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Hütter

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[54] **APPARATUS FOR PRESSING CHIPBOARD PANELS**

[75] Inventor: **Wilhelm Hütter,** Krefeld, Germany

[73] Assignee: **Becker & van Hullen Niederrheinische Maschinenfabrik,** Krefeld, Germany

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[52] **U.S. Cl.** ..... **425/338,** 425/406, 100/93 P, 100/194

[51] **Int. Cl.** **B29j 5/00,** B29c 3/00

[58] **Field of Search** ..... 100/194, 196, 93 P; 425/338, 406

[56] **References Cited**

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Primary Examiner—Robert L. Spicer, Jr.
Attorney, Agent, or Firm—Herbert E. Kidder

[57] **ABSTRACT**

A multi-deck heating press having vertical frame members at spaced points along its length, and conduits carrying liquid heating medium for the individual press decks, which pass close alongside some of these frame members, causing them to heat up, while other frame members remain cool. To eliminate differential thermal expansion due to some vertical frame members being heated while others remain cool, the said frame members have passageways provided therein, and fluid medium is circulated through these passageways. In one embodiment, heating medium is circulated through the cold frame members; in another coolant is circulated through the heated frame members; and in a third form, heating medium is circulated through some frame members and coolant through others. All vertical frame members of the press are brought to substantially the same temperature by the fluid medium, thereby eliminating thermal distortion in the press.

5 Claims, 3 Drawing Figures

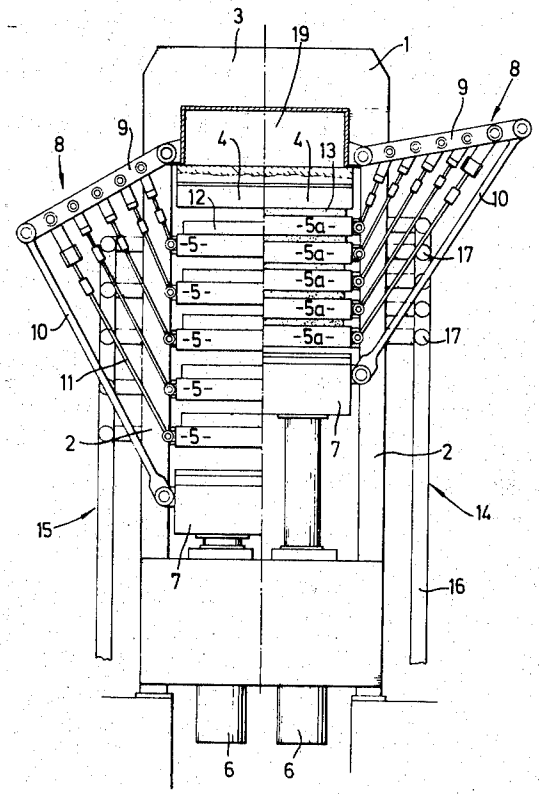
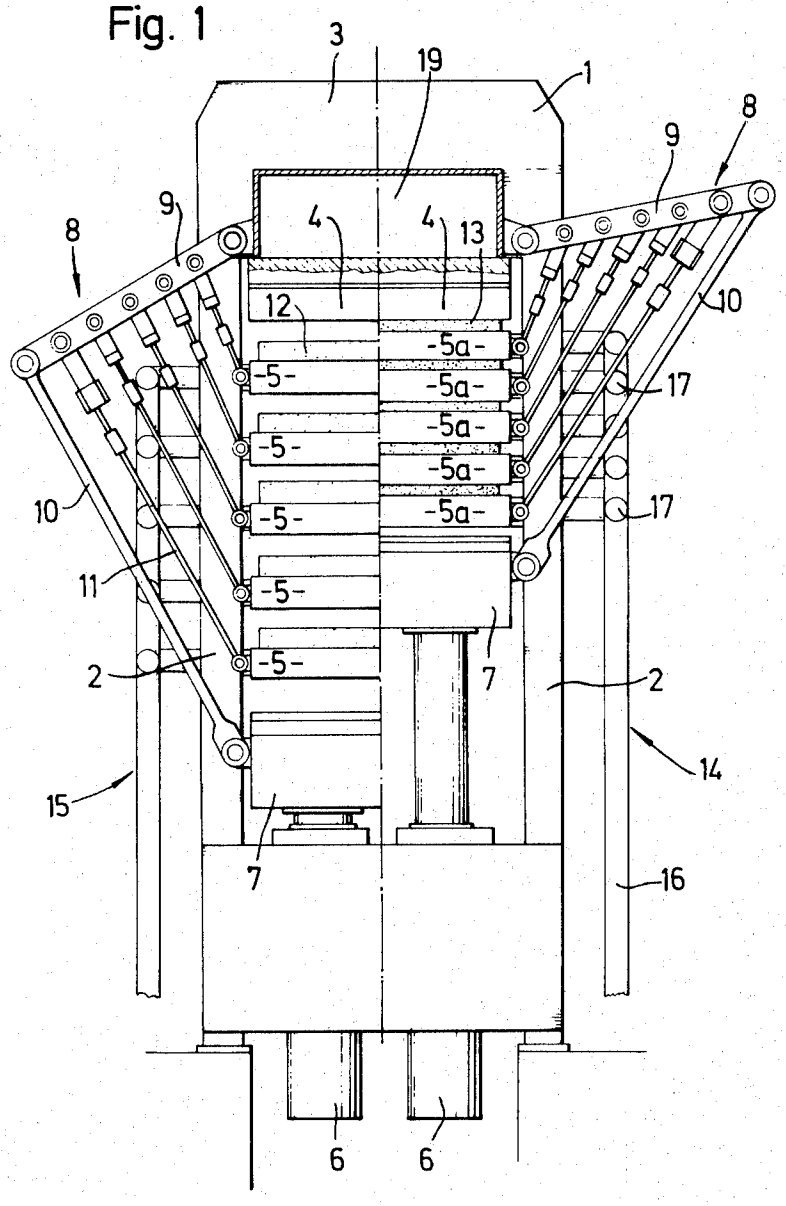


Fig. 1



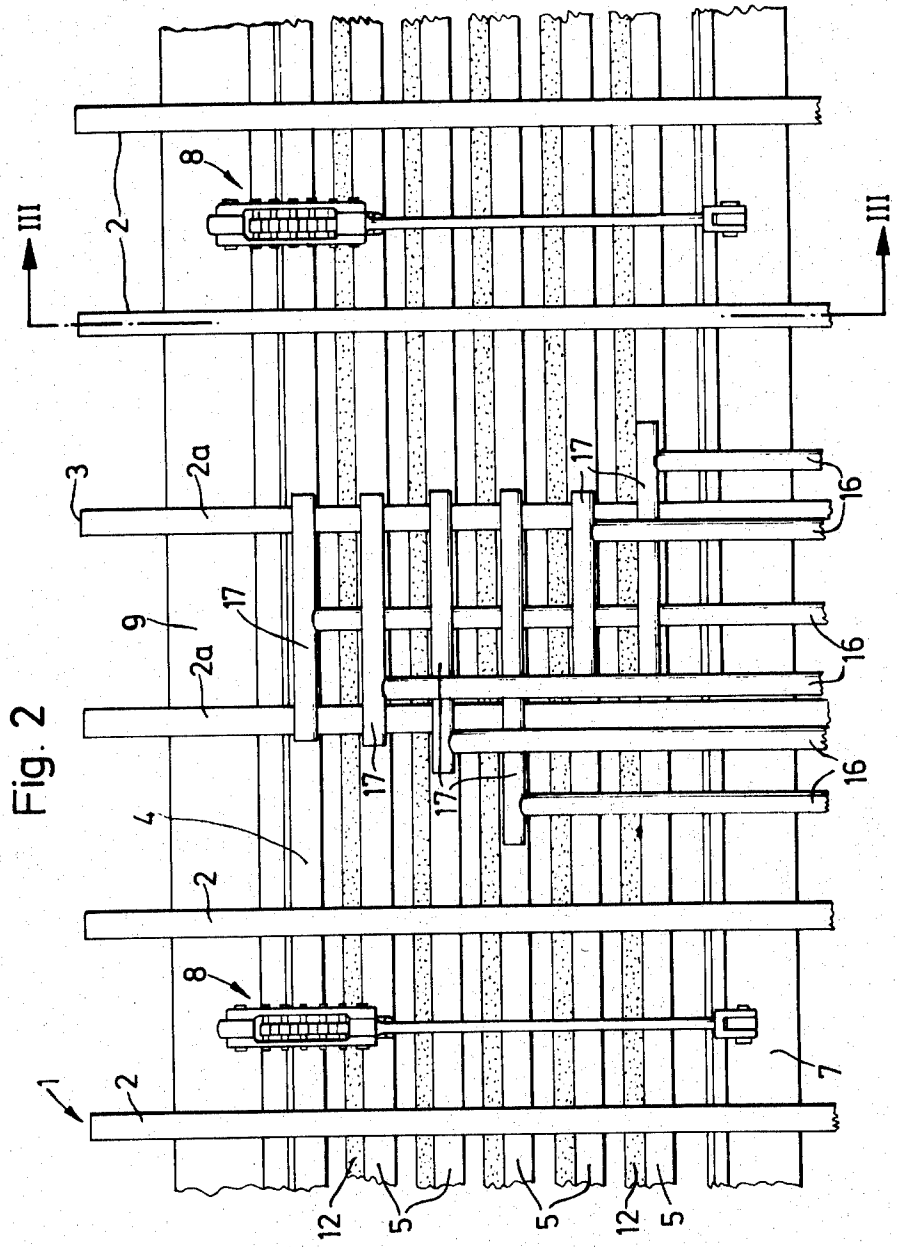
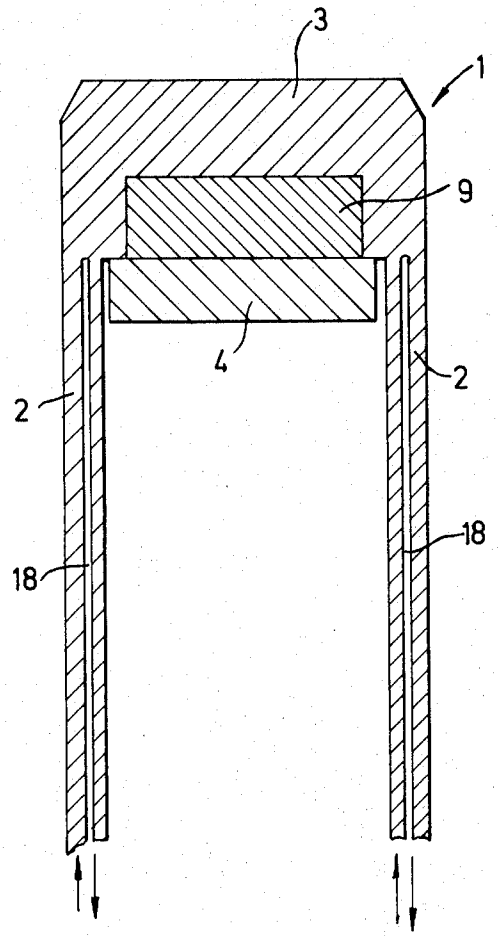


Fig. 2

Fig. 3



APPARATUS FOR PRESSING CHIPBOARD PANELS

The invention relates to a method for the manufacture of chipboard panels in a multi-deck heating press wherein a heating medium is fed through the individual press decks, as well as to a press for carrying out this method.

As a rule, a multi-deck press has several press frames mounted in succession in the longitudinal direction of the press which consist essentially of vertical parts firmly attached in pairs opposite each other and which are connected together on their upper sides by a horizontally attached connecting member. The individual press decks are mounted so as to be vertically displaceable within the press frames. A full-length plate serving as the press bolster is attached at the horizontal connecting parts. In order to fill the press with a web of chips, the individual press decks are each lowered sufficiently to allow the individual press decks to be filled. The press decks are then raised until the uppermost deck abuts the press bolster and the decks mounted therebeneath, or the web of chips mounted thereon, abut the lower sides of each deck lying thereabove. Thus, as a result of heating the individual press decks, the manufacture of chipboard panels takes place in known manner through the effect of heat and pressure.

The supply of the heating medium to the individual press decks in presses of the usual construction is by way of vertically arranged supply pipes which are connected at their upper ends with cross-pipes. The cross-pipes are in turn connected with the heating channels in the individual press decks. The cross-pipes are firmly attached to the heating plates and are moreover fixedly connected with the supply pipes. The cross-pipes consequently move up and down with the individual decks during opening and closing of the multi-deck heating press. The supply pipes terminate at their lower side in the press pit and are there connected with flexible hoses which enable the necessary length compensation to be effected.

In addition to the pipes for supplying the heating medium, corresponding pipes are provided for the removal of the heating medium after it has flowed through the heating channels in the individual press decks.

The pipes for the supply or transfer of the heating medium lie relatively close to each other on the longitudinal sides of the press; the pipes for the supply of heating medium are provided at one longitudinal side of the press whilst the pipes for transferring the heating medium are provided at the other longitudinal side thereof. This arrangement means that the press frames lying in the region of the heating pipes, namely in particular the vertical parts of the press frames, are heated. The vertical parts of the press frames adjacent the heating tubes therefore assume a higher temperature than the press frames which are not directly adjacent the heating pipes. Since the heating medium in the heating pipes has a temperature of the magnitude of 180° C, the vertical parts of the press frames adjacent the heating pipes assume a temperature which is indeed less than 180° C, but lies however considerably above the temperature of the remaining press frames. Often the multi-deck heating presses are mounted in draughty passageways which has the result that the press frames not

directly adjacent the heating pipes are cooled down as a result of the draught.

Owing to the temperature difference between the vertical parts of the press frames adjacent the heating pipes and the remaining press frames, the thermal expansion in the vertical parts of the press frames adjacent the heating pipes is greater than the thermal expansion in the remaining press frames.

This has the result that the plate-like press bolster firmly attached to the cross-member of the press frames is distorted owing to the thermal expansion of the verticle parts of the press frames adjacent the heating pipes. If for example the heating pipes are attached on the longitudinal sides of the heat press so as to be axially opposite each other, the press bolster undergoes arcuate working, such that, seen from the inlet to the press in the longitudinal direction thereof, the press bolster is at first flat, then in the region of the press frames with higher thermal expansion is deflected upwardly in the form of a curve and finally lies again in the plane corresponding to the inlet region.

During pressing of the chipboard panels, the chipboard panel produced on the uppermost press deck is therefore distorted in a manner corresponding to the deformation of the press bolster. This distortion is transferred to the individual deck located beneath it, since the lower press decks match the shape of each daylight mounted above them. This results in the chipboard panels manufactured on a multi-daylight heating press of this kind being of various thicknesses.

It is an object of the invention to avoid the deformation of the upper press bolster and thus to enable the manufacture of chipboard panels of equal thickness in a multi-daylight heating press.

It is endeavoured to achieve this object in accordance with the invention by keeping the vertical parts of the press frames or, in the event of column presses, the press columns, at an even temperature. It thus happens that all the vertical parts of the press frames or the press columns always undergo the same thermal expansion and consequently arcuate deformation of the upper press bolster does not occur.

For simplicity, the following constantly relates to press frames. The measures described for the press frames can however be suitably applied to the columns of column presses.

Since the temperature of the heating medium supplied to the heating channels in the press daylights hardly differs from the temperature of the heating medium emerging on the opposite side of the press, according to a further feature of the invention the vertical parts of the press frames of both longitudinal sides of the press are kept at the same temperature.

The method according to the invention can be carried out in various ways. Thus, a heating medium may be supplied to the vertical parts of the press frames for example so that the vertical parts of the press frames are heated to the temperature of the vertical parts having the highest temperatures owing to the supply and transfer of the heating medium to the press decks.

According to a further feature of the invention, a cooling medium may be supplied to the press frames. In a suitable example of this proposal, the vertical parts of the press frames heated as a result of the supply or transfer of the heating medium to the press decks are cooled down to the temperature of the vertical parts of the remaining press frames.

According to a further feature of the invention, a cooling medium may be supplied to the vertical parts of the press frames which are heated as a result of the supply or transfer of the heating medium to the press frames and a heating medium may be supplied to the vertical parts of the remaining press frames.

The device for carrying out the method according to the invention is characterized in that channels are arranged in at least the vertical parts of the press frames of a multi-deck heating press, a heating medium and/or cooling medium being passed through those channels.

According to a further feature of the invention, the heating medium which serves to heat up the individual press decks flows through the channels.

According to another feature of the invention, the channels provided in the vertical parts of the press frames are interconnected so that a closed heating or cooling circuit, or several closed heating or cooling circuits, can be formed for the vertical parts of the press frames.

In a further embodiment of the invention, the channels are only provided in the vertical parts of the press frames which are heated as a result of the supply of heating medium to the press decks. In this case, a cooling medium is passed through the channels, namely so that the vertical parts provided with the channels are cooled down to the temperature of the remaining vertical parts of the press frames.

According to a further feature of the invention, the channels may only be provided in the vertical parts of the press frames which are not heated as a result of the supply of the heating medium to the press decks. In this case, a heating medium is passed through the channels, namely so that the vertical parts of the press frames provided with the channels assume the same temperature as the vertical parts of the press frames heated by the supply of the heating medium to the press decks.

A further possibility for carrying out the method according to the invention exists in that the channels are provided in elements, by way of example attached plates, tubes or the like provided on the vertical parts of the press.

Furthermore there is the possibility of electrically heating the vertical parts whereby a regulating device which can be controlled by the maximum temperature of a vertical part is provided for the heating device.

Preferred embodiment of the invention to be described by way of example is illustrated in the drawings in which:

FIG. **1** is a diagrammatic end view of a multi-deck heating press with a simultaneous closing apparatus;

FIG. **2** is a diagrammatic side view of the arrangement according to FIG. **1**, in which however the ends of the press and the lower part of the press are not illustrated;

FIG. **3** is a simplified illustration of the cross-section of a press frame according to line III-III of FIG. **2**.

In the multi-deck heating press illustrated in the drawing, several press frames **1** are provided in succession in the longitudinal direction of the press and consist of vertical parts **2** and a horizontal part or top member **3** connecting the vertical parts **2**. A plate-like press bolster **4** is attached to the horizontal part in the longitudinal direction of the press.

Vertically displaceable individual press decks **5** are provided within the press frames **1** and the press bolster **4**. The press is illustrated in the open state on the left of FIG. **1**, and in the closed state on the right of FIG. **1**. The press decks **5** are therefore indicated in the right half of the drawing by reference symbol **5***a*. A press table or horizontal bottom member **7** which is vertically movable by means of the piston **6** is provided beneath the press decks. Simultaneous closing devices **8** which are pivotally connected to the upper press beam **19** on opposite sides of the press engage on the individual press decks **5** and the press table **7**. The simultaneous closing devices **8** have pivotal arms **9** provided at their ends with hinged pressure rods **10** which are hingedly fastened at their other end to the press table **7**. The individual press decks **5** are hingedly connected with the pivotal arms **9** by suitably mounted tie-rods **11**. The tie-rod **11** thereby engage the relevant pivotal arm **9** in the sequence of the individual press decks **5**, seen from bottom to top, at proportionally increasing spacing from the pivotal axis. Further details regarding the construction and function of the simultaneous closing devices **8** are apparent for example from our German Pat. No. 1,198,057.

When the press is open (left-hand side of FIG. **1**), a web of chips **12** is applied to the individual daylights. The press is then closed (right-hand side of FIG. **1**). The web of chips located on the uppermost daylight **5***a* thereby abuts the press bolster **4** and the web located in the daylight mounted beneath it abuts the lower sides of the press daylights mounted above it. The web of chips located on the uppermost daylight **5***a* thereby abuts the press bolster **4** and the web located in the daylight mounted beneath it abuts the lower sides of the press daylights mounted above it. The web of chips is pressed into chipboard panels **13** through the effect of pressure and heat.

Heating channels (not shown), through which a heating medium flows, are provided in the individual press decks for the heating thereof. The supply of heating medium to the individual press decks **5** takes place via pipe system **14** mounted at one longitudinal side of the press while the removal of the heating medium takes place via the pipe system **15** mounted at the opposite longitudinal side of the press. The pipe systems **14** and **15** correspond with each other so that only the pipe system **14** will be described below.

The pipe system **14** comprises a row of heating pipes **16** vertically mounted near the press and which are provided for supplying the heating medium to a press deck **5**. The heating pipes **16** open at the upper end into transverse pipes **17** which in turn are connected with the heating channels (not shown) in the individual press decks. The pipes **16** and **17** thus move up and down with the individual press decks **5** during opening and closing of the press. The pipes **16** terminate at their lower side (not shown) in the press pit (not shown) and are there connected by flexible hoses which enable a length compensation and through which the heating medium is passed at the same time to the pipes **16**. After flowing through the heating channels in the individual press decks **5**, the heating medium is again drawn off via the pipe system **15** corresponding to the pipe system **14**.

The pipe systems **14** and **15** are mounted near the vertical parts **2** of a few press frames **1**. The adjacent verticals of the press frames in the pipe systems are marked by **2***a* in FIG. **2**. Since the vertical parts **2***a* are mounted near the pipe systems **14**, **15** the latter are

heated as a result of the effect of the heating medium passing through the pipe system, namely to an essentially higher temperature than the temperature of the remaining vertical parts **2.** Owing to the thermal expansion which thereby occurs in the longitudinal direction of the vertical parts **2***a*, the press bolster **4** firmly attached thereto is arcuately distorted in the region of the vertical parts **2***a*, so that the press bolster **4** is no longer flat. Consequently, the chipboard panels pressed on such a press would be of different thickness.

To carry out the proposal according to the invention, namely to keep the vertical parts of the press frames at the same temperature in order to avoid this disadvantage, channels **18** are provided in the vertical parts **2** of the press frames and a medium is supplied to the vertical parts through said channels **18** according to the arrows in FIG. **3,** which medium enables the desired temperature compensation to be achieved between the vertical parts **2***a* and the remaining vertical parts **2** in order to achieve an even as possible temperature of the vertical parts. This medium can be a heating medium with which the vertical parts **2** are heated to the temperature of the vertical parts **2***a*, or may be a cooling medium with which the heat absorbed from the vertical parts **2***a* by the pipe systems **14** and **15** can be dissipated. The channels **18** of the individual vertical parts **2, 2***a* are preferably connected together at least on one longitudinal side of the press so that one or more closed heating or cooling circuits ensue for the vertical parts of the press frames. If the vertical parts **2, 2***a* all have the same temperature, the thermal expansion of these vertical parts in the longitudinal direction is also equal, and thus the undesired deformation of the press bolster **4** cannot arise.

I claim:

1. A multi-deck heating press for the manufacture of chipboard panels or the like, comprising:

a press frame having a plurality of laterally spaced vertical parts which are connected together at their top ends by a horizontal top member, and at their bottom ends by a horizontal bottom member, said top and bottom members being normally parallel to one another;

a plurality of vertically spaced press decks disposed between said vertical parts and stacked between said top and bottom members, said decks being movable vertically with respect to said frame and also movable vertically with respect to one another;

means for heating said press decks up to operational temperature;

means for closing said press decks uniformly together in the vertical direction;

thermal sources located closely adjacent certain of said vertical parts of said frame, which tend to radiate heat to said certain vertical parts; and

means for equalizing the temperature of all of said vertical parts of said frame to counteract the unequalized heating effects caused by said thermal sources, so that said vertical parts are all caused to expand equal amounts, thereby preserving parallelism between said top and bottom members, and between said deck plates.

2. A multi-deck heating press as in claim **1,** wherein said thermal source comprises conduits carrying liquid heating medium from a source of supply to said press decks, where the heating medium is circulated through channels in the decks to heat up the decks.

3. A multi-deck heating press as in claim **1,** wherein said means for equalizing the temperature of all of said vertical parts comprises channels provided in the vertical parts through which liquid heat-exchange medium is circulated, said liquid heat-exchange medium bringing all of said vertical parts to a uniform temperature.

4. A multi-deck heating press as in claim **2,** wherein said means for equalizing the temperature of all of said vertical parts comprises channels provided in the vertical parts through which said liquid heating medium is circulated so as to heat up all of said vertical parts to a uniform temperature.

5. A multi-deck heating press as in claim **1,** wherein said certain vertical parts have channels provided therein, and wherein said means for equalizing the temperature of all of said vertical parts comprises a source of liquid coolant connected to said channels in said certain vertical parts, whereby said certain vertical parts are cooled to remove the heat added by said thermal source.

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