

[54] **CONTINUOUSLY OPERATING ROUGH OR FINAL PRESS**

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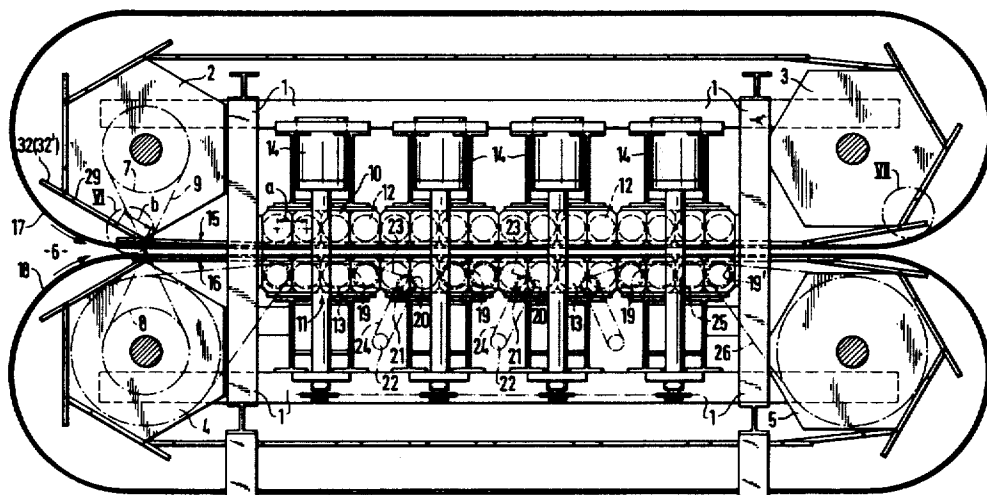
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[57]

ABSTRACT

A continuously operable press in panels, such as chipboards, fiberboards, and the like by compressing material between endless belts having portions of their respective travel paths in facing relationship to one another. The belts are constructed of a plurality of plates articulated to one another. Surrounding the plate belts are steel bands which are compressed between their respective plate belts against the material forming the panels. The plates of the plate belts are constructed with trapezoidal to triangular shaped recesses and projections which interengage respective recesses and projections in adjacent plates articulated thereto. The plates are pivotally connected only at the outer lateral sides thereof with flange portions being provided at the recesses and projections which cooperate to mutually support the plates with respect to one another.

17 Claims, 7 Drawing Figures



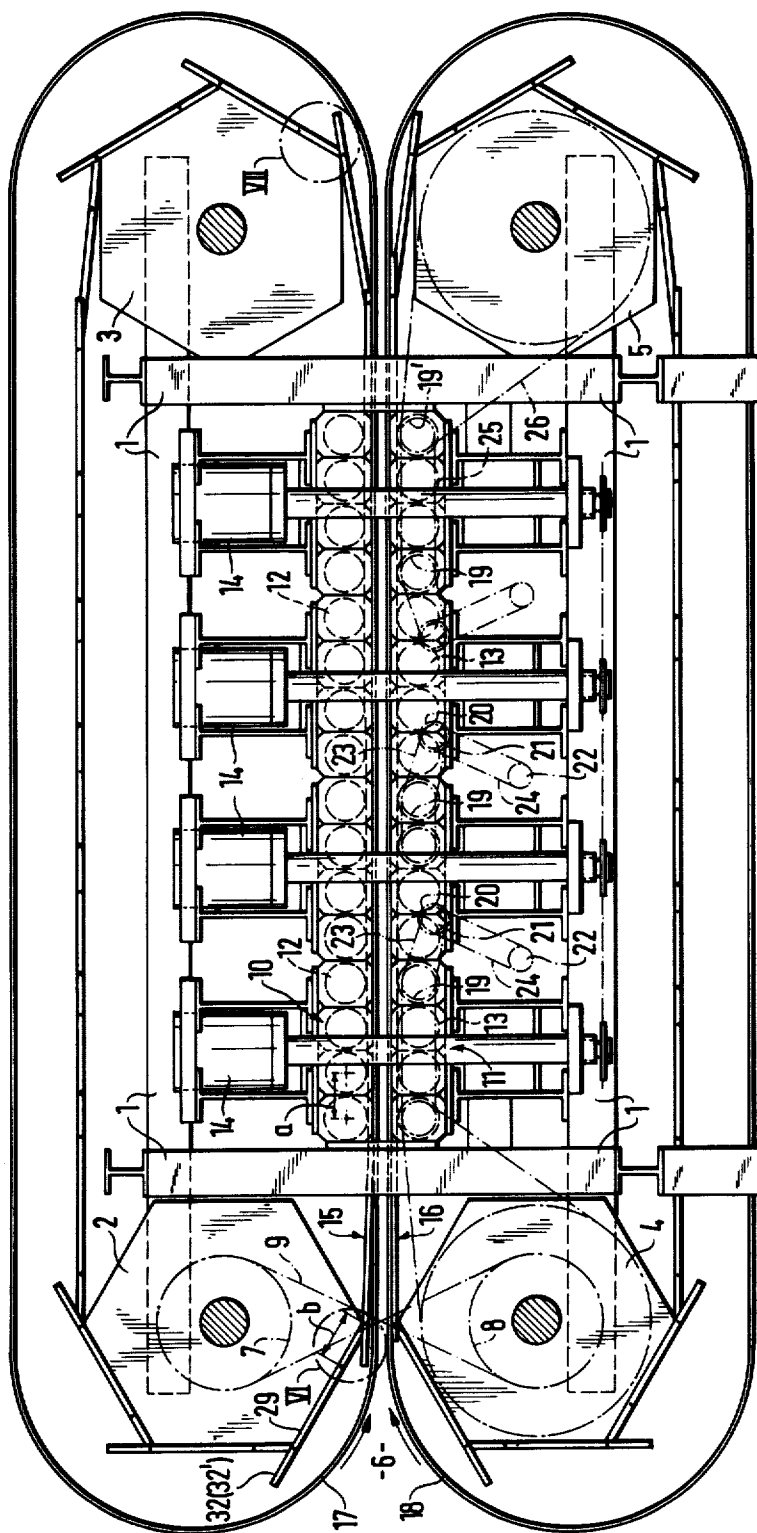
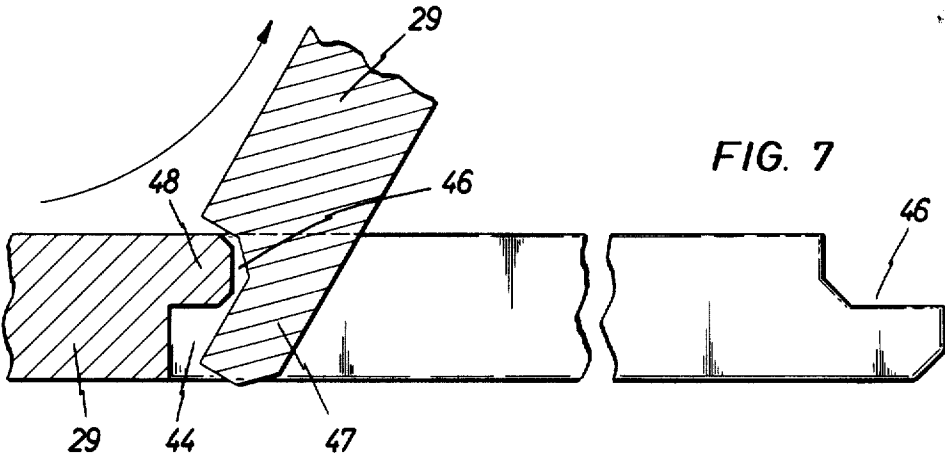
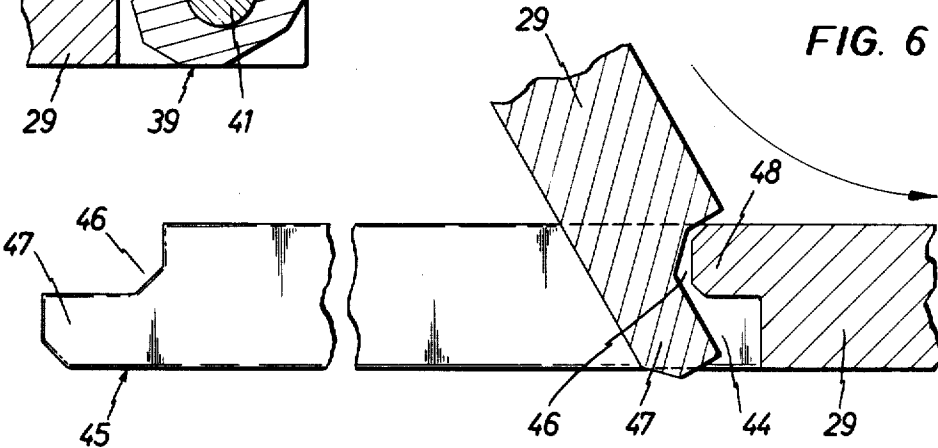
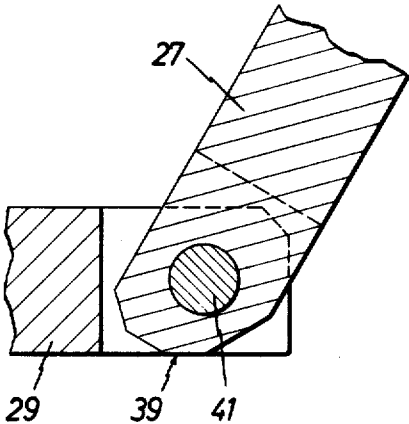


Fig. 1



CONTINUOUSLY OPERATING ROUGH OR FINAL PRESS

BACKGROUND AND SUMMARY OF THE INVENTION

This invention relates to a continuously operating rough or final press for the production of panels, such as chipboards, fiberboards, or the like, with two superimposed facing endless plate belts traveling around polygonal rolls disposed in a horizontal and parallel relationship to each other, each of these plate belts consisting of articulated plates provided, along their edges extending at right angles to the travel direction of each endless plate belt, with recesses and projections, wherein at least one of the two endless plate belts is movable by means of pressure rolls which are at least partially drivable and which can be affected by variable pressure forces, and wherein each endless plate belt is encompassed by an endless steel belt. See my copending application Ser. No. 339,039, filed Mar. 3, 1973 for further details of the general type of press contemplated by the present invention.

The recesses and projections provided at the individual plates of the previously contemplated endless plate belts had a rectangular shape and adjacent plates were hingedly joined in this zone by way of bolts or pins, the length of which corresponded to the width of the plate. The number of the recesses and projections was relatively high, in order to be able to maintain the cross section of the bolts relatively small. The compressive forces occurring herein thus were transmitted uniformly by each of the bolts. This solution is disadvantageous because, due to the large number of recesses and projections and due to the necessary clearance of the bolts, which clearance is still further increased during longer operating periods due to wear, each drivable pressure roll, when passing over a junction place between adjacent plates, abutted against the front edges of the projections of the subsequent plate and was only in linear contact at that point. Thus, there was the danger of deformation of the front edges of the plate projections in the zone of the junction points, and furthermore an increased bending stress on the plates had to be tolerated, so that these plates had to be excellently tempered or refined. Accordingly, the manufacture of these plates was inordinately expensive.

The invention contemplates fashioning and connecting the plates of the endless plate belts so that not only the number of the recesses and projections provided between two neighboring plates is reduced, but also the feature is attained that the pressure rolls roll over the junction points between adjacent plates with smooth transition.

In particularly preferred embodiments of the present invention the recesses and projections are fashioned of a trapezoidal to triangular configuration; adjacent plates are connected by means of guide elements supported only in the zone of the lateral surfaces of the plates approximately in the depth of the recesses of adjacent plates; and each projection is equipped at its free end, and each recess at its base, with respectively one flange or rabbet. As seen in the direction of travel of the endless plate belt, the subsequent plate in the inlet zone of the press engages with its flange tongue the flanges of the preceding plate which are open toward the corresponding endless steel belt.

The above described arrangement of the present invention has the resultant advantages that the bending forces to be absorbed by the projections of the plates can be more easily tolerated; the pressure rolls are always in satisfactory contact in the zone of the junction points of adjacent plates; the specific contact pressure to be exerted on the plate belts via the pressure rolls is lower than heretofore possible; the individual plates can be manufactured to be substantially thinner than heretofore; there is practically no stress exerted on the bolts joining adjacent plates by way of the guide elements; and the operating speed of the endless plate belts, as well as the endless steel belts encompassing same, can be considerably increased without there being the danger of oscillation of the endless plate belts.

In particularly preferred embodiments of the invention, the length of each projection and/or each recess is selected to be larger than the mutual spacing of the axles of rotation of adjacent pressure rolls. This has the effect that the stress on the projections becomes considerably lower than when the spacing of the axles or axes of rotation of adjacent pressure rolls is larger than the length of the projections and/or recesses. Although the guide elements connecting neighboring plates with each other can also be arranged outside of the lateral surfaces of the plates according to the present invention, whereby the width of the endless plate belts is enlarged, in particularly preferred embodiments the outer lateral surfaces of the guide elements are in the planes occupied by the outer lateral surfaces of the plates. The operating width of the endless plate belts is not changed thereby; however, the total width of the press is reduced.

These and further objects, features and advantages of the present invention will become more obvious from the following description when taken in connection with drawings which show, for purposes of illustration only, a single embodiment in accordance with the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic side view of a continuously operable press for producing fiberboards, chipboards and the like with plates fashioned in accordance with this invention;

FIG. 2 is a top plan view of one of the plates constructed in accordance with the present invention;

FIG. 3 is a cross sectional view along line III—III of FIG. 2;

FIG. 4 is a lateral view of one of the guide elements of the plate belt constructed in accordance with the present invention;

FIG. 5 is a sectional view along line V—V of FIG. 2 with a guide element connected thereto, in an enlarged view;

FIG. 6 is a view of area VI in FIG. 1 on an enlarged scale; and

FIG. 7 is an enlarged illustration of area VII in FIG. 1, wherein the drawings of FIGS. 6 and 7 represent the areas VI and VII from the rear of the press according to FIG. 1.

DETAILED DESCRIPTION OF THE DRAWINGS

The press shown in FIG. 1 includes a frame 1 which supports, in the upper zone, two polygonal rolls 2 and 3 and, in the lower zone, two polygonal rolls 4 and 5.

The bearing points of these rolls 4, 5 have not been illustrated in order not to obscure the invention. In preferred embodiments the rolls 2 and 3 are advantageously vertically adjustable. The two rolls 2 and 4 disposed one above the other in the inlet zone 6 are joined with each other by way of sprocket wheels 7 and 8 and a chain 9 and are driven by a drive unit, not shown, via a slipping clutch at least during the idling of the press. Moreover, several groups 10 and 11, respectively, of pressure rolls 12 and 13 are disposed in the frame 1, of which the roll groups 10 can be selectively pressed against the roll groups 11 by means of hydraulic cylinders 14.

Two endless plate belts 15 and 16 and two endless steel belts 17 and 18, respectively surrounding these endless plate belts, are disposed to travel between the groups 10 and 11. Several of the pressure rolls 13 can be driven in this embodiment, namely via sprocket wheels 19, 20, 21, and 22, joined by means of chains 23 and 24, respectively, and drivable by means of a drive unit, not shown. In order to be able to drive also the polygonal roll 5, one of the pressure rolls 13 is connected to a cogwheel 19' by means of a chain 25, and the cogwheel 19' is connected with the roll 5 via a chain drive 26.

Other preferred embodiments are contemplated with several of the pressure rolls 12 of the roll groups 10 and the polygonal rolls 2 and 3 being driven in a corresponding manner as described above.

The endless plate belts 15 and 16 each consist of a plurality of plates 29 articulated together via guide elements 27 and 28 (FIGS. 2, 4 and 5). Each of these plates 29 are provided with recesses 31 and with projections 32 in the zone of their edges extending at right angles to the travel direction (arrow 30 in FIG. 2). These recesses 31 and projections 32 have a trapezoidal to triangular configuration as illustrated. In the preferred embodiments illustrated, additional, rectangular recesses 35 and 36 are provided on one side (righthand side as shown in FIG. 2) in the zone of the lateral surfaces 33 and 34, and enlarged recesses 31' are provided on the other side, each equipped with bearing points 37 and 38, as well as 39 and 40, for guide elements 27 and 28, respectively. Correspondingly, the projections 32' arranged in the zone of the lateral surfaces 33 and 34 have a different shape than the projections 32.

When several plates 29 are joined together, to form the belts 15, 16, the projections 32' engage the recesses 31', and the projections 32 engage the recesses 31. Adjacent plates 29 are joined together by connecting the guide elements 27 and 28, via bolts 41 and 42, to neighboring plates. Each recess 31 or 31' is provided, in the zone of its base 43 or 43', respectively, with a rabbet (flange) 44, or 44', extending at right angles to the travel direction 30 of the endless plate belts 29. Also each projection 32 or 32' is equipped, in the zone of its free end 45 or 45', respectively, with a flange 46 or 46', likewise extending at right angles to the travel direction (arrow 30) of each endless plate belt. The depth of the flanges 46 and 46' of the projections 32 and 32', as seen in the travel direction (arrow 30) of the endless plate belts, is somewhat larger than the depth of the flanges 44 and 44' of the recesses 31 and 31', respectively.

As can be seen from FIG. 6, each flange tongue 47 associated with a flange 46 or 46', extends, in the inlet zone of the press, underneath the flange tongue 48 as-

sociated with the flange 44 or 44' at the base of the corresponding recess 31 or 31', so that adjacent plates mutually support each other. Consequently, the bolts 41 and 42 connecting the adjacent plates with each other by way of the guide elements 27 and 28 practically have merely the task of joining the adjacent plates with each other, i.e. there is a minimum of stress of the bolts 41 and 42 due to the mutual support of adjacent plates by way of the flange tongues.

It is advantageous according to the preferred illustrated embodiment of the invention, to provide furthermore that the length of each projection 32 or 32' and/or the length of each recess 31 or 31' (indicated in FIG. 1, circle VI, with "b" on the lefthand side), is larger than the spacing *a* of the axles (axes) of rotation of adjacent pressure rolls 12 or 13, because this results in advantageous bending stresses.

In the illustrated preferred embodiment, the outer lateral surfaces 49 and 50 of the guide elements 27 and 28 are disposed in the same planes as the lateral surfaces 33 and 34 of the plates 29. In other non-illustrated preferred embodiments, the guide elements 27 and 28 are arranged outside of the planes of the lateral surfaces 33 or 34 of the plates 29. In such a case, the recesses and the projections are fashioned differently from the illustrated arrangement. It is also advantageous in this case (last-mentioned non-illustrated embodiment) to provide additionally strips on the lateral surfaces 33 and 34, the outer side faces of which are then disposed in the planes wherein the outer lateral surfaces of the guide elements extend. The illustrated arrangement is more advantageous than the last-mentioned embodiment.

While the plates of the endless plate belts in presses of the type contemplated for use with the present invention heretofore had to have a thickness of about 100 mm., the plates as constructed according to this invention need only be half this thickness. Accordingly, the weight of each individual plate of heretofore about 3 tons is now reduced to about 1 ton, whereby the operating speed of the press can practically be doubled, namely, for example, from previously 20 m. per minute to presently 40 m. per minute and thereabove using plate constructions in accordance with the present invention. If the press of the invention is used as a rough press, which first compacts a chip cake before the latter is hardened in a final (finishing) press, then the pressure forces to be exerted can now be reduced, because the thickness of the pressed cake is now substantially more uniform than possible with the use of the conventional presses. For example, if the pressure of a rough press was previously 30 kg./cm², this pressure can now be reduced to 25 kg./cm² using plate constructions in accordance with the present invention. Additionally, with the use of the plates of this invention also in continuously operating final (finishing) presses, a considerable increase in tolerance is obtained. Therefore, this solution represents a substantial advance in the art.

It has also been found according to another non-illustrated feature of the invention that a further improvement can be attained by driving the polygonal rolls 2 and 4 disposed in the inlet zone via a friction clutch synchronously and moreover arranging the two endless plate belts in a mutual association so that the points of articulation of the plates 29 of one endless plate belt 15, determined by bolts 41, are offset with respect to the points of articulation of the other plate

belt 16. This has the effect of moving the two endless plate belts also at the same speed, and the offset relationship of the plate belts remains constant even though the lower belt face of the lower endless plate belt 16 sags downwardly, whereas the upper belt face of the upper endless plate belt 15 is held planar, supported by the endless steel belt 17 and the chip cake. Thus, due to the synchronous drive of the polygonal rolls 2 and 4 arranged in the inlet zone, the upper endless plate belt cannot travel more rapidly than the lower endless plate belt, and also the disadvantage is avoided that the articulation points of the two endless plate belts are disposed one on top of the other, as has been the case in previously conventional presses.

The following dimensional example for a plate 29 constructed in accordance with the present invention is given to aid in an understanding of the invention and enable those skilled in the art to practice the invention, and is not intended to limit the scope of the claims. With an overall length in the direction 30 of 860 mm. the intermediate recesses 31 and projections 32 have a length of 261 mm. and the distance *a* between pressure roll axles is 250 mm.

While I have shown and described several embodiments in accordance with the present invention, it is understood that the same is not limited thereto but is susceptible of numerous changes and modifications as known to those skilled in the art and I therefore do not wish to be limited to the details shown and described herein but intend to cover all such changes and modifications as are encompassed by the scope of the appended claims.

I claim:

1. A continuously operable press for producing panels, such as chipboards, fiberboards, and the like; said press comprising:

- a first movable belt,
- a second movable belt,
- and guiding and moving means for guiding and moving said first and second belts with respective outer surfaces of said belts in facing relationship and moving in the same direction over a material pressing portion of the respective travel paths of said belts such that material forming said panels can be conveyed by and compressed between said belts along said material pressing portion of said respective travel paths,

wherein at least one of said first and second belts includes a plurality of belt plates articulatedly joined to one another by guide element means, the edges of said belt plates which extend at right angles to the travel direction of said belt plates including recess means and projection means, said recess means and projection means including interengageable flange portion means such that during operation of the press the flange portion means of one of the recess means and projection means of one plate engage and support the flange portion means at the other of the recess means and projection means of the next adjacent plate over at least a portion of the respective travel path of said belts.

2. A press according to claim 1, wherein both of said first and second belts are endless belts formed of a plurality of said belt plates, and wherein said guide element means are separate from said interengageable flange portions.

3. A press according to claim 2, wherein said recess means and projections means have a trapezoidal shape, said trapezoidal shaped recess means being bounded by at least one of said projection means and said guide elements and opening outwardly toward the next adjacent plate.

4. A press according to claim 3, wherein said flange portion means are provided respectively at the free ends of said projection means and the bases of said recess means.

5. A press according to claim 4, wherein said guide elements are provided only at the outer lateral sides of said plates such that all of said recess means and projection means are disposed intermediate the guide elements which interconnect the plates.

6. A press according to claim 5, wherein said guide elements pivotally connect said plates to one another by way of bolt connections at respective opposite ends of said guide elements, whereby only two guide elements with a total of four separate bolts are provided for connecting a plate to the next adjacent plate.

7. A press according to claim 6, wherein the flange portion means are configured such that, in the material inlet area of the press, as seen in the travel direction of the belts, the flange portion means of a subsequent plate engages flange portion means of a preceding plate with the preceding plate flange portion means opening toward the material being pressed.

8. A press according to claim 7, wherein at least one of the first and second belts is driven at least partially by means of pressure rolls subject to variable pressure forces.

9. A press according to claim 8, wherein at least one of the first and second belts is driven at least partially by means directly driving polygonal shaped return guide wheels engaging said plates to reverse the travel direction of said belts.

10. A press according to claim 3, wherein at least one of the first and second belts is driven at least partially by means of pressure rolls subject to variable pressure forces.

11. A press according to claim 10, wherein the length of each projection and each recess in the travel direction of the belts is larger than the spacing of the axles of rotation of adjacent presser rolls in the travel direction of the belts.

12. A press according to claim 2, wherein the outer lateral surfaces of the guide element means lie in the planes occupied by the outer lateral surfaces of the plates.

13. A press according to claim 12, wherein at least one of the first and second belts is driven at least partially by means of pressure rolls subject to variable pressure forces.

14. A press according to claim 13, wherein the length of each projection and each recess in the travel direction of the belts is larger than the spacing of the axles of rotation of adjacent presser rolls in the travel direction of the belts.

15. A press according to claim 2, further comprising a first movable flexible band surrounding a portion of and movable with said first belt and a second movable flexible band enclosing a portion of and movable with said second belt, wherein said first and second bands are interposed between said belts over said material pressing portion of the respective travel paths thereof

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to transfer material pressing forces from said belts to said material.

16. A press according to claim 15, wherein each of said first and second movable flexible bands are endless steel belts.

17. A press according to claim 16, wherein said end-

less steel belts are guided so as to be spaced from the projections on said plates in the area where said belts formed plates have their respective travel directions reversed.

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