

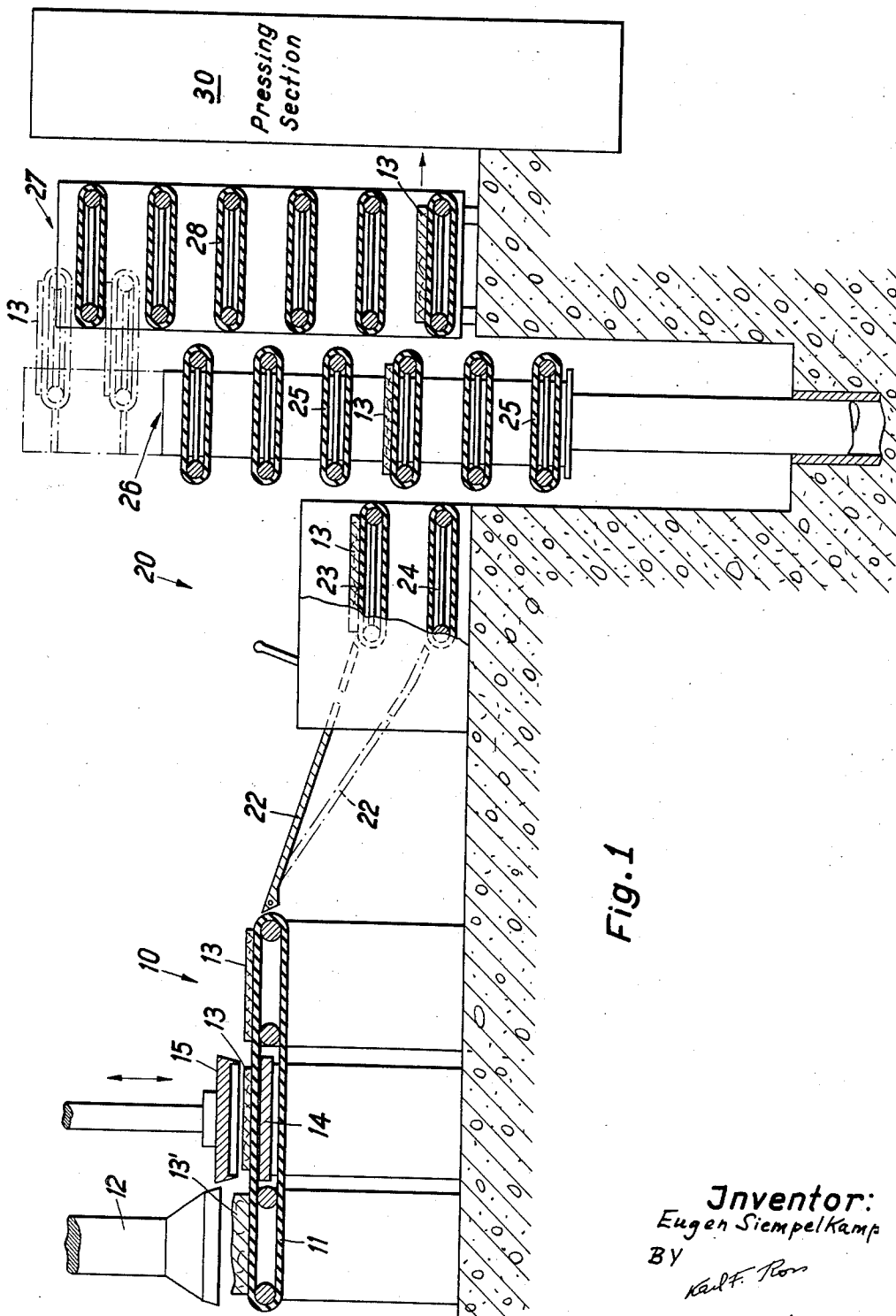
Feb. 12, 1963

E. SIEMPELKAMP
PROCESS AND APPARATUS FOR CHARGING AND
DISCHARGING MULTI-LEVEL PRESSES

3,077,271

Filed Aug. 24, 1959

4 Sheets-Sheet 1



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4 Sheets-Sheet 2

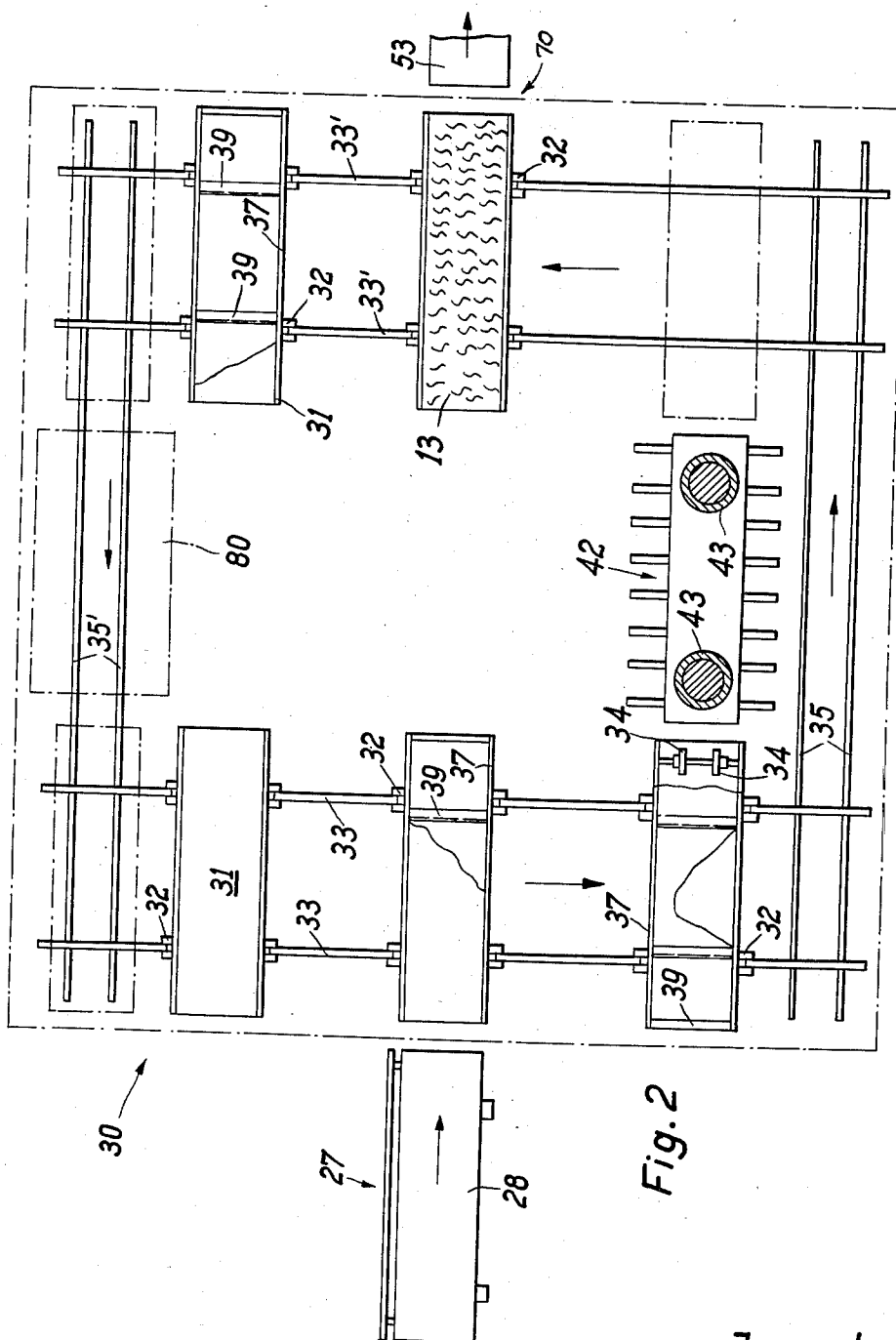


Fig. 2

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Fig. 3

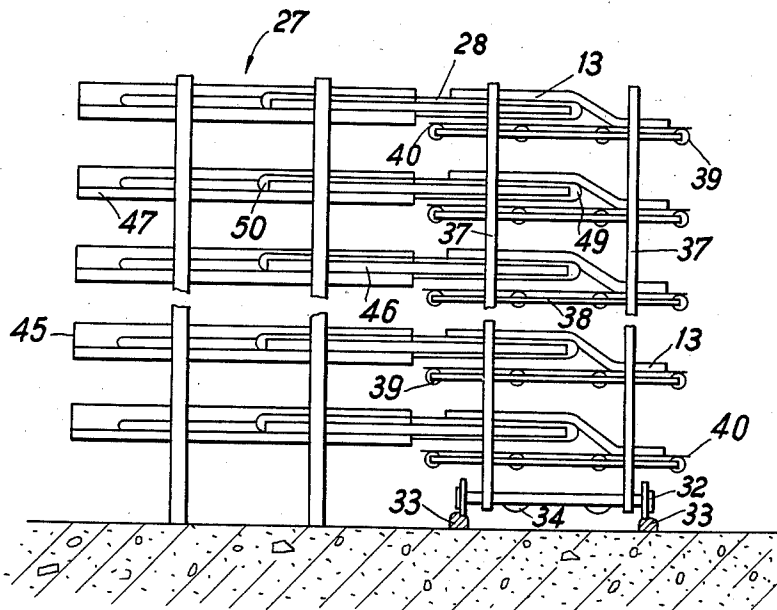
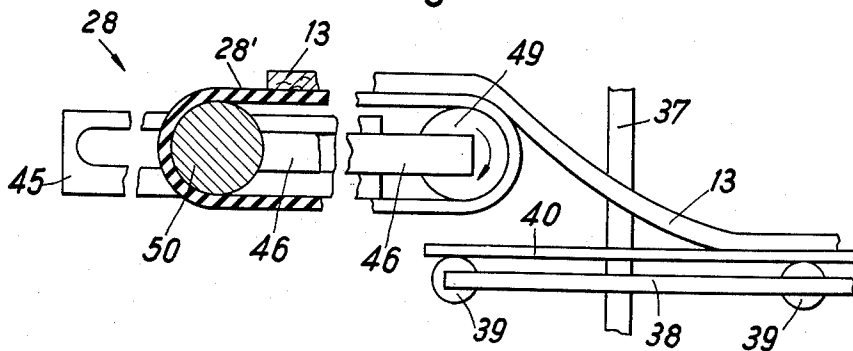


Fig. 3a



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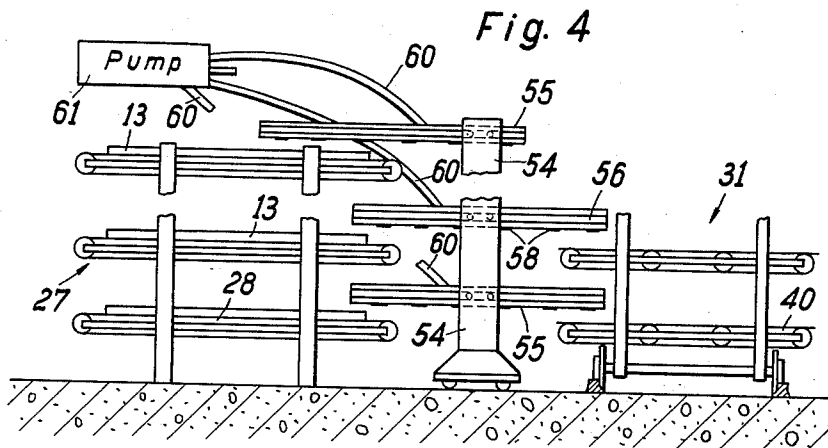
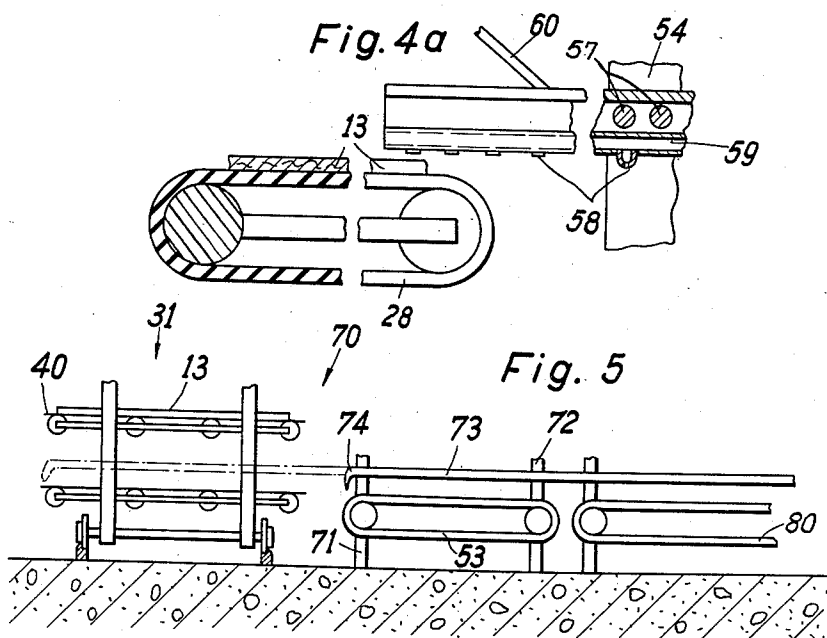
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PROCESS AND APPARATUS FOR CHARGING AND DISCHARGING MULTI-LEVEL PRESSES

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Filed Aug. 24, 1959, Ser. No. 835,687

Claims priority, application Germany Aug. 23, 1958
6 Claims. (Cl. 214-16.6)

My present invention relates to a process and an apparatus for the charging and discharging of multi-level presses and, more particularly, to the loading and unloading of such presses for the manufacture of sheets of compacted cellulosic material, such as wood chips or fibers, known in the building industry as fiberboard sheet and under various commercial names.

In the present processes for producing such sheets, wood chips and/or wood fibers are distributed on a charging tray in a wet or otherwise plastic condition, the sheets are rough-pressed to a generally flat form, and the rough-pressed boards are then stacked and fed into a multi-level press for sustained compression in the presence of heat, steam or other drying and stiffening media. In the conventional mass production of such sheets, the roughly-formed boards are stacked in small groups upon charging plates or trays for compression in the multi-level press; still, the relatively long press time per sheet results in a slowing down of the overall process as each tray is kept out of circulation for the duration of an entire press cycle.

An important object of my present invention is the provision of a system for the acceleration of cellulosic-sheet production by reducing the press time per sheet.

A more specific object of the invention is the provision of an improved and accelerated process for charging and discharging multi-level presses.

A feature of my invention is the provision of a conveyor system for the transfer of roughly pressed sheets in stacks, whereby the sheets received from the stacking section (preferably of the type disclosed in my co-pending application Ser. No. 835,686, filed on even date herewith) of a fiberboard plant or the like are transferred to charging trays carried by a multi-level truck; the truck is then moved to a charging position, where the trays and the sheets thereon are placed on the anvil of a multi-level press for compression to the final thickness of the sheets, and thence to a discharging position, where the trays with the compressed sheets thereon are returned to the truck, preparatorily to the unloading of the sheets from the trays of the truck for further processing or discharge from the plant.

According to a more specific feature of the invention, several trucks are guided by suitable means (e.g. rails) in a closed path past the pressing stage, this path including the several transfer, charging and discharging positions referred to above and, advantageously, also a cooling stage (such as, for example, a wind tunnel) in which the empty trays are cooled down from the elevated temperatures encountered in the press. Thus, none of these trays passes through the precompression and stacking stages traversed by the sheets on their way to the multi-level main press.

The above and additional features, objects and advantages of my invention will become more readily apparent from the following description of a plant for the manufacture of fiberboard sheets or the like, reference being made to the accompanying drawing in which:

FIG. 1 is a schematic view of a plant according to the invention;

FIG. 2 is a top-plan view of the preess and the charging and discharging apparatus therefor;

FIG. 3 is a side-elevational view of a portion of the apparatus;

FIG. 3a is a detail view, partly in section, of a part of the apparatus shown in FIG. 3;

FIG. 4 is a side-elevational view of a transfer device adapted to be used with the apparatus of FIG. 2;

FIG. 4a is a detail view, partly in section, of the device shown in FIG. 4; and

FIG. 5 is a side-elevational view, partly in section, of the discharge station of the apparatus of FIG. 2.

In FIG. 1 I show a schematic layout of a plant for the production of fiberboard and similar sheet materials for the purpose of illustrating the movement of the fiberboard sheet through the several stages of its manufacture. The plant comprises a rough-forming section, a stacking station, and a finish-forming or press section. The rough-forming station 10 comprises a conveyor belt 11 upon which wood fiber in a wet or dampened condition is distributed by a spreader 12 to form a pile of fiber 13' on conveyor 11. The belt 11 carries the mass 13' over an anvil 14 where the mass is roughly pressed by a plunger 15 to sheet form in a rapid operation. The rough sheet 13 is then transferred, e.g. by the same belt, to the stacking section 20 which, as described in my above-identified co-pending application, may comprise a swinging platform 22 adapted to distribute the sheets from primary conveyor belt 11 to two or more secondary conveyor belts 23, 24 from which the sheets are transferred onto conveyor belts 25 of an elevatable stacking rack 26. From rack 26 the sheets are advantageously transferred to a multi-level stationary conveyor rack 27 having a number of superposed conveyor belts 28 equal to the number of belts 25.

The sheets may then be fed into the finishing or pressing section 30 which will be more particularly described with reference to FIGS. 2, 3 and 3a.

Section 30 comprises several trucks 31 having flanged wheels 32 and 34, alternately lowerable for respective engagement of transverse tracks 33, 33' and longitudinal tracks 35, 35' for displacement of the trucks along these tracks in a generally counterclockwise sense as viewed in FIG. 2. The trucks 31 are provided with side-support members 37 and cross-bars 38, rigidly secured to uprights 37 (best seen in FIG. 3). Rollers 39, journaled in cross-bars 38, determine a plurality of stacking tiers each adapted to carry a charging tray 40. A hydraulic press 42 is so positioned as to permit a set of stacked trays 40 to be admitted from a truck 31 to the press and to be removed therefrom to the same truck. The pressure is applied by conventional hydraulic cylinders 43 actuated by a pump not shown. The press 42 is further provided with heating means serving to dry the pressed material.

As may be seen from FIGS. 3 and 3a, each tier of the multi-level stationary conveyor rack 27 is formed by two horizontal channel members 45 (only one shown) in which extension arms 46 are slidable. Each conveyor-belt unit 28 comprises a belt 28' carried by drums 49 and 50 which are journaled in the arms 46 for bodily horizontal displacement of the unit out of and into the rack. The belt 28' is driven clockwise by suitable manual or automatic means not shown.

In operation, roughly pressed sheets 13 are deposited on the stationary conveyor rack 27 from the stacking section 20. A truck 31 is then positioned on the tracks 33 in front of this rack, its conveyor-belt units 28 are then displaced to the right (FIGS. 3 and 3a), and the belts 28' on drums 49, 50 are rotated to deposit the sheets on respective trays 40 with which they are interleaved, this operation being advantageously accompanied by a leftward withdrawal of the conveyor units 28 at the speed of their belts whereby the loosely cohering sheets 13 come to rest on the trays

40 without undue strain. Once the multi-level truck 31 is loaded, it is rolled to a charging position next to press 42. The trays 40 with the sheets 13 thereon are then inserted into press 42 which is advantageously provided with a number of platforms equal to the number of tiers of trucks 31, each of the platforms being directly lined up with one of the tiers to enable the trays 40 to be rapidly rolled into the press. Pressure and heat are then applied to compress the sheets 13 to the required thickness and to dry them, thus producing the finished fiberboard sheets. The trays 40 carrying the sheets 13 are removed from the press 42, at the conclusion of its operation, by sliding these trays 40 onto the truck 31 from which they had been charged into the press and which has in the meantime been moved along tracks 35 from the charging side on the left to the discharge side on the right of press 42. Next, the reloaded truck 31 is moved along tracks 33' to an unloading station 70 adjacent a conveyor belt 53 upon which the finished sheets 13 are placed for removal to a storage room, a kiln for further curing, or any other destination. The truck 31, still carrying the hot trays 40 which are now empty, is then moved past a cooling position 80 along tracks 35' where the plates may once again be positioned opposite conveyor rack 27 for loading. It will be noted that additional trucks 31 are provided so that while one truck is unloading at the conveyor 53, other trucks are loading at conveyor rack 27, charging the press 42, and cooling at the station 80.

In FIGS. 4 and 4a I illustrate another device for delivering rough-pressed sheets to the trucks 31, comprising a transfer rack 54 movable on wheels and adapted to remove the sheets 13 from conveyor rack 27 and to deposit them on the trays 40. The rack 54 is provided with a number of suction plates 55 having channels 56 adapted to receive rollers 57 journaled in the side walls of that rack. The number of suction plates 55 is equal to the number of tiers of conveyor rack 27 and of trucks 31. Each suction plate 55 is provided with numerous nozzles 58 which open into a suction chamber 59 in the plate 55 and are connected via pipes 60 with a suction pump 61. In operation, the transfer rack 54 is pushed against conveyor rack 27, the suction plates 55 are displaced along rollers 57 and positioned over the sheets 13 on conveyor rack 27, and suction is applied to hold the sheets 13 on the lower face of the plates 55. The plates are then shifted to overlie the trays 40 on truck 31 whereupon the suction is cut off and the sheets 13 are gently dropped on the trays thereon. When truck 31 is loaded, it is positioned so as to charge press 42 as described above.

FIG. 5 shows the unloading station 70 as comprising a pair of intermediate conveyor belts 53 journaled in uprights 71, 72 and a conveyor belt 80 leading to a shipping or storage area. Unloading arms 73, each having a hook 74 adapted to engage a finished sheet 13, are slidably mounted on uprights 71, 72. To unload, a truck 31 carrying sheets 13 is positioned along tracks 33', arms 73 are displaced so that hooks 74 engage the far edge of sheets 13, and the arms 73 are then retracted to draw the sheets 13 onto belts 53 whence they may be transferred to conveyor 54 for delivery to the desired storage location. The truck 31 may then continue to the cooling station. The arms 73 may be actuated manually or by suitable automatic means, not shown, and may be operated in unison or successively and coordinated with other operations of the plant as described if automation is desired.

Many modifications of the system specifically disclosed will be readily apparent to persons skilled in the art. In particular, it is possible to transfer the rough-pressed sheets 13 without trays, if so desired, e.g. if the press 42 is adapted to receive the entire truck 31 so that the final forming of the sheets will take place on the truck; the sheets may be transferred to the trucks directly from the stacking mechanism, thereby eliminating the intermediate conveyor rack 27. These and other modifications may be

made without departing from the spirit and scope of the invention as defined in the appended claims.

I claim:

1. A process for charging and discharging a press adapted for the compression of sheet material on a tray, with the aid of a movable support for said tray, said press having a charging side and a discharging side opposite said charging side, comprising the steps of leading said support over a closed path surrounding said press and including a loading station, a charging station adjacent said charging side, a discharging station adjacent said discharging side, an unloading station and a cooling station, loading sheet material onto said tray on said support at said loading station, transferring the loaded tray to said press at said charging station, receiving the loaded tray from said press at said discharging station, removing said sheet material from said tray at said unloading station while leaving said tray unloaded on said support, and allowing the unloaded tray to cool upon the passage of said support through said cooling station prior to the return of the support with said tray to said loading station.

2. A process according to claim 1 wherein said support is moved past the charging and discharging sides of said press over two parallel ways respectively adjacent said charging and discharging sides, said tray being transferred to and from said press in a direction transverse to said ways.

3. A process according to claim 1 wherein additional trays are carried in like manner over said path in at least one other support, said other support passing through said cooling station concurrently with the treatment of the sheet material from the first-mentioned support in said press.

4. A system for the charging and discharging of a multi-level press adapted for the compressing of sheet material, said press having a charging side and a discharging side opposite said charging side, comprising track means forming a closed path surrounding said press with a pair of parallel branches respectively leading past said charging side and said discharging side, at least one multi-level truck displaceable along said path, supporting means on said truck for a plurality of stacked trays capable of carrying said sheet material, and means on said truck for guiding said trays out of and back into said truck in a direction transverse to the motion of said truck over said parallel branches whereby the loaded trays are transferrable from said truck to said press and vice versa upon the arrival of said truck opposite said charging side and said discharging side, respectively; said path being provided with a cooling station at a location remote from said press, a loading station between said cooling station and said charging side, and an unloading station between said cooling station and said discharging side.

5. A system according to claim 4 wherein said path consists of two transverse branches in addition to said parallel branches and one of said transverse branches bypasses said press, the other of said transverse branches being provided with said cooling station.

6. A process for charging and discharging a press, adapted for the compression of sheet material on two trays, with the aid of two movable supports for said trays, said press having a charging side and a discharging side opposite said charging side, comprising the steps of leading one of said supports over a closed path surrounding said press and including a loading station, a charging station adjacent said charging side, a discharging station adjacent said discharging side, an unloading station and a cooling station, loading sheet material onto one of said trays on said one support at said loading station, transferring the loading tray from said one support to said press at said charging station, receiving the loaded tray from said press at said discharging station, removing said sheet material from said one tray at said unloading station while leaving said one tray unloaded on said one support, allowing the unloaded tray to cool upon the passage of said one

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support through said cooling station prior to the return of said one support with said one tray to said loading station, and carrying the other of said trays in like manner over said path on the other of said supports, said other support passing through said cooling station concurrently with the treatment of the sheet material from said one support in said press.

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