

[54] WORKPIECE CONVEYER DEVICE FOR A PRESS

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[57] ABSTRACT

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A conveyor device for long workpieces falling vertically from a press and comprising an open topped receiving device capable of receiving only one workpiece, a brake device adjacent to the receiving device for braking the fall of the workpiece into the receiving device, a track for the workpieces, means for moving the receiving device towards the track, a lifting device adjacent to the track whereby a workpiece can be displaced from the receiving device along the track, and a mechanism operatively associated with the working cycle of the press incorporating a first switch operated when the receiving device is located in the receiving position and a further switch which is operated when a workpiece is located in the receiving device.

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12 Claims, 4 Drawing Figures

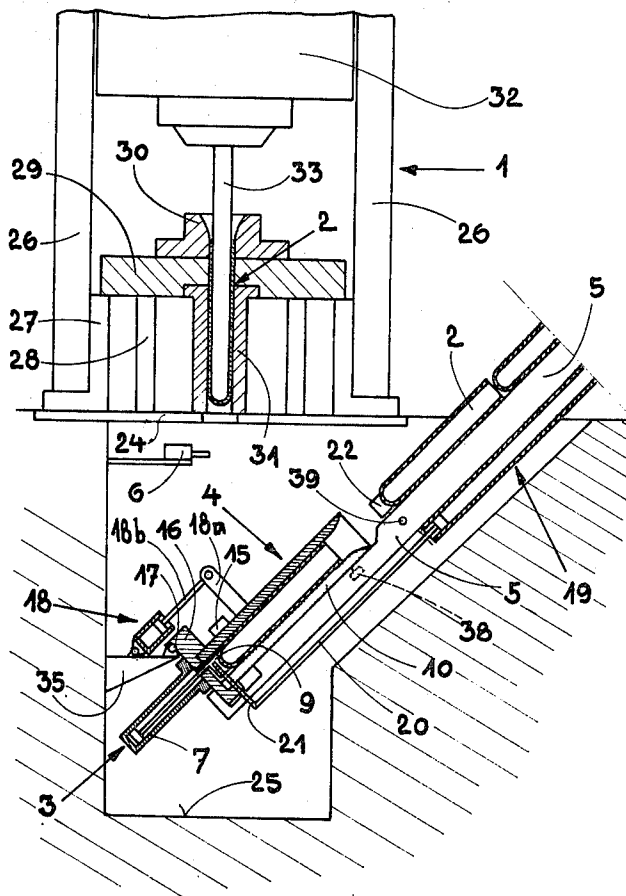
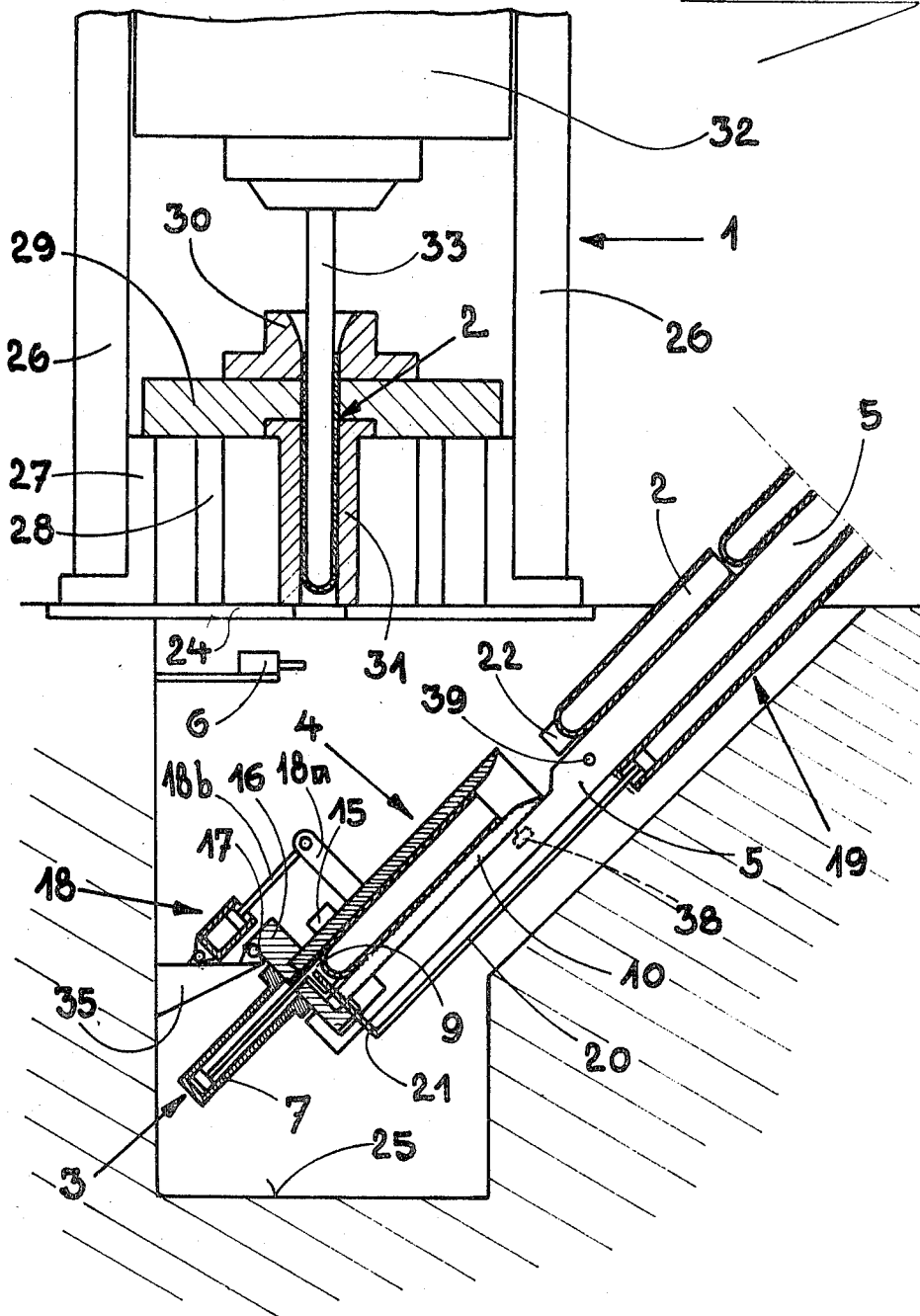


Fig. 1



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Fig. 2

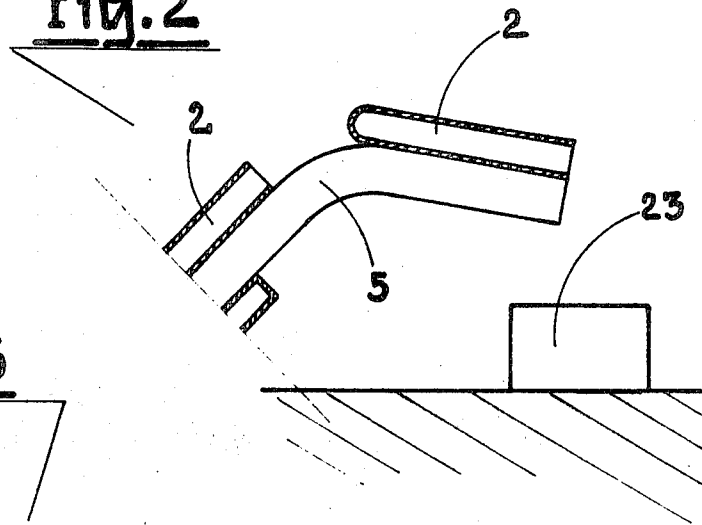
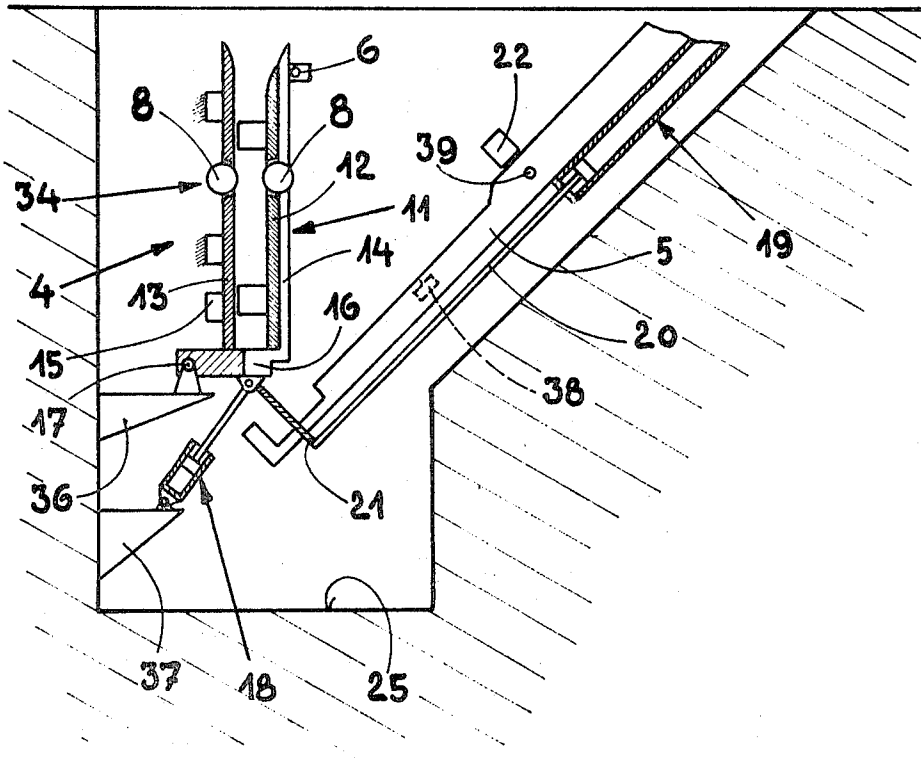


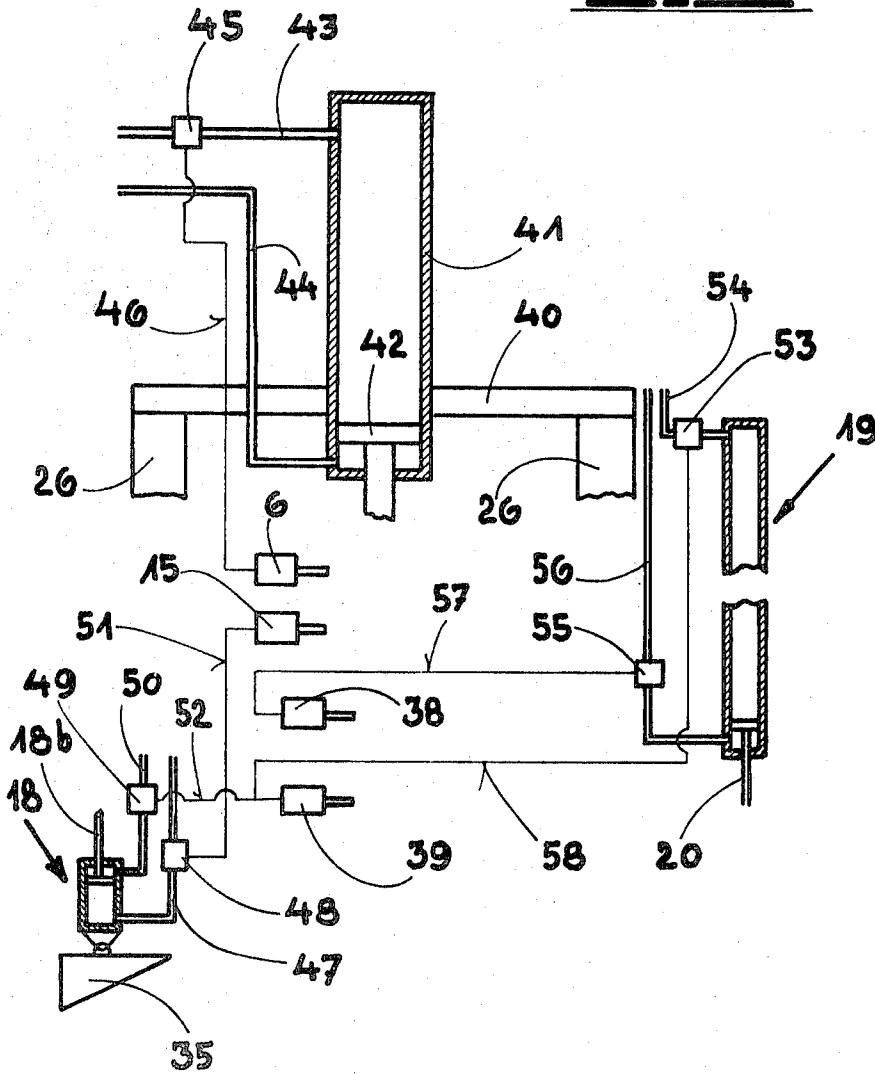
Fig. 3



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Fig. 4



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WORKPIECE CONVEYER DEVICE FOR A PRESS

The invention relates to a conveyer device for workpieces falling from a vertical press.

The manufacture of long pressed or drawn pieces on vertical, mechanical or hydraulic presses is accompanied at present by particular difficulties when the workpieces, depending on the method of production and their length, fall through the pressing table and cannot be removed from the press body at floor level. Normally, such workpieces fall into a receptacle in a base cavity. The workpieces in the base cavity have been selectively placed on a conveyer belt, which conveys the latter to ground level in disordered sequence and regardless of the pressing strokes. Devices for this purpose have the disadvantage that the workpieces falling on top of each other tend to be damaged because of the large distance of their fall. Moreover, the removal of the workpieces from the space under the press, namely from the base cavity, takes place in disordered sequence.

Thus, it is the object of the invention to avoid damage to the workpieces and to ensure a removal of the workpieces from the space under the press in the correct sequence.

According to the invention, a conveyer device of the kind specified, comprising a receiving device open at the top, and capable of receiving only one workpiece, a brake device adjacent to the receiving device for braking the movement of a workpiece falling into the receiving device, a track for workpieces, means for moving the receiving device towards the track, a lifting device adjacent to the track whereby a workpiece can be displaced from the receiving device along the track, and a mechanism operatively associated with the working cycle of the press, said mechanism including a first switch which is operated when the receiving device is located in the receiving position and a further switch which is operated when the workpiece is located in the receiving device.

With a conveyer device according to the invention, the workpieces fall individually into a container provided under the pressing table or under the press, which has approximately the same dimensions as these workpieces. As soon as this container has received a workpiece, it tilts laterally outwards and by means of an appropriate control switch, sets in motion a lifting device, which removes the workpiece from the container so that it travels along an oblique receiving or guide path, to a position above ground level. Since the device works in sequence with the press, this prevents workpieces from falling on each other and from being damaged. In addition the workpieces arrive in the correct order.

In order to ensure these operations the following devices are used. A brake, which retards the speed of fall of the workpiece. A selectively operated damping device, which at the end of the free fall retards the hard impact of the end of the workpiece on the base of the receiving container. A first switch, which operates when the receiving container is in its correct receiving position before the start of the pressing operation, to cause the fall of the workpiece into the container. An additional switch which operates when the workpiece has reached the bottom of the container, and initiates the tilting process.

The invention will now be described in detail, with reference to the accompanying drawings which illustrate preferred embodiments of the invention.

FIG. 1 is a side view of a conveyer device with closed receiving container and showing a press in part cross section;

FIG. 2 is an extension of FIG. 1;

FIG. 3 shows a conveyer device in cross section with divided receiving container; and

FIG. 4 is a diagrammatic illustration of the electric and hydraulic devices of the conveyer device shown in FIG. 1.

According to FIGS. 1 and 2, a vertical press 1 stands on a plate 24, which extends over a base cavity 25. The press 1 has legs 26 and a pressing table 29 resting on supports 27, 28. On the pressing table 29 is located a die 30. A fall tube 31 is provided under the press table 29 and between the supports 28. Above the press table 29 there is located between the legs 26 a

press ram 32, to which is attached a drawing punch 33, which projects vertically downwards and is displaceable in the die 30 in an opening in the press table 29 and fall tube 31.

From the press 1 hollow workpieces 2 are ejected by the drawing punch 33 downwards through the fall tube 31, slowed down by a brake device 3 into a receiving device 4 provided in the base cavity 25, from which they are conveyed, in unison with the cycle of the press, on a track 5 which rises obliquely and which leads from the base cavity 25 at least to ground level, i.e., to the level of the plate 24 of the press. The receiving device 4 can be tilted out of the position shown in FIG. 1 in anticlockwise direction into its receiving position, in which its vertical central axis coincides with the central axis of the drawing punch 33. Movement of the receiving device 4 into the receiving position operates a first switch 6 located on the wall of the base cavity 25, by means of which a pressing or drawing operation of the press 1 is initiated. The braking device 3 is provided in order to avoid damage to the workpieces caused by impact. This device comprises a plate 9 which absorbs the shock by means of a hydraulic unit 7 inside the receiving device 4. The braking device 3 is used both for the receiving device 4 shown in FIG. 1, i.e., with a closed receiving container 10, as well as in the construction shown in FIG. 3, i.e., with a vertically divided container 11. For the purpose of adaption to various diameters of the workpieces 2, both embodiments of the container can be provided with lining members 12 (FIG. 3). In addition, for this purpose, in the divided container 11 in FIG. 3, different distances can be set between the stationary part 13 and the movable part 14.

A further switch 15 is provided adjacent to the base of the receiving device 4 and is actuated when the workpiece 2 fully occupies the receiving container 10. The switch actuates means which tilts a base plate 16 supporting the receiving container about a pin 17 located at the lower end of the receiving device. Actuation is by means of a hydraulic unit 18. The first switch 6 is provided in the path of movement of the receiving device 4. A further hydraulic unit 19 is provided, having a piston rod 20 carrying an arm 21, which slides in a slot of the track 5 or of the receiving container 10, and engages the base of the workpiece 2 in the receiving container. The hydraulic unit 19 is arranged to convey the workpiece to the track 5 where it is prevented from sliding back by means of a back stop 22. The back stop 22 is provided on the track 5 above the receiving container 4 lying in the track.

The cavity of the receiving container 10 is open at the top and has the outer shape of the workpiece 2 produced by the press 1. The second switch 15 has, for example, an operating arm (not shown) which projects into the receiving container 10 and is pressed downwards by a workpiece, when one falls into the receiving container. However, it is also possible to provide other suitable switches. The receiving device 4 has a projection 18a, on which the piston rod 18b of the hydraulic device 18 engages. If the receiving device 4 is swung out of the position shown in FIG. 1 into the vertical receiving position, then the arm 21 of the hydraulic unit 19 leaves the receiving container 10. The hydraulic unit 19 is located underneath the track 5.

The back stop 22 is, for example, constructed in a manner (not shown in detail) such that a pin arranged to be displaceable on the track 5 is pushed into the path of movement of the workpiece 2 on the track by a spring. If a workpiece is pushed from below against the pin, then it falls back under the force of the spring. If the workpiece has passed the pin, then it moves forward again under the pressure of the spring. Other forms of back stops may be provided.

The workpiece 2 is pushed by the subsequent workpieces onto the track 5, and is slowly tilted round so far that liquid which may be inside the workpiece 2 runs out and can be caught in a container 23. For this purpose, in the end region of the track, there is provided a small slope in the direction of the end of the track and the container 23 is located below the track.

As shown, in FIG. 1, the press 1 ejects a workpiece 2 whenever the switch 6 is actuated by the receiving device 4. The hydraulic unit 18 is set in motion, when a workpiece contacts the switch 15, which swings the receiving device 4 on the track 5. There it actuates a control switch 38, by means of which the hydraulic unit 19 is actuated, so that the arm 21 pushes the workpiece out of the receiving device 4 onto the track 5. By means of the arm 21 which is pushed upwards a contact 39 located near the back stop 22 on the track 5 is actuated whereby both the hydraulic unit 19 as well as the hydraulic unit 18 are drawn back, so that the arm 21 and the receiving device 4 return to their initial position.

The conveyer device illustrated in FIG. 3 has substantially the same construction as that in FIGS. 1 and 2. It has a braking device 34, which consists of two brake parts 8 located at the side of the path of fall of the workpiece onto the receiving device 4, which are constructed, for example, as rubber rollers.

Where the receiving device 4 has a container 10, whose side wall is closed, except for the slot for the arm 21, as in FIG. 1, then a damping of the fall is achieved if the workpiece fits exactly in the container. Whereas in FIG. 1 the pin 17 and the hydraulic unit 18 are pivotally arranged on a common base, in FIG. 3, there are provided two bases 36, 37 arranged one above the other, the hydraulic unit 18 being connected to the lower base 37 and engaging the base plate 16 which is itself pivotally mounted at 17 on the upper base 36.

As a variation from the above embodiment, in place of the hydraulic unit 18, a mechanical or pneumatic unit can be used. As shown in FIGS. 1 and 3, the track 5 is an elongated, beamlike structure. It may be constructed as a channel, in which the workpieces lie along the length and from which the workpieces cannot fall laterally.

As FIG. 4 shows, the press 1 of FIG. 1 is supported on a cross-piece 40 connecting the legs 26 to a cylinder 41, in which a piston 42 is displaceable. The press ram 32 is attached to the piston rod of the piston 42. A pipe 43 communicates with one end of the cylinder 41, through which pressure fluid flows into the cylinder 41 in order to move the piston 42 downwards. A further pipe 44 communicates with the other end of the cylinder to admit pressure fluid in order to lift the piston. The pipe 43 passes through a solenoid valve 45, which is opened by the switch 6 through a lead 46. The switch 6 being actuated by the receiving device 4, allows pressure fluid to flow into the cylinder 41.

A pipe 47 with a solenoid valve 48 leads to the hydraulic device 18, through which pressure fluid is supplied, in order to swing the receiving device 4 out of the receiving position. Through a further pipe 50 having a solenoid valve 49, pressure fluid is supplied to the hydraulic device 18, in order to swing the receiving device 4 back into the receiving position. In this case, the solenoid valve 48 is controlled through a lead 51 by the switch 15, which is actuated by the falling workpiece. The solenoid valve 49 is opened through a lead 52 by the contact 39, which is actuated when a workpiece is pushed out of the receiving device.

The hydraulic device 19 is supplied with pressure fluid by a

pipe 54 having a solenoid valve 53, in order to lower the piston rod 20 and is supplied with pressure fluid by a pipe 56 having a solenoid valve 55, in order to push the piston rod 20 upwards. In this case, the solenoid valve 45 is opened by the control switch 38 through a lead 57, when the receiving device 4 is tilted towards the track 5, whereas the solenoid valve 53 is opened by means of the contact 39 through a lead 58.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

1. Conveyer device for workpieces falling from a vertical press, comprising a receiving device open at the top, and capable of receiving only one workpiece, a brake device adjacent to the receiving device for braking the movement of a workpiece falling into the receiving device, a track for workpieces, means for moving the receiving device towards the track, a lifting device adjacent to the track whereby a workpiece can be displaced from the receiving device along the track, and a mechanism operatively associated with the working cycle of the press, said mechanism including a first switch which is operated when the receiving device is located in the receiving position, and a further switch which is operated when a workpiece is located in the receiving device.

2. Conveyer device according to claim 1, wherein the brake device has two brake parts arranged on either side of the path of fall of the workpiece, which retard the speed of fall of the workpiece.

3. Conveyer device according to claim 1 wherein the brake device has a movable plate on the base of the receiving device which absorbs shock of the fall path of the workpiece.

4. Conveyer device according to claim 1 in which the receiving device pivots about its lower end and the track rises obliquely.

5. Conveyer device according to claim 1, wherein the receiving device is provided with lining members.

6. Conveyer device according to claim 1, said further switch is located adjacent to the base of the receiving device.

7. Conveyer device according to claim 1, characterized in that the first switch is located in the path of movement of the receiving device.

8. Conveyer device according to claim 1, wherein the receiving device has a receiving container provided on a tiltable base plate.

9. Conveyer device according to claim 1, wherein receiving device has a vertically divided container, one part of which is stationary and the other part being arranged to swing and to be set at various distances.

10. Conveyer device according to claim 1 wherein the lifting device has a fluid pressure operated unit, a piston rod thereof having a workpiece engaging arm whereby the workpiece is movable onto the track.

11. Conveyer device according to claim 1, wherein a back stop is provided on the track above the receiving device, for preventing the sliding back of a raised workpiece.

12. Conveyer device according to claim 1 wherein the end region of the track has a slight incline in the direction of the end of the track; and a container for liquid escaping from the interior of a workpiece is provided.

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