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

(11) Publication number : **0 677 376 A1**

(12) EUROPEAN PATENT APPLICATION

(21) Application number : **95500041.9**

(22) Date of filing : **05.04.95**

(51) Int. Cl.[6] : **B30B 9/30,** B65B 27/12

(30) Priority : **15.04.94 ES 9400793**

(43) Date of publication of application :
18.10.95 Bulletin 95/42

(84) Designated Contracting States :
BE CH DE FR GB IT LI SE

(71) Applicant : **Lopez Ramirez, Miguel**
Sant Maties 26
E-08208 Sabadell (Barcelona) (ES)

(72) Inventor : **Lopez Ramirez, Miguel**
Sant Maties 26
E-08208 Sabadell (Barcelona) (ES)

(74) Representative : **Curell Sunol, Jorge et al**
c/o Dr. Ing. M. Curell Sunol I.I. S.L.
Passeig de Gràcia 65 bis
E-08008 Barcelona (ES)

(54) A process and an apparatus for forming bales of loose materials.

(57) The apparatus may be installed in the proximity of a hydraulic press having a bale pressing chamber (1) provided with an outlet port (3) for pressed bales (20) and may be associated with an automatic pressed bale binding appliance. It has a tubular auxiliary chamber (10) formed by a fixed first tubular box (11), and a moving second tubular box (12) which may slide along the outer surface of the first box (11). There are guide members (13, 14, 14a) and drive means (15) for the sliding of the second box (12). The tubular auxiliary chamber (10) is provided with open opposite end ports (17) and one of them is facing the outlet port (3). Between them there is a moving gate (3a).

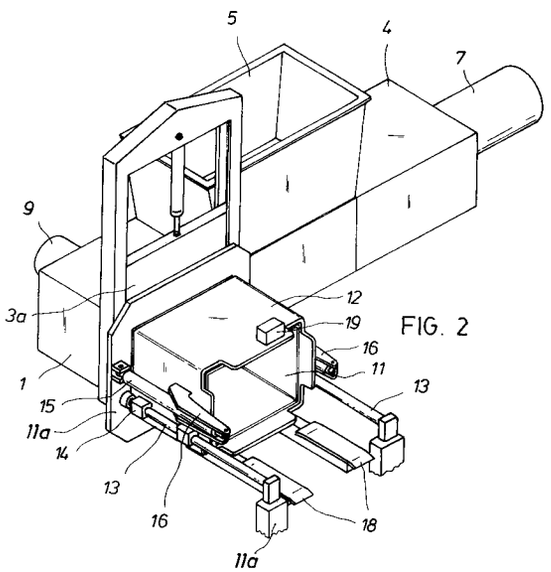

FIG. 2

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The invention relates to a process for forming bales of loose materials, comprising a prior step of forming bales pressed in a hydraulic press provided with a pressing chamber having an outlet port for pressed bales, there being provided a gate for closing said port.

The invention also relates to an apparatus for the formation of bales of loose materials which: (a) is adapted for installation in the proximity of a hydraulic press provided with a pressing chamber having an outlet port for pressed bales; and (b) may be associated with an automatic pressed bale binding appliance.

The process and the apparatus are directed particularly to obtaining high density bales of urban waste and forage, particularly dehydrated alfalfa, without thereby excluding other materials, such as waste paper and textiles, cardboard packing cases, plastics and the like.

US-A- 5,201,266 (Schmale et al.), US-A- 5,239,919 (Maki et al.) and US-A- 5,247,881 (Rosser et al.), among others, disclose horizontal hydraulic presses for compacting sundry materials in bale form to facilitate the storage, carriage or treatment thereof. Such presses are formed by a horizontal pressing chamber in communication at the top with a loading hopper and inside which there moves a pressing piston which leads and compresses the material against a facing wall of a box having an outlet port for the formed bale perpendicular to the pressing direction, for which purpose it is provided with an ejector piston which feeds the pressed bale outwards stepwise, whereby the bale exits by successive portions for strapping on each of them. This means that during the bale exit and strapping time, the press piston cannot form another bale until the previous one has been removed.

This reduces the performance of the press, since there is a downtime for the simultaneous removal and strapping during which the press piston cannot work.

It would therefore be desirable to have a process in which the binding of the compacted bale did not prevent the compacting of another bale, whereby the downtimes of the pressing piston would be avoided.

With a view to achieving the above purpose, the process of the invention has been developed, characterized in that it comprises the following steps: inserting at least two pressed bales in a tubular auxiliary chamber, formed by a fixed first tubular box and a moving second tubular box, adapted to slide along the outer surface of the first box, said auxiliary chamber having a port facing said outlet port; closing said gate; retracting said second box on the first box, with the consequent gradual uncovering of one of said pressed bales; binding of said bale as said uncovering takes place; removing the bound bale; extending said second box; reopening said gate; and inserting a new pressed bale in the tubular auxiliary chamber; with restart of the cycle.

In turn, the apparatus is characterized in that it is provided with a tubular auxiliary chamber formed by a fixed first tubular box, fixedly attached to a fixed structure for attachment to said chamber; and a moving second tubular box adapted to slide along the outer surface of the first box, there being guide members and drive means for such sliding movements; said tubular auxiliary chamber having open opposite end ports, one of which faces said outlet port, there being a movable gate between both facing ports.

To facilitate the understanding of the foregoing ideas, there is described hereinafter one embodiment of the invention, with reference to the accompanying illustrative drawings. In the drawings:

Figure 1 is a schematic illustration of a cross section on a horizontal plane, of an apparatus for carrying out the process of the invention.

Figure 1a schematically shows the position of the apparatus during the binding step of the outermost of the bales lodged in the auxiliary chamber.

Figure 2 is a schematic perspective view of the press and of the apparatus, with the auxiliary chamber recoiled.

Figure 3 is a side elevation view of the apparatus according to the invention.

Figure 4 is a cross section view on the line IV-IV of Figure 3.

Figure 1 shows a conventional horizontal hydraulic press installation, in which the apparatus of the invention, allowing the claimed process to be carried out, has been installed.

Said installation conventionally comprises a press chamber 1 having an inlet port 2 and an outlet port 3, the former being in communication with a loading chamber 4, into which there opens a feed hopper 5 and through which the press platen 6, pushed by the press piston 7, moves, while the outlet port 3 faces an ejector plate 8, driven by an ejector piston 9 which moves through the press chamber 1 in a direction perpendicular to that of the press piston 7. The press chamber 1 communicates with the apparatus of the invention through a movable gate 3a (Figure 2). The apparatus is provided with a tubular auxiliary chamber 10, the first dimension of which in the feed direction of the ejector piston 9, is greater than the dimension in the same direction as the press chamber 1.

The said tubular auxiliary chamber 10 is provided with an organization allowing the value of the said first dimension to be varied, there having been adopted, in the embodiment described, a telescopic structure formed by a fixed first tubular box 11 and by a moving second tubular box 12, capable of sliding along the outer surface of the first box 11. Such sliding movements may take place between a retracted position (Figure 2) in which the second box 12 is surrounding the first box 11, and an extended position (Figures 1, 3 and 4) in which the second box 12 extends from the

first box 11. The auxiliary chamber 10 is provided with open opposite end ports.

The fixed first tubular box 11 is fixedly attached to a base structure 11a which places one of the opposite open ports of the auxiliary chamber 10 opposite the outlet port 3 of the chamber 1 and between both ports there is to be found the said moving gate 3a.

The second box 12 is slidingly supported on two guide bars 13, fixedly mounted to the base structure 11a, on which respective pairs of slide members 14 fixedly attached to the side walls of the second box 12. They may be replaced by or cooperate with guided support shoes 14a, which move on ways of the base structure 11a.

Furthermore, the second box 12 is moved by hydraulic cylinders 15 attached at one end to the base structure 11a and at the other end to cantilever brackets 16, extending in front of the outer end port 17 of the moving second box 12. The said guide members and driving means described do not exclude the possibility of using a rack, screw spindles or other mechanisms for carrying out this movement.

The moving second box 12 has fixedly attached thereto two supports 18 in projecting fork form, extending outwardly at the level of the bottom wall from the outer edge thereof and which move with the said second box 12.

The outer end port 17 of the moving second box 12 is provided with a conventional automatic bale binding appliance 19, using wire, string, metal, textile or plastic strapping. Nevertheless, the invention also comprises the case in which this appliance is not fixedly attached to the apparatus.

The process of the invention consists of compacting a first high density bale 20a in the press chamber 1 with the gate 3a closed, by the successive action of the press platen 6, after which, said gate 3a having been opened, said bale is inserted in the auxiliary chamber 10 by means of the ejector plate 8, as shown in Figure 1, at which time the formation of a new bale 20b is initiated in the press chamber 1. Said new bale will be inserted in the said auxiliary chamber 10 pushing the bale 20a, with the production of a third bale being set under way, while the bale 20a is being bound or strapped in the auxiliary chamber with wire, string or strapping by means of the automatic binding appliance 19 which, as may be seen in Figure 1a, is fed over the bale 20a by movement of the outer box 12 supporting said bale, retained by the bale 20b and the sliding gate 3a, along the supports 18.

With the invention it is obviously possible totally to eliminate the downtimes of the press platen 6, such that while one bale 20a is being bound, the press chamber 1, thanks to the sliding gate 3a, is in a position to form a new bale 20c, at the same time as an intermediate bale 20b, housed in said auxiliary chamber, is waiting to occupy the place of the bale 20a once bound, ejecting it by the thrust received on removing the bale 20c by means of the ejector plate 8 which finds the gate 3a open.

Since the movement of the automatic binding appliance 19 is independent of the movement of the ejector plate and only depends on the movement of the outer box 12, the number of bindings may be selected at will, without a loss of production.

Thus, with the process and apparatus of the invention, a large increase in the performance of a conventional type horizontal hydraulic press is achieved.

Claims

1.- A process for forming bales of loose materials, comprising a prior step of forming bales (20) pressed in a hydraulic press provided with a press chamber (1) having an outlet port (3) for pressed bales (20), there being provided a gate (3a) for closing said port (3), characterized in that it comprises the following steps: inserting at least two pressed bales (20) in a tubular auxiliary chamber (10), formed by a fixed first tubular box (11) and a moving second tubular box (12), adapted to slide along the outer surface of the first box (11), said auxiliary chamber (10) having a port facing said outlet port (3); closing said gate (3a); retracting said second box (12) over the first box (11), with the consequent gradual uncovering of one of said pressed bales (20); binding said bale as said uncovering takes place; removing the bound bale; extending said second box; reopening said gate; and inserting a new pressed bale in the tubular auxiliary chamber (10), with restart of the cycle.

2.- An apparatus for forming bales of loose material which: (a) is adapted for installation in the proximity of a hydraulic press provided with a bale pressing chamber (1) having an outlet port (3) for pressed bales (20); and (b) may be associated with an automatic pressed bale binding appliance (19), characterized in that it is provided with a tubular auxiliary chamber (10) formed by a fixed first tubular box (11), fixedly attached to a fixed structure (11a) for attachment to said chamber (1); and a moving second tubular box (12) adapted to slide along the outer surface of the first box (11), there being guide members (13, 14, 14a) and drive means (15) for such sliding movements; said tubular auxiliary chamber (10) having open opposite end ports (17), one of which faces said outlet port (3), there being a movable gate (3a) between both facing ports.

3.- The apparatus of claim 2, characterized in that said automatic pressed bale (20) binding appliance (19) is situated in an area of the exit end port (17) of the second box (12).

4.- The apparatus of claim 2 or claim 3, characterized in that it is provided with a support member (18) for the bales (20) exiting from the second box

(12), said support member (18) being fixedly attached to said moving second box (12) at the level of the lower wall thereof and projecting from the outer edge of said lower wall.

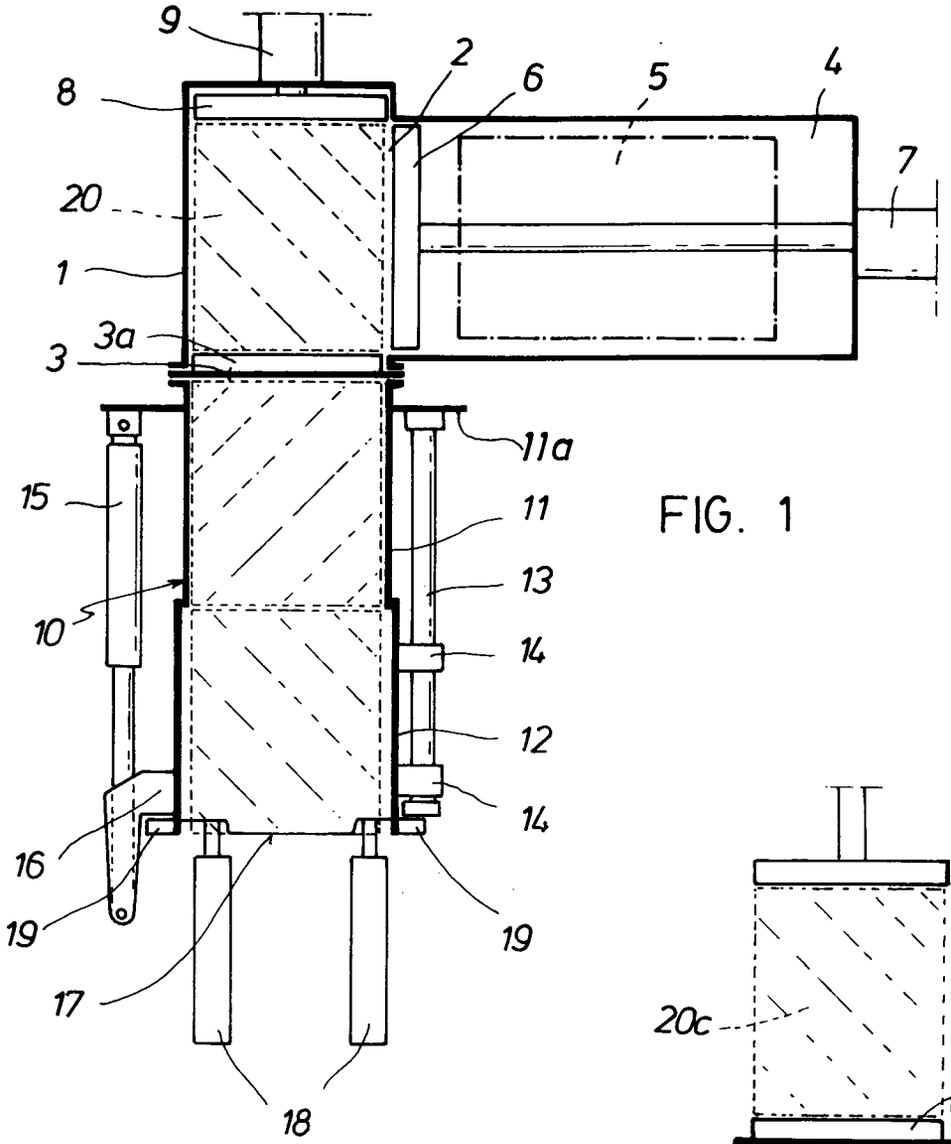
5.- The apparatus of claim 4, characterized in that said support member is fork-shaped (18).

6.- The apparatus of anyone of claims 2 to 5, characterized in that said guide members comprise at least two guide bars (13), attached to said fixed structure (11a) and sliding members (14) attached to said moving second box (12) which, at least in part, surround said guide bars (13).

7.- The apparatus of claim 6, characterized in that said guide members (13,14) are complemented by support shoes (14a) moving on ways located on said fixed structure (11a).

8.- The apparatus of anyone of claims 2 to 7, characterized in that said drive means comprise hydraulic cylinders (15) which associate said fixed structure (11a) with said moving second box (12).

9.- The apparatus of claim 8, characterized in that the connection between said hydraulic cylinders (15) and said moving second box (12) is by means of cantilever brackets (16) extending in front of the end port (17) of the second box (12).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4
8
7
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11a
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18

FIG. 1

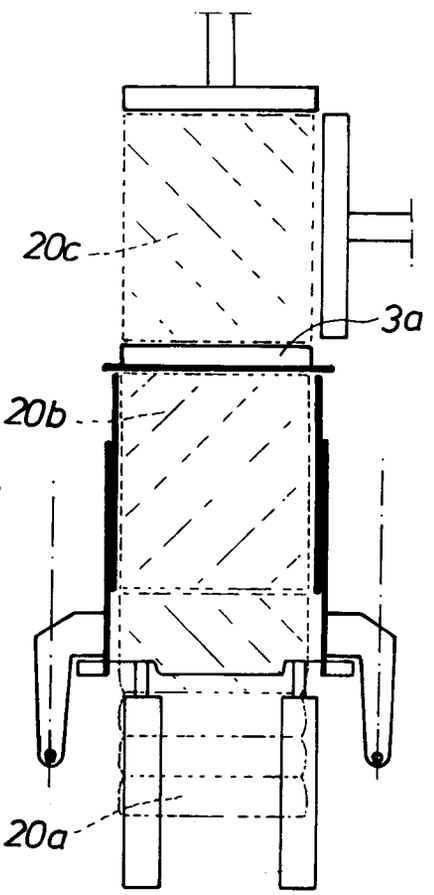

20c
3a
20b
20a

FIG. 1a

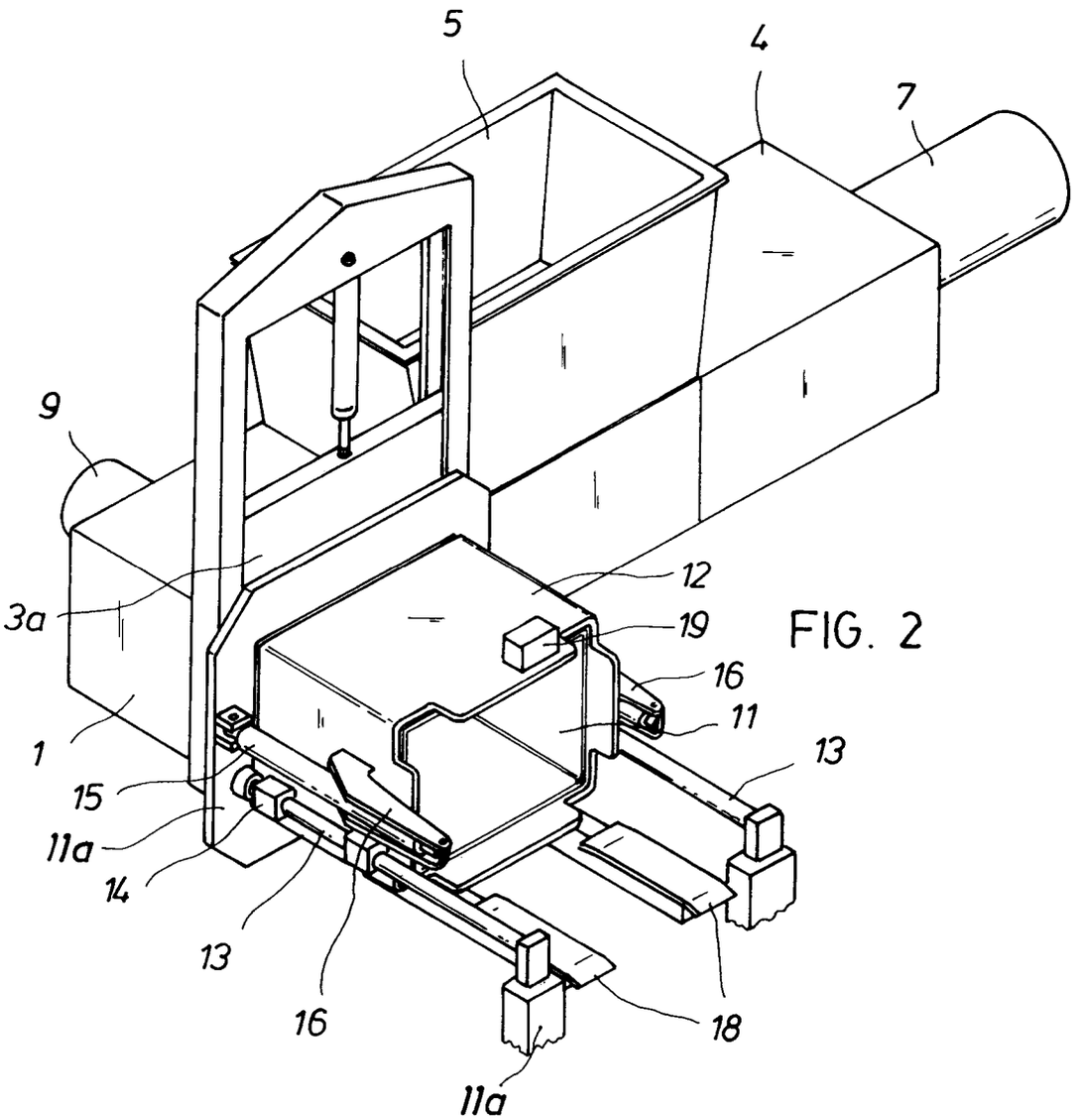


FIG. 2

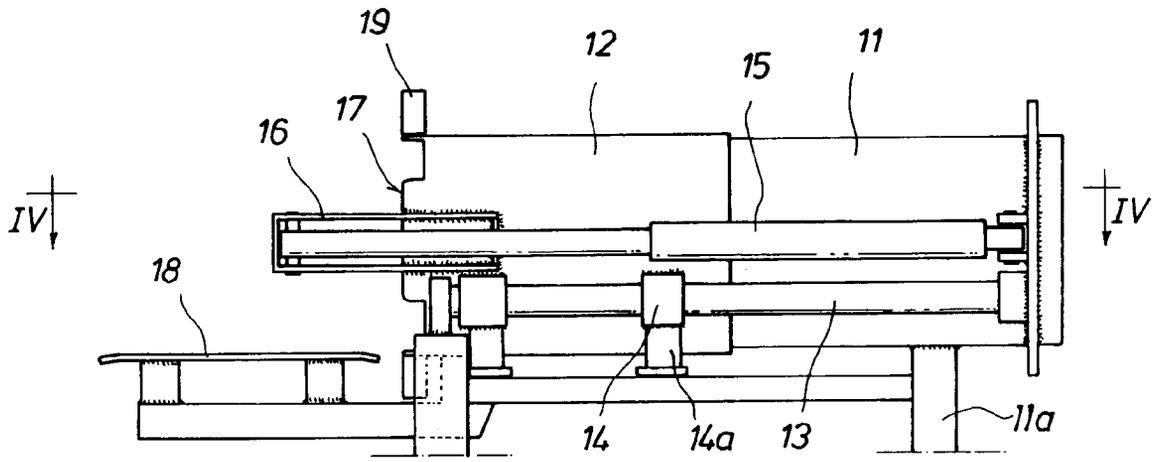
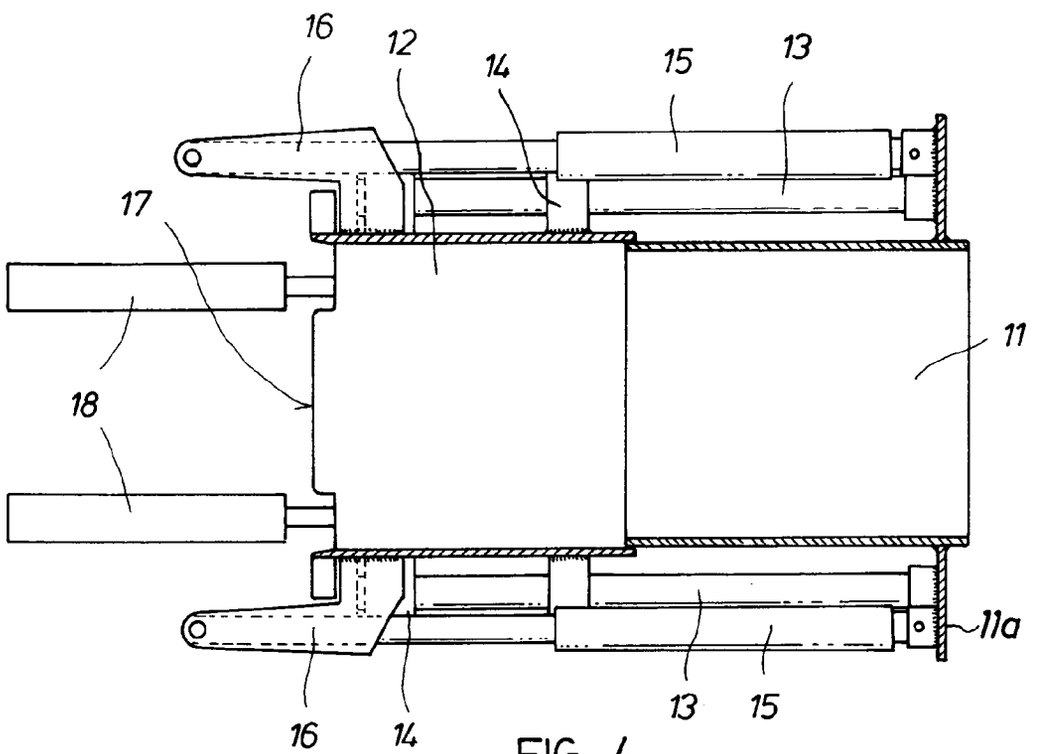

19
12
11
15
17
16
IV
IV
18
14
14a
13
11a

FIG. 3


16
12
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11a
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14

FIG. 4

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 95 50 0041

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	GB-A-1 338 371 (AMERICAN HOIST & DERRICK CO;KELLY H F) 21 November 1973 * claims; figures *	1,2	B30B9/30 B65B27/12
A	EP-A-0 150 687 (GUALCHIERANI & C SPA) 7 August 1985 * claims; figures *	1,2	
A	GB-A-2 184 979 (SNOWFLAKE WOODSHAVING COMPANY) 8 July 1987 * abstract; figures *	1,2	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

B30B
B65B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	28 July 1995	Voutsadopoulos, K

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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