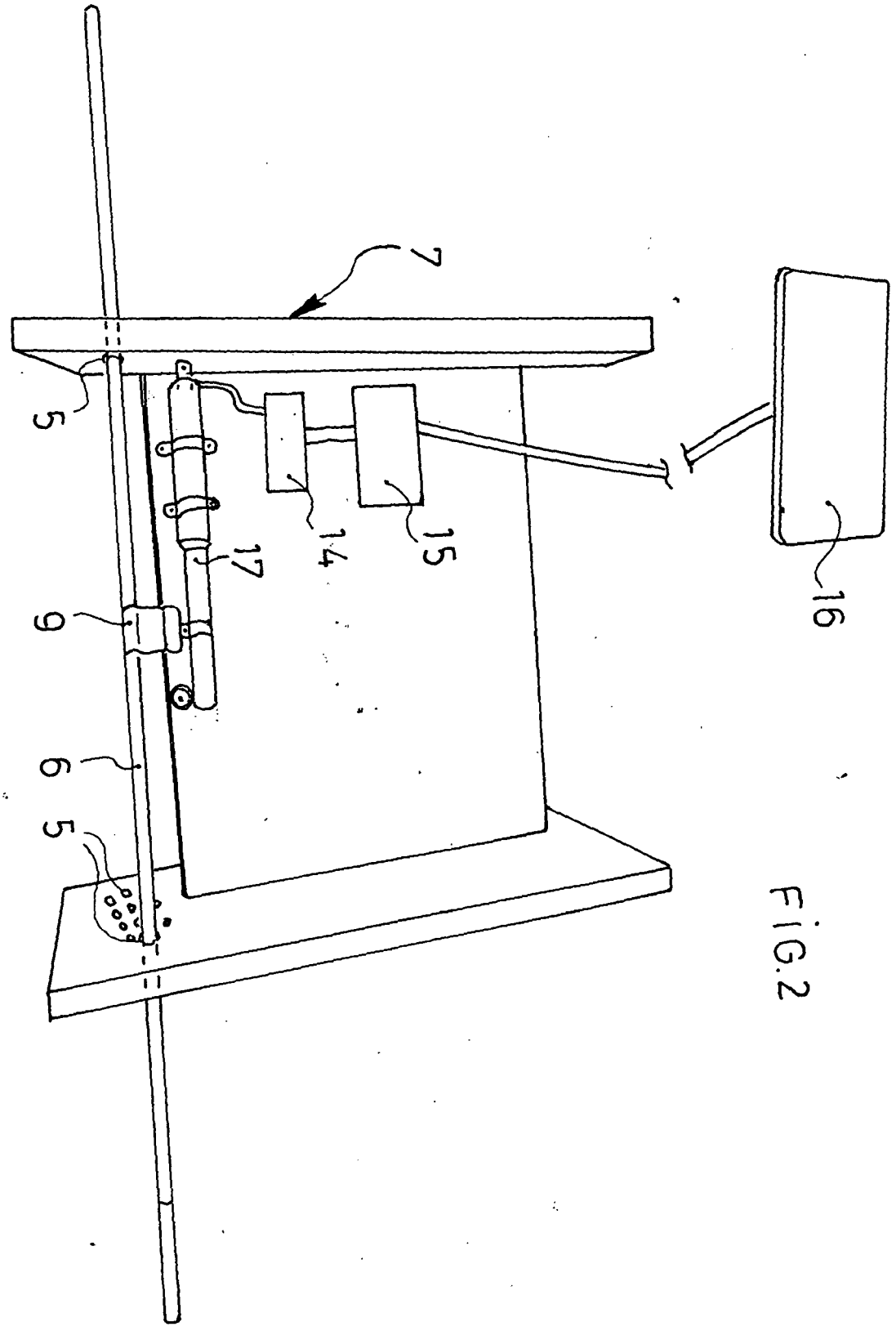

FIG.2

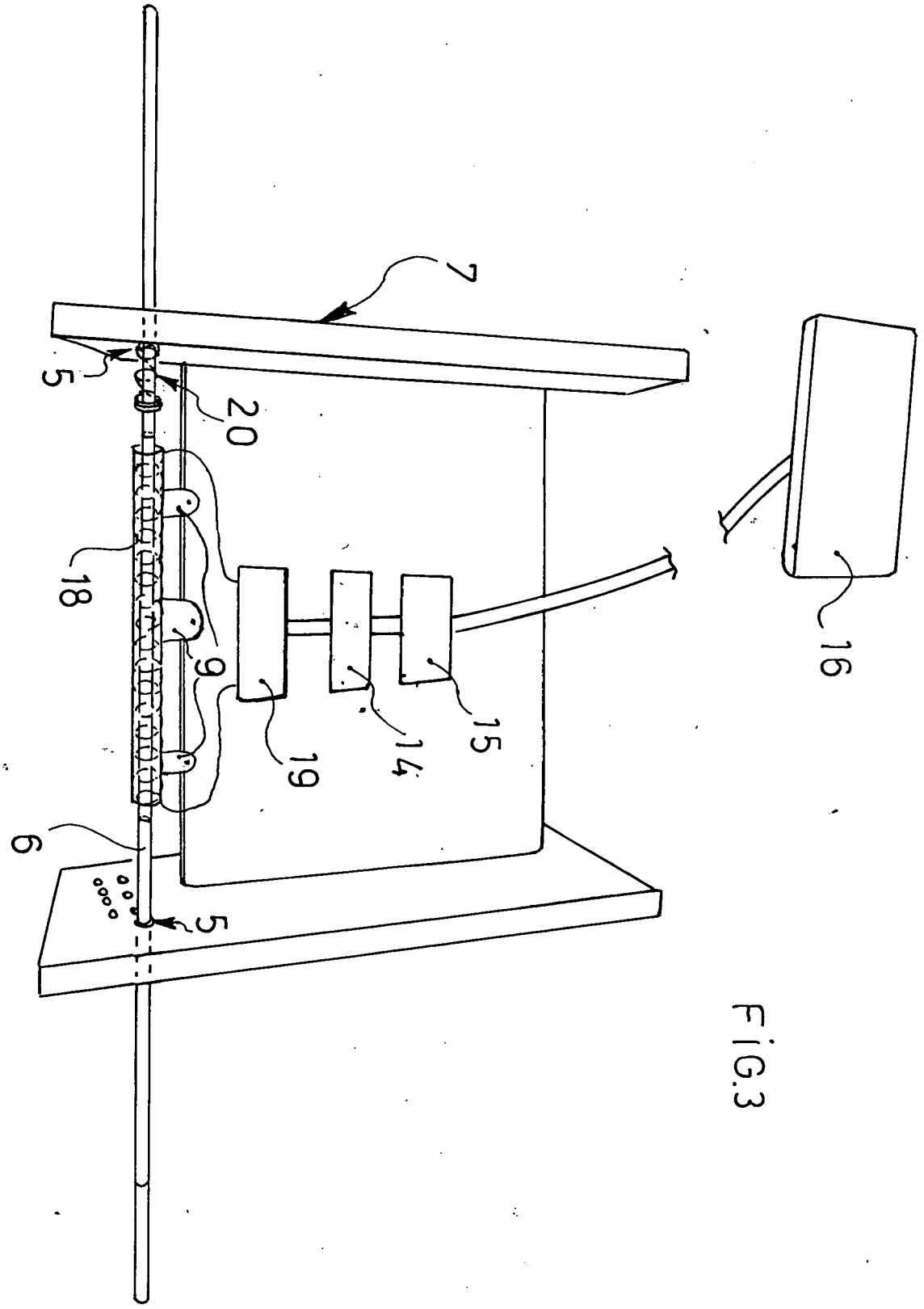

FIG.3

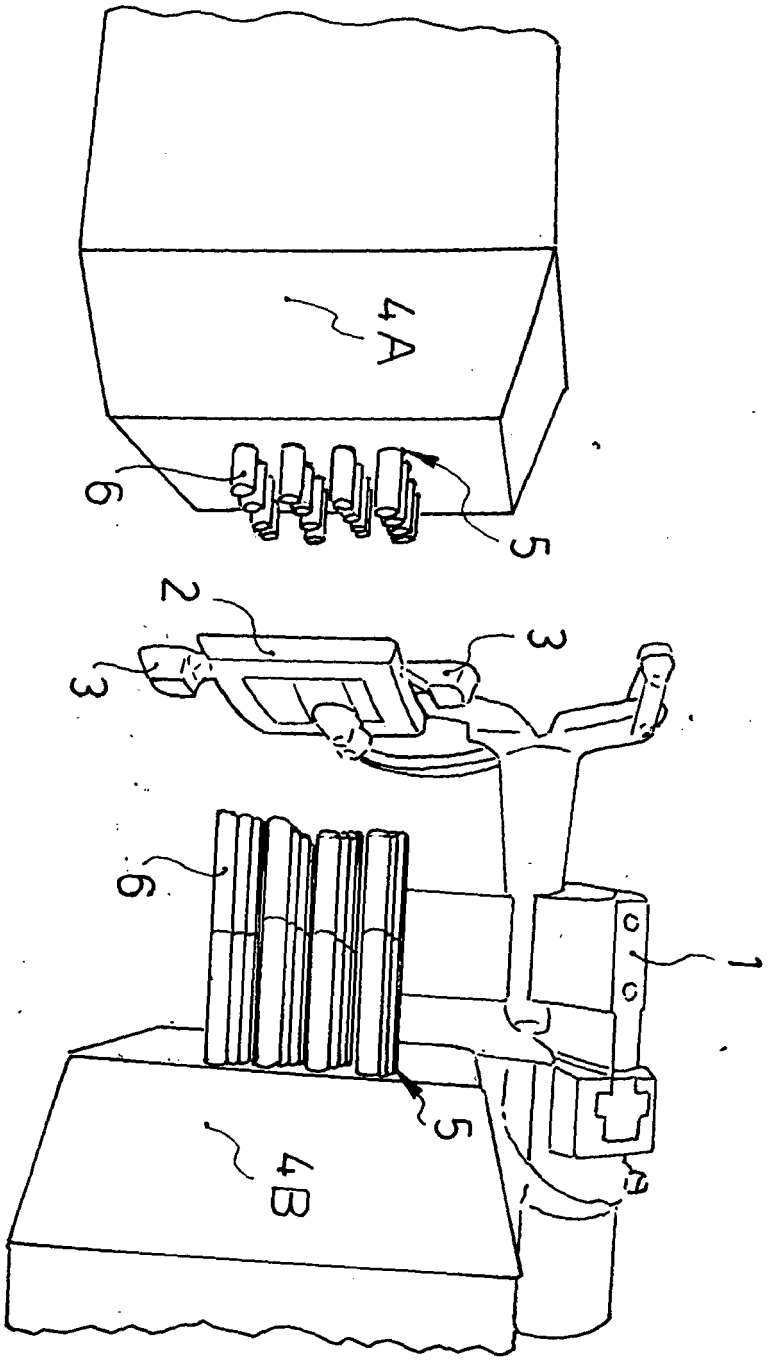

FIG.4

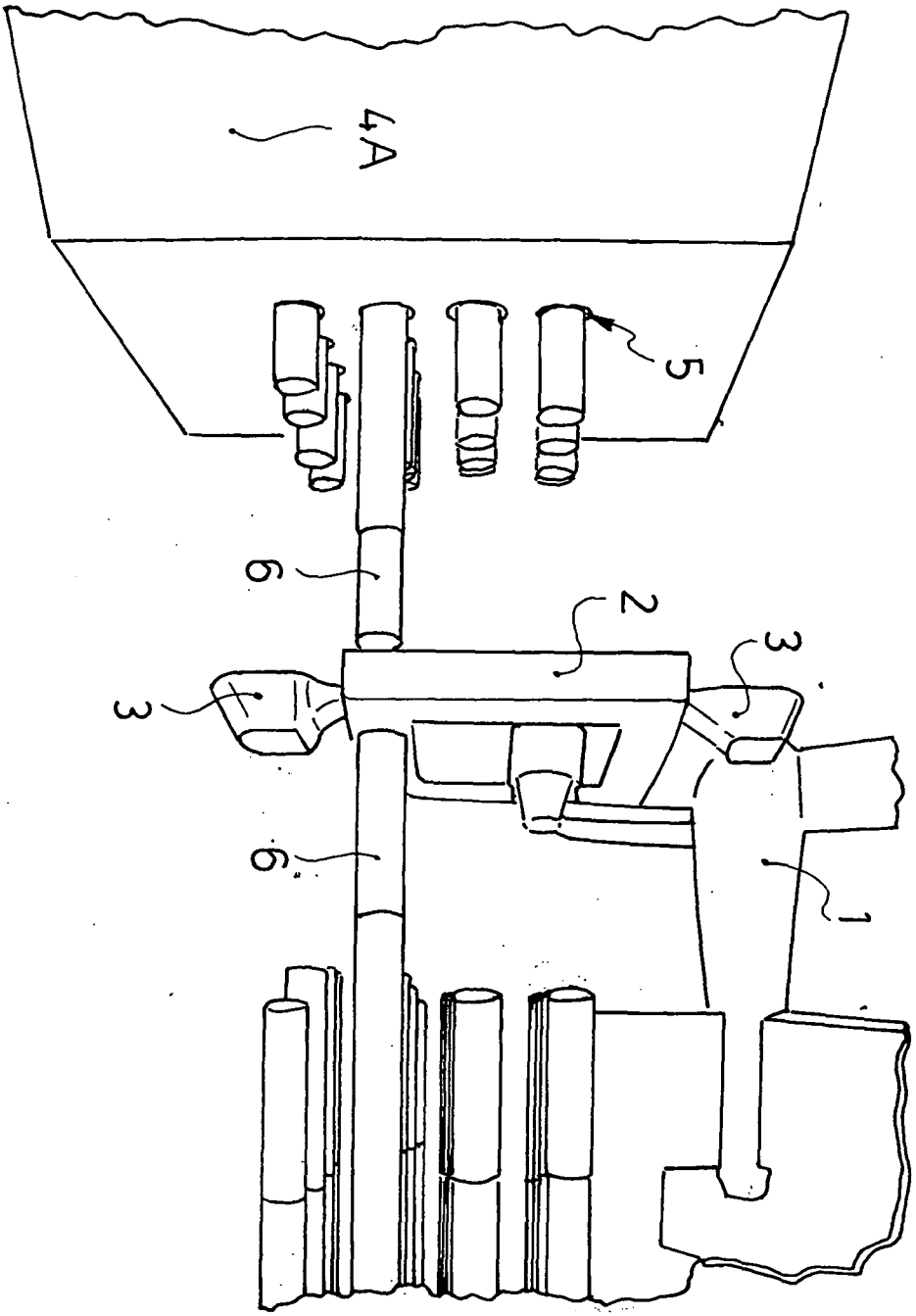

FIG.5

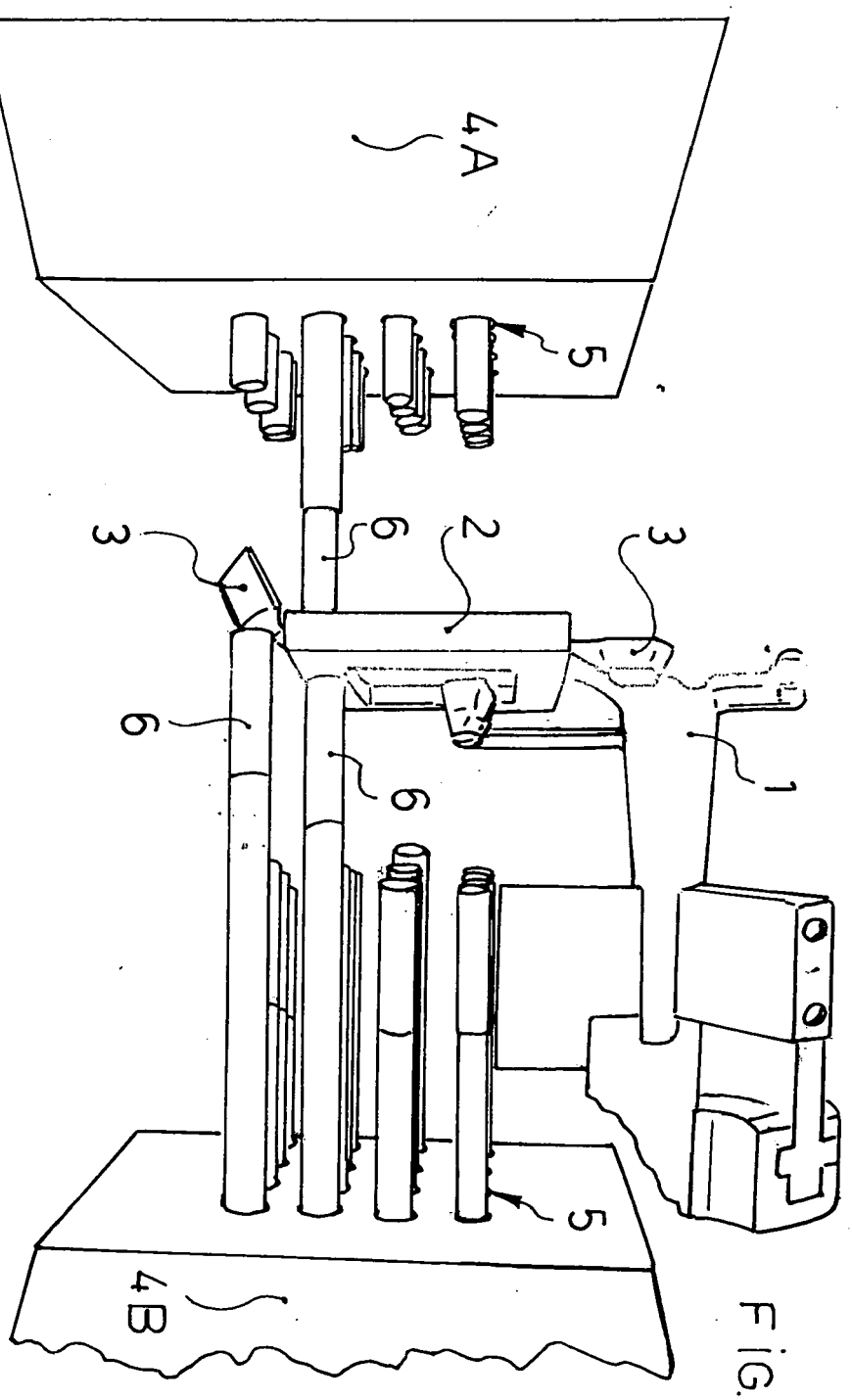

FIG.6

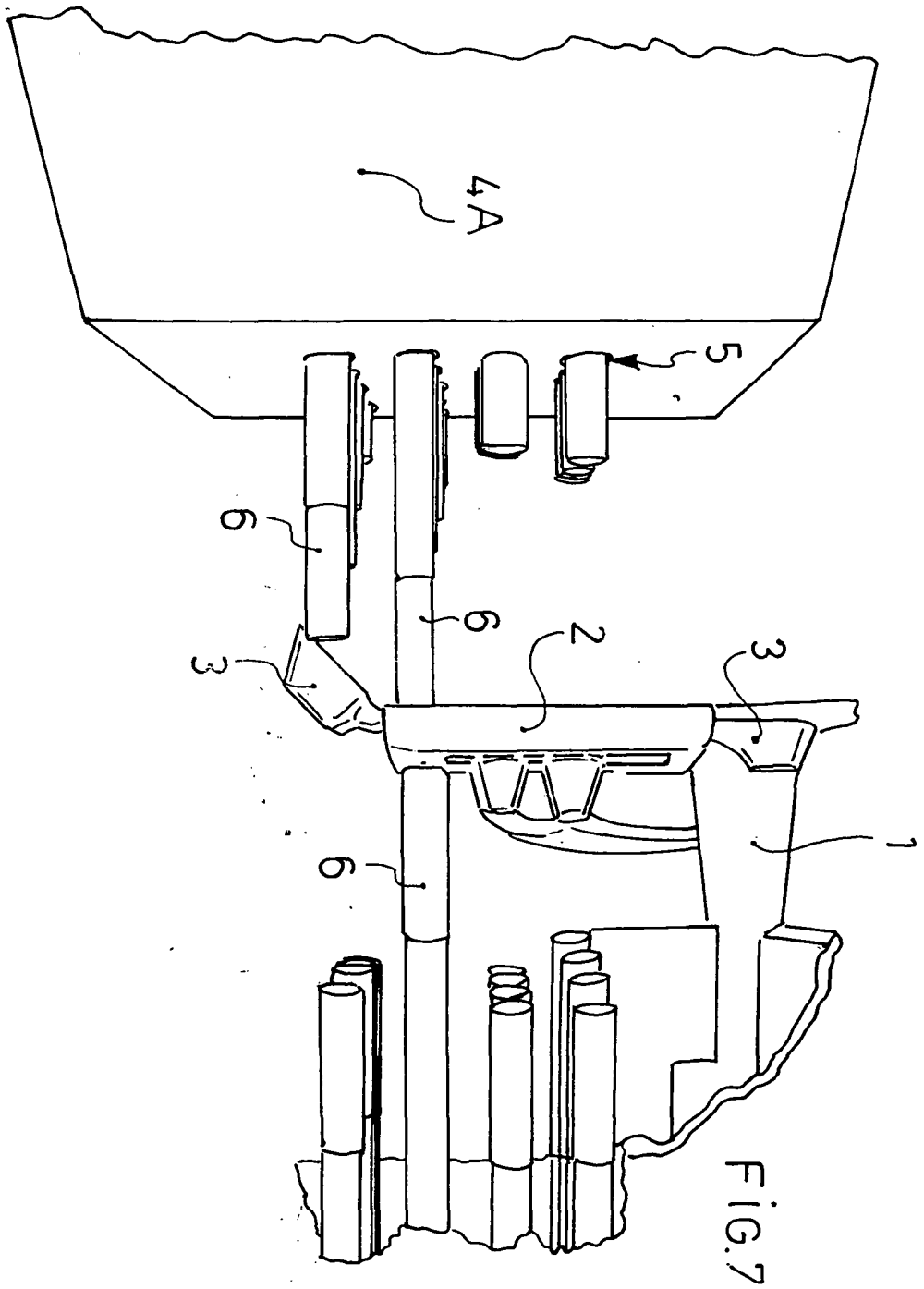

FIG.7

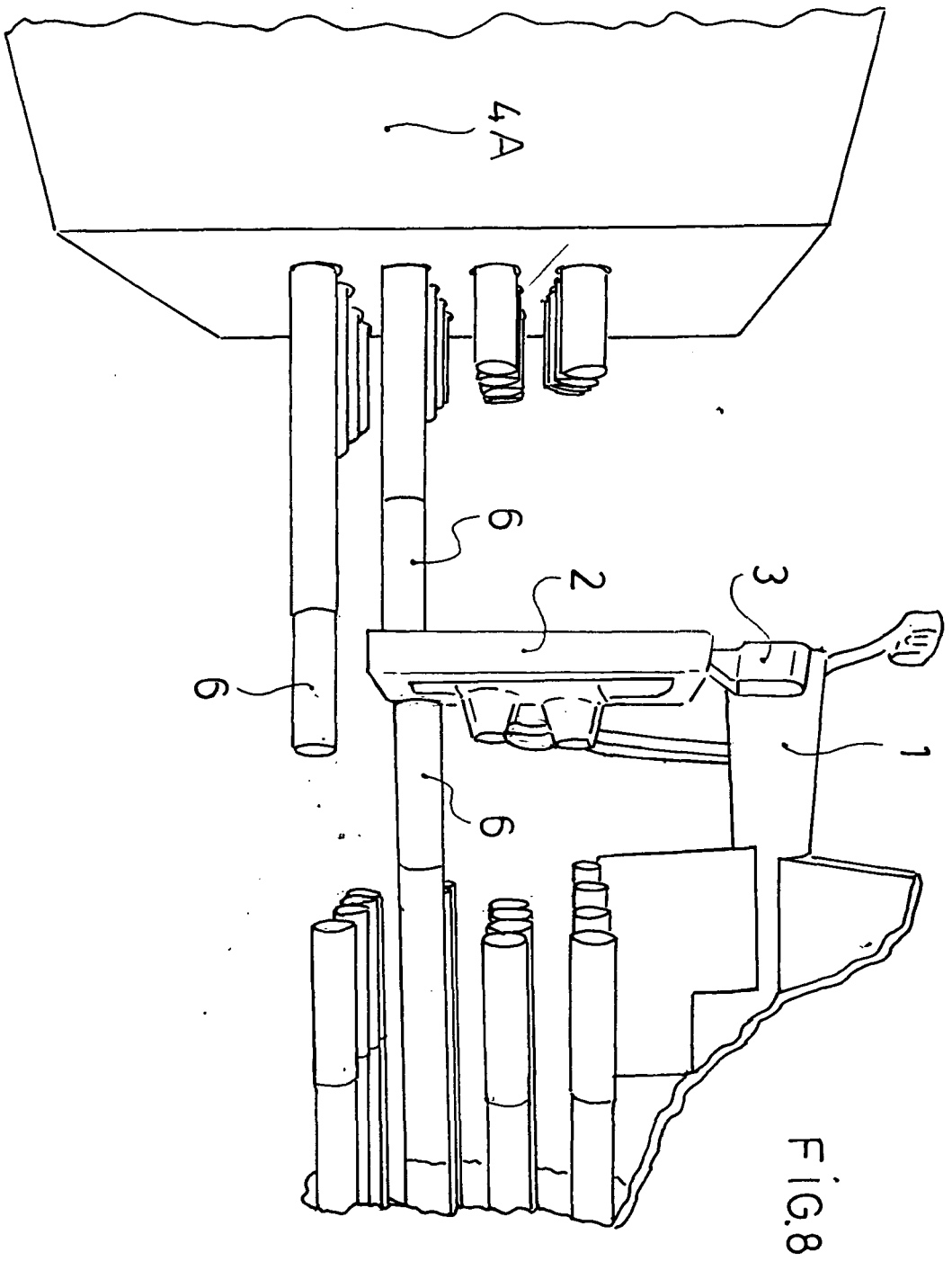

FIG.8

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EUROPEAN SEARCH REPORT

Application Number
EP 06 42 5198

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 5 597 521 A (WICKHAM ET AL) 28 January 1997 (1997-01-28) * column 3, line 29 - column 5, line 24 * * figures 1,2 * -----	1-10	INV. B22D17/20 B22D31/00

TECHNICAL FIELDS SEARCHED (IPC)

B22D
B29C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	7 September 2006	Scheid, Michael

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 06 42 5198

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5597521 A	28-01-1997	NONE	

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