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(54) **Wrapping machine**

(57) A wrapping machine for wrapping and stabilizing a palletized load (2) in stretch film (3) has a supporting device (9) for supporting a reel (33) of stretch film (3); a first actuating device (7) for producing, between the supporting device (9) and the palletized load (2), a

relative revolving movement in a horizontal plane, so as to wind the stretch film (3) about the palletized load (2); and a second actuating device (38, 45) for moving the stretch film (3), as it is unwound off the reel (33), in a vertical direction (46); the supporting device (9) being positioned in a fixed vertical position.

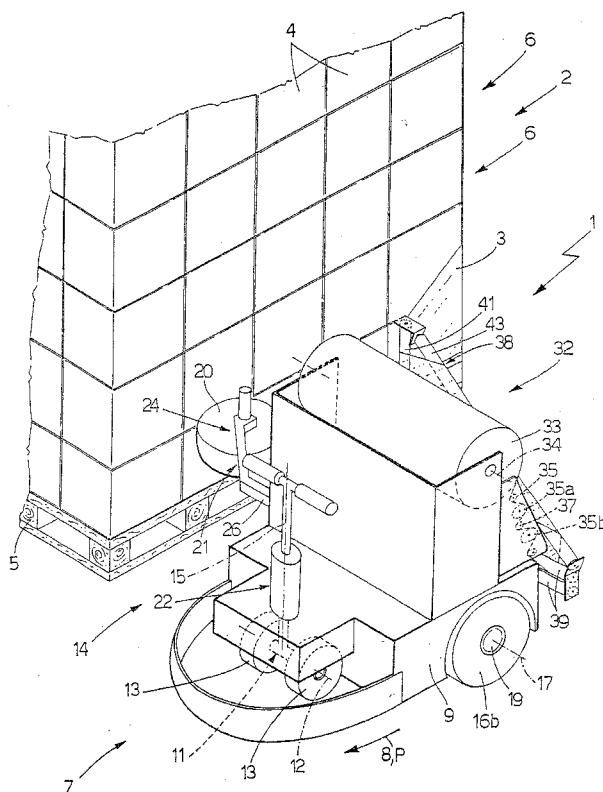


Fig.1

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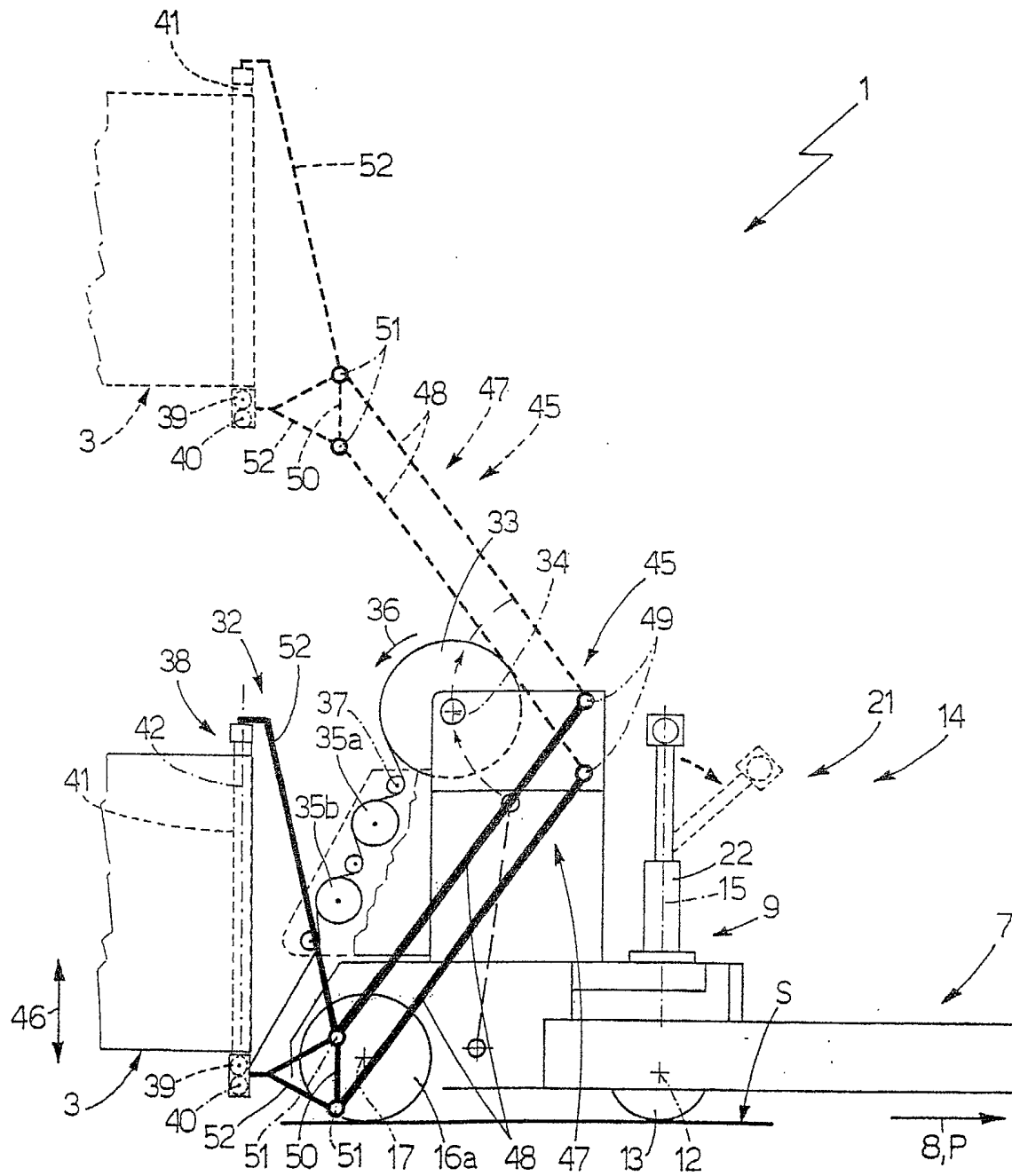


Fig.3

Description

[0001] The present invention relates to a wrapping machine for wrapping and stabilizing in stretch film a palletized load comprising a supporting pallet and a number of products resting on the pallet.

[0002] To wrap and stabilize palletized loads in stretch film, a wrapping machine is used comprising supporting means for supporting a reel of stretch film; and actuating means for producing, between the supporting means and the palletized load, a relative revolving movement in a substantially horizontal plane to wind the stretch film about the palletized load.

[0003] The supporting means normally comprise a slide fitted in known manner to a vertical rail on an upright to move linearly along the rail between a raised position and a lowered position; and the reel is fitted to the slide to rotate, with respect to the slide, about a respective vertical longitudinal axis. By combining said relative revolving movement with the movement of the slide along the rail, the stretch film is wound substantially in a coil about the whole palletized load when the palletized load is of a height greater than the width of the stretch film.

[0004] Known wrapping machines of the above type have the drawback of being relatively bulky and expensive, on account of the upright.

[0005] Moreover, in known wrapping machines of the above type, the established height of the upright also establishes the diameter and, hence, weight of the reel, which must be kept within given respective values, over and above which the machine may be overturned when the slide and, hence, the reel move into the raised position.

[0006] It is an object of the present invention to provide a wrapping machine designed to eliminate the aforementioned drawbacks.

[0007] According to the present invention, there is provided a wrapping machine for wrapping and stabilizing a palletized load in stretch film, the machine comprising supporting means for supporting a reel of stretch film; and first actuating means for producing, between the supporting means and the palletized load, a relative revolving movement in a substantially horizontal first plane, so as to wind said stretch film about the palletized load; and being characterized in that said supporting means are positioned in a fixed first vertical position; second actuating means being provided to move the stretch film, as it is unwound off said reel, in a substantially vertical direction.

[0008] A non-limiting embodiment of the present invention will be described by way of example with reference to the accompanying drawings, in which:

Figure 1 shows a schematic view in perspective of a preferred embodiment of the wrapping machine according to the present invention;

Figure 2 shows a plan view, with parts removed for

clarity, of the Figure 1 machine in three different operating positions;

Figure 3 shows a first side view, with parts removed for clarity, of the Figure 1 machine in two different operating positions;

Figure 4 shows a second side view, with parts removed for clarity, of the Figure 1 machine.

[0009] Number 1 in Figure 1 indicates as a whole a machine for wrapping and stabilizing a palletized load 2 in a stretch film 3 of plastic material.

[0010] Load 2 comprises a number of products 4 resting on a substantially rectangular supporting pallet 5, which rests on a substantially horizontal supporting surface defined by a floor S, and supports a number of superimposed layers 6 of products 4. More specifically, each layer 6 comprises a number of side by side products 4 oriented with respect to one another to maximize the number of products 4 in layer 6.

[0011] With reference to Figures 1 and 2, machine 1 comprises a trolley 7 powered, as explained in detail later on, to run continuously about load 2 along an endless path P extending in a substantially horizontal plane and in a given traveling direction 8.

[0012] Trolley 7 comprises a supporting frame 9 having a substantially horizontal longitudinal axis 10 and supporting an axle 11, which is located at the front in direction 8, has a longitudinal axis 12, is fitted on its free ends with two wheels 13 fitted in rotary manner to axle 11, and is hinged to frame 9 to swing, with respect to frame 9 and under the control of a steering device 14, about a substantially vertical hinge axis 15 perpendicular to axes 10 and 12.

[0013] Trolley 7 also comprises two wheels 16 located behind wheels 13 in direction 8, and mounted to rotate about a horizontal axis 17 crosswise to axis 10. More specifically, one of wheels 16 (hereinafter indicated 16a) is located facing load 2, and is fitted to a supporting shaft 18 coaxial with axis 17 and fitted in rotary manner to frame 9; and the other (hereinafter indicated 16b) is located on the opposite side of wheel 16a to load 2, and is fitted to a powered supporting shaft 19 coaxial with axis 17 and fitted in rotary manner to frame 9.

[0014] Steering device 14 comprises a touch roller 20 for tracing the outline of load 2; and an orienting device 21 interposed between roller 20 and axle 11 to control the angular position of axle 11 about axis 15 as a function of said outline.

[0015] Device 21 comprises a steering column 22, which extends upwards, coaxially with axis 15, is connected in angularly fixed manner to axle 11, and is fitted at an intermediate point with a crank 23 extending radially outwards from the outer surface of column 22.

[0016] Device 21 also comprises a rocker arm 24, which is hinged to frame 9 to swing, with respect to frame 9, about a hinge axis 25 substantially parallel to axis 15 and located behind axis 15 in direction 8, and in turn comprises a first arm 26 for supporting roller 20 in

rotary manner, and a second arm 27 connected to crank 23 by the interposition of a connecting rod 28 extending between two axes 29 and 30, of which axis 29 is the axis of rotation of connecting rod 28 with respect to crank 23, and axis 30 is the axis of rotation of connecting rod 28 with respect to arm 27.

[0017] In connection with the above, it should be pointed out that connecting rod 28 is so located that a clockwise swing of rocker arm 24 about axis 25 corresponds to an anticlockwise swing of axle 11 about axis 15; and, conversely, an anticlockwise swing of rocker arm 24 about axis 25 corresponds to a clockwise swing of axle 11 about axis 15.

[0018] Device 21 also comprises a spring 31 interposed, in the example shown, between frame 9 and a free end of arm 27, and which provides for normally keeping axle 11 in a steering position (Figure 2a) in which trolley 7 is pointed towards load 2.

[0019] In actual use, since wheel 16a is idle and wheel 16b powered, and spring 31 keeps axle 11 in the steering position, wheel 16b tends to push trolley 7 and, hence, roller 20 towards load 2.

[0020] Consequently, by combining the thrust exerted by load 2 on roller 20 with the steering position of axle 11, rocker arm 24 swings about axis 25 (clockwise in Figure 2a) in opposition to spring 31, so that axle 11 is swung by connecting rod 28 (anticlockwise in Figure 2a) about axis 15 into a travel position (Figure 2b) in which axis 12 is substantially parallel to axis 17 to allow trolley 7 to travel along the straight portions of path P.

[0021] When axle 11 is in the travel position, roller 20 is therefore located behind axle 11 in direction 8, so that, as shown in Figure 2c, when the outline of load 2 is such as to obstruct the travel of roller 20 in direction 8, rocker arm 24 swings clockwise about axis 25, and axle 11 anticlockwise about axis 15, to allow roller 20 to get past, as opposed to jamming against, the obstacle.

[0022] It should be pointed out that, since the height of roller 20 off floor S is controllable selectively, travel of roller 20 in direction 8 may be obstructed either by the shape of pallet 5, in the event roller 20 is positioned contacting pallet 5, or by relatively soft products 4, in the event roller 20 is positioned contacting products 4.

[0023] When trolley 7 reaches the end of a straight portion of path P (e.g. the end of a straight side of load 2) and roller 20 is released from load 2, rocker arm 24 is swung anticlockwise about axis 25 by spring 31, so that axle 11 is swung clockwise about axis 15 by connecting rod 28 into the steering position. In other words, orienting device 21 is so designed that trolley 7 is guided along substantially the whole of path P by the outline of load 2.

[0024] With reference to Figures 3 and 4, machine 1 also comprises a feed device 32 for unwinding film 3 continuously off a reel 33 fitted to frame 9 to rotate, with respect to frame 9, about an axis 34 substantially parallel to axis 17.

[0025] Device 32 comprises a number of known rollers 35, which are arranged successively in the feed direction 36 of film 3, are mounted to rotate, with respect to frame 9, about respective axes 37 substantially parallel to one another and to axis 34, and are each located on the opposite side of film 3 to the adjacent rollers 35. More specifically, two rollers 35 (hereinafter indicated 35a and 35b) are powered to rotate at different angular speeds, so as to pre-stretch in known manner film 3 to be wound about load 2.

[0026] Device 32 also comprises an orienting member 38 located downstream from rollers 35 in direction 36, and for orienting film 3 as it is unwound off reel 33, so that, downstream from member 38, film 3 is positioned substantially vertically.

[0027] Member 38 is triangular, extends in a substantially vertical plane perpendicular to direction 8, and comprises two rollers 39 mounted idly to rotate about respective longitudinal axes 40 substantially parallel to axes 37; a roller 41 which extends upwards from the free ends of rollers 39 facing load 2, and is mounted idly to rotate about a longitudinal axis 42 substantially parallel to axes 15 and 25; and a roller 43 which extends between rollers 39 and roller 41, and is mounted idly to rotate about a longitudinal axis 44 forming a substantially 45° angle with axes 40 and with axis 42.

[0028] As shown in Figure 4, film 3 is inserted between the two rollers 39, is wound about roller 43 and, finally, about roller 41 into a vertical position.

[0029] Member 38 is movable, with respect to frame 9 and by an actuating device 45, in a direction 46 substantially parallel to axis 42, so that, by combining the movement of trolley 7, and therefore of reel 33, about load 2 with the movement of member 38 in direction 46, film 3 can be wound substantially in a coil about the whole of load 2, when the height, measured parallel to direction 46, of load 2 is greater than the width of film 3.

[0030] Device 45 comprises an articulated parallelogram 47 in turn comprising two cranks 48, which are substantially the same length, extend parallel to each other, and are fitted in rotary manner to the side of frame 9 facing load 2, so as to swing, with respect to frame 9 and under the control of a known actuating member (not shown), about respective axes 49 extending parallel to each other and to axes 34 and 37, and substantially aligned with each other in direction 46.

[0031] Parallelogram 47 also comprises a connecting rod 50, which extends between two axes 51 of rotation, about which connecting rod 50 rotates with respect to cranks 48, and is fixed, by the interposition of two fastening appendices 52, to the free ends of roller 41, so as to keep member 38 coplanar at all times with said vertical plane, and axis 42 parallel at all times with direction 46.

[0032] Machine 1 therefore has the further advantage of reel 33 being maintained in a fixed vertical position, as opposed to moving in direction 46, and of only the film 3 just unwound off reel 33 being moved in direction 46, so that machine 1:

enables the use of a relatively large-diameter, and therefore relatively heavy, reel 33; increases output by reducing the number of reel-change operations required; and enables frame 9 to be produced relatively easily and cheaply.

Claims

1. A wrapping machine for wrapping and stabilizing a palletized load (2) in stretch film (3), the machine comprising supporting means (9) for supporting a reel (33) of stretch film (3); and first actuating means (7) for producing, between the supporting means (9) and the palletized load (2), a relative revolving movement in a substantially horizontal first plane, so as to wind said stretch film (3) about the palletized load (2); and being **characterized in that** said supporting means (9) are positioned in a fixed first vertical position; second actuating means (38, 45) being provided to move the stretch film (3), as it is unwound off said reel (33), in a substantially vertical direction (46).
2. A machine as claimed in Claim 1, wherein said reel (33) is fitted in rotary manner to said supporting means (9) to rotate about a substantially horizontal first axis (34); said second actuating means (38, 45) comprising orienting means (38) for positioning the stretch film (3), as it is unwound off said reel (33), in a second vertical position.
3. A machine as claimed in Claim 2, wherein said second actuating means (38, 45) also comprise an actuating device (45) designed to move said orienting means (38) in said direction (46) so that a portion, located downstream from the orienting means (38), of the stretch film (3) is maintained at all times in said second vertical position.
4. A machine as claimed in Claim 2 or 3, wherein said actuating device (45) comprises an articulated parallelogram (47) in turn comprising two cranks (48) and a connecting rod (50) interposed between the cranks (48); said orienting means (38) being carried by said connecting rod (50).
5. A machine as claimed in Claim 4, wherein said cranks (48) are substantially the same length, and swing about respective second axes (49) parallel to each other and to said first axis (34), and substantially aligned with each other in said direction (46).
6. A machine as claimed in any one of Claims 2 to 5, wherein said orienting means (38) comprise a substantially triangular orienting member (38) located in a substantially vertical second plane and in turn

comprising a first transmission member (39) substantially parallel to said first axis (34), a second transmission member (41) substantially parallel to said direction (46), and a third transmission member (43) extending between said first and said second transmission member (39, 41); said stretch film (3) successively engaging said first, said third, and said second transmission member (39, 43, 41) in that order.

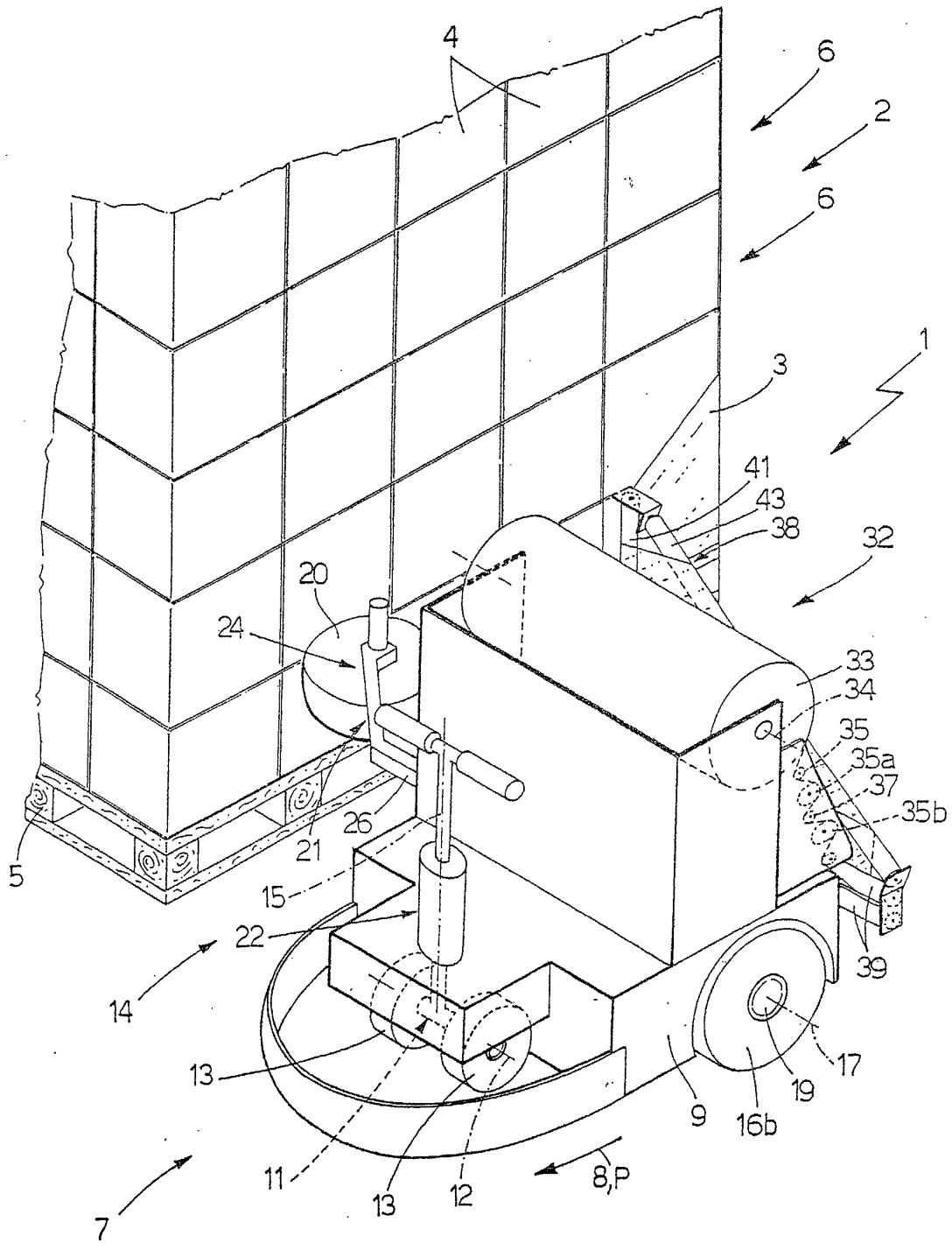
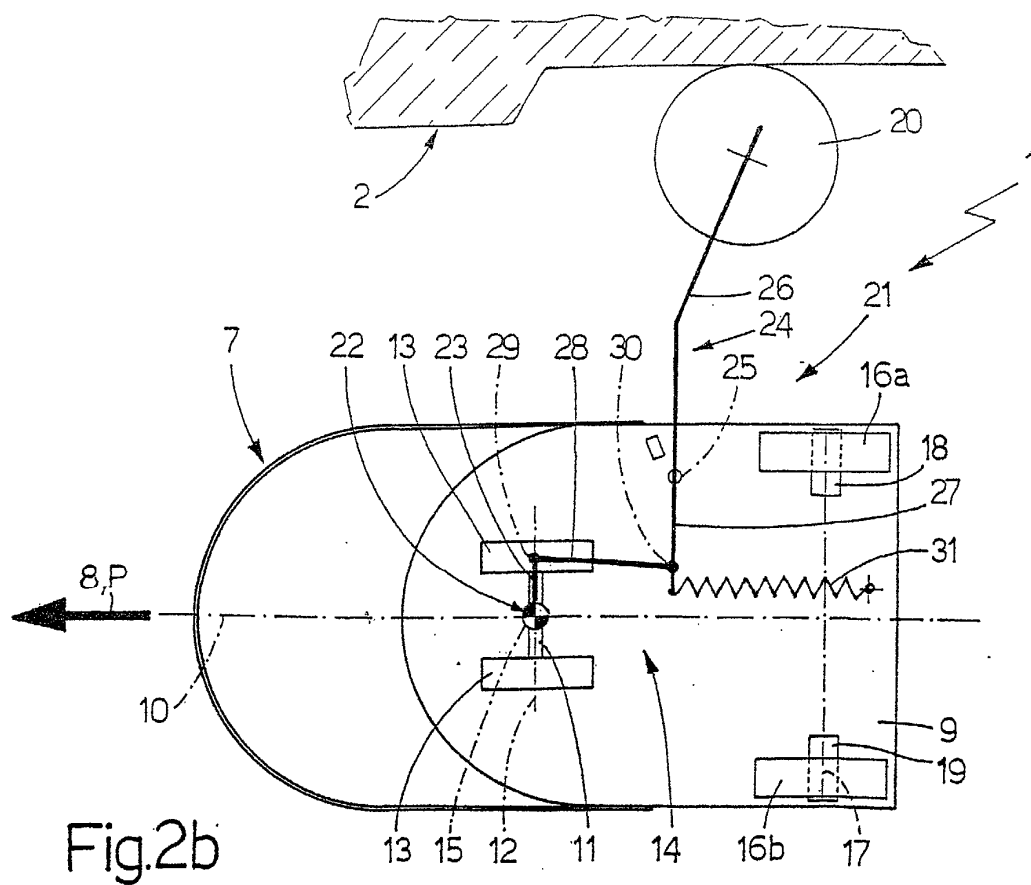
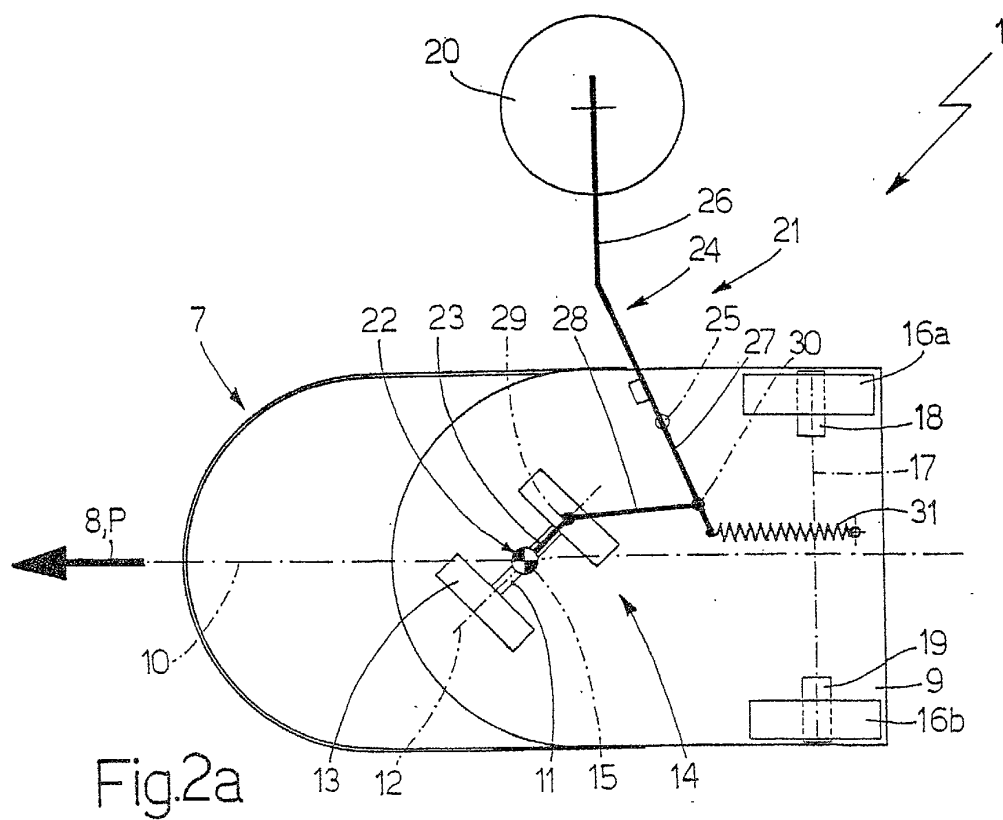
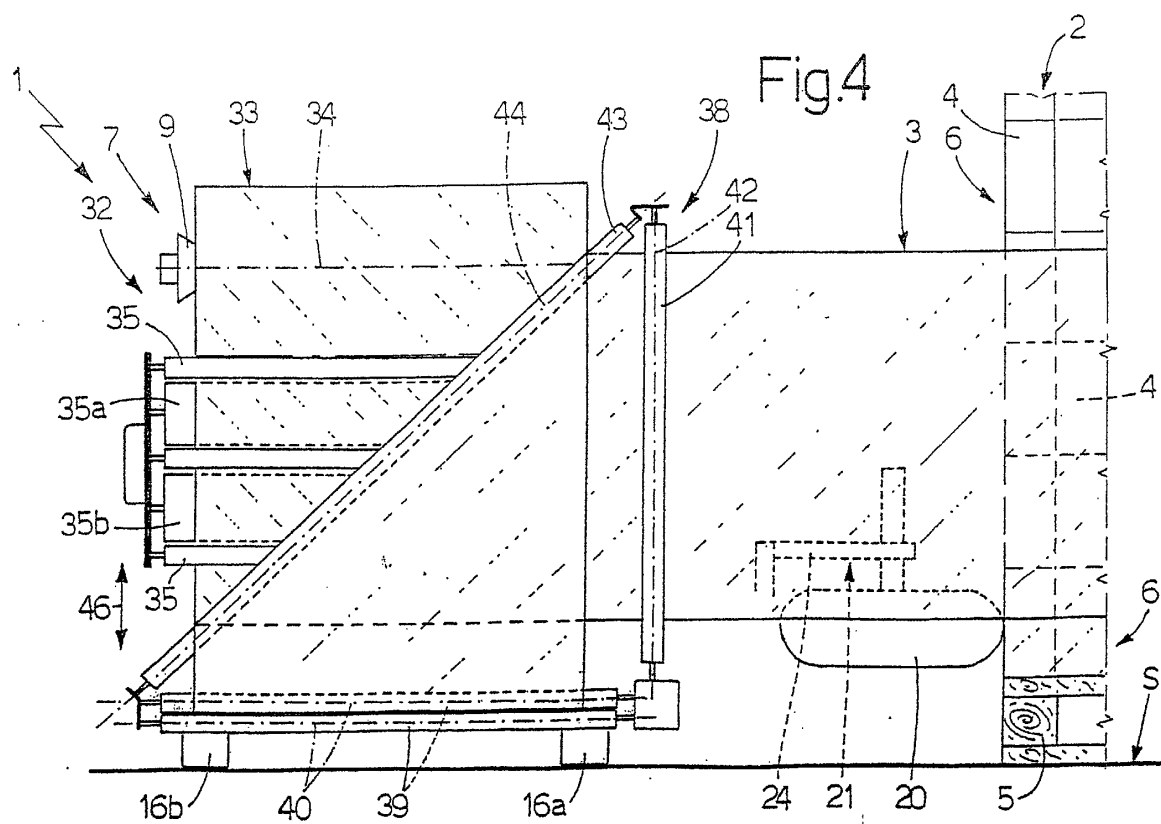
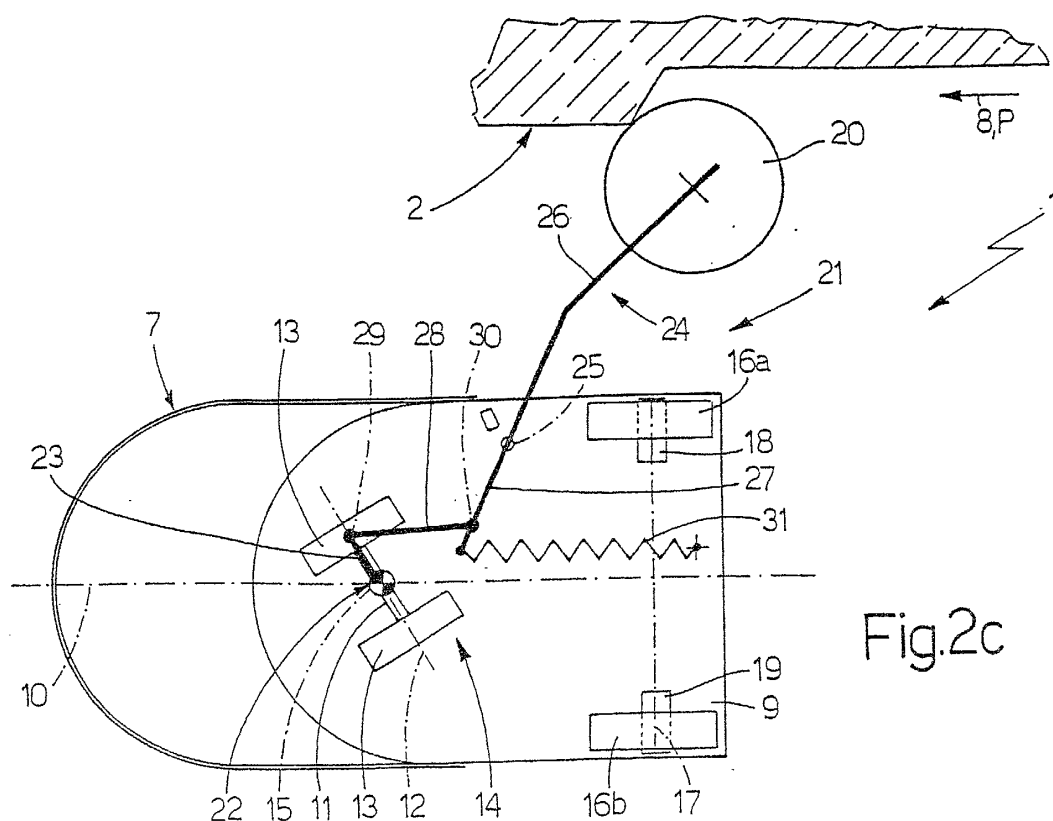


Fig.1





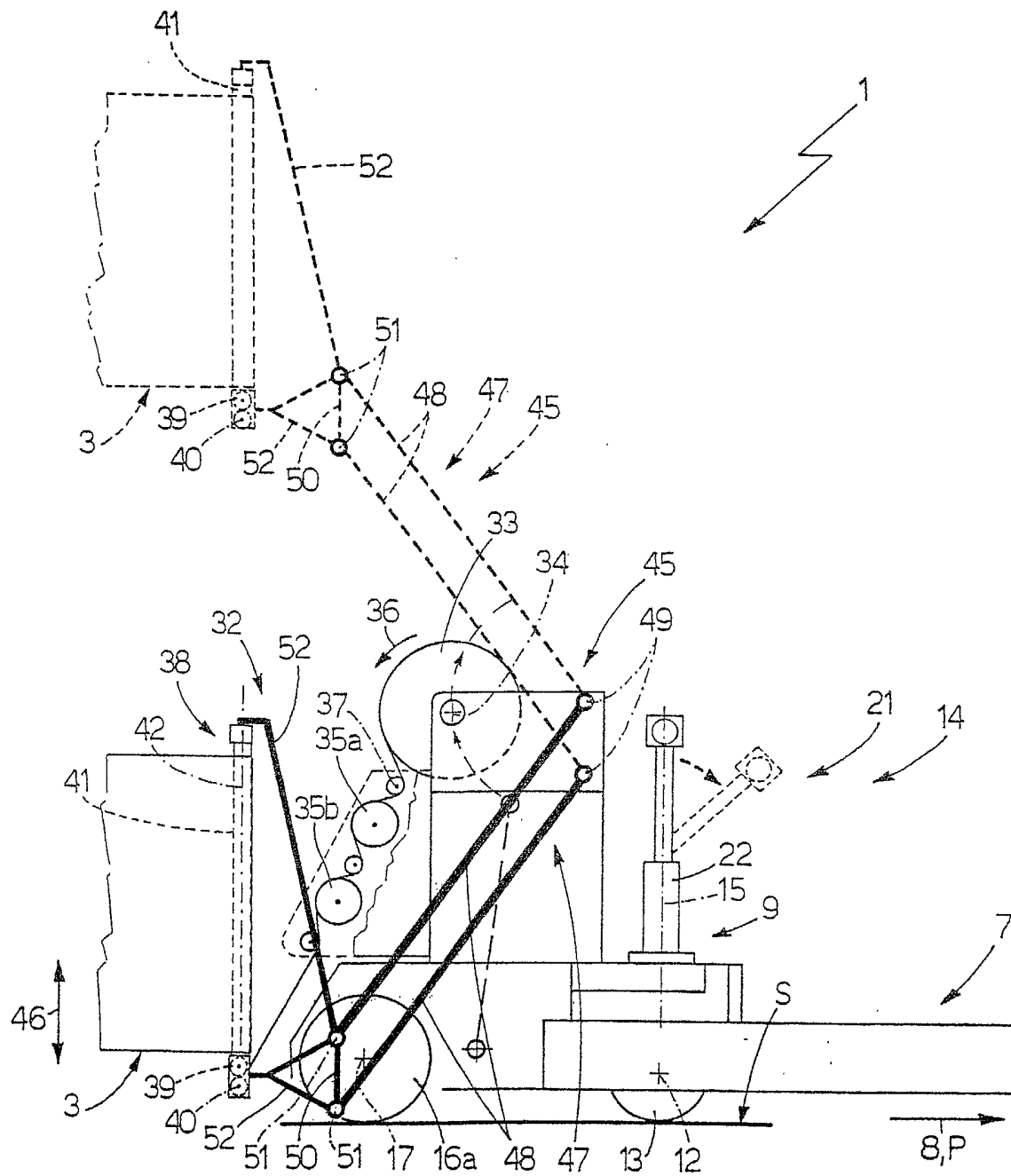


Fig.3



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EUROPEAN SEARCH REPORT

Application Number
EP 02 01 4327

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The present search report has been drawn up for all claims			
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THE HAGUE		8 October 2002	Grentzius, W
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EP 02 01 4327

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