

[54] **APPARATUS FOR CHARGING PANELS INTO A PRESS**

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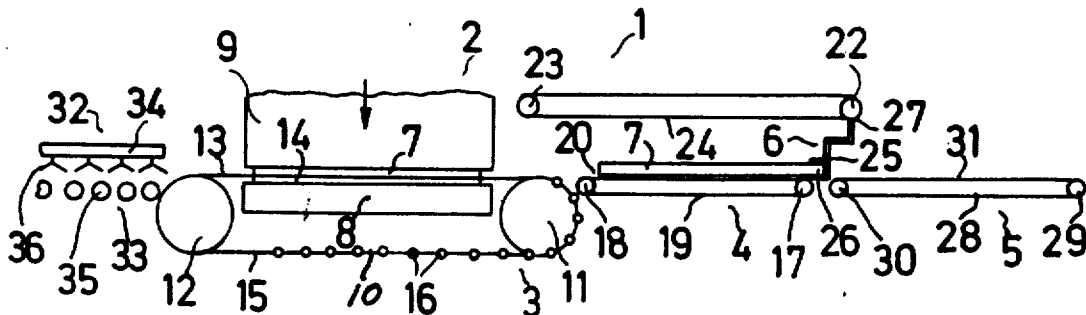
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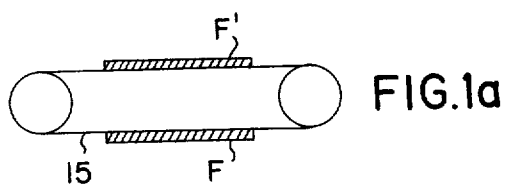
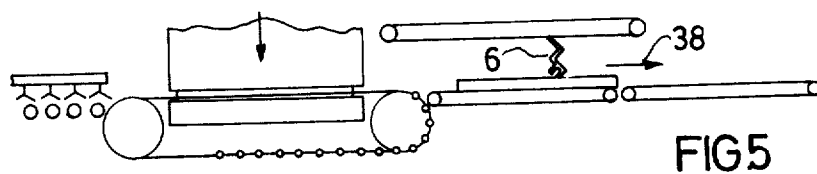
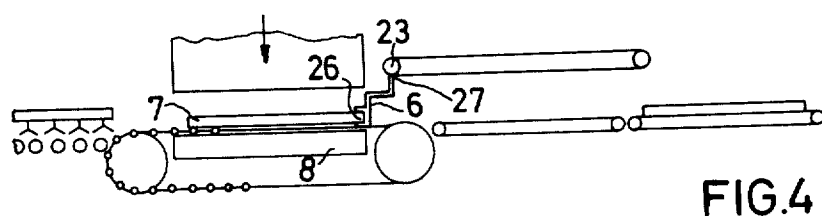
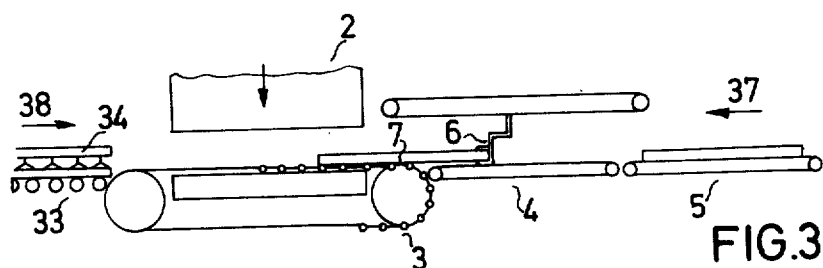
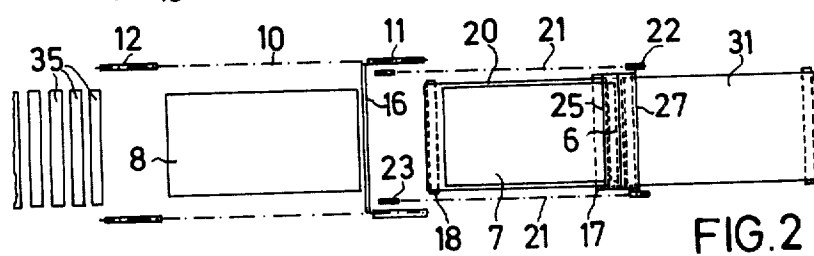
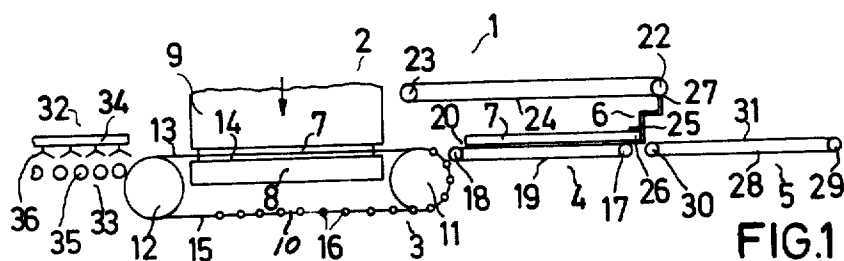
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[57] **ABSTRACT**

A method and apparatus for charging panels, especially panels having a cover layer, into a press for being hot pressed therein between pressing members. Each panel is prepared outside the press on an infeeding conveyor and is moved in parallelism with itself into the pressing space while rotary support members beneath the panel provide support for the panel. The support members move with the panel. The panel is arrested in working position and the support members continue to move until withdrawn from beneath the panel so the panel is deposited vertically downwardly on the lower pressing member. After pressing, the panel is lifted off the lower pressing member by a suction device and is conveyed thereby to an outgoing conveyor.

8 Claims, 6 Drawing Figures





APPARATUS FOR CHARGING PANELS INTO A PRESS

The present invention relates to charging devices for feeding plate shaped material to be pressed, e.g., plates provided on at least one side with a cover layer, into a press, especially into a one-layer press. More specifically, the present invention relates to a feeding device of the above type which is equipped with a press conveyor which is movable in the direction of the feeding device and in moving-in position has supporting elements for the material to be pressed located above the press table, while the supporting members which during the pressing operation occupy a pressing position are movable out of the press. The said press conveyor is directly preceded by a cover conveyor which during the movement of the material to be pressed into the press transfers a workpiece which moves synchronously onto the supporting members.

The covering of plates, for instance plywood plates or panels with resin impregnated papers which are at high temperatures and pressure glued thereto and hardened while such covering of plates is to be effected in particular with a press associated with a charging device according to the invention frequently encounters considerable difficulties due to the fact that the cover paper covered cover layers are extremely sensitive. If the material to be pressed lies with its lower cover layer too long on the heated press table, i.e. long prior to the pressing operation proper which is effected over a very short period, the lower cover layer may be damaged and a faulty connector with the plate may result. Problems of this type do not exist when placing together the individual layers forming the material to be pressed because this laying together is effected prior to the pressing operation outside the press in a separate device. Therefore damage to the cover layers by heat acting thereupon will not be possible.

It is, therefore, an object of the present invention to provide a feeding device of the above mentioned general type which will assure an extreme short and substantially pressureless resting of the material to be pressed on the press table prior to the pressing operation proper.

This object and other objects and advantages of the present invention will appear more clearly from the following specification in connection with the accompanying drawing, in which:

FIG. 1 diagrammatically illustrates a side view of a press with the feeding device according to the present invention.

FIG. 1a diagrammatically illustrates a side view of a press with a feeding foil according to the present invention.

FIG. 2 shows a top view of the device of FIG. 1.

FIGS. 3, 4 and 5 respectively illustrate different positions of the feeding device of FIG. 1.

The feeding device according to the present invention is characterized primarily in that a holding means is provided which engages exclusively the material to be pressed and arrests the same in pressing position during the advancement of the press conveyor, and is furthermore characterized in that the supporting members for the material to be pressed are in pressing position located outside the press. In this way the material to be pressed is first in spaced relationship to and above the press table fed to the latter whereupon only shortly

prior to closing the press, the supporting members are conveyed to their pressing position outside the press so that only then the material to be pressed is deposited on the press table.

It is particularly expedient to arrange the holding member which preferably prior to the inward moving engages the material to be pressed, on a runner which is movable in feeding direction approximately synchronously with and parallel to the cover conveyor. In this way, the material to be pressed can safely be guided and it will be possible to move the holding member out of the press during the pressing operation from its arresting position. In this way the holding member will in no way be impeded during the pressing operation and can be dimensioned relatively large. The runner may for instance through a reverse drive be movably mounted between its moving-in position and its moving-out position so that it will be arranged for a reciprocal movement.

According to a structurally simple and easily accessible embodiment of the invention, the runner is located above the press table while being formed preferably by at least one endless guided pulling member which is passed over two deviations so that instead of by a reversing drive it can also be driven in such a way that in one direction it moves into driving-in position and approximately in the opposite direction it moves again into its starting position. A particularly simple connection of the holding member with the material to be pressed prior to the moving-in operation can be realized by arranging the runner above the layer conveyor and preferably designing the holding member for engagement with the rear end of the material to be pressed. Due to this engagement of the rear end of the material to be pressed, by the holding member, it will be possible with one and the same holding member to move highly different sizes and widths of the material to be pressed into the press without requiring special adjustments. This would not be possible if the holding member engages the lateral edge or edges of the material to be pressed. Over the last mentioned type of engagement, the arrangement according to the invention also has the advantage that a hanging through of the lower cover layer of the material to be pressed is not possible because this cover layer is supported by the supporting members.

A very safe and careful holding of the material to be pressed will be assured when the holding member forms a type of pliers preferably embracing the material to be pressed at its upper and bottom side.

In order to make sure that the holding member can with the material to be pressed in a simple manner be completely moved into the press prior to the pressing operation, the holding member is offset in feeding direction relative to its connecting area with the runner.

If the press conveyor has its supporting members only on one part of its length, preferably the part corresponding to the length of the workpiece, a simple construction will result because the press conveyor can always be safely guided within the region of the press.

According to a further feature of the invention, the press conveyor is designed as an endless conveyor moving around the press table. This endless conveyor includes at least one endless pulling member which is passed over deviations located opposite to each other. The supporting members when occupying the pressing position are preferably located substantially below the press table so that a very compact construction will be

possible. Furthermore, in this way, and in particular due to the described design of the holding member, the advantage is realized that the supporting members will be able from the same moving-in position in the same direction as before, namely in feeding direction, to be moved in a minimum of time to their pressing position outside the press so that a fast depositing of the material to be pressed upon the press table will be effected, and very short cycles of pressing will be realized.

In order to assure a very easy removal of the supporting elements from the pressed material located above the press table, the supporting elements have line-shaped or similar supporting surfaces. This will be further improved when the supporting members are in the form of roller bodies, especially in the form of rotatable axles located one behind the other for instance approximately at a right angle with regard to the feeding direction and parallel to the press table, and preferably are formed by rollers located laterally outside the press table and journaled on two lateral pulling members such as chains. These rollers may in moving-in position be spaced by an extremely narrow distance or gap from the press table so that when the rollers are removed they will not touch the press table and therefore will only roll along the bottom side of the material to be pressed but will not slide thereon.

Due to the design according to the invention it is also possible that the supporting members are exchangeably connected to a feed foil which preferably is located in pressing position in the press, so that by means of the feeding device according to the invention it will be possible to carry out two different charging principles. The feeding or charging foil will during the press operation remain in the press between the press table or the lower heating plate on one hand and the material to be pressed on the other hand while the side of the feed foil is greater than the size of the press surface or the size of the heating plates thereof. In both instances, the material to be pressed will during the feeding operation practically not be subjected to stresses with regard to its tear resistance. When employing the above described supporting members formed by rollers, these rollers will during the pressing operation cool off in their pressing position outside the press so that at the subsequent moving-in into the press with the material to be pressed, they will practically have only room temperature.

Also the cover conveyor may be designed as an endless conveyor having a pulling member which is formed by a conveyor belt and is passed over oppositely located deviations.

The cover conveyor is expediently preceded by a depositing device for the material to be pressed which device preferably includes an endless conveyor belt extending in feeding direction so that during the transfer of the material to be pressed from the cover conveyor to the press conveyor, it is possible already on the depositing device to prepare further material to be pressed so that short cycles are made possible.

For a safe and fast withdrawal of the pressed material from the press, the press is followed by a withdrawing device which preferably includes a roller system and a suction carriage movable thereover.

It is also an object of the present invention to provide a method of charging a press, especially for operating the above mentioned charging devices, by means of which a short stay which is substantially pressure-less of

the material to be pressed on the press table will be obtained prior to the pressing operation proper.

For purposes of realizing this object, the present invention provides a method for charging the press, especially a one-layer press, with plate-shaped material to be pressed and also with plates which are at least on one side provided with a cover layer according to which method the prepared material to be pressed is moved on the press table in a feeding direction substantially parallel to said press table and then is pressed while according to the invention the material to be pressed is moved in feeding direction in spaced relationship above and to the press table and only directly prior to the pressing operation is deposited on the press table.

In order not to subject the lower cover layer to any tear stresses, the material to be pressed is supported substantially uniformly at its bottom side approximately over its entire surface until it is deposited.

It is particularly advantageous when the material to be pressed is deposited first with its rear edge (with regard to the feeding direction) and subsequently continuously up to its front edge so that on one hand a fast depositing will be realized and on the other hand the material to be pressed is during the entire depositing operation always supported over its entire surface on the bottom side.

A fast depositing can also be realized by depositing the material to be pressed by pulling away the supporting members which support the material to be pressed at its bottom side and feed it over the press table. In this connection, during the pulling-away operation, the material to be pressed is held fast against the pulling-away direction relative to the press table so that the material to be pressed can be carried away by the supporting members.

When the supporting members are pulled away in feeding direction, it is not necessary to arrest the same after the feeding but they can move on at uniform or higher speed so that a considerable reduction in the depositing time will be realized.

In order to expose the material to be pressed and in particular the thin cover layers at best only to pulling stresses and thereby to prevent a distortion or the like, the material to be pressed is at its rear end (with regard to the pulling direction) held fast preferably by embracing the material in a plier-like manner at the upper and bottom side whereby an extremely precise setting of the layers of the material to be pressed relative to each other can be obtained. This will be further improved when the material to be pressed is held fast already during and in particular directly prior to the feeding and when the material to be pressed is at the end of the feeding arrested by a retardation at the arresting zone.

For further reducing the time necessary for the charging operation, the material to be pressed is during the feeding accelerated approximately over a first distance corresponding to half the total stroke and is retarded over the rest of the distance while preferably the supporting members are accelerated over the first portion of the distance in synchronous movement with the workpiece so that no relative movement will occur between the surfaces of the supporting members and the material to be pressed, which surfaces engage the material to be pressed. However, it is expedient when the supporting members are pulled away relative to the material to be pressed already over the remainder of

the distance while preferably the supporting members are additionally accelerated until they reach their pulled-away position, so that an extremely fast depositing will be realized.

The depositing of the material to be pressed onto the supporting members may be effected during the first stroke section in feeding direction.

The device as well as the method according to the present invention are particularly suitable for pressing material the cover layer of which are designed in the manner of cover foils. The material to be pressed may also consist of a pressed sheet metal or the like which engages the bottom side and from which the workpiece is removed after completion of the pressing operation so that it can be employed again.

Referring now to the drawings in detail, FIGS. 1 and 2 illustrate a press 2 according to the invention which press has associated therewith a charging device 1, a press conveyor 3, a cover conveyor 4 preceding feed press conveyor 3, and a depositing conveyor 5 preceding feed cover conveyor 4, and also a holding member 6 for charging the press with plate-shaped material 7 to be pressed. The press 2 includes a press table 8 and an upper press part 9 which is movable at a right angle to said press table 8 in vertical direction.

The press or charging conveyor 3 has two circulating endless feeding members preferably in the form of chains 10, which are located laterally of the press table 8. Each chain 10 passes two reversing sprocket wheels 11 and 12 respectively located in front and behind the press and guided in such a way that the upper section 13 of the chain is located directly above the plane of the upper press table surface 14 and parallel thereto, whereas the lower section 15 is located in spaced relationship to and below the plane of the bottom side of press table 8.

The reversing sprockets 11 and 12 are equally spaced from the input side and discharge side respectively of the press 2. Over a portion of their length which is slightly less than half its total length and slightly greater than the length of the press table 8 which in plan view has the same size as the upper part 9, the two pulling members 10 are connected to each other by means of supporting rolls or supporting rollers. These supporting rolls or rollers 16 are rotatable about axles which are parallel to the press table 8 and at the right angle to the longitudinal direction of the pulling members 10 while being journaled on the pulling members 10. In order not to unnecessarily clog up the drawings, FIG. 2 shows only one of said axles. The members or rollers 16 have as small a diameter as possible and are longer relative to the width of the press table 8 while they are arranged preferably at equal distance from each other and behind each other.

The cover conveyor 4 comprises a conveyor belt 19 which is passed over two reversing rollers 17, 18 having a diameter which is considerably shorter than the diameter of the reversing sprockets 11, 12. The upper section of conveyor belt 19 is located at the level of the upper section 13 of the pulling members 10 or at the level of the upper mantle lines of rollers 16, when the same are located above the press table 8. The front roller 18 of the conveyor belt 19 is arranged directly adjacent to the rear sprocket 11 of the press conveyor 3. The width of the cover conveyor 4 or its transport belt 19 is slightly greater than the width of the press table 8 but is smaller than the distance between the two pulling members 10 of the press conveyor 3. In place of rollers

16 there are shown two feed foils F and F' in FIG. 1a on sections of the conveyor belt (13, 15, respectively). Such feed foils are exchangeably connected to the supporting members and are disposed with the range of the pressing members of the press 2.

The holding member 6 is journaled on two lateral endless chains 21 which are passed over two reversing sprockets 22, 23, and is as a rule located on the lower section 24 of said chains 21 while the holding member 6 establishes a connection between the two chains 21. The rear sprocket 22 of the chains 21 is located behind the rear roller 17 of the cover conveyor 4, whereas the front sprocket 23 of the chains 21 is located in front of the front roller 18 of the cover conveyor 4 and with its axis is located in front of the axis of the rear sprocket 11 of conveyor 3 directly adjacent to press 2. The sections 24 of the chains 21 which receive the holding member 6 extend parallel to the upper sections 13, 20 of the press conveyor 3 and of the cover conveyor 4. The holding member 6 which extends downwardly and protrudes away from the lower section 24 of chains 21 has its lower end equipped with a plier-shaped member 25 which is open toward the center of press 2. This member 25 which in starting position is located directly behind the rear roller 17 of the cover conveyor and is adapted to embrace the workpiece 7 at the top and bottom side of its rear end, when this end 26 protrudes beyond the rear end of the cover conveyor 4 or beyond the rear roller 17 protrudes toward the rear. The member 25 has a shorter distance from the center of press 2 than the connecting point 27 of the holding member 6 with the chains 21. This may for instance be realized by having the holding member 6 offset between each connecting point 27 and the member 25 in the direction toward the press 2. In starting position, the connecting point 27 is expediently located at the bottom side of the rear sprocket 22 of the chains 21. The space of the chains 21 from each other is greater than the width of the transporting belt 19 of the cover conveyor 4 and is shorter than the distance of the pulling members 10 of conveyor 3 from each other in such a way that the chains 21 when viewed in the plan view of FIG. 2 are located between the side edges of the cover conveyor 4 and the pulling members 10.

The depositing conveyor 5 likewise has an endless conveyor belt 28 which is passed over two reversing rollers 29 and 30. The upper section 31 of conveyor belt 28 is located at the level of the upper section 20 of the cover conveyor 4 while the front reversing roller 30 is provided at a distance from the rear reversal 17 of the cover conveyor 4, said distance being provided for engagement by the member 25.

Press 2 is followed by a withdrawing device 32 which is provided with discharge guiding means 33 in the form of a roller system which has a suction carriage 34 arranged thereabove. The top sides of the rollers 35 which are located behind each other and pertain to the roller system 33 are provided slightly below the plane of the table surface 14 of press table 8 while the rear-most roller is located directly adjacent to the front sprocket 12 of the pulling members 10. The suction members 36 located at the bottom side of the suction carriage 34 have their bottom sides arranged in a plane which is parallel to the press table 8 and is located above the table surface 14 by a distance approximately equaling the thickness of the material 7 to be pressed.

FIGS. 1 and 2 illustrate the starting position of the charging device 1 with which the material 7 to be

pressed is located in the closed press 2, whereas the supporting rollers 16 are located outside the press 2 substantially below the press table 8 in such a way that the foremost supporting roller 16 has reached nearly the uppermost position of the rear sprocket 11. The prepared material 7 to be pressed rests upon the upper section 20 of the cover conveyor 4 in such a way that its rear end 26 protrudes beyond the rear end of the conveyor 4 and is connected to the holding member 6 occupying its starting position.

After the material 7 has been pressed in press 2, the upper portion 9 of the press is moved upwardly so that the suction carriage 34 can move in the direction of the arrow 38 into the press 2 and can pick up the pressed material and move in the direction of the arrow 37 back over the roller system 33 where the pressed material is then deposited onto the roller system 33.

When the suction carriage 34 begins to move back in the direction of the arrow 37 and thus when pressed material 7 starts moving out of the press 2, the press conveyor 3 is started in such a way that its upper section 13 moves in feeding direction indicated by the arrow 37, and the supporting rollers 16 are moved from the rear reversal 11 over the table 8. At the same time and at the same speed, also the conveyor 4 and the chains 21 of the holding member 6 are started so that the not yet pressed material 7 can be transferred in the direction of the arrow 37 in a substantially frictionless manner onto the supporting rollers 16 of the press conveyor 3 and by the latter will be moved above the press table 8 which is slightly wider than the material 7 (See FIG. 3). The conveyor 3, the conveyor 4, and the holding member 6 are accelerated in the feeding direction indicated by the arrow 37 over the first half of the stroke up to a maximum speed, whereupon the holding member 6 and as the case may be, the conveyor 4 is over the second half of its stroke slowed down again until it comes to a standstill, in such a way that the moved-in material 7 will, when its moving or pressing position has been reached, be arrested by the holding member 6 (FIG. 4) with regard to the feeding direction indicated by the arrow 37. The connecting point 27 of the holding member 6 with the chains 21 may be located at the bottom side of the front reversal 23 of said chains 21. During the delay or retardation of the holding member 6, however, the press conveyor 3 is accelerated further so that the supporting rollers 16 carry out a relative movement with regard to the material 7 in the feeding direction indicated by the arrow 37 and are pulled away from below the material 7. A holding member 6 may be so arranged that during this pulling away it will hold the rear end 26 of the material 7, for instance in such a way at slight distance above the press table 8, that the material 7 will during the entire pulling away of the supporting roller 16 be located parallel to the press table 8 and after pulling away the last supporting roller 16 is with its front end first deposited upon the press table 8. Simultaneously therewith or directly afterwards, the holding member 6 can be detached from the rear end 26 of the material 7 and can again be moved out of the press 2. In this way, the material 7 will only in the last moment directly before the press 2 can be closed, have its bottom side resting on the press table 8, whereupon the upper part 9 of the press 2 is moved downwardly, and the material 7 is pressed in conformity with FIG. 5. During this pressing operation, the press conveyor 3 fully moves to the starting position of the supporting rollers 16 in conformity with FIGS. 1

and 5, whereas the holding member 6 is returned in the direction of the arrow 38 to its starting position in conformity with FIG. 5. During the moving-in of the material 7 to be pressed into the press 2, additional material 7 to be pressed can be prepared on the depositing conveyor 5 which material 7 will then during the pressing operation be transferred from the conveyor 5 to the conveyor 4 in such a way that the material 7 can be grasped at its rear end by the holding member 6. The holding member 6 is pivotally mounted in such a way that when being returned to its starting position it can move above the material 7 on the conveyor 4.

It is, of course, to be understood that the present invention is, by no means, limited to the specific showing in the drawing but also comprises any modifications within the scope of the appended claims.

What is claimed is:

1. A charging device for feeding panels into a press having opposed pressing members for pressing a cover layer on the panel, said device comprising an endless first conveyor in the press having panel supporting members distributed along a portion only of the length thereof and having one position wherein the supporting members are outside the range of the pressing members, second conveyor means outside the press along which the panels move into the range of said pressing members while said first conveyor is operating to move said supporting members in the range of said pressing members in supporting relation to the panel, and a reciprocable holding member operable to engage the trailing end of a panel moving into the press and halt the panel in working position within the range of said pressing members while said first conveyor moves into said one position thereof and releases the panel for engagement with the lower pressing member.

2. A charging device according to claim 1 which includes endless means supporting said holding member and operable to position said holding member to engage the trailing end of the panel remote from the press prior to feeding the panel into the press and to move the holding member in substantial synchronism with said first conveyor during movement of the panel into working position in the press and also operable to retract said holding member after the panel is in working position in the press.

3. A charging device according to claim 1 in which said holding member has a groove facing the trailing end of the panel which embraces the trailing end of the panel, and endless supporting means above the holding member pivotally engaging the holding member in a region which is spaced from the said groove in a direction away from the press, said holding member supporting the trailing end of the panel above the level occupied by the panel during pressing thereof by said pressing members.

4. A charging device according to claim 1 in which said second conveyor means comprises a pair of conveyors each about as long as a said panel and in adjacent coplanar relation with a gap therebetween, said holding member being receivable in said gap when in retracted position for engagement with the trailing end of a panel on the one of said pair of conveyors which is nearest said press.

5. A charging device according to claim 1 in which said first conveyor comprises at least one endless band, reversing rollers at opposite ends of the working space of the press about which said band is entrained, said supporting members being distributed along a longitu-

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dinal region of said band about equal to the length of a panel to be treated in the press.

6. A charging device according to claim 1 in which said first conveyor comprises a pair of endless bands in respective planes parallel to the direction in which a panel is fed into the press, each of the bands being outside the range of said pressing members on a respective one of the fore and aft sides of the press, said supporting members comprising roller bodies extending laterally between said bands and distributed along a longitudinal region thereof about equal to the length of the working space of said press in the feed direction.

7. A charging device according to claim 6 which includes a feed foil exchangeably connected to said

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supporting members and disposed within the range of said pressing members.

8. A charging device according to claim 1 in which said second conveyor means comprises a pair of conveyors in end to end relation and each about as long as a panel to be fed into the press, a discharge conveyor on the side of the press opposite said pair of conveyors, and a suction device operable to engage a panel in working space in the press from above operable to lift a pressed panel off the lower pressing member and move the panel from the press to the discharge conveyor.

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