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(54) Quick plate press

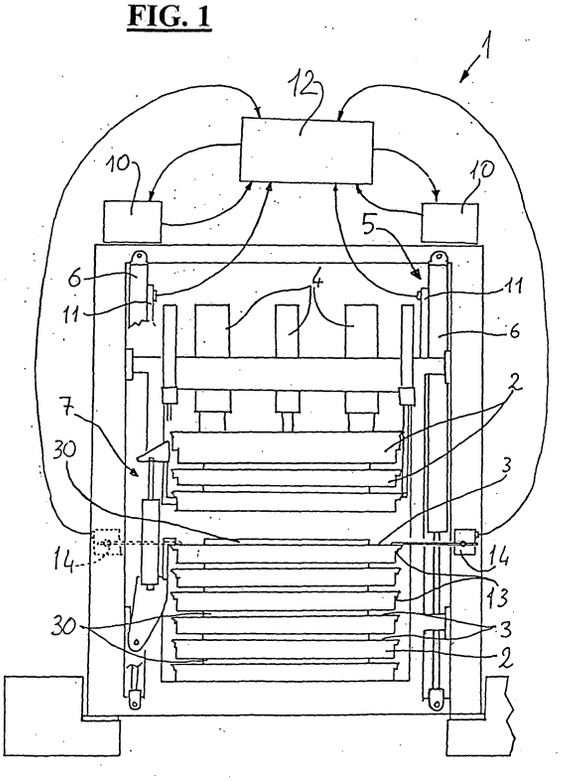
(57) A quick plate press is provided with a plurality of side by side plates (2), which delimit interposed spaces (3) for panels. Said press (1) comprises compression hydraulic cylinders (4) of the plates (2) and translation means (5) which are provided with a plurality of respective linear hydraulic actuators (6) to alternatively position the spaces (3) at opening means (7), fit for reciprocally remove the plates (2) of a space (3) for entering said space (3).

Said press (1) includes:

- proportional valve means (10) for individually driving each actuator (6) of translation means (5);
- a plurality of linear encoder means (11), each thereof associated to a respective actuator (6) of translation means (5);
- control means (12) whose input port is connected to linear encoder means (11) and whose output port is connected to proportional valve means (10).

The control means (12) are fit for driving the actuators (6) of translation means (5) with differences of position or of relative speed, which are lower than predefined threshold values.

FIG. 1



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Description

[0001] The present invention relates to machines for manufacturing hollow panels or veneered wood or the like for doors, shelves or boards generally and it refers to a quick plate press.

[0002] There are known quick presses provided with a plurality plates or plates which are hold close each to other by means of compression hydraulic cylinders exerting a predefined compression force for sticking the panels positioned in the spaces between the plates.

[0003] Said presses are provided with translation means of the plates in order to move said plates with respect to opening means, in order to allow said opening means to alternatively open all the spaces included between couples of adjacent plates.

[0004] Consequently, the opening means are fit to overcome the force of the compression hydraulic cylinders for mutually space apart two adjacent plates for allowing to insert or to extract the panels between said plates.

[0005] The translation means and the opening means of the known quick presses are of hydraulic drive type and they are controlled by hydraulic valve means and/or electromechanical means which enable their operation.

[0006] A drawback of said known presses consists in that the translation means sometimes incorrectly position the plates with respect to the opening means, so precluding opening the space included between said plates to be spaced apart.

[0007] A further drawback of said known presses consists in that, in case of malfunction they require operators to execute dangerous recovery operations with risk of wounds and physical injuries generally; moreover said operations have difficult and long executions, so requiring expensive interventions of qualified technicians.

[0008] An object of the present invention is to propose a quick plate press provided with translation means of the plates fit to correctly position said plates with respect to the opening means.

[0009] Other object is to propose a press, which is virtually free from malfunctions of translation means and of opening means and capable to allow easy, fast and remote recovery operations of the functioning.

[0010] Further object is to propose a press capable to control the deformations of plates and to avoid breakdowns or breaking caused by panel irregularities and defects or by positioning errors of panels inside the press.

[0011] The above-mentioned objects are achieved in accordance with the claim content.

[0012] The characteristics of the present invention are underlined in the following with particular reference to the enclosed figure 1 which shows a schematic partial front view of the press of the invention.

[0013] In figure 1 the quick plate press, indicated by the reference 1, is provided with a plurality of plates 2 which are positioned with side by side faces, which lay one on top of the other and on horizontal plates, so forming a kind of pile or block of plates.

[0014] Each couple of adjacent plates 2 delimit an interposed plate 3 for panels 30 or similar to be manufactured by gluing which is speeded up and consolidated also by the heat of plates that are of heated type, for such purpose.

[0015] The press 1 includes compression hydraulic cylinders 4 transmitting to plates 2 a remarkable force fit for compressing the panels positioned in the space 3, in order to facilitate their consolidation and to confer to the faces a flat and regular shape.

[0016] The press 1 further has translation means 5 provided with four linear hydraulic actuators 6, of cylinder type, arranged in parallel couples at opposed sides of plates 2 in order to vertically move said plates and to alternatively position the spaces 3 at opening means 7.

[0017] Said opening means 7 are positioned close to each of the two couples of linear hydraulic actuators 6 and they include hydraulic cylinders which operate on horizontal prismatic elements fit for removably engaging side abutments of two adjacent plates 2 in order to space apart and move away each plate from the other, allowing to enter the respective space 3 and to extract a consolidated panel or to insert a panel to be consolidated, while the remaining panels are compressed by plates 2, operated by the compression hydraulic cylinders 4.

The press 1 includes proportional valve means 10, for individually driving each actuator 6 of translation means 5, and a plurality of linear encoder means 11, each thereof associated to a respective actuator 6 of translation means 5.

[0018] The press 1 is also provided with control means 12, of digital electronic type, whose input port is connected to the linear encoder means 11 and whose output port is connected to proportional valve means 10.

[0019] The control means 12 drive the actuators 6 of translation means 5 and they control, in a closed-loop way and by linear encoder means 11, the differences of position or of relative speed of said actuators, in order to maintain said differences lower than predefined threshold values.

[0020] Each proportional valve means 10 has an output for data related to the state of said valve means 10 and connected to a respective input port of control means 12.

[0021] The plates 2 include driving means 13, consisting of protrusions fixed at each of the four vertexes of each plate 2. The driving means 13 drive level sensor means 14, which are connected to respective input ports of control means 12, in order to send thereto at least a signal when said level sensor means 14 abut on driving means 13.

[0022] Said level sensor means 14 are four in number and are positioned approximately at the level of opening

means 7, along lines which are parallel to the motion of plates 2, or which are vertical and passing through the vertexes thereof.

[0023] The level sensor means 14 are of on/off type, in other words they provide a signal which can assume two distinct values only and which commutes from one value to the other one at the abutment of driving means 13.

[0024] The operation of the press 1 provides that, starting from a condition wherein each space 3 has a panel and the plates are in a lowered end position, the linear hydraulic actuators 6 of translation means 5, which are closed-loop controlled by control means 12, makes the plates to rise to bring at the loading level one of the spaces 3 of the press.

[0025] The control means 12 drive the valve means 10 consisting of four proportional electric valves, one for each of the linear hydraulic actuators 6, which are also indicated as hydraulic axles; said proportional electric valves regulate the oil flow.

[0026] The cycle executed by the control means 12 is controlled by first and second variables, which are, respectively, the start and the incremental number of the space to be sought.

[0027] To activate the ascent cycle the second variable must be written out with the number of the space to be sought relevant to the present plan (= 1 for the following one), and then the first variable must be set up.

[0028] At this point the four hydraulic axles that move the plates, move upwards at the same speed. Each hydraulic axle waits for an height signal of the related level sensor.

[0029] When the control means 12 receive the height signal, they memorize the corresponding height and perform an incremental positioning of the height as indicated in a related parameter.

[0030] At the end of the ascent cycle, the hydraulic axles remain enabled and they control the position at the arrest point. During the rise the four axles are mutually controlled.

[0031] If an axle diverges from the others by an amount greater than the set tolerance parameter, namely the above mentioned predefined threshold value, the axles are immediately stopped and a suitable error flag is set.

[0032] A signal front of one of the reset flags also reset a value of the deviation between the axles. With a descent front of the first variable, the cycle is stopped.

[0033] It is important to observe that the control means 12 of the press guarantee a real time control of the deformation of plates, which can be caused, for instance, by out of tolerances measures of panels, wrong positioning of panels or structural yielding of said panels.

[0034] Said control advantageously allows to stop or to deactivate the press in order to prevent damages, due or consequent to the excessive deformations of plates.

[0035] The main advantage of the present invention is to provide a quick plate press, provided with translation means of the plates fit to correctly position said plates with respect to the opening means.

[0036] Other advantage is to provide a press, which is virtually free from malfunctions of translation means and of opening means and capable to allow easy, fast and remote recovery operations of the functioning.

Claims

1. Quick plate press provided with a plurality of side by side plates (2) which delimit interposed spaces (3) for panels; said press (1) comprises compression hydraulic cylinders (4) of the plates (2) and translation means (5), which are provided with a plurality of respective linear hydraulic actuators (6) to alternatively position the spaces (3) at opening means (7) fit for reciprocally space apart the plates (2) of a space (3) for entering said space(3); said press (1) being **characterized in that** it includes:

   - proportional valve means (10) for individually driving each actuator (6) of translation means (5);
   - a plurality of linear encoder means (11), each thereof associated to a respective actuator (6) of translation means (5);
   - control means (12) whose input port is connected to linear encoder means (11) and whose output port is connected to proportional valve means (10);

   the control means (12) are fit for driving the actuators (6) of translation means (5) with differences of position or of relative speed which are lower than predefined threshold values.

2. Press according to claim 1 **characterized in that** the linear hydraulic actuators (6) are arranged in parallel couples at two opposed sides of plates (2).

3. Press according to claim 2 **characterized in that** each proportional valve means (10) has an output port for data related to the state of said valve means (10), said output port being connected to a respective input port of control means (12).

4. Press according to claim 1 **characterized in that** the plates (2) comprise driving means (13) fit to operate level sensor means (14) connected to respective input ports of control means (12) to send thereto at least a signal when said level sensor means (14) abut on the driving means (13).

5. Press according to claim 4 **characterized in that** the driving means (13) consist of protrusions positioned at each of the four vertexes of each plate (2)

and **in that** the level sensor means (14) are four in number approximately arranged at the opening means (7) along lines parallel to the motion of plates (2) and passing through the vertexes thereof.

6. Press according to claim 4 **characterized in that** the level sensor means (14) provide a signal with two distinct values, which commute at the abutment on the driving means (13).

FIG. 1