Dec. 1, 1964 A. DEDEKAM ETAL 3,159,098

BALE PRESS

Filed April 8, 1963

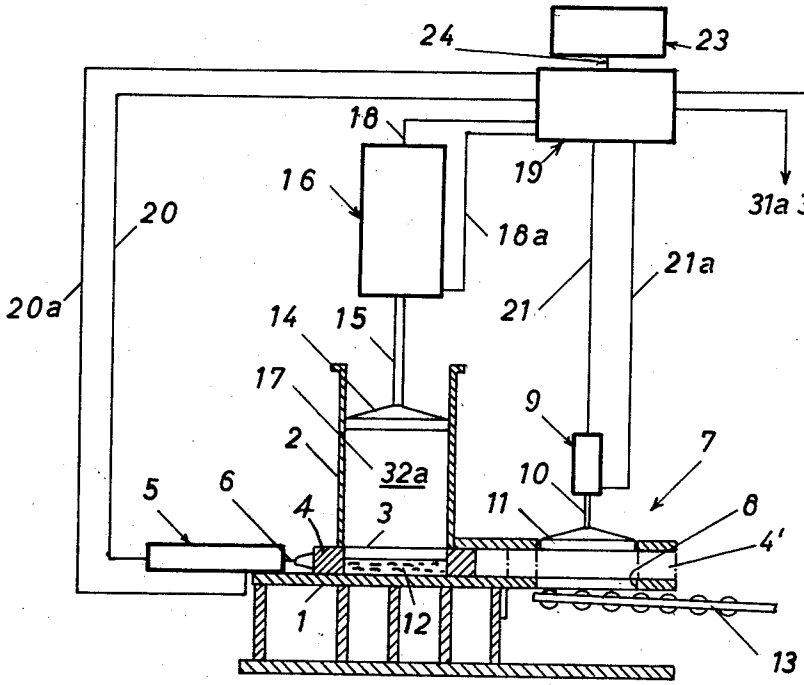


FIG 1

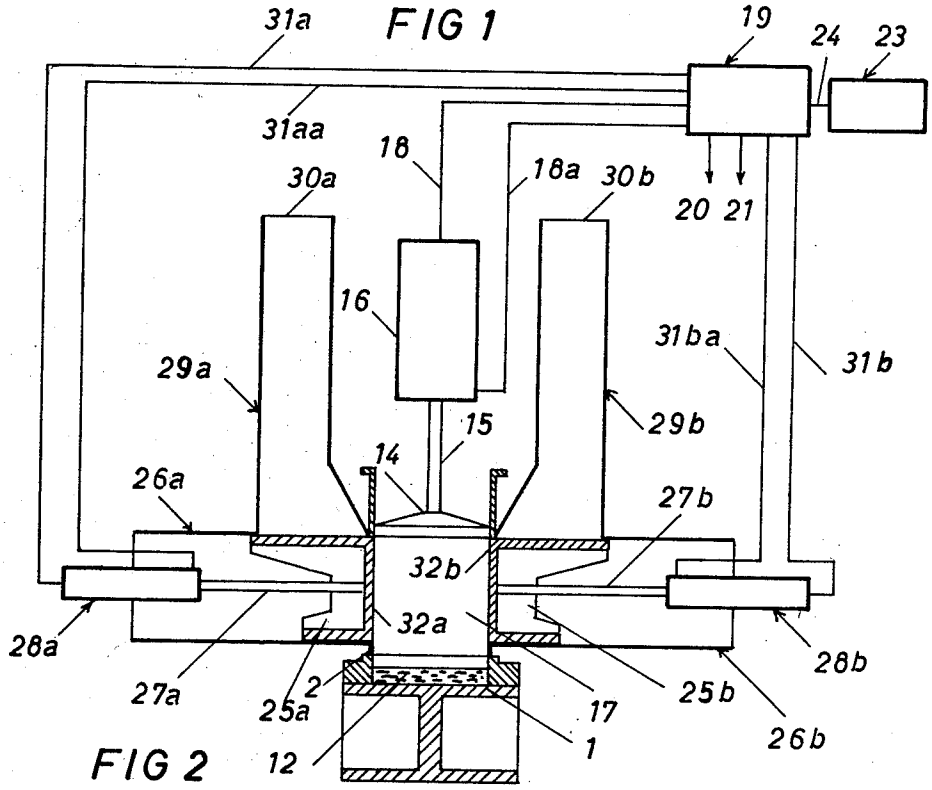


FIG 2

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BALE PRESS

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The present invention relates to compression of voluminous material such as shredded and fluffed groundwood, cellulose or the like.

More specifically the invention relates to a bale press adapted to be used for converting voluminous material into bales of relatively high specific weight.

Many difficulties are encountered in pressing voluminous material into a product of high specific weight. The bottom and the walls of the press chamber must be able to withstand high pressures. Usually either the bottom or one of the walls of the press chamber is made removable in order to allow ejection of the pressed sheet or mat of material.

If the press shall work with a satisfactory speed it is difficult to combine a moveable bottom or wall with sufficient strength.

It is an object of the present invention to eliminate these and other difficulties.

It is further an object of the invention to provide a new and improved construction of the press chamber in a press of the kind described.

The invention relates to a bale press of the kind comprising a press base, vertical walls above the base defining a pre-compressing chamber, a press ram vertically moveable through the pre-compressing chamber, a press frame below the pre-compressing chamber, means for reciprocally moving the ram, means for supplying material to be pressed into the pre-compressing chamber and means for ejecting the pressed material from said chamber.

The main feature of the invention consists substantially therein that the lower edges of the walls of the pre-compressing chamber extend in a horizontal plane in a distance above said base, a press frame laterally moveably supported on said base, said press frame having vertical walls defining an opening of the same shape and dimensions as said pre-compressing chamber, the height of the walls being equal to the distance between the base and the lower edges of the walls of said pre-compressing chamber, the press frame being moveable between a first position in which the inner surfaces of its walls are flush with the inner surfaces of the walls of said pre-compressing chamber, the press frame thus forming the press chamber proper, and a second position outside the pre-compressing chamber, a press ram adapted to be moved up and down in said pre-compressing chamber and said press frame, driving means for the press ram, means for supplying material to be pressed into the pre-compressing chamber, driving means for said press frame and means for ejecting the pressed mat of material from said press frame when it is in its second position, the driving means for the press ram and the driving means for the press frame being synchronized in such a manner that the press frame is in position below the pre-compressing chamber when the ram exerts its downward stroke and is moved to its outside position when the ram moves upwards, said press frame consisting of a rigid and integral unit with such dimensions that it is able to withstand large pressures in lateral directions during the pressing operation and having such a height that all the material is completely housed in the press frame after the downward stroke of the press ram, whereby the final phase of the pressing operation takes place in the press frame itself.

Said frame constitutes simultaneously part of the ejection means. The frame has a height at least equal to and preferably greater than the thickness of the pressed mat of material. When the mat has been pressed and the press ram is moving upwards, the frame with the pressed mat is moved laterally. Outside the press the mat is ejected from the frame in vertical direction.

Further features of the invention will appear from the following description in connection with the accompanying drawing in which:

FIG. 1 diagrammatically shows in vertical, longitudinal section a press according to the invention.

FIG. 2 diagrammatically shows a fragmentary transverse section of the press in FIG. 1.

In the drawing the reference numeral **1** designates a horizontal press base, which constitutes the bottom in the press chamber, **2** are the stationary walls of the press chamber. The walls **2** do not extend down to the base **1** but end at a level **3** at a distance above the base **1** equal to or preferably larger than the thickness of the mat of pressed material **12**.

Between the lower edges of the walls **2** and the base **1** is positioned a frame **4**. This frame has vertical inner surfaces, which in the position of the frame shown in full lines in FIG. 1 flush with the inner surfaces of the walls **2**, so that the base **1**, the frame **4** and the walls **2** together form a closed press chamber being open only at the top.

The frame **4** is made very strong so that it may resist high pressures in lateral directions. This can easily be made, because the walls of the frame do not comprise openings or relatively moveable parts.

The frame **4** is moveably mounted in a lateral direction on the base **1**. **5** designates a hydraulic cylinder, and **6** is a piston rod, the left end of which is provided with a piston working in the cylinder **5**. The right end of the rod **6** is connected with the frame **4**. By means of the hydraulic mechanism comprising the parts **5** and **6**, the frame **4** can be moved from the position shown in full lines in FIG. 1 to the position indicated with the dotted lines **4'**. The base **1** is to this end extended laterally and is outside the press at **7** provided with an opening **8** of dimensions greater than the inner section of the frame **4**. **9** is a hydraulic cylinder with a piston rod **10** carrying at its lower end an ejector plate **11**. Below the opening **8** is shown a roll conveyor **13**.

A press ram **4** being driven by a hydraulic cylinder **16** through piston rod **15** is adapted to reciprocate in vertical direction within the chamber enclosed by the walls **2** and a suitable distance into the opening in the press frame **4**. The said chamber enclosed by walls **2** hereinafter will be referred to as the pre-compressing chamber, in accordance with its function. For feeding material to be compressed into the pre-compressing chamber there is provided two containers or hoppers **29***a*, and **29***b* respectively, on opposite sides of the pre-compressing chamber. Each hopper has an opening **30***a* and **30***b*, respectively, on the top of receiving material. At the bottom each hopper is open into a feeding chamber **26***a* and **26***b*, respectively. In each of these feeding chambers there is provided a feeding piston **25***a* and **25***b*, respectively, being formed with a feeding surface **32***a* and **32***b*, respectively. The pistons are each adapted for horizontal, reciprocating movement by means of cylinders **28***a* and **28***b*, respectively with piston rods **27***a* and **27***b*, respectively.

The various hydraulic cylinders are each connected to a valve block **19** through two conduits. The valve block is supplied with hydraulic fluid from a hydraulic pump **23** through a conduit **24**. Preferably the valve block is controlled by a timer (not shown) so as to actuate the different cylinders in a properly related time sequence. Alternatively the valve block may be controlled fully or partly manually.

The valve block and timer are not explained in detail as components of this type are well known in the art.

For supplying the different hydraulic cylinders with pressurized hydraulic fluid for performing the movements required, there are a number of conduits leading from the valve block to the different cylinders. Thus, press ram cylinder **16** is connected to the valve block **19** through conduits **18** and **18***a*. The press frame cylinder **5** is provided with conduits **20** and **20***a*, whereas ejector plate cylinder has conduits **21** and **21***a*. The feeding cylinders **28***a* and **28***b* are likewise connected to the valve block **19** through conduits **31***a*, **31***aa* and **31***b*, **31***ba*, respectively.

The operation of the press according to the embodiment described above is as follows:

Starting with press ram **14** in the retracted position as shown in the drawing, the feeding pistons **25***a* and **25***b* retracted from the position in which they are shown in FIG. 2, and with the press frame in position underneath the pre-compressing chamber **17** as shown, material which is filled into the hoppers **29***a* and **29***b* will flow by gravity into the feeding chambers **26***a* and **26***b*, respectively and from there partly into the pre-compressing chamber and the opening in the press frame **4**. By supplying pressurized fluid through conduits **31***a* and **31***b* the cylinders **28***a* and **28***b* will move the feeding pistons in the direction of the pre-compressing chamber to the position in which these pistons are shown in FIG. 2. Thus the material in the feeding chambers is transferred to the pre-compressing chamber, and the feeding surfaces **32***a* and **32***b* are placed in alignment with their respective walls **2**, thus forming part of these walls to close the pre-compressing chamber **17**. This chamber now is filled with the material to a substantial height above its bottom.

The valve block **19** is actuated to supply pressurized fluid to the press ram cylinder through conduit **18**, and the press ram now performs its downward stroke and presses the material in the pre-compressing chamber into a sheet or mat **12** as indicated in FIGS. 1 and 2. During the last part of the compression the material to be pressed is completely surrounded by the walls of the frame **4**, which take up the lateral pressure forces generated in the material.

When the press ram has begun its upward stroke under the influence of pressurized fluid supplied through conduit **18***a*, the frame **4** with its content of presses material **12** is moved to the right by means of the hydraulic cylinder **5**. The frame is moved to the position indicated at **4'** in which the material **12** (not shown) is positioned directly above the opening **5** in the base. Now the material is ejected from the frame by means of the mechanism **9**, **10**, **11** driven by hydraulic fluid from the valve block through conduit **21**, and falls down into the conveyor **13**

on which it is conveyed to a station for further handling.

Instead of the conveyor **13**, any suitable conveyor or transporting means may of course be used.

In order to increase the capacity of the press, two frames **4** may be combined in a known manner to a double acting frame.

We claim:

A bale press for pressing voluminous material, such as fluffed groundwood, cellulose or the like, into sheets or mats of relatively high density, comprising in combination a horizontal press base, vertical walls above the press base, defining a pre-compressing chamber, the lower edges of said walls extending in a horizontal plane at a distance above said base, a laterally moveable press frame supported on said base, said press frame having vertical walls defining an opening of the same shape and dimensions as said pre-compressing chamber, the height of the walls being equal to the distance between the base and the lower edges of the walls of said pre-compressing chamber, said press frame being moveable between a first position in which the inner surfaces of its walls are flush with the inner surfaces of the walls of said pre-compressing chamber thus forming the press chamber proper, and a second position outside said pre-compressing chamber, a press ram adapted to be moved up and down in said pre-compressing chamber and said press frame, driving means for said press ram, means for supplying material to be pressed into said pre-compressing chamber, driving means for said press frame and means for ejecting the pressed mat of material from said press frame when in its second position, said driving means for said press ram and said driving means for said press frame being synchronized so that said press frame is in position below said pre-compressing chamber when said ram exerts its downward stroke and is moved to its outside position when said ram moves upwardly, said press frame being a rigid and integral unit for withstanding large pressures in lateral directions during the pressing operation and having such a height that all the material after the pressing is completely housed in said press frame, whereby the final phase of the pressing operation takes place in said press frame.

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