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

(11) EP 1 201 578 A2

# (12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
**02.05.2002 Bulletin 2002/18**

(51) Int Cl.[7]: **B65H 3/24**

(21) Application number: **01125179.0**

(22) Date of filing: **23.10.2001**

(84) Designated Contracting States:
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE TR**
Designated Extension States:
**AL LT LV MK RO SI**

(30) Priority: **24.10.2000 IT BO000617**

(71) Applicant: **Innopack S.r.l.**
**40012 Calderara di Reno (IT)**

(72) Inventors:
- **Grandi, Lia**
  **40024 Castel S Pietro Terme (IT)**
- **Cinotti, Andrea**
  **40141 Bologna (IT)**
- **Mazzini, Luciano**
  **40037 Sasso Marconi (IT)**

(74) Representative: **Bongiovanni, Simone (IT) et al**
**Studio Torta S.r.l**
**Via Viotti 9**
**I-10121 Torino (IT)**

## (54) Line for feeding stacks of sheets to an operating unit

(57) A succession of stacks (2) of sheets (3) is fed to an input station (4) of an operating unit by means of a transfer device (9) having a transfer station (8) for receiving the stacks (2) of sheets (3) successively; the transfer device (9) being supported by a fixed supporting structure (11) located on the opposite side of the transfer station (8) to the input station (4).

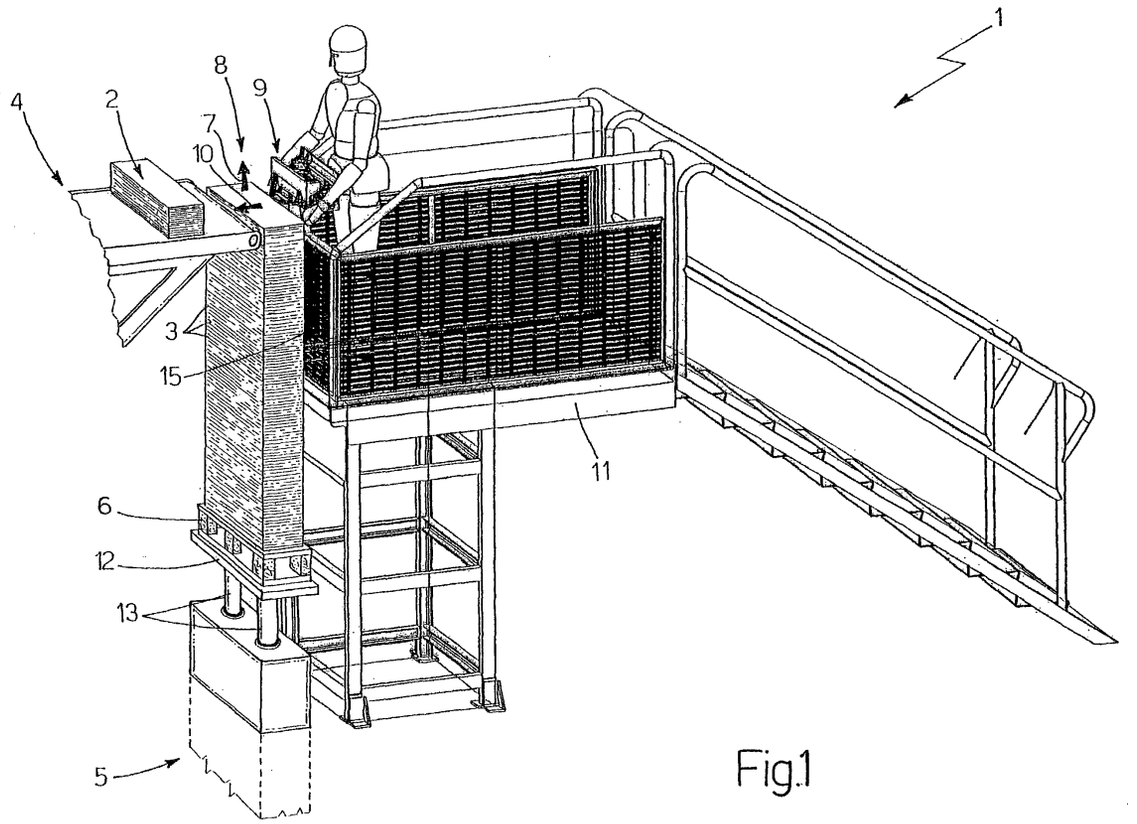


Fig.1

EP 1 201 578 A2

## Description

**[0001]** The present invention relates to a line for feeding stacks of sheets to an operating unit.

**[0002]** More specifically, the present invention relates to a semiautomatic line for feeding stacks of sheets to an operating unit and of the type comprising a feed device for feeding a succession of stacks, normally placed one on top of the other, to a transfer station of a transfer device, which feeds each stack in a given traveling direction to an input station of the operating unit.

**[0003]** The line also comprises a platform located a given height off the floor and on the opposite side of the transfer station to the input station, and on which an operator is stationed facing the transfer station to separate the stack at the transfer station from the next stack at each operating cycle of the line.

**[0004]** The transfer device is normally defined by a substantially L-shaped pusher fitted to and movable with respect to the operating unit in a back and forth movement comprising a forward movement to feed a stack to the input station, and a return movement.

**[0005]** Known feed lines of the above type have several drawbacks, the main one of which lies in the pusher, on certain lines and at relatively high operating speeds, moving back rapidly to within a short distance of the operator, thus endangering the safety of the operator who may easily be struck by the pusher in the event of a fault and/or malfunction on the pusher, and/or carelessness on the part of the operator himself.

**[0006]** Moreover, pushers of the above type are normally bulky and expensive, and, over and above given operating speeds, generate a rarely permissible degree of inertial vibration.

**[0007]** It is an object of the present invention to provide a line for feeding stacks of sheets to an operating unit and designed to eliminate the aforementioned drawbacks.

**[0008]** According to the present invention, there is provided a line for feeding stacks of sheets to an operating unit, the line comprising a feed device for supplying a succession of said stacks; a transfer device having a transfer station for receiving said stacks successively from said feed device, the transfer device feeding the stacks successively to an input station of said operating unit; and supporting means for supporting said transfer device; and being characterized in that said supporting means are fixed supporting means located on the opposite side of said transfer station to said input station.

**[0009]** 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 line according to the present invention;

Figure 2 shows a plan view of a detail of Figure 1 in a first operating position;

Figure 3 shows a view in perspective of the Figure 2 detail in a second operating position.

**[0010]** Number 1 in Figure 1 indicates as a whole a line for feeding stacks 2 of sheets 3 to an input station 4 of a known operating unit not shown.

**[0011]** Line 1 comprises a known feed device 5 for feeding a succession of stacks 2, placed one on top of the other on a pallet 6, in a substantially vertical direction 7 to a transfer station 8 of a transfer device 9, which feeds each stack 2 in a substantially horizontal direction 10 crosswise to direction 7, to transfer stack 2 from station 8 to station 4.

**[0012]** Line 1 also comprises a platform 11 located a given height off the floor and on the opposite side of station 8 to station 4, and on which an operator is stationed facing station 8 to separate the stack 2 at station 8 from the next stack 2 at each operating cycle of line 1.

**[0013]** Device 5 comprises a substantially flat plate 12 perpendicular to direction 7 and for supporting pallet 6; and two actuating cylinders 13 for moving plate 12 linearly to and from station 8 in direction 7.

**[0014]** With reference to Figures 2 and 3, device 9 comprises a substantially L-shaped bracket 14, which is fixed to a front railing 15 of platform 11 and in turn comprises a flat plate 16 crosswise to direction 10, and a flat plate 17 perpendicular to plate 16.

**[0015]** Device 9 also comprises a substantially L-shaped push member 18, which, in turn, comprises a flat plate 19 substantially parallel to plate 16, and a blade 20 perpendicular to plate 19, and is moved in direction 10 and with respect to bracket 14 by two actuating devices 21 for moving member 18 between stations 4 and 8 to transfer a stack 2 of sheets 3 to said operating unit (not shown) at each operating cycle of line 1.

**[0016]** Each device 21 comprises a crank mechanism 22 in turn comprising a crank 23 fitted to a powered shaft 24 fitted to plate 17 and having a substantially vertical longitudinal axis 25 parallel to direction 7, and a connecting rod 26 having an intermediate point hinged to a free end of crank 23, one free end hinged to one end of plate 19, and the other free end hinged to a slide 27, which is moved by connecting rod 26 itself along a straight guide 28 fitted to plate 16 and parallel to a direction 29 perpendicular to directions 7 and 10.

**[0017]** Connecting rod 26 therefore oscillates, with respect to crank 23, slide 27, and member 18, about respective hinge axes 30, 31 and 32 substantially parallel to one another and to axis 25.

**[0018]** In connection with the above, it should be pointed out that the two guides 28 are fitted to plate 16 parallel to each other and one over the other; that the two cranks 23 are powered in time with each other; and that each axis 30 is the same distance from relative axes 25, 31 and 32, so that both devices 21 move member 18 linearly back and forth in direction 10, with plate 19 maintained substantially perpendicular to direction 10 at all times.

**[0019]** In a variation not shown, slides 27 are powered in time with each other, and both cranks 23 are rotated about respective axes 25 by respective connecting rods 26.

**[0020]** In actual use, feed device 5 is advanced in steps in direction 7, so that, at each operating cycle of line 1, a stack 2 of sheets 3 is fed to transfer station 8, where the operator separates the stack 2 to be transferred to station 4 from the next stack 2 by means of a known measuring device not shown. Push member 18 is then moved in direction 10 so that plate 19 and blade 20 are positioned respectively contacting and underneath the stack 2 for transfer, and so that stack 2 is transferred to station 4.

**[0021]** Finally, push member 18 is drawn back to set transfer device 9 to the withdrawn position shown in Figure 1, in which transfer device 9 does not interfere with the next stack 2, which may therefore be fed to transfer station 8.

**[0022]** Line 1 has several advantages, foremost of which is that, in the course of the return stroke of push member 18, bracket 14 of transfer device 9 acts as a safety device to protect the operator on platform 11.

**[0023]** Moreover, the design of the two actuating devices 21 of push member 18 makes transfer device 9, when in the withdrawn position, relatively compact and ergonomic.

## Claims

1. A line for feeding stacks (2) of sheets (3) to an operating unit, the line comprising a feed device (5) for supplying a succession of said stacks (2); a transfer device (9) having a transfer station (8) for receiving said stacks (2) successively from said feed device (5), the transfer device (9) feeding the stacks (2) successively to an input station (4) of said operating unit; and supporting means (11) for supporting said transfer device (9); and being **characterized in that** said supporting means (11) are fixed supporting means located on the opposite side of said transfer station (8) to said input station (4).

2. A line as claimed in Claim 1, wherein said transfer device (9) comprises push means (18) for pushing said stacks (2); and actuating means (21) for imparting to the push means (18) a reciprocating movement comprising a forward stroke to feed a stack (2) to said input station (4), and a return stroke; said reciprocating movement being a straight movement in a given first direction (10).

3. A line as claimed in Claim 2, wherein said push means (18) comprise a substantially flat push member (19); said actuating means (21) maintaining said push member (19) substantially perpendicular to said first direction (10) during at least said forward stroke.

4. A line as claimed in Claim 3, wherein said actuating means (21) comprise two actuating devices (21), each in turn comprising a crank mechanism (22), a guide (28), and a slide (27) mounted to slide along said guide (28) by virtue of said crank mechanism (22); said push member (19) being connected to said crank mechanisms (22) to move in said first direction (10) as said slides (27) move along the respective said guides (28).

5. A line as claimed in Claim 3, wherein said actuating means (21) comprise two actuating devices (21), each in turn comprising a guide (28), a slide (27) mounted to slide along said guide (28), and a crank mechanism (22) oscillating by virtue of said slide (27); said push member (19) being connected to said crank mechanisms (22) to move in said first direction (10) as said slides (27) move along the respective said guides (28).

6. A line as claimed in Claim 4 or 5, wherein each said crank mechanism (22) comprises a crank (23) oscillating about a first axis (25), and a connecting rod (26) oscillating about a second, a third, and a fourth axis (30, 31, 32) substantially parallel to said first axis (25); said second, said third, and said fourth axis (30, 31, 32) being hinge axes between said connecting rod (26) and said crank (23), said slide (27) and said push member (19) respectively.

7. A line as claimed in Claim 6, wherein the crank (23) and the connecting rod (26) of each said crank mechanism (22) are so formed that, during said reciprocating movement, the relative said first (25) and fourth (32) axes remain aligned with each other in said first direction (10).

8. A line as claimed in Claim 6 or 7, wherein said second axis (30) of each said crank mechanism (22) is substantially equidistant from said third and said fourth axis (31, 32).

9. A line as claimed in Claim 8, wherein said second axis (30) of each said crank mechanism (22) is substantially equidistant from said first, said third, and said fourth axis (25, 31, 32).

10. A line as claimed in any one of Claims 6 to 9, wherein said first and said third axis (25, 31) of each of the two crank mechanisms (22) are aligned with each other in a second direction (29) substantially crosswise to said first direction (10), and are aligned with the first and third axis (25, 31) of the other crank mechanism (22) in the second direction (29).

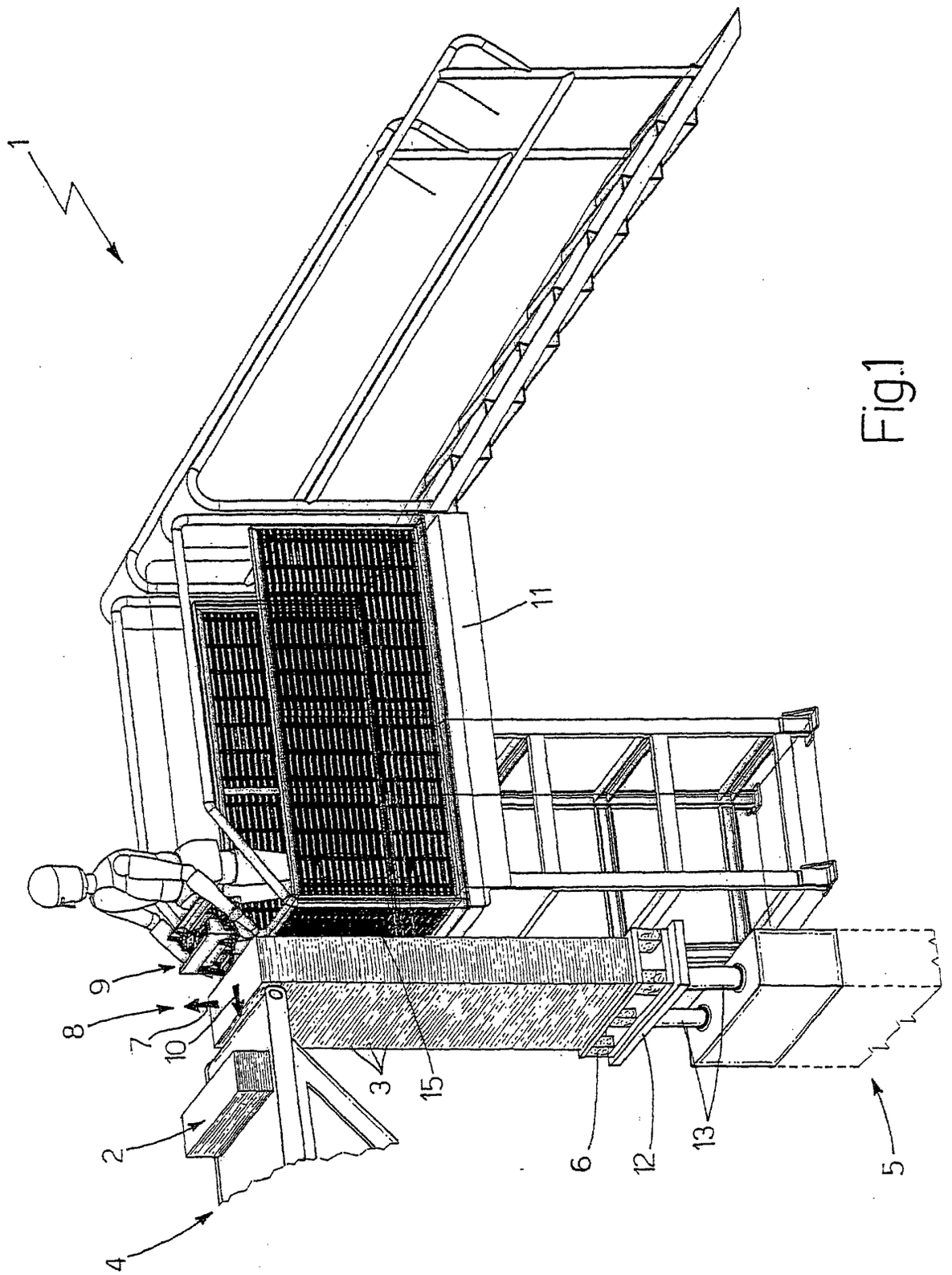


Fig.1

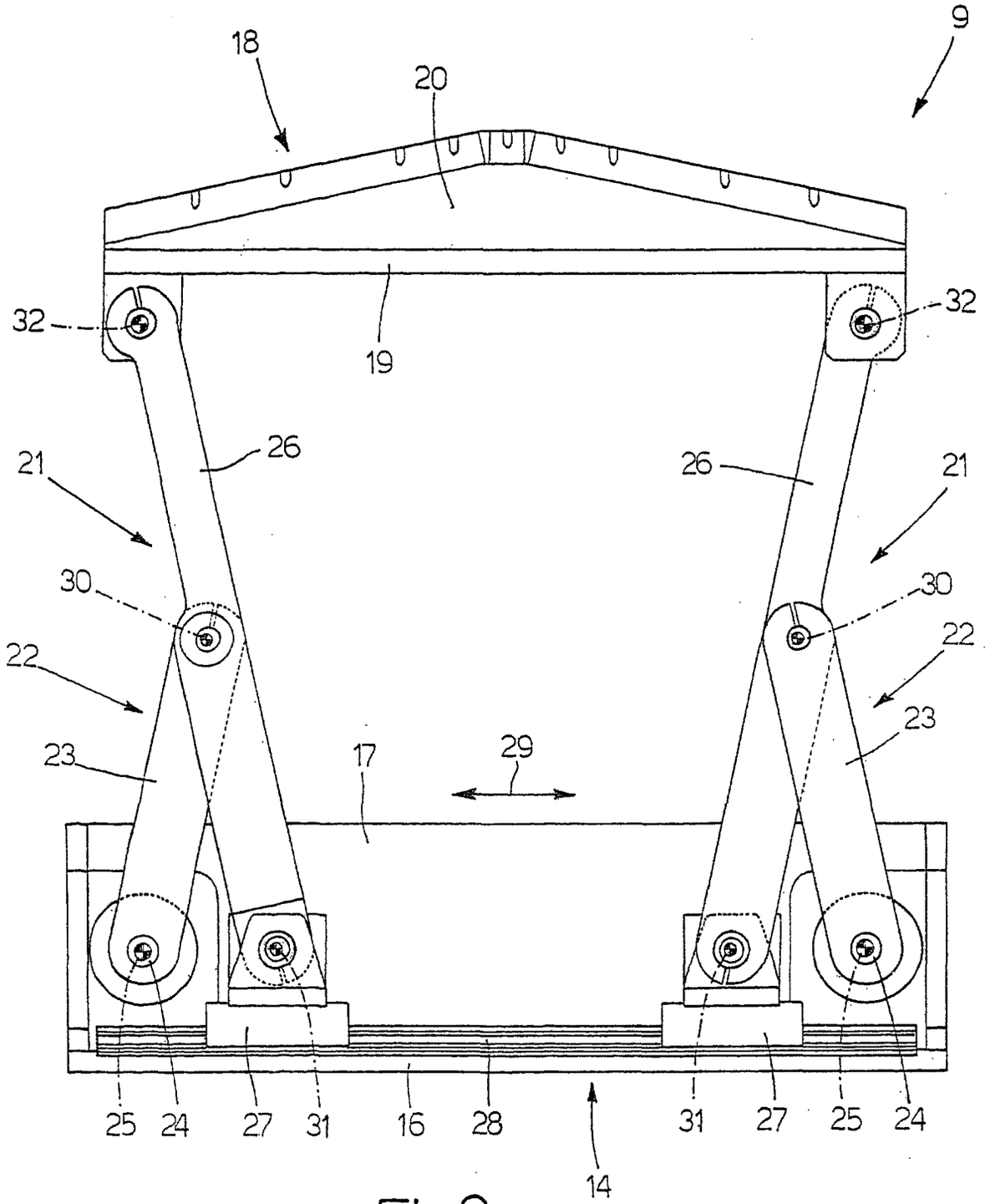
9
18
20
32
32
19
26
26
21
21
30
30
22
22
23
23
17
29
25
24
27
31
16
28
14
31
27
25
24

Fig.2

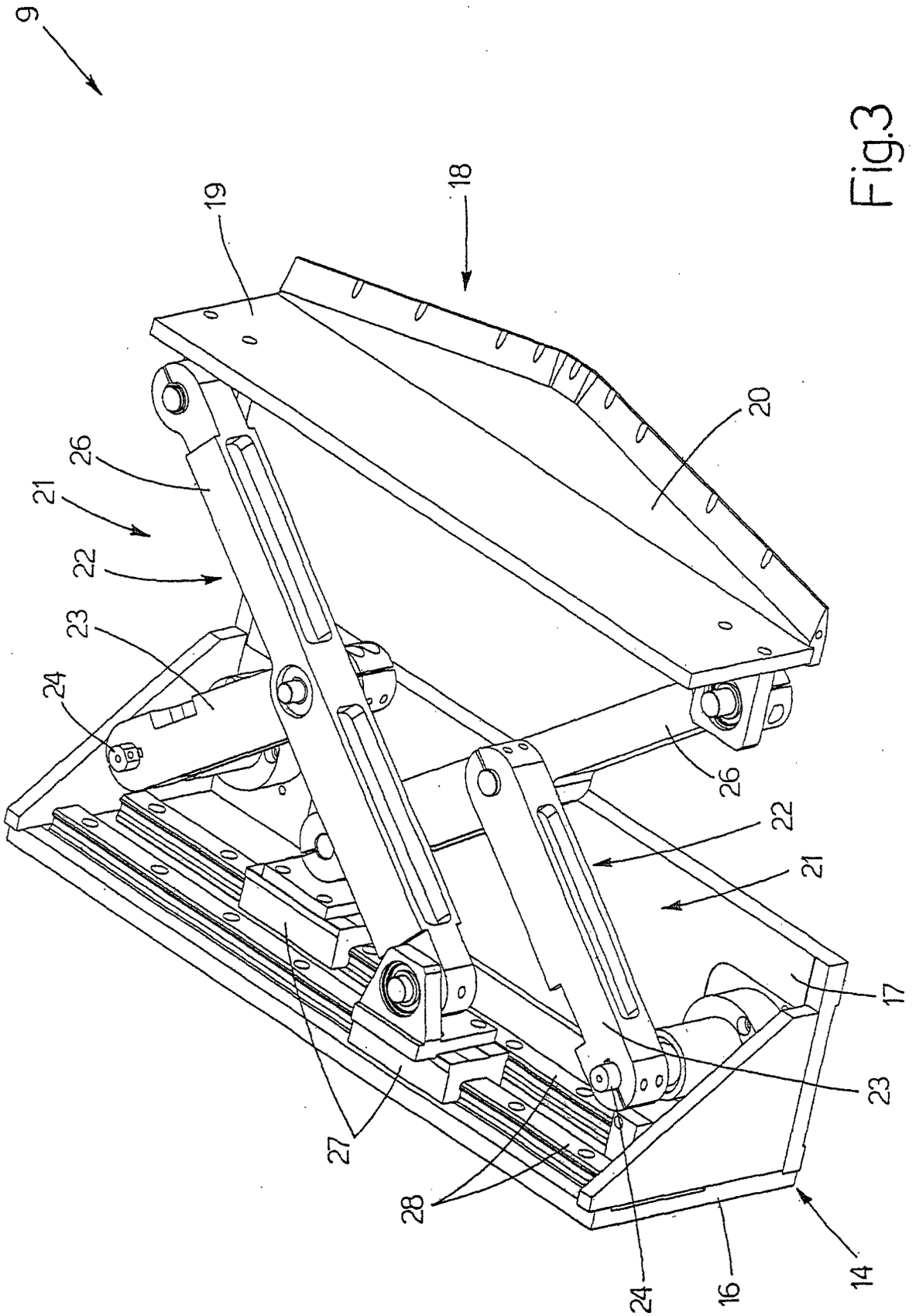


Fig.3