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None

(58) Field of search

B8A

Selected US specifications from IPC sub-class B65G

(54) **Alignment station in a conveyor system**

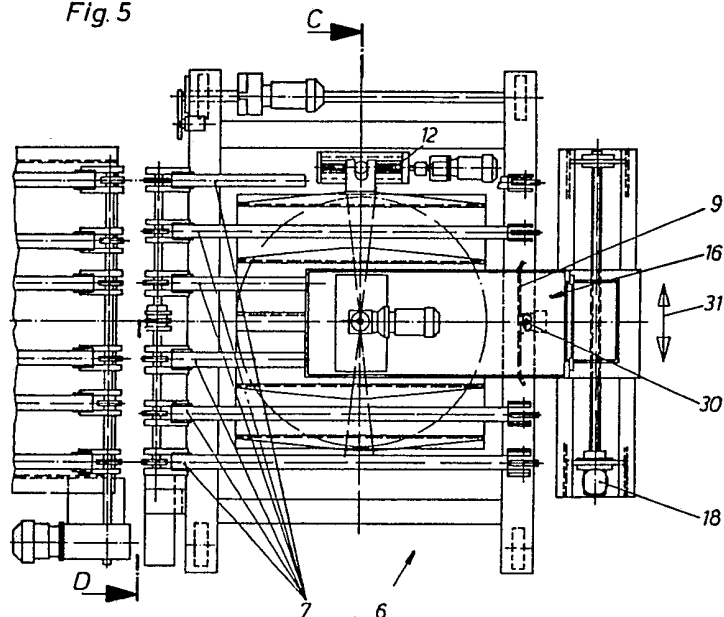
(57) In a device for unstacking and transporting stacks of sheets or plates to a press line or machining line, the unstacking station is preceded by a station aligning the pile of sheets or plates.

It is the object of the invention to provide an alignment station by which an alignment of the stack of sheets is possible without great expenditure.

For this purpose, it is proposed that the alignment station consists of a transport carriage (6) with a chain conveyor system (7) and incorporated lifting and rotation device (respectively 12) and of a stationary measuring system (16). The measuring system (16) serves for monitoring the angular position of the pile of sheets located on the transport carriage (6) and consists of a measuring rule (9) which is mounted to rotate and is applied against the pile of sheets by way of an air cylinder.

The angular position is measured by way of an absolute value

Fig. 5



Continued overleaf . . .

The drawing(s) originally filed was/were informal and the print here reproduced is taken from a later filed formal copy.

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transmitter (11) attached at the pivot of the measuring rule and is compared with the reference value; which is stored in the control arrangement. The stack is rotated by the device 12 until the measured value equals the reference value whereupon the stack is lowered and the carriage 6 moved transversely to convey the stack to the unstacking station.

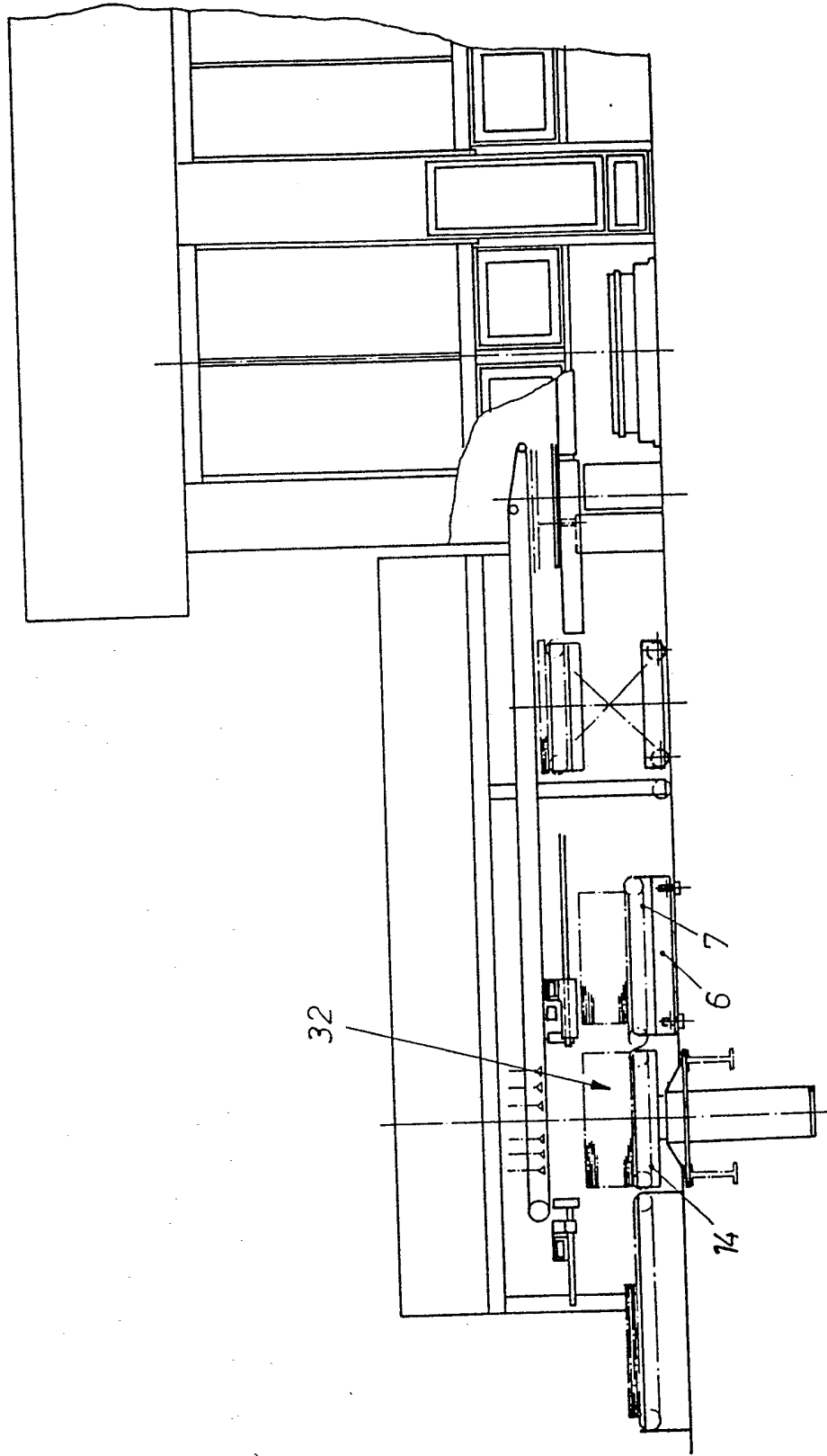
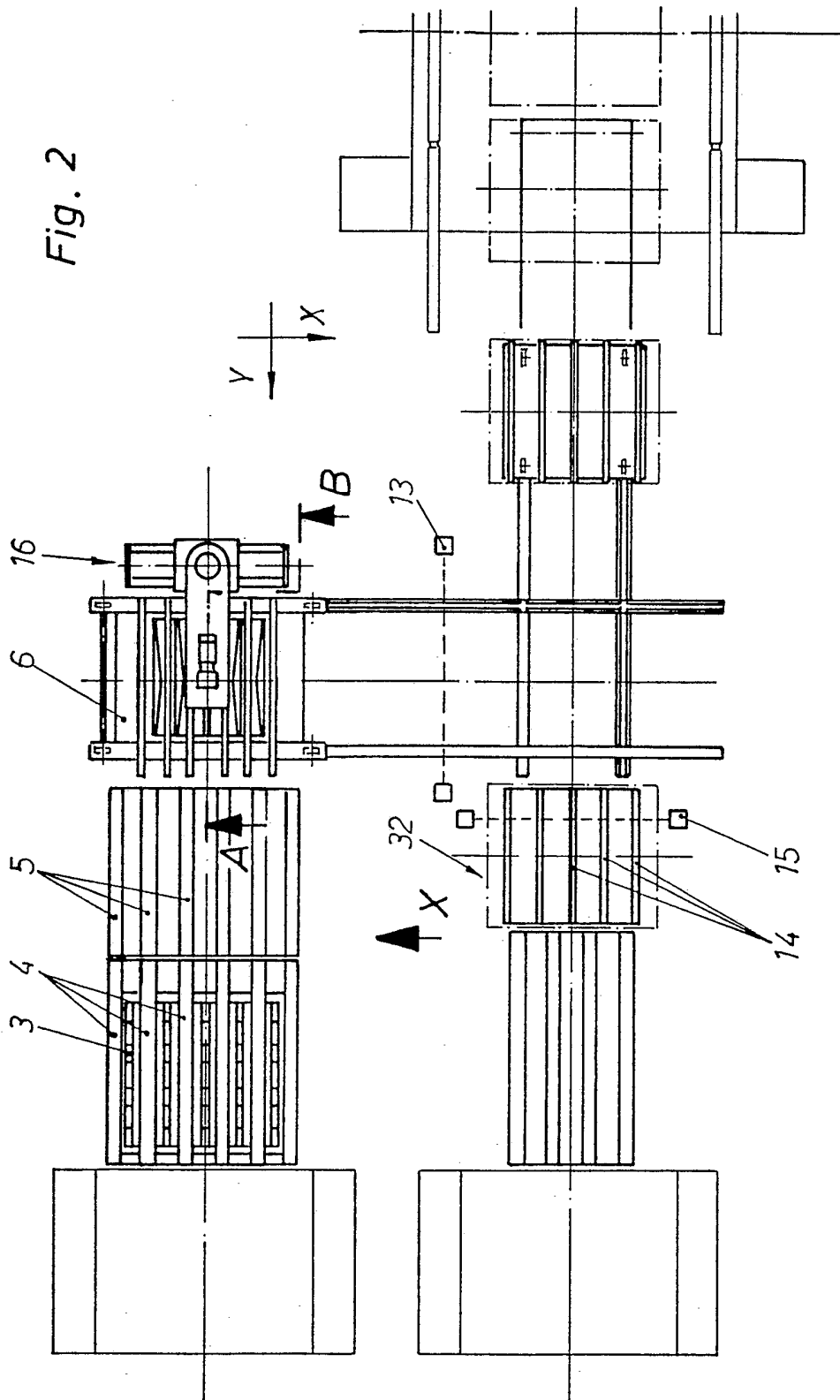


Fig. 1

Fig. 2



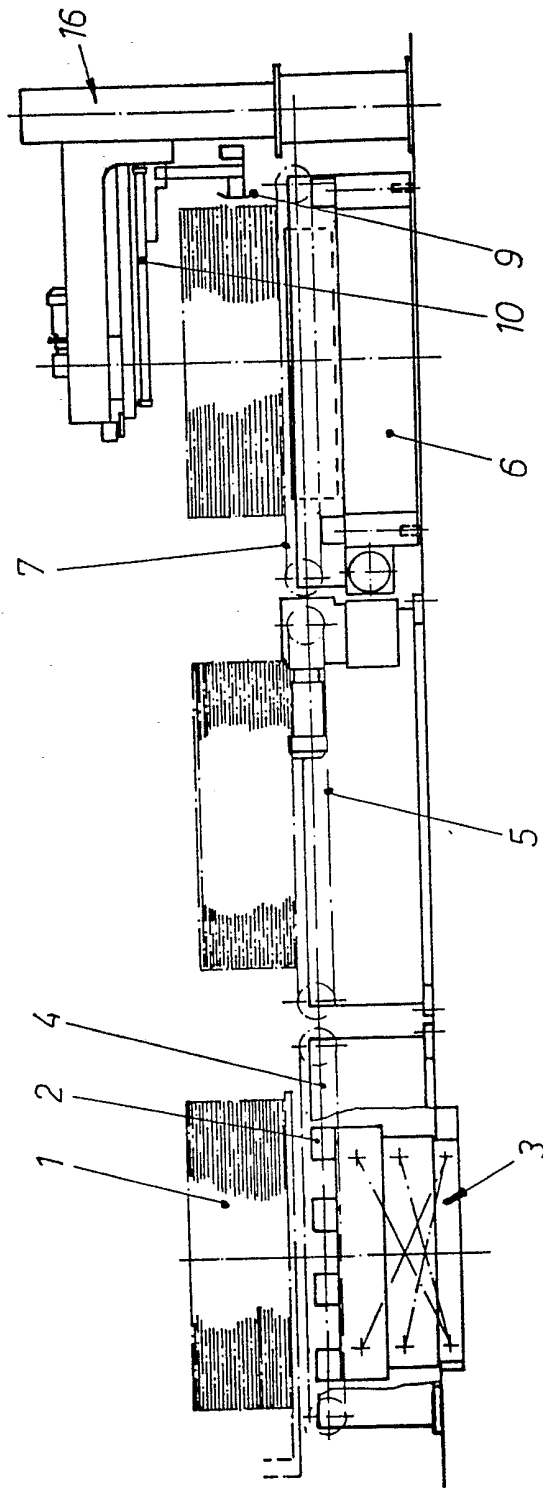
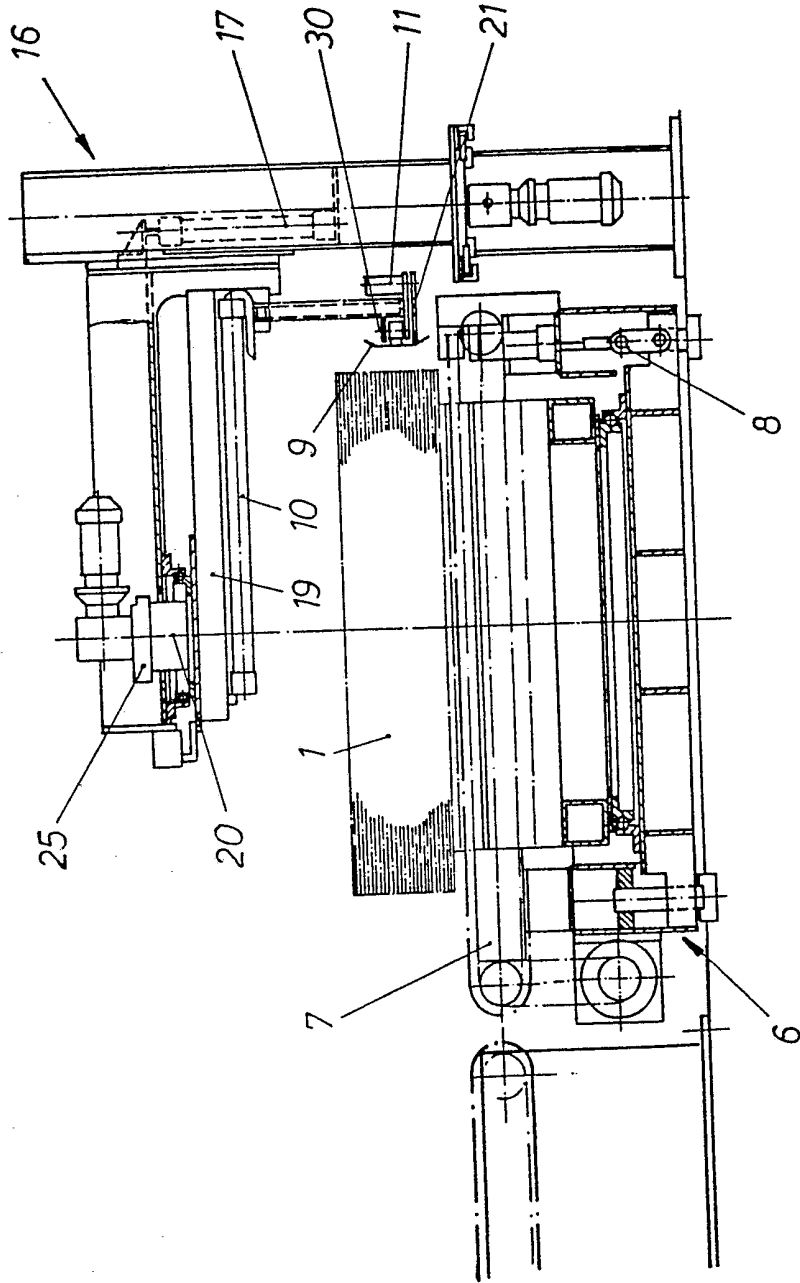


Fig. 3

Fig. 4



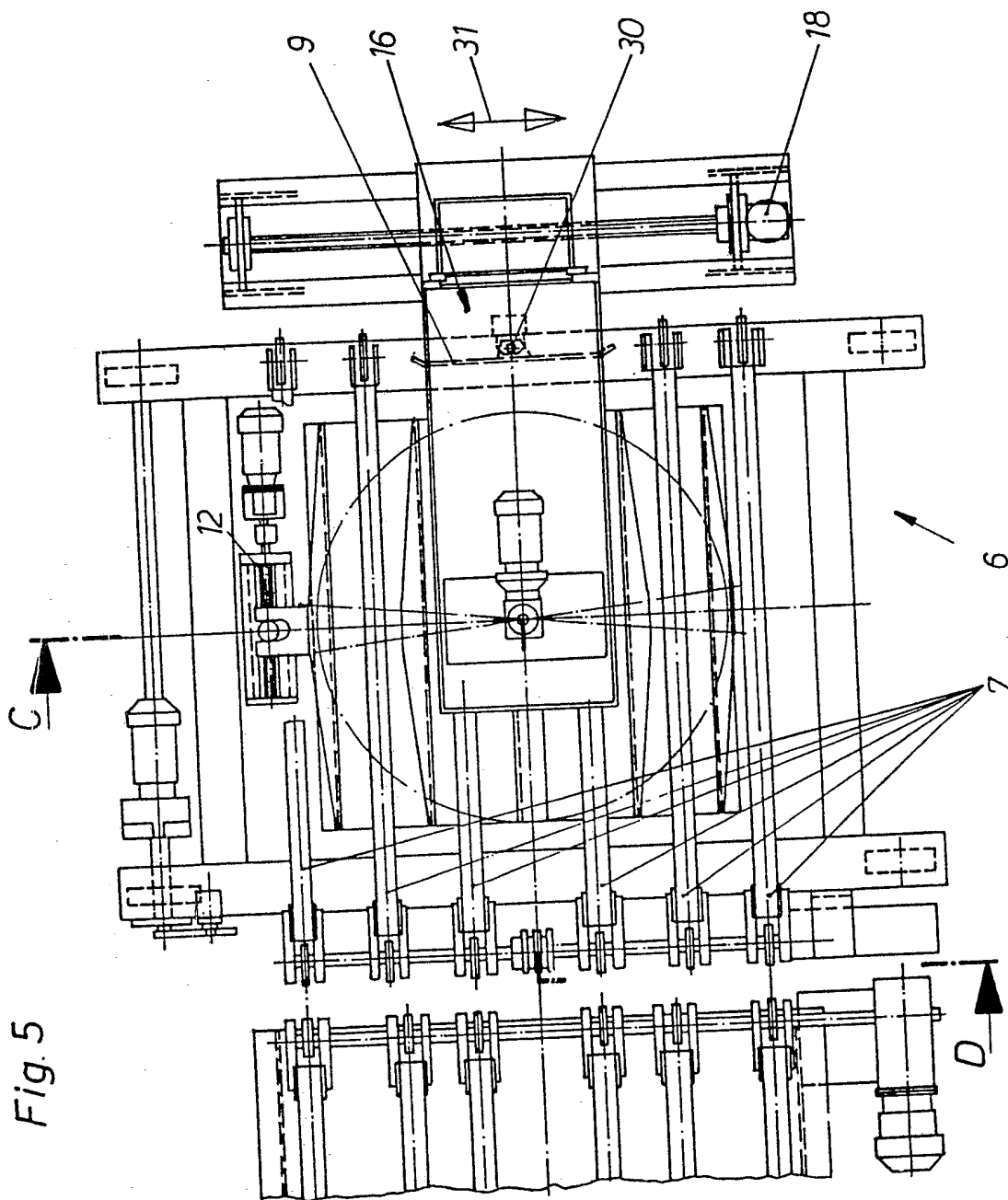


Fig. 5

Fig. 6

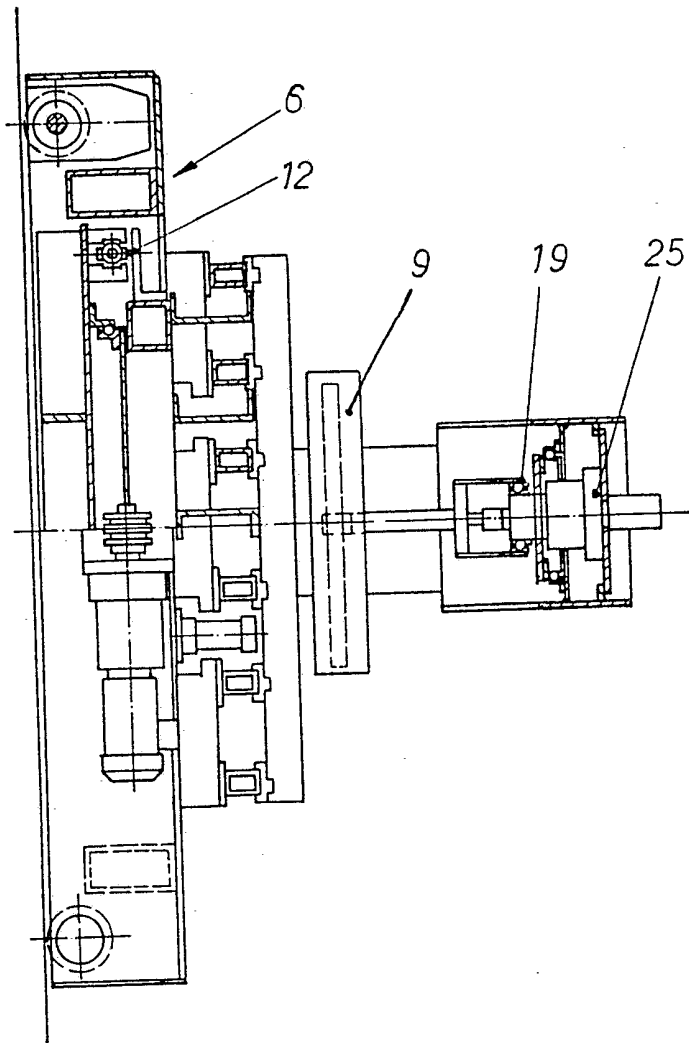


Fig. 7

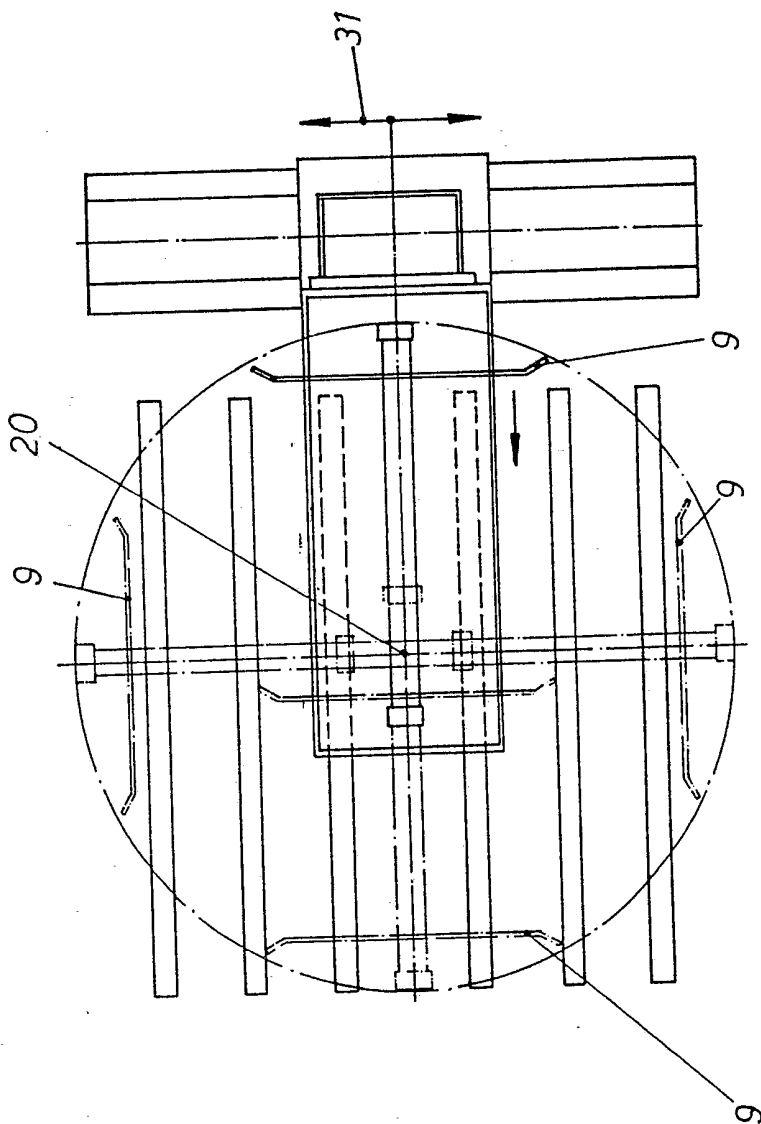


Fig. 8

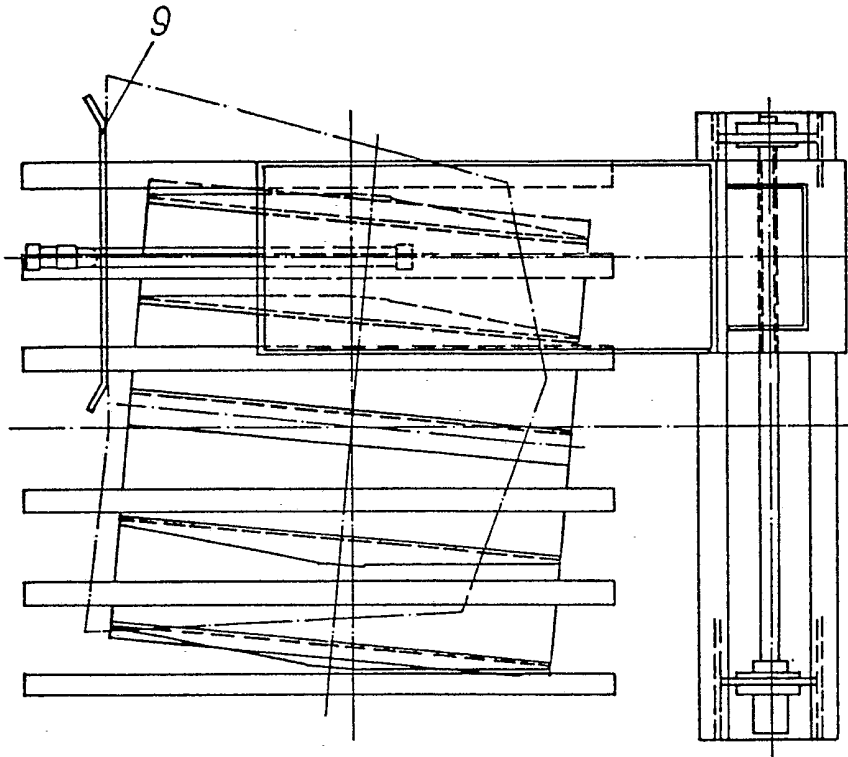


Fig. 9

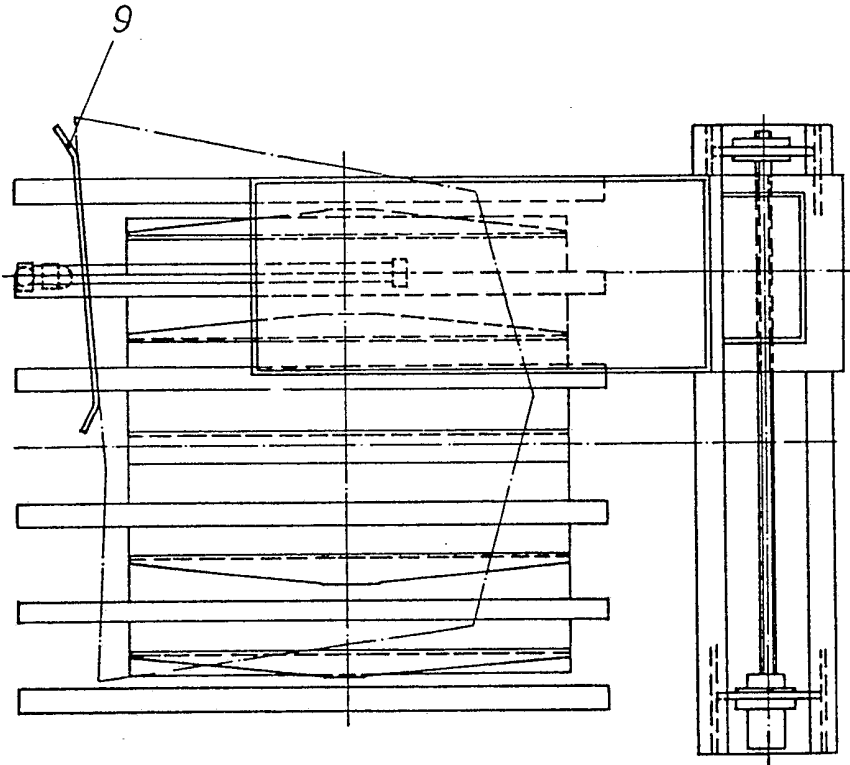


Fig. 10

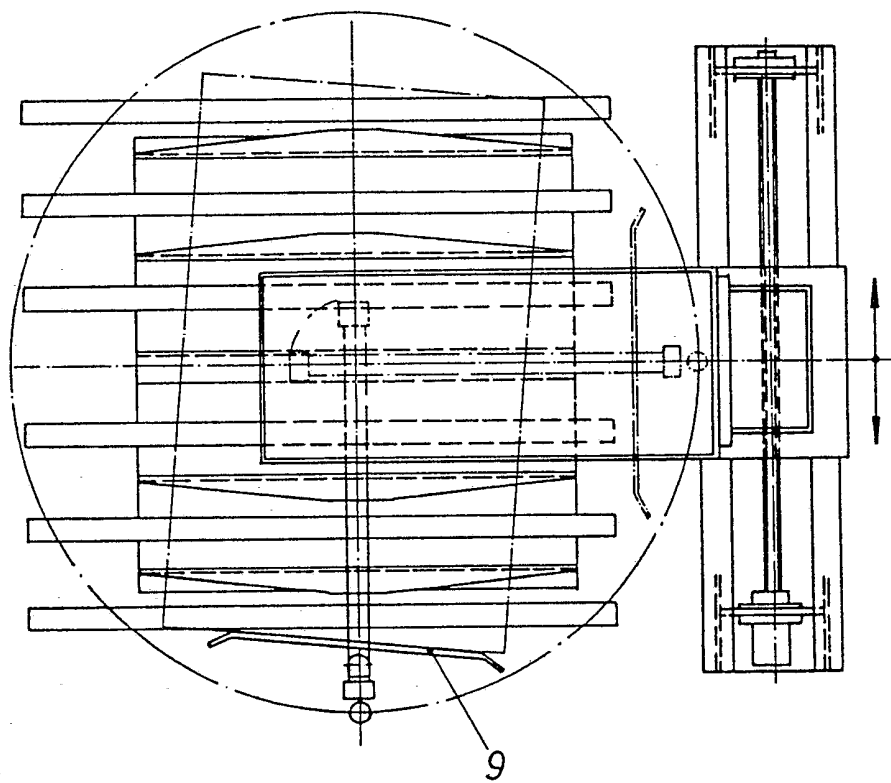
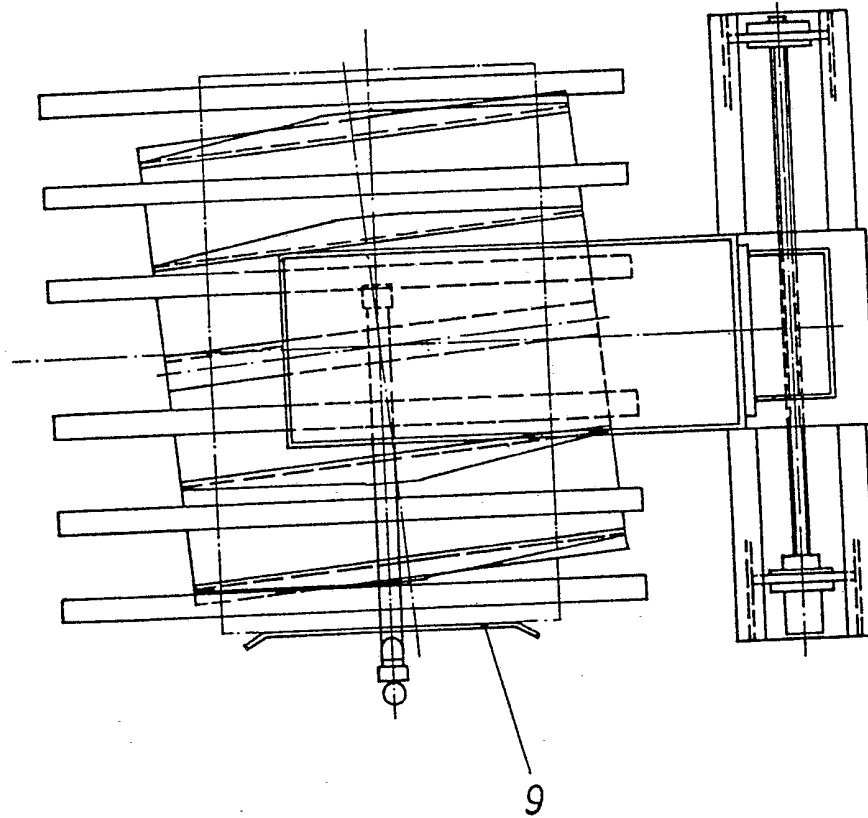


Fig. 11



SPECIFICATION

Plate loader system with automatic alignment station for sets or piles of plates

5 The invention relates to a device for unstacking and transporting piles of plates or plates to a press line or machining line, the unstacking station being preceded by a station aligning the pile of sheets or plates.

10 Apparatus of this type are required for supplying the plates by way of subsequent intermediate stations to the working chamber of a processing machine, for example an automated press line.

15 The drawbacks of previously known devices consist in particular of the pile of sheets which has to be loaded in an extremely awkward manner and above all in that this

20 pile of sheets must be loaded in the correct position with weights of 10 to 12 tonnes, partly with even greater weights, that is in the X- and Y- direction and in the correct position with respect to the vertical axis of rotation.

25 This is the starting point of the present invention and its object is to provide an alignment station in which any piles of sheets can be aligned without great expenditure in the correct position, as described previously.

30 This is achieved in a device of the afore-described construction due to the fact that the alignment station consists of a stationary measuring system (16) and a transport carriage receiving the pile of sheets to be aligned, a

35 lifting and turning device being incorporated in the transport carriage, which lifts the pile of sheets from the chain conveyor and turns it into the correct position, a measuring rule mounted in a rotary manner being applied to

40 the pile of sheets by means of an air cylinder. The angle to be turned is monitored by the absolute value transmitter and compared with the reference value. Then, the pile of sheets is turned until the measuring rule indicates a

45 measured value on the absolute value transmitter which is identical to the reference value in the control device.

The construction of the measuring rule is such that it can be rotated by a rotary suspension on all four sides of the pile of sheets, that is to say that all four sides of the pile of sheets can be scanned. Furthermore, the entire measuring device can also be shifted eccentrically for asymmetrical sheets.

55 In order that it is always possible to monitor the most favourable measuring edge on the pile of sheets, the guide system for the measuring rule is suspended in a rotary manner on the axis of rotation above the pile of sheets and can be positioned in any angular position by way of a program. Furthermore, the entire measuring system can be shifted laterally, as illustrated by the arrow (31) in Fig. 4.

60 Due to this construction it is ensured that

the pile of sheets can be monitored as regards position on all four sides and in the case of corresponding shaped plates, due to the lateral displacement, a suitable, i.e. a

70 straight measuring edge on the pile can be reached.

The lifting and rotating device in the transport carriage serves for rotating the pile of sheets into the correct angular position, the

75 angle through which rotation is to occur being ascertained by the measuring system by way of the evaluation electronics.

One embodiment of the invention is illustrated diagrammatically in the drawings, in

80 which:

Figure 1 is a general view of the feeding device,

Figure 2 is a plan view of the feeding device,

85 *Figure 3* is a view in the direction of arrow x,

Figure 4 is a section on line A-B of Fig. 2,

Figure 5 is a plan view according to Fig. 4,

Figure 6 is a section on line C-D of Fig. 6,

90 and

Figures 7 to 11 are views from above of the alignment station with examples for the possibilities of adjusting the measuring rule.

The operation of the device is as follows:

95 The pile of sheets 1 is deposited by means of a crane or fork-lift truck on the support bars 2 of the lifting station 3 in the conveying system 4.

100 After removing the marking bends, the lifting unit of the lifting station 3 lowers the pile 1 onto the chain conveyor of the conveying system 4. From here, the pile of sheets 1 is conveyed by way of chain conveyors 4 to the buffer section 5 or to the transport carriage 6.

105 The pile 1 stops approximately at the centre of the carriage due to pre-selectable proximity switches in the chain conveyor 7 of the transport carriage 6. The lifting unit 8 in the transport carriage 6 now rises and the measuring rule 9 is applied by means of the air cylinder 10 to the pre-selected edge of the pile of sheets 1. The angle is measured by way of the absolute value transmitter 11, compared with the reference value and the pile 1 is

115 turned by way of the rotary drive 12 until the actual value and desired value correspond.

120 Since the angle of rotation is limited by the construction, the cycle for the rotation can be repeated as often as desired, that is to say, if the pile of sheets has not reached the correct position after the first rotating process, the lifting unit is lowered, the rotary drive returned to the initial position, then the lifting unit raises the pile and a new rotating operation is initiated. After reaching the exact angular position, the lifting unit 8 is lowered, the measuring rule 9 passes into the initial position. With the transport carriage 6, the pile is now

125 moved transversely with respect to the conveying direction to the centre of the feed de-

130

vice. After interrupting the light barrier 13, the carriage travels further by a distance pre-selected according to the shape of the plate.

This distance is predetermined automatically

5 by way of the control system, so that the pile stands exactly at the centre of the plate feed arrangement. The pile is now conveyed by the chain conveyor 14 to the centre of the unstacking point 32. Here also the distance is
10 monitored by way of a light barrier 15 and then by way of a pre-selected distance, which is predetermined by way of the control system, the pile is moved into the correct position at the unstacking point 32.

15 If no suitable edge is present on one of the sides of the pile of sheets, in order to measure the angularity or positional accuracy, the measuring system can be rotated automatically on each of the four sides of the pile 1 by way
20 of a program and by way of a transmission 25 having little clearance.

For introducing and withdrawing the pile 1, in this case the measuring system may be raised by way of the cylinder 17, in order that
25 there is no collision with the introduction or withdrawal of the pile. For a pile of plates in which the measuring edges lies eccentrically, the measuring device 16 is shifted automatically by way of the shifting drive 18, by way
30 of a program, into the suitable position for monitoring of the pile position by the measuring rule.

Figs. 7 to 11 show the possibility of universal adjustment of the measuring rule on the
35 pile of sheets for monitoring the correct position.

In the device according to the invention, the entire pile of plates may be deposited roughly and is orientated by the automatic alignment
40 station so that the pile of sheets is in the correct angular position and thus can be introduced into the plate stacking station, where individual plates are supplied to the automatic press or machining line. Misalignment in the
45 longitudinal and transverse direction (see Fig. 2) is corrected by limiting the travelling distances of the transport carriage and of the chain conveyor, i.e. the correct position in these two co-ordinates is achieved by monitoring the edge of the pile of sheets and with
50 this monitoring signal, dependent on the distance and by way of the program, the pile is transported into the correct position, so that the pile of sheets lies in the exact position
55 along the horizontal axis X and Y in the unstacking station.

CLAIMS

1. Device for unstacking and transporting
60 plates to a press line or machining line, the unstacking station being preceded by a station for aligning the pile of sheets or plates, wherein the alignment station comprises a transport carriage for receiving the pile of
65 sheets and a measuring system, a lifting and

rotating device being incorporated in the transport carriage and a chain conveyor being arranged for loading and unloading the pile of sheets, the measuring system consisting of a rotatable measuring rule with an angular pulse transmitter and transmission gear, which can be applied to the pile of sheets by way of an air cylinder.

2. Alignment station according to claim 1,
75 wherein the measuring rule can be turned by way of a program through 270° by way of transmission having low clearance.

3. Alignment station according to claim 1 or 2, wherein the support for the measuring rule including the measuring system is designed to move transversely, adjusting movement being started by way of a program.

4. Alignment station according to any one of claims 1 to 3, wherein the chain conveyor
85 associated with the alignment station and the travel of the transport carriage bring the pile of plates into the correct position in the X-and Y- direction by way of suitable measuring systems (light barriers).

5. An alignment station substantially as herein described with reference to the accompanying drawings.

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