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Remarks:
This application was filed on 29-09-2010 as a divisional application to the application mentioned under INID code 62.

(54) Press for miscellaneous scrap, such as paper

(57) Machine for forming bales of loose fibrous material, such as scrap paper, comprising a frame (2) carrying a pressing compartment (3) defined by three consecutive mutually perpendicular walls, a pressing unit (6) arranged to slide within the interior of said compartment and associated with drive means, a binding unit (100) positioned at that end of the compartment distant from the pressing unit, and a discharge chamber (800) positioned downstream of the binding unit and provided with lateral apertures at least in correspondence with the binding unit; said pressing unit (6) comprises a cylinder-piston unit (7), of which the piston rod (71) is fixed to the pressing plate (62) of the unit (6) and the cylinder (72) is fixed to a slide (73) slidable within the machine frame (2) to assume and be locked in a position close to the binding unit in which the cylinder-piston unit (7) is contained within the outline of the machine frame (2), and an operative position distant from the binding unit (100).

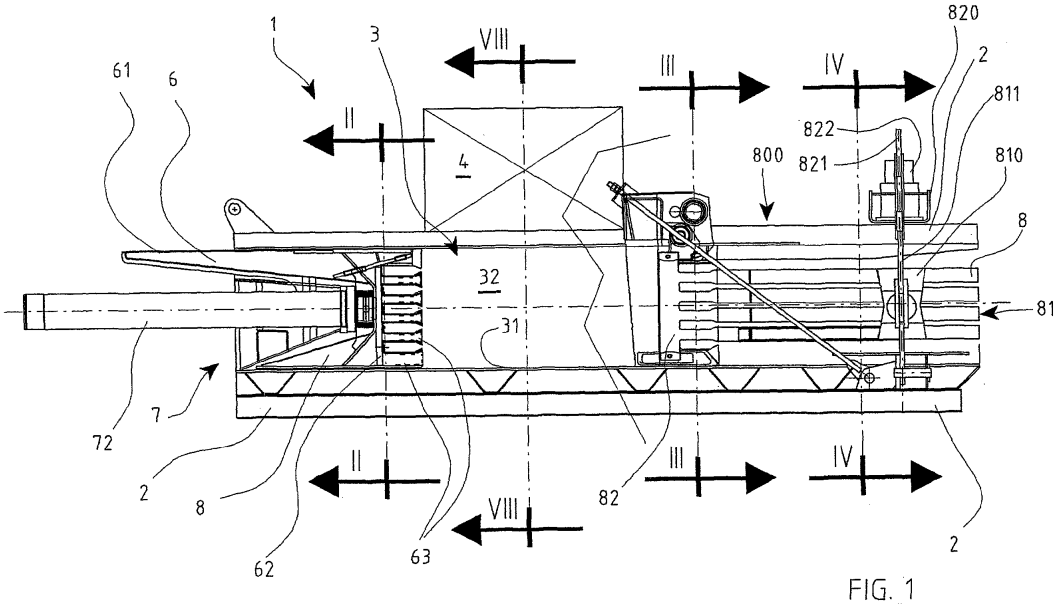

FIG. 1

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Description

[0001] This invention relates to a press for forming regular bales of yieldable material scrap, such as scrap paper.

[0002] Hereinafter, reference will be made exclusively to paper, it being understood that that stated is also valid for material other than paper. The problem which lies at the base of the invention is the formation and binding of rectangular or otherwise regular bales, starting from scrap paper.

[0003] The known art provides baling machines which have an overall size such that they cannot be transported.

[0004] The material to be baled must therefore be transported to the site where the machine is permanently installed, with consequent problems not only of transport, but also of material storage before treatment.

[0005] The known machines also operate batchwise, it being necessary to form and bind each bale before commencing formation of the next bale.

[0006] The object of this patent is to provide a baling machine which can assume both a transport configuration of reduced overall size, and an operative configuration.

[0007] It is also required to be easily transportable to the site on which the paper is stored in its loose state, and to operate continuously without stoppages and down-times, all within the framework of a simple and low-cost construction.

[0008] Said object is attained, according to the invention, by a machine having the characteristics defined in the claims.

[0009] Essentially, the machine of the invention comprises a frame carrying a forming compartment defined by three consecutive mutually perpendicular walls, a pressing unit arranged to slide within the interior of said compartment and associated with drive means, a binding unit positioned at that end of the compartment distant from the pressing unit, and a discharge chamber positioned downstream of the binding unit; the pressing unit comprises a cylinder-piston unit, of which the piston rod is fixed to the pressing plate and the cylinder is fixed to a slide slidable on the machine frame to assume and be locked in a position close to the binding unit in which the cylinder-piston unit is contained within the outline of the machine frame, and an operative position distant from the binding unit.

[0010] The merits and constructional and operational characteristics of the invention will be apparent from the ensuing detailed description with reference to the accompanying drawings, which illustrate a preferred embodiment thereof given by way of non-limiting example.

Figure 1 is a schematic side view of the invention in its operative position.

Figure 2 is a section on the line II-II of Figure 1.

Figure 3 is a section on the line III-III of Figure 1.

Figure 4 is a section on the line IV-IV of Figure 1.

Figure 5 shows the machine of Figure 1 arranged for transportation.

Figure 6 shows a detail of the binding means.

Figures 7A, 7B and 7C show further details of the binding means.

Figure 8 is a section on the line VIII-VIII of Figure 1.

Figure 9 is a plan view of Figure 8.

[0011] Figures 1 and 4 show the machine 1, which comprises a robust frame 2 defining a chamber 3 of quadrangular section for entry of the material.

[0012] The chamber 3 is closed on three sides, namely the base 31 and two side walls 32, and is open on the other sides.

[0013] The chamber 3 is overlaid by a hopper 4 which can assume a raised position, as in Figure 1, or a lowered transport position retracted into the chamber 3 or rotated laterally as best seen in Figure 8.

[0014] At the base of the hopper 4 there is a wheel 5 with radial cutting blades 51, visible in plan view in Figure 9.

[0015] The wheel 5 is driven by the electric motor 52 supported by the crosspiece 53.

[0016] At one end of the frame 2 there is positioned a slidable pusher 6 comprising a horizontal upper wall 61, the purpose of which is to close the base of the hopper 4 when the pusher is advanced.

[0017] The pusher 6 comprises a pressing front plate 62 provided at its front with projecting horizontal ribs 63, and engaged at its rear with the piston rod 71 of a cylinder-piston unit 7, the cylinder 72 of which is rigid with a slide 8 slidable within the frame 2 and lockable in the position shown in Figure 1.

[0018] The pusher 6 itself can be locked in the advanced position as shown in Figure 5.

[0019] In both cases the locking is achieved by a catch, not shown, operable from the outside.

[0020] At that end of the chamber 3 distant from the pusher unit 6 the is provided for the already formed bale an exit chamber 800, defined laterally by two sets of parallel equidistant bars 8 branching from an end plate 82 to form two side walls 81, and upperly by the solid wall 82.

[0021] As can be seen in Figure 4, the bars of the side walls 81 are engaged by two lateral frames 810, whereas the upper wall 82 is engaged by an upper frame 820.

[0022] The frames 810 are directly fixed to the connecting rods 811, the frame 820 being engaged with a connecting rod 821 by way of an interposed cylinder-piston unit 822.

[0023] The connecting rods 811 are hinged at their base end to the frame 2, and at their opposite end to two intermediate connecting rods which connect them to the upper connecting rod.

[0024] A binding unit 9 is visible in Figure 3, Figure 6 and Figure 7.

[0025] The binding unit comprises a full-width transverse guide 900 within which the beam 901 slides, driven by the cylinder-piston unit 902.

[0026] From one end of the beam there branches a vertical frame 903 which projectingly supports a series of horizontal needles 904 guided by a like number of bushes 905 rigid with the guide 900.

[0027] The needles are equidistant and positioned in front of the space existing between the bars 8, such that they can be inserted between one bar and the next by traversing the compartment between the two walls 81. The bars 8 lie in correspondence with the ribs 63 of the pressing plate 62. Each needle 904 is shown in Figure 6, and comprises a fork-shaped head 906, at the ends of the sides of which there are located two idle rollers provided with a peripheral groove.

[0028] Externally to the machine sides there are located two series of bobbins 907, in a number equal to the number of needles, and from which the metal binding wire 908 unwinds.

[0029] The device 100 for making the knots is positioned on that side of the machine distant from the frame 903 (Figure 3).

[0030] This device comprises a plate 101 carrying a number of mutually engaged toothed wheels 102 equal to the number of needles, one of the toothed wheels being engaged with a motorized pinion 103.

[0031] Each toothed wheel 102 (Figure 7) presents, in correspondence with a recess in the plate 101, a slot 104 which reaches the centre of the wheel, has a flared end and is as wide as the diameter of the wire 908.

[0032] With the plate 101 the is associated a plate 105 slidable under the control of means, not shown, and supporting a number of small cutters 106 for cutting the wires 908.

[0033] The invention operates in the following manner.

[0034] During its transportation the machine is in the configuration shown in Figure 5, with the frame 904 adjacent to the side wall of the machine, the pusher unit 6 in its advanced position, and the slide 8 carrying the cylinder 7 close to the binding unit.

[0035] After unloading the machine onto its working site, the cylinder-piston unit 7 is operated while maintaining the pusher unit in its locked position, by which the slide 8 moves to the left in the figure, into the position shown in Figure 1.

[0036] The slide 8 is then locked and the pusher unit 6 released, by which the subsequent operation of the cylinder-piston unit 7 drags the pusher unit towards the left in the figure.

[0037] The hopper 4 is raised into its working position and the wires 908 arranged such that the ends of those wires positioned on one side of the machine are tied to the ends of the corresponding wires positioned on the other side.

[0038] In this manner the wires 908 are stretched through the forming compartment defined by the chamber 3.

[0039] At this point the wheel 5 for shredding the paper is operated and paper feed through the hopper 4 is commenced.

[0040] When the chamber 3 is full, the pusher unit 6 is operated, which operation can be repeated several times until a first bale of compressed paper reaches the interior of the discharge chamber 8.

[0041] The cylinder-piston unit 822 forces the walls 81 and 82 to approach each other to brake the advancement of the bale, in order to exert the necessary reaction to pressing.

[0042] When a bale of the desired length has been formed, the pusher 6 is halted in an advanced position, and the needles 904 are advanced by operating the cylinder-piston unit 902.

[0043] The needles bring those wires unwinding from the bobbins positioned on one side of the machine into contact with those wires unwinding from the bobbins positioned on the other side, and insert the two wires in mutual contact into the slots 104 of the corresponding toothed wheels.

[0044] These latter are rotated to twist the two wires together, the knot then being cut in half by the cutters 106 of the plate 105.

[0045] During their advancement, the needles 904 with their respective heads are inserted into the space between the ribs 63 of the plate 62 and between the bars 8.

[0046] Having made the knot the needles withdraw into their initial position ready for the next intervention, and the bale which has just been bound remains in position acting as a stopper for the next bale which forms against the preceding bale until its subsequent binding.

[0047] On termination of the baling operation, the transporting configuration is restored and the machine can be transferred to another site.

Claims

1. A machine for forming bales of loose fibrous material, such as scrap paper, comprising a frame (2) carrying a pressing compartment (3) defined by three consecutive mutually perpendicular walls, a pressing unit (6) arranged to slide within the interior of said compartment and associated with drive means, a binding unit (100) positioned at that end of the compartment distant from the pressing unit, and a discharge chamber (800) positioned downstream of the binding unit and provided with lateral apertures at least in correspondence with the binding unit, wherein the pressing unit (6) comprises a cylinder-piston unit (7), of which the piston rod (71) is fixed to the pressing plate (62) of the unit (6) and the cylinder (72) is fixed to a slide (73) slidable within the machine frame (2) to assume and be locked in a position close to the binding unit in which the cylinder-piston unit (7) is contained within the outline of the machine frame (2), and an operative position distant from the binding unit (100), **characterised in that** the binding unit comprises a vertical frame (903) carrying a series of wire guide needles (904) and arranged to as-

sume two positions, of which one is adjacent to the side wall of the machine with the needles traversing the region between the forming compartment and the discharge chamber, and the other is distant from the side wall of the machine with the needles external to said region.

2. A machine as claimed in claim 1, **characterised by** comprising, overlying the pressing chamber, a hopper (4) able to be contained within the pressing chamber (3) when under transportation conditions, or be raised above the pressing chamber when under working conditions.

3. A machine as claimed in claim 1, **characterised by** comprising, overlying the pressing chamber (3), a hopper (4) able to be rotated to the side of the chamber (3) when under transportation conditions, or raised above the chamber (3) when under working conditions.

4. A machine as claimed in claim 1, **characterised in that** the pressing unit comprises a pressing plate (62) provided with equidistant horizontal parallel ribs (63) positioned in correspondence with the lateral apertures of the discharge chamber.

5. A machine as claimed in claim 1, **characterised in that** each needle comprises a fork-shaped end piece (101) carrying two idle rollers positioned at the ends of the sides of the fork.

6. A machine as claimed in claim 1, **characterised in that** on the side opposite that side of the frame carrying the needles, the machine comprises a plate carrying a toothed wheel in correspondence with each needle, the wheels engaging with each other and with a motorized pinion, and presenting a slot flared towards the periphery of the wheel, which is coplanar with the fork of the respective needle.

7. A machine as claimed in claim 1, **characterised in that** the discharge chamber comprises three movable walls, of which two are side walls (81) defined by a series of parallel horizontal rods, and one is a solid upper wall (82).

8. A machine as claimed in claim 7, **characterised in that** said three walls (81, 82) are each fixed to a frame (810, 820), the lateral frames (810) being fixed directly to the centre of respective connecting rods (811), whereas the frame (820) is fixed to the centre of a connecting rod via a cylinder-piston unit, the lateral connecting rods (811) being hinged at one end to the base of the machine, and at the other end to two intermediate connecting rods which connect them to the ends of the upper connecting rod (821).

9. A machine as claimed in claim 2, **characterised in that** a wheel (5) with cutting blades (51) is positioned at the base of the hopper (4) to shred the material to be pressed.

10. A machine as claimed in claim 1, **characterised by** being able to assume a transportation position in which the hopper (4) is inserted into, or rotated to the side of, the pressing compartment, and the slide carrying the cylinder (72) is close to the binding unit.

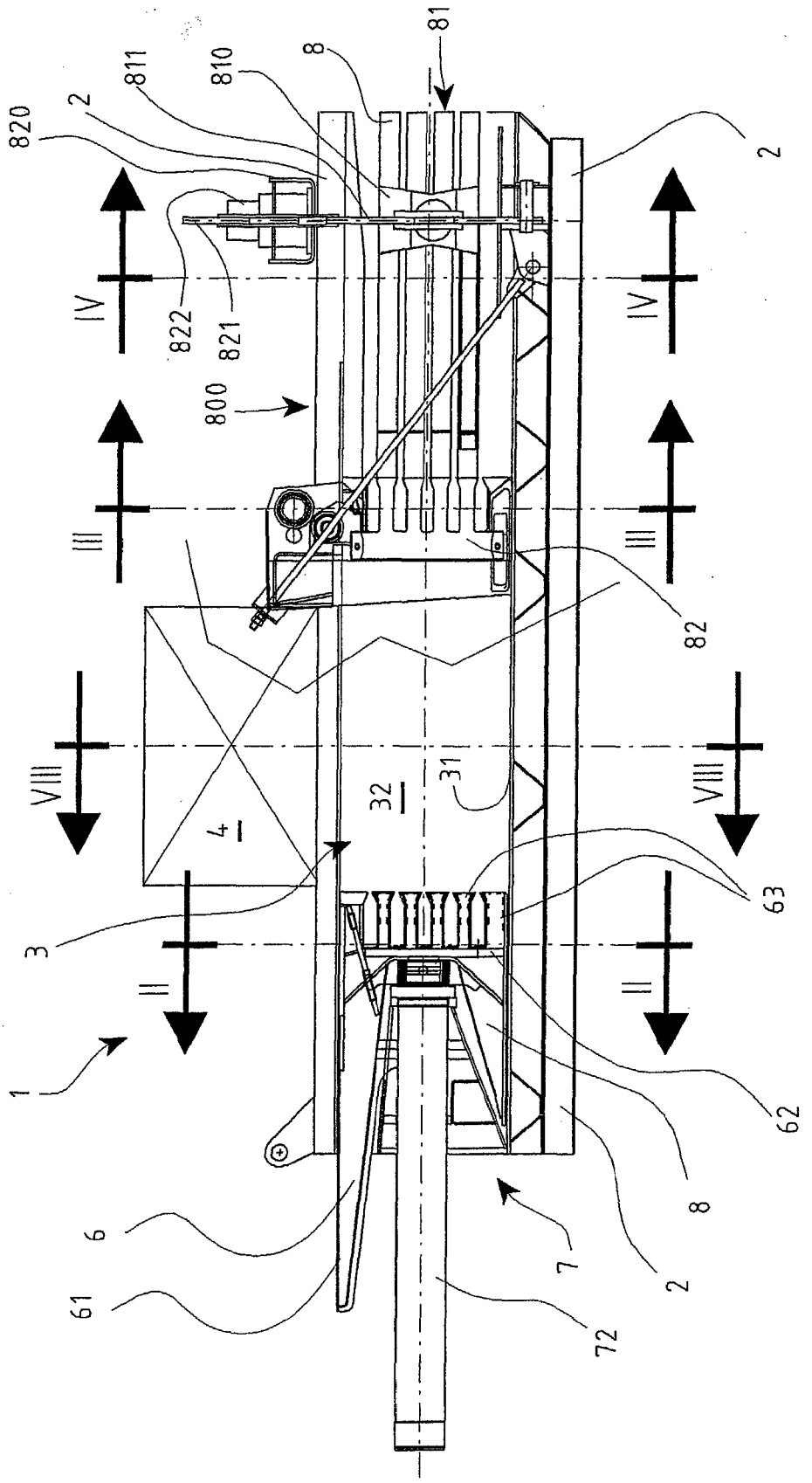
81
8
811
810
820
2
822
821
800
IV
III
VIII
II
82
31
32
4
3
63
62
1
6
61
7
72
2
8

FIG. 1

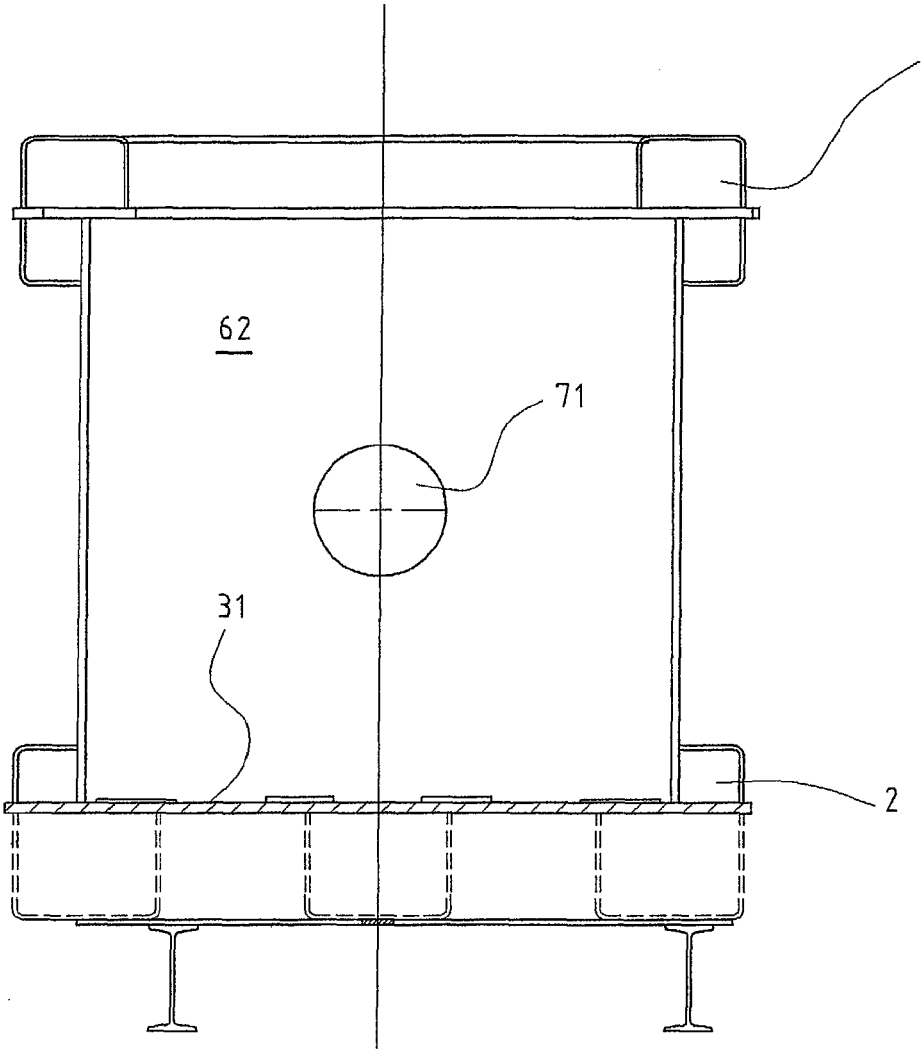

FIG. 2

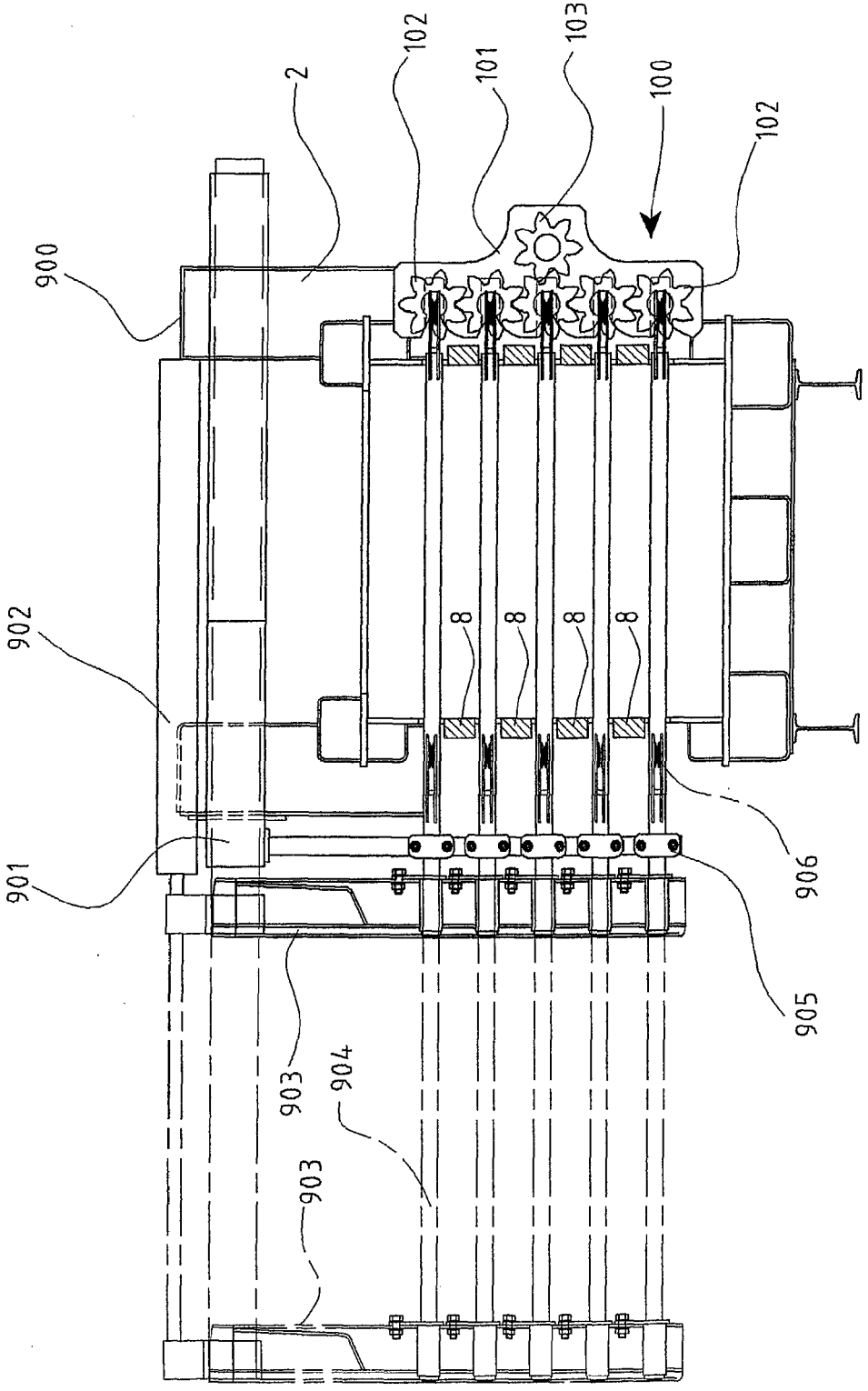

FIG. 3

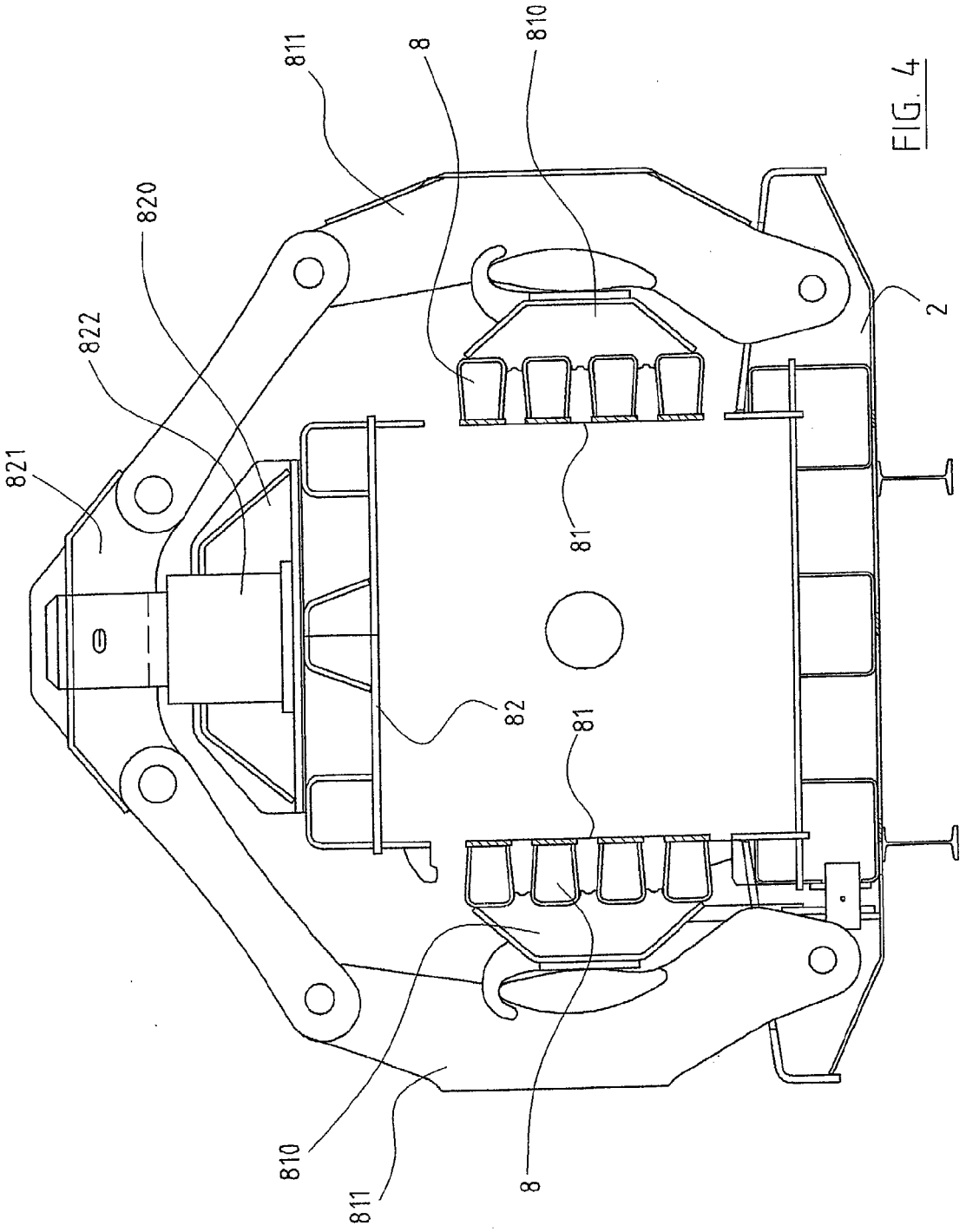

FIG. 4

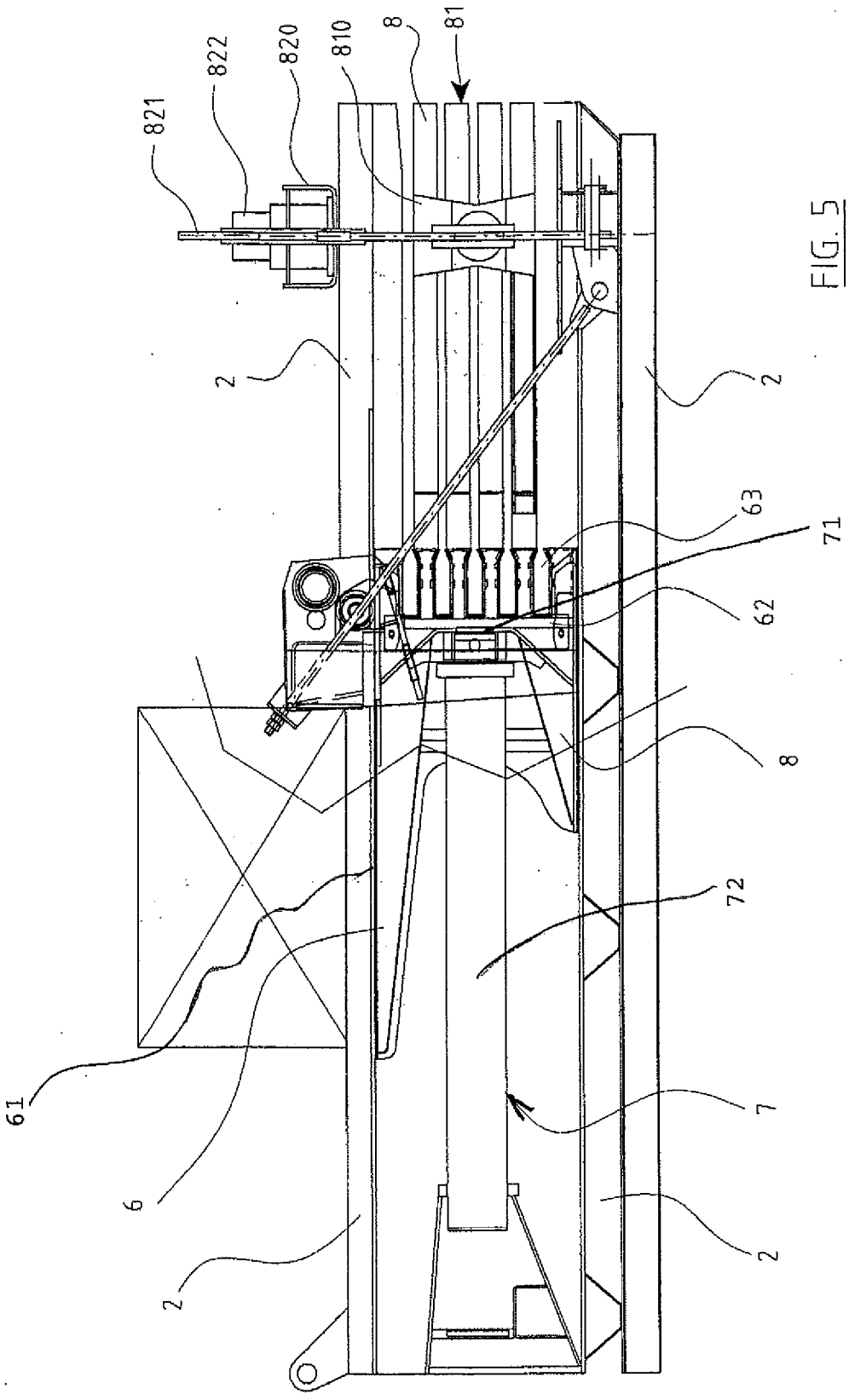

FIG. 5

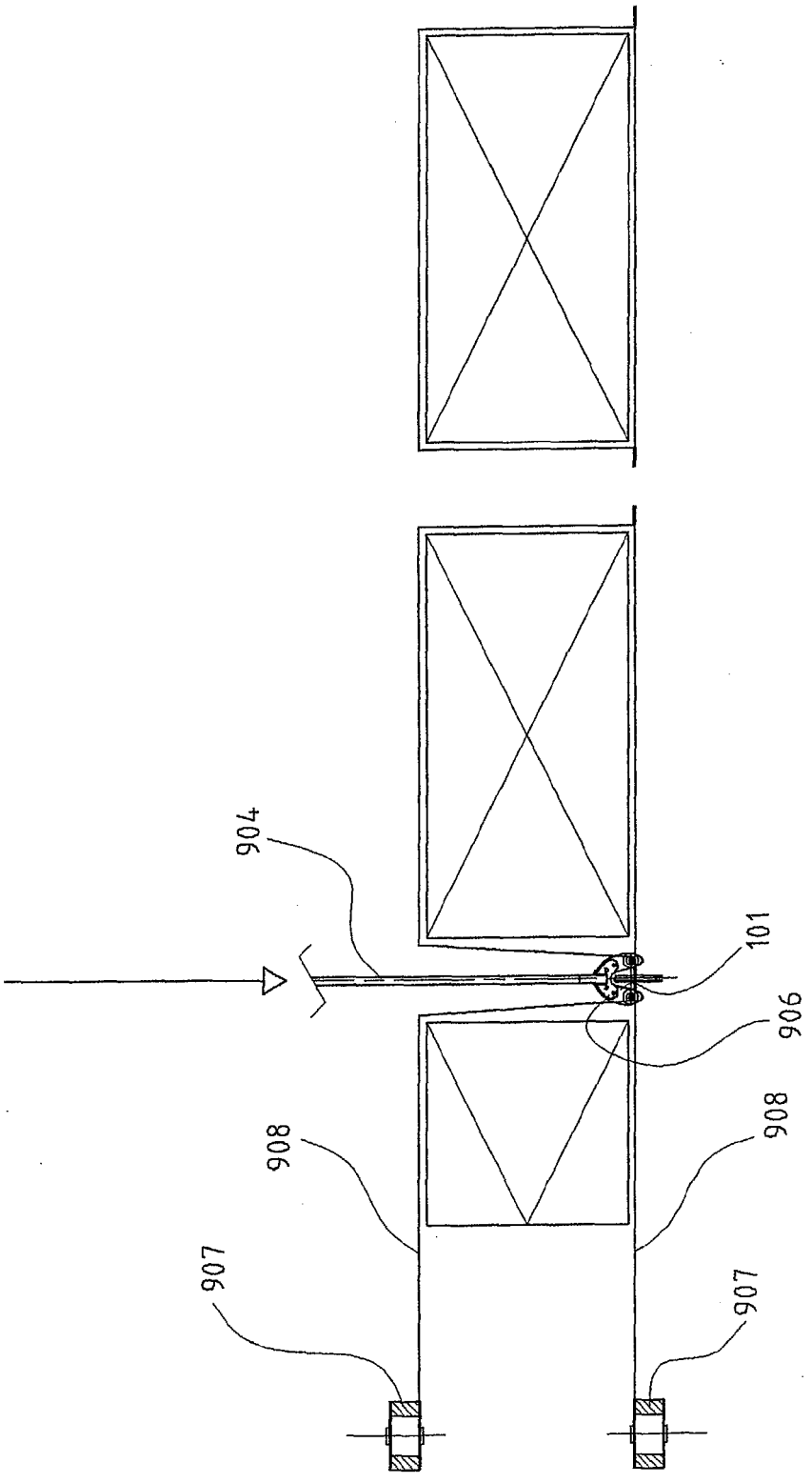

FIG. 6

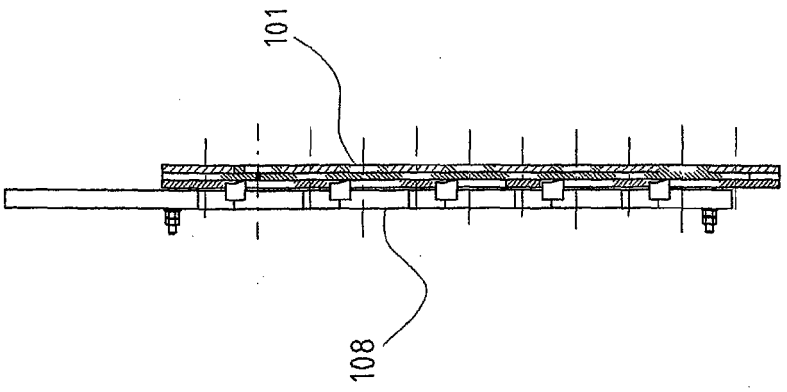

FIG. 7c

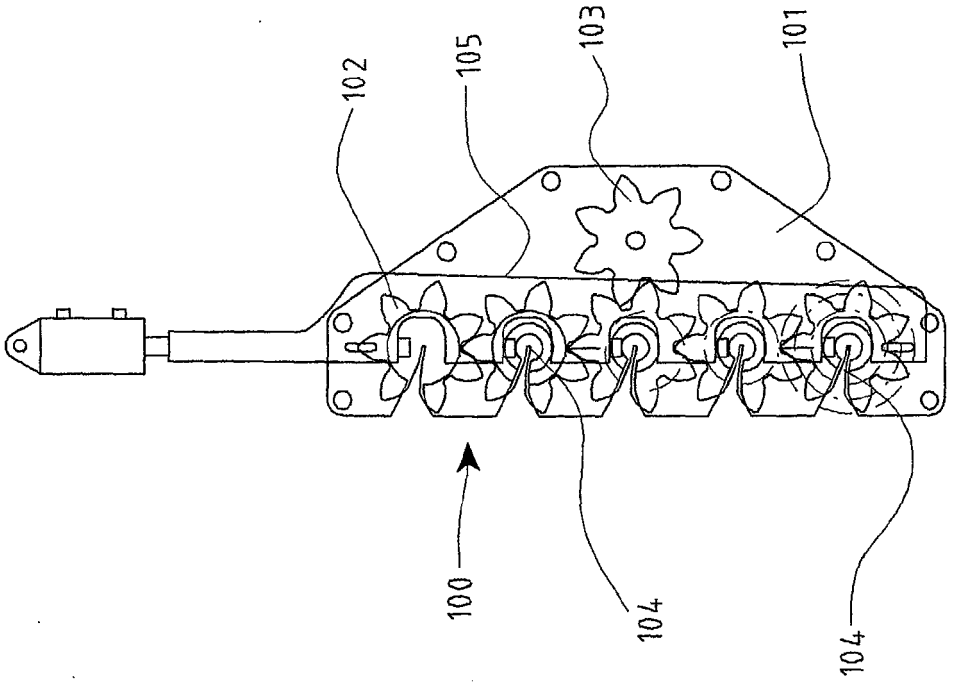

FIG. 7b

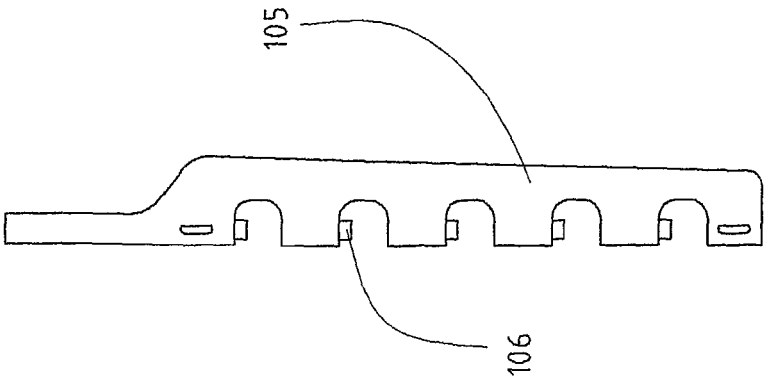

FIG. 7a

FIG. 8

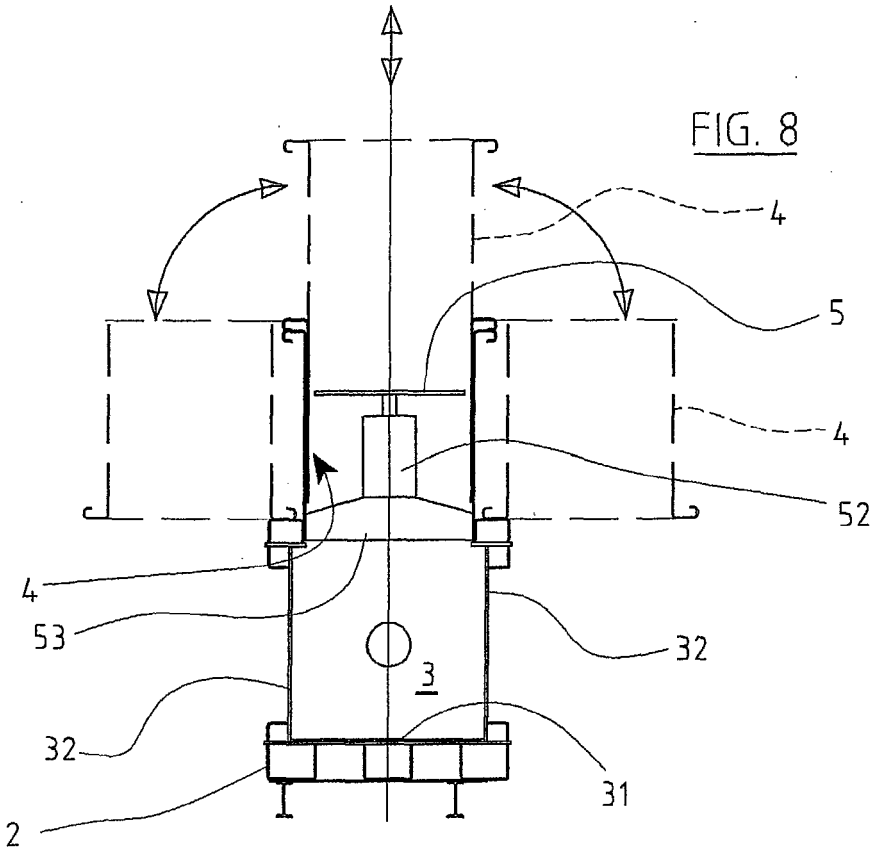

FIG. 9