

[54] **CONTINUOUSLY OPERATING PRESS FOR CHIPBOARDS, FIBERBOARDS, OR THE LIKE**

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[57]

ABSTRACT

A press for processing panels such as chipboard, fiberboards and the like which include endless steel belts in facing relationship along a portion of their travel paths for compressing chipboard or fiberboard material. Each of the endless steel belts surrounds a plate belt including a plurality of articulatedly connected plate members, which plate members apply pressing forces against the steel belts during the pressing operation. In order to avoid indentations in the finished panel material due to the junction lines at the plates of the plate belts, the present invention provides a plurality of rigid strips connected to the steel belts and extending transverse to the direction of travel of the steel belts. In order to accommodate thermal expansions and permit sufficient flexibility of the steel belts, the strips are attached by rivet means with radial play in all directions for sliding movement of the strips with respect to the steel belts. In one preferred embodiment, the plate belt is pressed outwardly against the steel belt by pressure rollers, while in another preferred embodiment, a chain link belt with a plurality of articulated plate members is provided for pressing against the plate belt. In this last-mentioned embodiment, the junction points of the chain belt and the plate belt are staggered with independent drive mechanisms to retain this staggered relationship so as to aid in keeping the plate belt rigidly and smoothly in contact during pressing operations. Preferred embodiments also include the spacer element for preventing contact of the facing steel belts, as well as additional conveyor belt systems and additional surrounding belts so as to prevent contact of at least one of the endless steel belts directly with the material forming the panels and the like.

33 Claims, 4 Drawing Figures

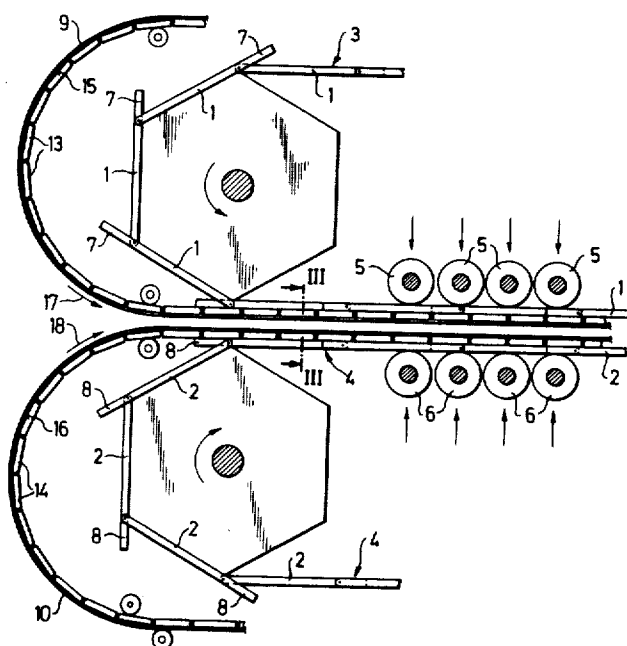
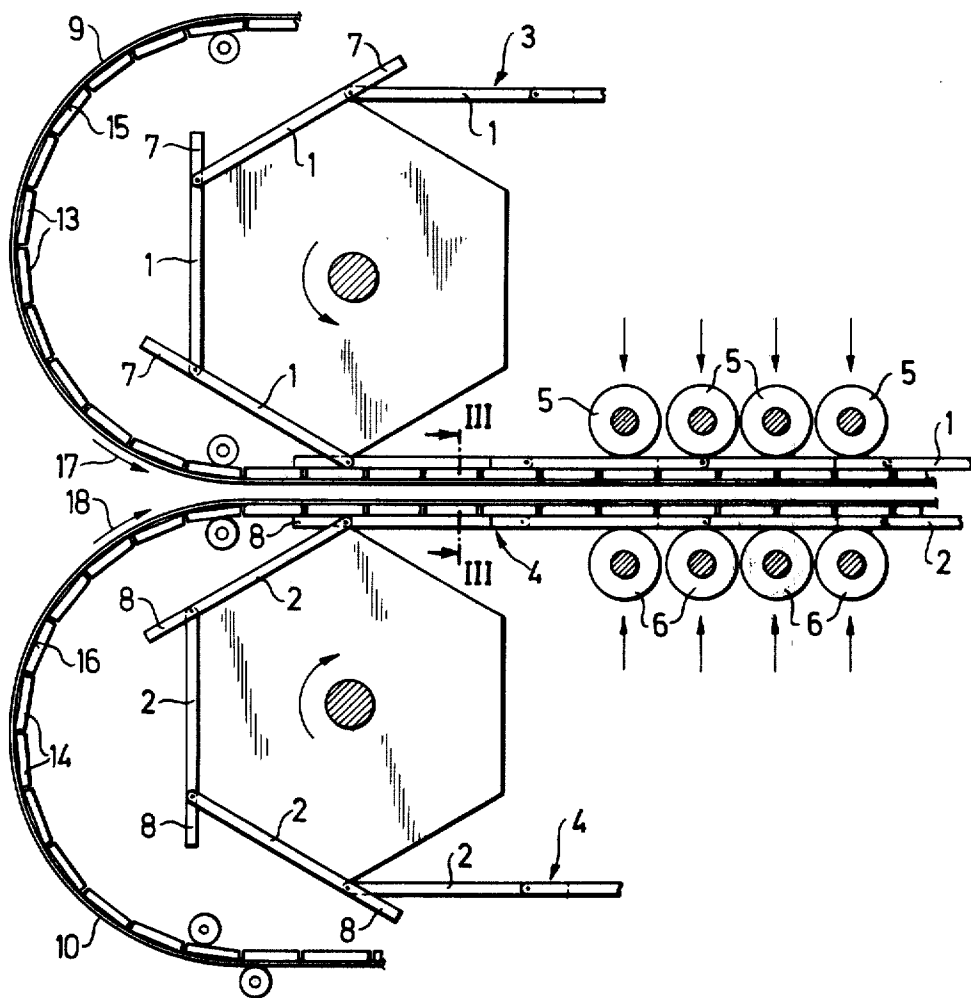
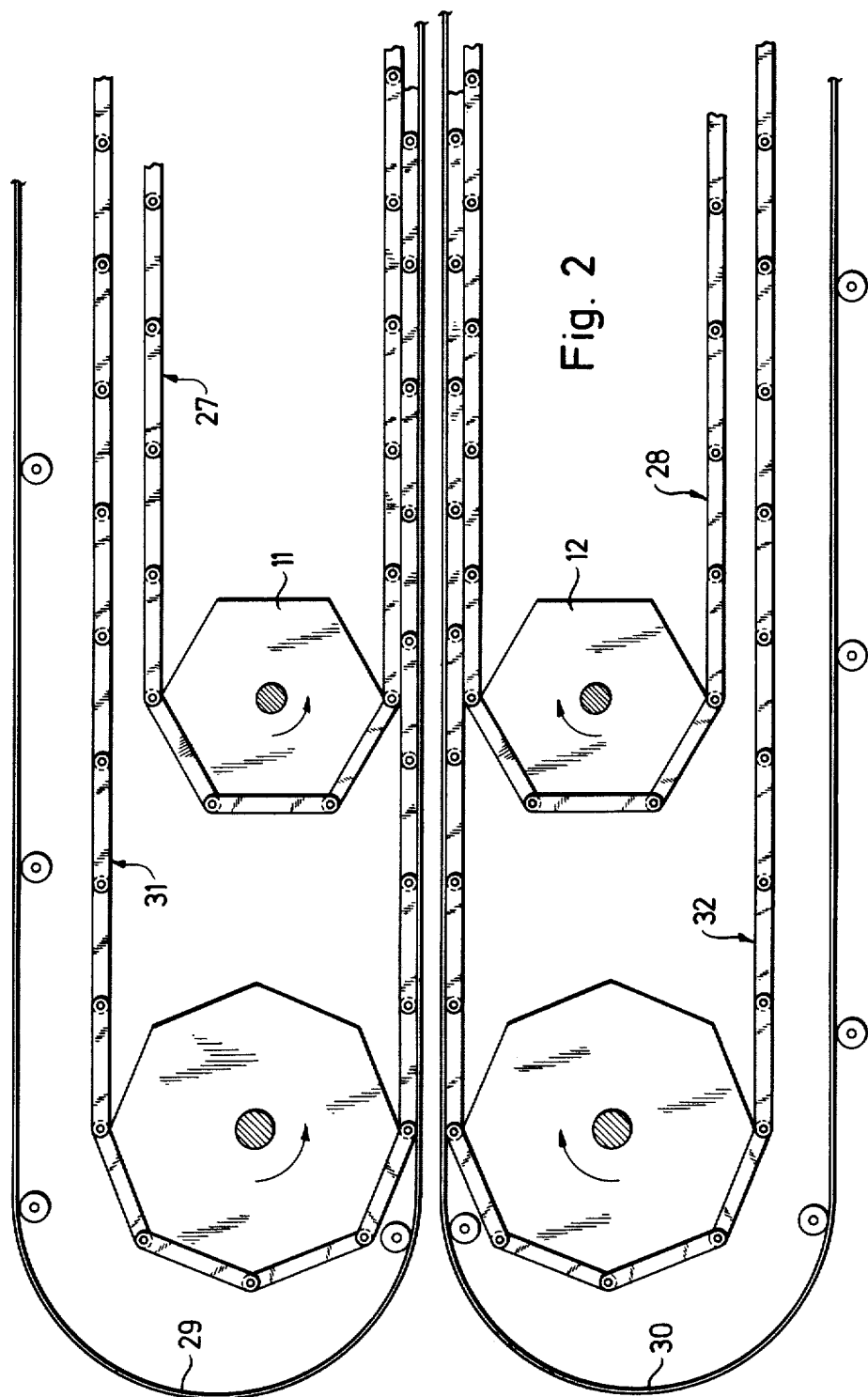


Fig. 1





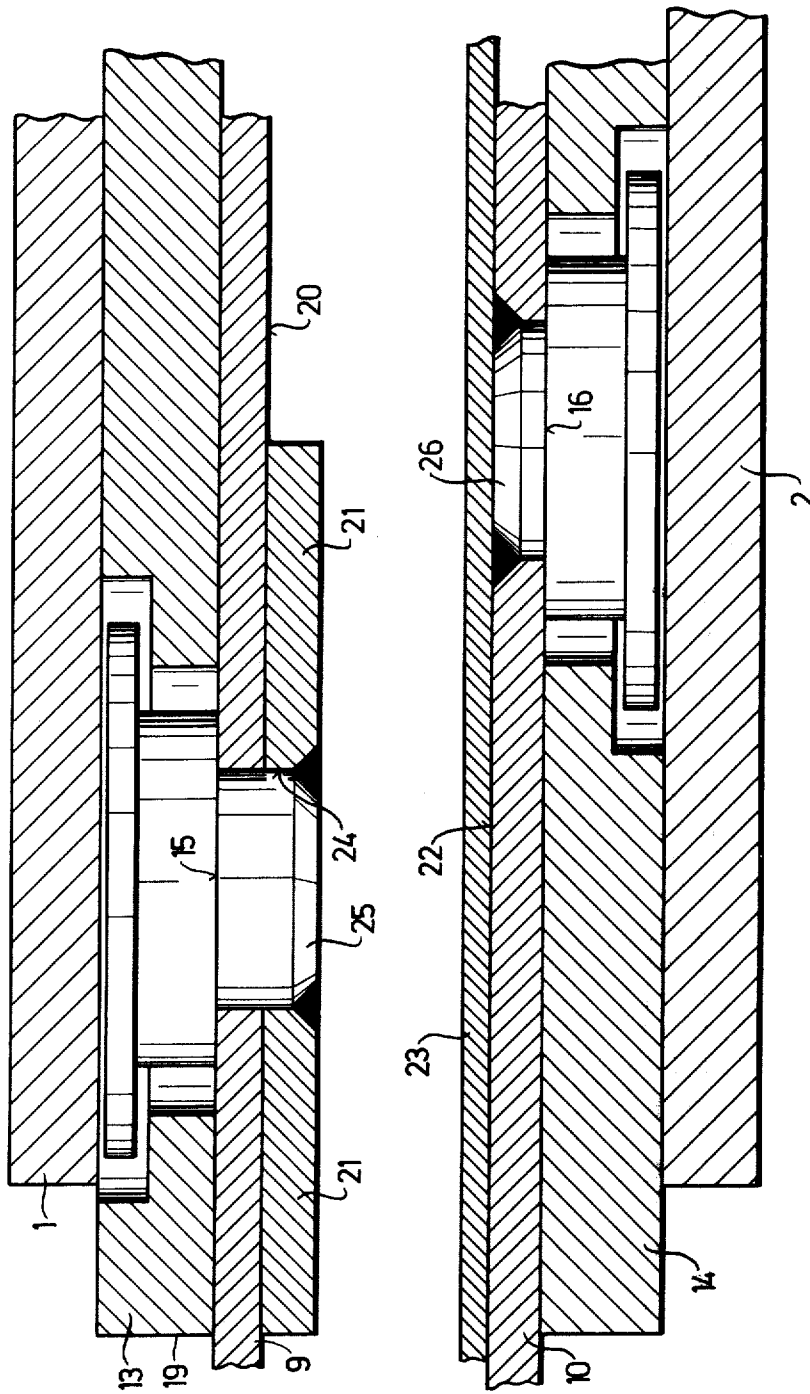
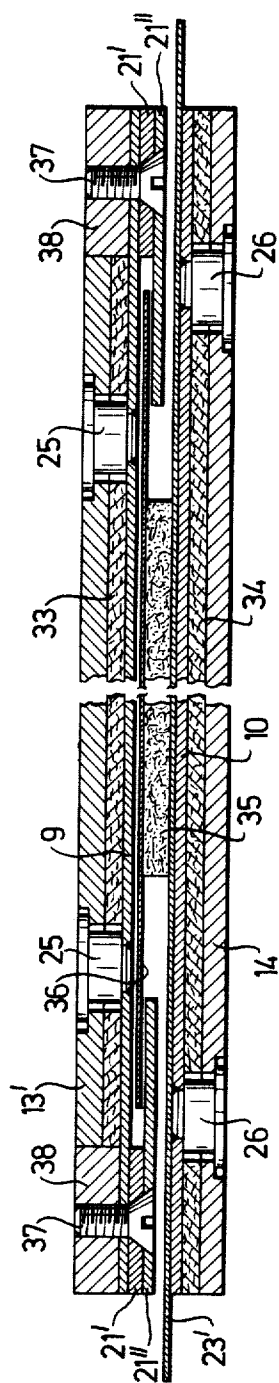


Fig. 3

Fig. 4



CONTINUOUSLY OPERATING PRESS FOR CHIPBOARDS, FIBERBOARDS, OR THE LIKE

BACKGROUND AND SUMMARY OF THE INVENTION

This invention relates to a continuously operating press for the rough pressing and finishing pressing of a chip cake (fleece) and/or for the coating of panels, such as chipboards, fiberboards, or the like, with two superimposed endless plate belts (segmented belts) traveling around axes disposed horizontally and in parallel to each other, which plate belts consist of hinged joined plates, the mutually facing belt sides (runs) being movable in the same direction, preferably by means of drivable pressure (contact) rolls, and wherein each endless plate belt is encompassed by an endless steel belt, each endless plate belt and each endless steel belt being heatable. See my copending application to be filed with this application titled "CONTINUOUSLY OPERATING ROUGH OR FINAL PRESS" as well as my copending application Ser. No. 339,039, filed Mar. 8, 1973 for further details of presses of the type with which the present invention is primarily concerned.

Although previously contemplated presses of this type have proven themselves well as rough or preliminary presses, they have the disadvantage that the junction points between adjacent plates of the endless plate belts produce markings on the cake (fleece) and/or on the panels formed from the cake. These markings can be reduced by providing the plates of the endless plate belts, according to the suggestions of my above-mentioned copending application to be filed herewith, with recesses and projections in the zone of their two edges extending at right angles to the traveling direction of the endless plate belts, which recesses and projections have a trapezoidal to triangular configuration. The plates of the endless plate belts shaped in this way are joined merely by way of guide elements arranged in the zone of the two lateral edges of the belts, since each projection of one plate is supported by way of rabbets or flanges with respect to a recess of the adjacent plate.

Consequently, the present invention is based on the object of preventing the occurrence of any markings whatever on the rough-pressed and/or finished pressed and/or coated chipboard or fiberboard sheet, with or without the use of the improved plates of the endless plate belts discussed in the above paragraph.

In order to attain this object, it is suggested according to this invention to provide each endless steel belt on its side facing the plate belt with strips of a heat-conductive material extending at right angles to the travel direction of the belt and following one another in a maximally close succession. These strips are attached with a clearance or play with respect to the endless steel belt. If the endless steel belts are associated with a rough press wherein the cake of glue-covered chip or fiber material to be rough-pressed is not heated, then steel can be utilized as the material according to the invention. If these endless steel belts are associated with continuously operating finishing presses or continuously operating refining and/or coating presses, then it is advantageous according to the invention to employ as the heat-conductive material aluminum or aluminum alloys, because these substances conduct the heat better than is the case with steel. It is also important in this connection that aluminum or the alloys thereof trans-

mit the heat stored therein substantially more gradually to the surrounding atmosphere than is the case with steel.

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

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a partial schematic lateral view of a press constructed according to a first preferred embodiment of this invention;

FIG. 2 is a partial schematic lateral view of a press constructed according to another preferred embodiment of this invention;

FIG. 3 is a partial cross-sectional view of a first preferred embodiment of an endless steel belt constructed in accordance with the present invention for use with the presses of FIGS. 1 and 2; and

FIG. 4 is a cross-sectional view through a second preferred embodiment of a steel belt constructed in accordance with the present invention for use with the presses of FIGS. 1 and 2.

DETAILED DESCRIPTION OF THE DRAWINGS

As can be seen from FIG. 1, a continuously operating press includes two superimposed endless plate belts 3 and 4, formed respectively from plates 1 and 2, the mutually facing belt sides being movable with respect to each other by at least partially drivable pressure rolls 5 (and 6, respectively) which rolls can be placed under variable pressures, thus compacting a sheet of loose chips or fibers and optionally hardening such sheet and/or refining same by coating. In the embodiment of FIG. 1, the plates 1 and 2 are provided with trapezoidal or triangular recesses and projections 7 and 8, respectively, in the zone of the plate edges disposed at right angles to the operating direction of the endless plate belts. The recesses associated with the plates are not visible in the drawings, however details of the plate construction are included in my above-mentioned copending application to be filed on even date herewith. Each plate belt is encompassed by a steel belt 9 and 10, respectively, which is guided independently of the endless plate belts 3 and 4. Polygonal rolls 11 and 12 and respectively one further similar polygonal belt reversing roll, not illustrated, guide the endless plate belts 3 and 4 and, if necessary, also drive these plate belts.

According to the invention, each of the steel belts 9 and 10 is provided on its inside or side facing the plate belts with strips 13 and 14, respectively, extending at right angles to its travel direction and consisting of a heat-conductive material and being attached at a clearance with respect to the corresponding endless steel belt 9 or 10. This relative effective rigidity of these strips limits/prevents the marking of the panel or board being pressed at junctions of the plates in the plate belts. That is, without these strips, the flexibility of the outer steel belts would permit transfer of the junction lines or areas of adjacent plates to the material.

This attachment of the strips 13 and 14 will be explained with reference to FIG. 3. FIG. 3 is an enlarged schematic partial view, taken in the direction of travel and showing plate and belt features of respective facing runs. On the inside 15 of the endless steel belt 9 and on

the inside 16 of the endless steel belt 10, the strips 13 and 14 extend at right angles to the travel direction of the endless steel belts (arrows 17 and 18). These strips 13, 14 are preferably made of steel or aluminum, however aluminum is more advantageous in cases where the belts are heated. In the zone of the lateral faces of the endless steel belt 9 (left side shown in FIG. 3, right side not illustrated), spacer elements 21 are mounted on the outside 20 of the belt which are to prevent that the mutually facing surfaces 20 and 22 of the endless steel belts 9 and 10 come in contact with each other when the press is idling. Moreover, FIG. 3 shows also a conveyor belt 23 resting on the endless steel belt 10 and serving as the support for the sheet (cake) of loose material. This conveyor belt 23 is not shown in FIG. 1, it being noted that embodiments are contemplated without such a conveyor belt with the belt 10 directly supporting the material. The conveyor belt 23 preferably consists of steel, synthetic resin, or the like.

The spacer elements 21, which can also be utilized as separator strips, and the belt 9 are provided with bores 24 of equal diameter, corresponding to the diameter of the rivets 25 employed, which rivets 25 are riveted or welded together with the spacer elements 21.

The individual strips 13, are disposed in parallel to one another at minor spacings with respect to one another on the inside of the endless steel belt 9 and are held in place with all-around play with respect to the rivets 25. The minor spacing of the strips 13, 14 from one another in the travel direction permits the thermal expansions and flexibility of the combined steel belt and strips. Thus, the strips 13 can expand in correspondence with any occurring temperature fluctuations without the strips themselves or the steel belt becoming deformed. Corresponding remarks apply with respect to the rivets 26 holding the strips 14 at the lower endless steel belt 10. The shoulders on the rivets and on the strips 13, 14 permit sliding thermal expansion movement of the strips 13, 14 with respect to the steel belts 9, 10, while retaining the strips fastened to the steel belts.

The second press embodiment shown in FIG. 2 has respective endless plate chains 31 and 32 arranged between the superimposed endless plate belts 27 and 28 and the endless steel belts 29 and 30 encompassing same. Although the endless plate belts 27 and 28 and the endless plate chains 31 and 32 can be fashioned like conventional endless plate belts, it is advantageous to form at least the endless plate chains 31 and 32 of plates corresponding to the plates 1 of the endless plate belts 3 and 4 (FIG. 1), i.e., with trapezoidal to triangular projections and recesses. This FIG. 2 embodiment differs from the FIG. 1 embodiment in the arrangement for driving and supporting the plate chains, with FIG. 2 including the second sets of plate chains 27, 28 in place of the rollers 5, 6 of the FIG. 1 embodiment. As shown in the drawings the junction plates of the chains 27, 28 are offset from the junction points of chains 31, 32. These chains are separately driven to maintain this offset relationship.

If a continuously operating press according to FIGS. 1 and 2 is to be utilized as a final press or as a finishing (refining) or coating press, then at least the endless steel belts 9 and 10 provided with strips 13 and 14, or at least the endless plate chains 31 and 32 and the endless steel belts 29 and 30 are heated, although it is also contemplated by the invention to heat the endless plate

belts 3 and 4 or 27 and 28 additionally. If the endless plate belts 3 and 4 or 27 and 28 are not to be heated, it is advantageous according to another feature of the invention to insulate the individual plates thereof with respect to the belts encompassing same, or to inhibit the heat transfer, for example by providing the outer surfaces of these endless plate belts with a thermal-insulating material and/or to reduce the contact surface so that the heat transfer is reduced.

FIG. 4 is a view similar to FIG. 3 which shows another embodiment of belt constructions in accordance with the present invention. Identical parts bear the reference numerals of the above-mentioned embodiments. For the sake of clarity, the endless plate belts and/or endless plate chains are not shown in FIG. 4. In this connection, it will be understood that the construction of FIGS. 3 and 4 can be used with either of the overall press constructions of FIGS. 1 and 2. Between each endless steel belt 9 or 10 and the heat-conductive strips 13' and 14', respectively one pressure-distributing layer 33 and 34 is provided, consisting of an elastic material, preferably an asbestos fabric.

In the FIG. 4 embodiment, a belt 23' consisting of stainless steel is provided as the conveyor belt. The endless steel belt 9 does not come directly into contact in this case with a cake to be compacted, a cake to be hardened, and/or a chipboard 35 or the like to be coated, because in this instance the endless steel belt 9 is encompassed by a belt 36, preferably of stainless steel, for the coating and/or refining of a finished panel with a synthetic resin, veneer, or the like; the width of the stainless steel belt 36 being smaller than the width of the endless steel belt 9 as illustrated. To prevent this endless belt 36 from contacting the belt 23' when the press is idling, each of the spacer elements 21 illustrated in FIG. 3 is replaced by spacer elements in the form of two plates 21' and 21'', of which the plate 21'' extends underneath the endless belt 36. The spacer element plates 21' and 21'' are here mounted to threaded disks 38 by means of screws 37, these disks being arranged outside of the transverse strips 13' which are shortened in this embodiment. Since the screws 37 pass through the steel belt 9, the spacer elements and the threaded disks are mounted to the endless steel belt 9. This solution of affixing the spacer elements by means of screws has the advantage over the solution of FIG. 3 that the spacer elements can be quickly replaced, if necessary. These strips 13' are attached so as to be able to slide to accommodate thermal expansion and the like in a similar manner to that described above for FIG. 3.

Due to the fact that the endless steel belts 9 and 10, respectively, are provided with transverse strips 13 and 14, respectively, it is no longer necessary to utilize relatively thick endless steel belts; rather, steel belts having a thickness of 1.2 - 1.8 mm. are sufficient, and it is no longer necessary to support these endless steel belts in the zone of their two reversal points by guide rollers or the like, because they have sufficient rigidity due to the transverse strips connected thereto.

The following practical dimensions of an embodiment of the invention are given to further enable those skilled in the art to practice and are not intended to limit the scope of the claims: Radial play or gap between rivets 25, 26 and plates 13, 14 - 2.5 mm; spacing between plates 13 in travel direction - 1.5 mm; thickness of strips 13, 14 - 5 mm; length of strips 13, 14 in

travel direction — 150 mm; thickness of layer 33 — 3 mm; thickness of parts 21' and 21'' — 2.5 mm; thickness of belt 23' — 1.2 mm; width transverse to travel direction of 21' — 20 mm; and width transverse to travel direction of 21'' — 40 mm. It will be understood that these dimensions as well as dimensions of plates can be varied to suit specific needs.

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 press for processing panels, such as chipboard, fiberboard, and the like; said press comprising:

a first plate belt including a plurality of belt plates articulated to one another,

a second plate belt including a plurality of belt plates articulated to one another,

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

a first movable continuous flexible band surrounding a portion of said first plate belt,

a second movable continuous flexible band surrounding a portion of said second plate band,

said first and second bands being interposed between said belts over said material pressing portion of the respective travel paths thereof for transferring pressing forces from said plate belts to the material forming said panels which is disposed between said first and second bands,

and a plurality of strips mounted to said first band at the side thereof facing away from the second band when said bands are in facing relationship along said material pressing portion of their travel paths for avoiding production of markings and panels being processed along the junction areas of the belt plates of said first plate belt, said strips extending transverse to the travel direction of the respective band and being mounted to permit relative movement of said strip and said first band in the plane of the junction of said strips and said first band.

2. A press according to claim 1, wherein each of said plate belts is an endless belt which travels around respective spaced axles disposed horizontally and in parallel to one another.

3. A press according to claim 2, wherein each of said flexible bands is an endless steel band which surrounds a respective one of said plate belts.

4. A press according to claim 3, wherein said moving and guiding means include drivable pressure rolls disposed inside of the travel path of at least one of said plate belts for imparting plate belt driving forces as well as material pressing forces against said plate belt.

5. A press according to claim 4, wherein said belt plates, said flexible bands, and said strips are heat con-

ductive for accommodating heating of the material forming said panels.

6. A press according to claim 5, wherein said strips are substantially shorter in the travel direction than are the belt plates.

7. A press according to claim 6, wherein said first and second plate belts include 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 which are trapezoidally shaped, said recess means and projection means including interengagable 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 of the other of the recess means and projection means of the next adjacent plate over at least a portion of the respective travel paths of said plate belts.

8. A press according to claim 1, wherein said first and second plate belts include 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 which are trapezoidally shaped, said recess means and projection means including interengagable 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 of the other of the recess means and projection means of the next adjacent plate over at least a portion of the respective travel paths of said plate belts.

9. A press according to claim 1, wherein said guiding and moving means includes a first plate chain having a plurality of chain plates articulated to one another and plate chain driving means for moving said first plate chain along a predetermined path with chain plates of said first plate chain in engagement with belt plates of said first plate belt, and wherein the junction places between the chain plates of the first plate chain are offset with respect to the junction places between the belt plates of the first plate belt.

10. A press according to claim 1, wherein heat insulating means are provided intermediate the strips and the belt plates which apply pressing forces to said strips when said first flexible band and first plate belt are moved together over said material pressing portion of their respective travel paths, and wherein means are provided for applying heat directly to said first band and strips without directly heating said first plate belt.

11. A press according to claim 1, wherein said strips are attached to said first band by rivets rigidly fixed to said first band, said strips being provided with bores having dimension greater than the radial dimensions of said rivets for accommodating free sliding movement of said strips on said first band in all directions in the plane of the junction of said first band and strips.

12. A press according to claim 10, wherein both of said bands are provided with said strips.

13. A press according to claim 10, wherein a pressure distribution layer consisting of elastic material is disposed between said strips and said first band.

14. A press according to claim 13, wherein the pressure distributing layer consists of an asbestos fabric.

15. A press according to claim 2, wherein said first band is an upper endless steel band encompassing said

first plate belt and said second band is a lower endless steel band encompassing said second plate belt, and wherein the upper endless steel belt is encompassed by an endless belt guided with respect to this upper endless steel belt by guide means.

16. A press according to claim 15, wherein said endless belt encompassing said upper endless steel belt consists of one of stainless steel, synthetic resin, and the like.

17. A press according to claim 12, wherein each of said plate belts is an endless belt which travels around respective spaced axles disposed horizontally and in parallel to one another, wherein said first band is an upper endless steel band encompassing said first plate belt and said second band is a lower endless steel band encompassing said second plate belt, and wherein the upper endless steel belt is encompassed by an endless belt guided with respect to this upper endless steel belt by guide means.

18. A press according to claim 17, wherein said endless belt encompassing said upper endless steel belt consists of one of stainless steel, synthetic resin, and the like.

19. A press according to claim 2, wherein said first band is an upper endless steel band encompassing said first plate belt and said second band is a lower endless steel band encompassing said second plate belt, and wherein spacer elements are attached to the upper endless steel band in the zones of the lateral edges thereof for preventing contact of said upper and lower endless steel bands during idling operations.

20. A press according to claim 15, wherein said first band is an upper endless steel band encompassing said first plate belt and said second band is a lower endless steel band encompassing said second plate belt, and wherein spacer elements are attached to the upper endless steel band in the zones of the lateral edges thereof for preventing contact of said upper and lower endless steel bands during idling operations.

21. A press according to claim 18, wherein said first band is an upper endless steel band encompassing said first plate belt and said second band is a lower endless steel band encompassing said second plate belt, and wherein spacer elements are attached to the upper endless steel band in the zones of the lateral edges thereof for preventing contact of said upper and lower endless steel bands during idling operations.

22. A press according to claim 19, wherein the spacer elements are fashioned as holders and guide means for an endless steel belt which encompasses the upper endless steel belt.

23. A press for processing panels, such as chipboards, fiberboards, and the like; said press comprising:

a first plate belt including a plurality of belt plates articulated to one another, a second plate belt including a plurality of belt plates articulated to one another,

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

a first movable continuous flexible band surrounding a portion of said first plate belt,

and a second movable continuous flexible band surrounding a portion of said second plate band, said first and second bands being interposed between said belts over said material pressing portion of the respective travel paths thereof for transferring pressing forces from said plate belts to the material forming said panels which is disposed between said first and second bands,

wherein said guiding and moving means includes a first plate chain having a plurality of chain plates articulated to one another and plate chain driving means for moving said first plate chain along a predetermined path with chain plates of said first plate chain in engagement with belt plates of said first plate belt, and wherein the junction places between the chain plates of the first plate chain are offset with respect to the junction places between the belt plates of the first plate belt.

24. A press according to claim 23, wherein each of said plate belts is an endless belt which travels around respective spaced axles disposed horizontally and in parallel to one another.

25. A press according to claim 24, wherein each of said flexible bands is an endless steel band which surrounds a respective one of said plate belts.

26. A press according to claim 25, wherein the plurality of strips are mounted to each of said first and second bands at the sides thereof facing away from one another when said bands are in facing relationship along said material pressing portion of their travel paths, said strips extending transverse to the travel direction of the respective band and being mounted to permit relative movement of said strips and said respective bands in the travel direction of said bands.

27. A press according to claim 26, wherein heat insulating means are provided intermediate the strips and the belt plates which apply pressing forces to said strips when said first flexible band and first plate belt are moved together over said material pressing portion of their respective travel paths, and wherein means are provided for applying heat directly to said first band and strips without directly heating said first plate belt.

28. A press according to claim 27, wherein a pressure distribution layer consisting of elastic material is disposed between said strips and said first band.

29. A press according to claim 28, wherein the pressure distributing layer consists of an asbestos fabric.

30. A press according to claim 24, wherein said first band is an upper endless steel band encompassing said first plate belt and said second band is a lower endless steel band encompassing said second plate belt, and wherein the upper endless steel belt is encompassed by an endless belt guided with respect to this upper endless steel belt by guide means.

31. A press according to claim 30, wherein said endless belt encompassing said upper endless steel belt consists of one of stainless steel, synthetic resin, and the like.

32. A press according to claim 31, wherein said first band is an upper endless steel band encompassing said first plate belt and said second band is a lower endless steel band encompassing said second plate belt, and wherein spacer elements are attached to the upper endless steel band in the zones of the lateral edges thereof for preventing contact of said upper and lower endless steel bands during idling operations.

33. A press according to claim 32, wherein the spacer elements are fashioned as holders and guide means for an endless steel belt which encompasses the upper endless steel belt.