

Nov. 8, 1938.

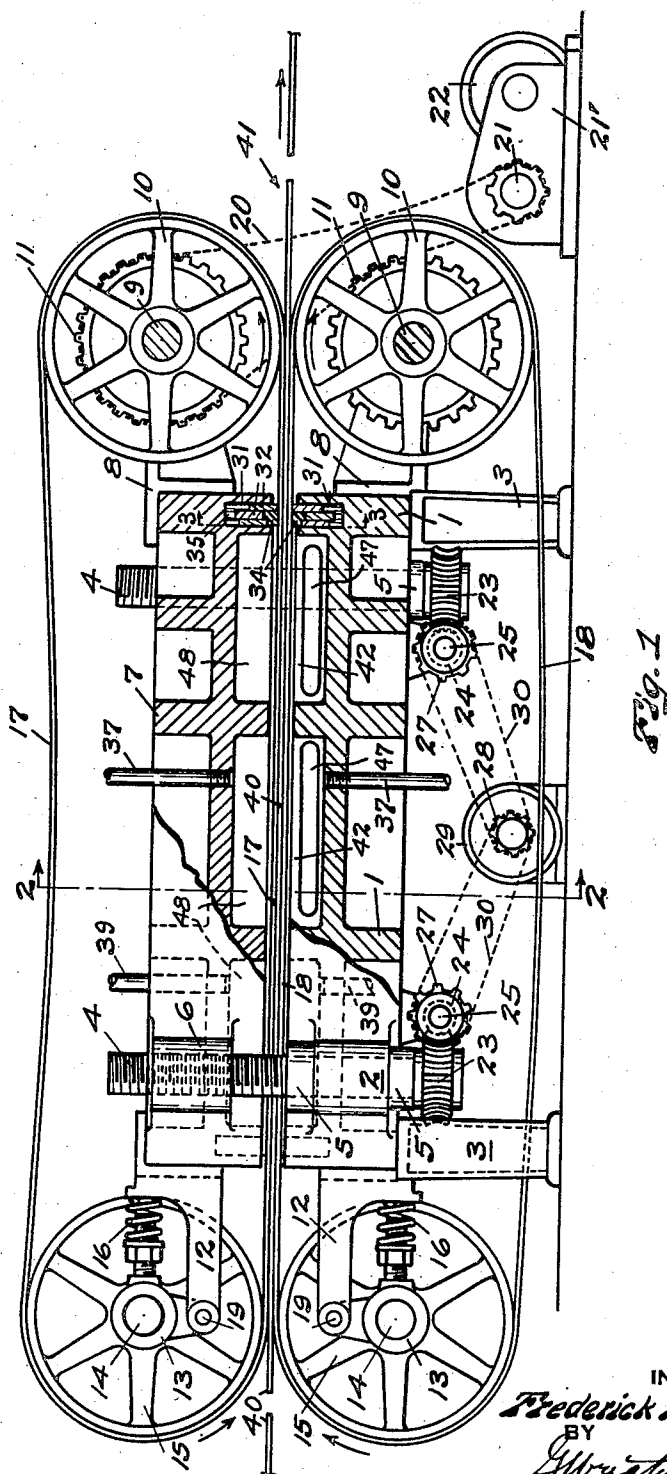
F. A. NICHOLSON

2,135,763

ENDLESS TRAVELING PLATEN FLUID PRESSURE PRESS

Filed Nov. 13, 1935

3 Sheets-Sheet 1



INVENTOR

Frederick A. Nicholson

BY

Elmer E. Arnold
ATTORNEY

ATTORNEY

Nov. 8, 1938.

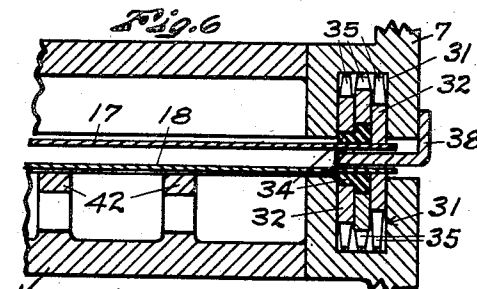
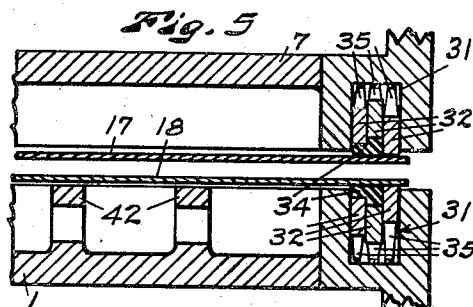
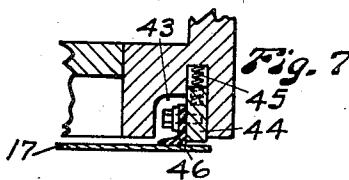
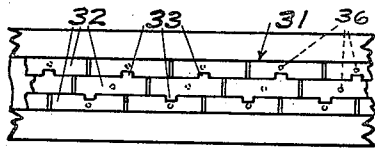
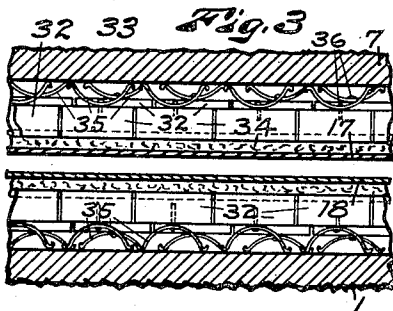
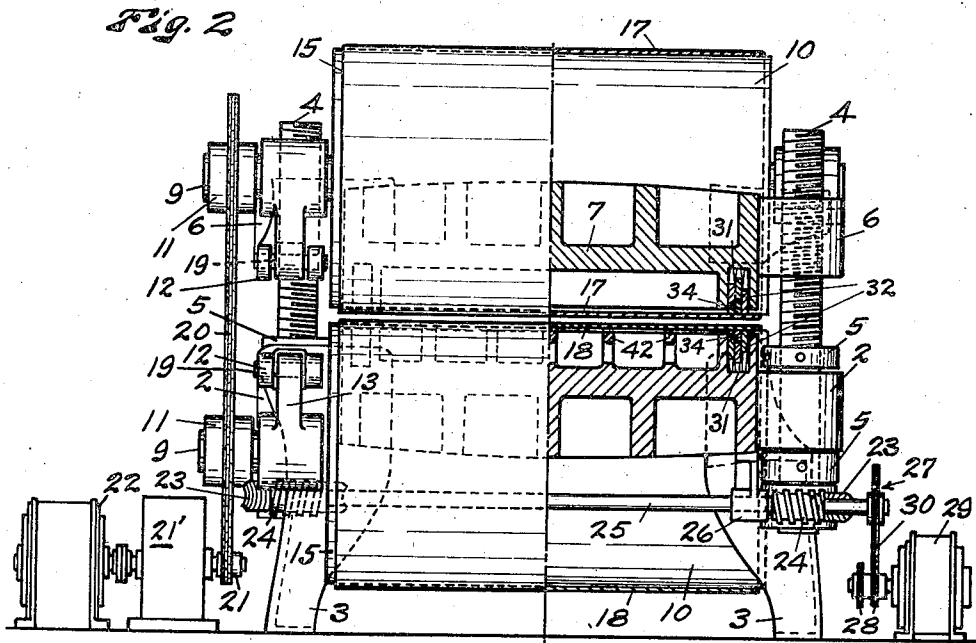
F. A. NICHOLSON

2,135,763

ENDLESS TRAVELING PLATEN FLUID PRESSURE PRESS

Filed Nov. 13, 1935

3 Sheets-Sheet 2



INVENTOR
Frederick A. Nicholson

BY

Wroughton Chubb
ATTORNEY

Nov. 8, 1938.

F. A. NICHOLSON

2,135,763

ENDLESS TRAVELING PLATEN FLUID PRESSURE PRESS

Filed Nov. 13, 1935

3 Sheets-Sheet 3

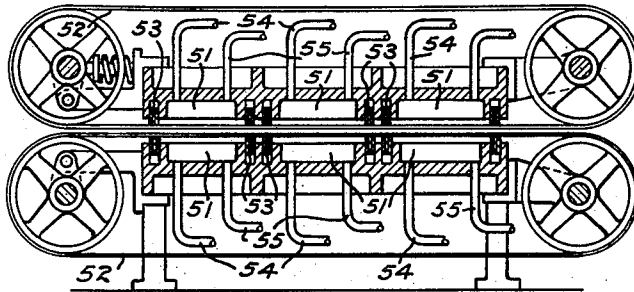


Fig. 8

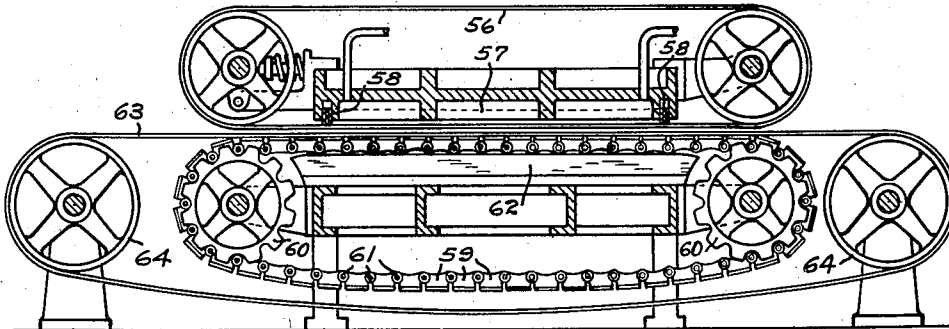


Fig. 9

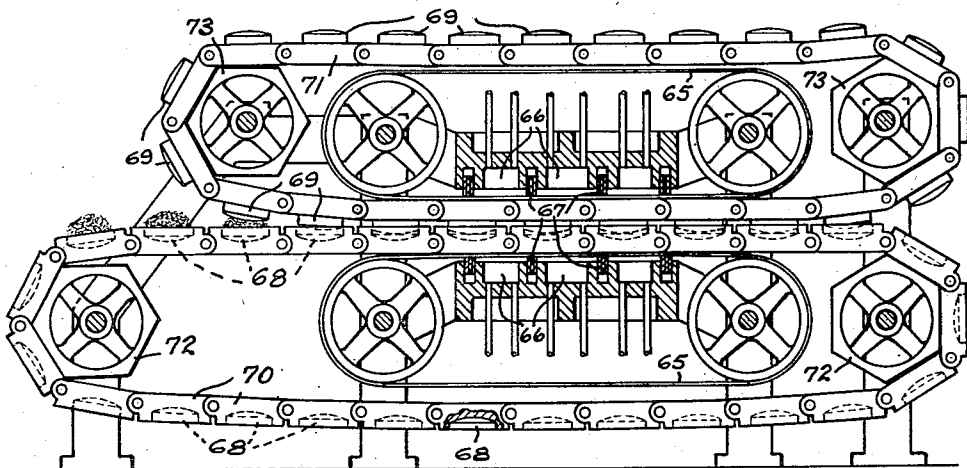


Fig. 10

INVENTOR
Frederick A. Nicholson
BY
Wright Arnold
ATTORNEY

UNITED STATES PATENT OFFICE

2,135,763

ENDLESS TRAVELING PLATEN FLUID PRESSURE PRESS

Frederick A. Nicholson, Seattle, Wash.

Application November 13, 1935, Serial No. 49,547

13 Claims. (Cl. 100—35)

My invention relates to an endless traveling platen fluid pressure press. More particularly, my invention relates to a machine in which fluid pressure is used directly against traveling platens to press or squeeze substances or materials between said platens.

Without limiting myself to such use and setting the same forth only as an example, my device is particularly useful in gluing sheets of veneer together to form plywood, and uniting layers of material to form boards such as fiber board. Also my invention is particularly useful where heat and pressure are used in processing compounds called plastics, or where heat or pressure or both are simultaneously used to remove water from or otherwise treat products, for example sheets of pulp or wood fibers, or plastics.

It is an object of the invention to provide a pressing device where a fluid such as steam may be used to provide the pressure urging a traveling platen in one direction and at the same time to utilize this pressure producing medium as the heating medium.

It is an object of my invention to provide a press device which is particularly applicable for use in connection with a continuous process for producing plywood where dry glue is used.

An object of my invention is to provide a machine wherewith the materials to be pressed can be introduced into one end of it and move continuously or progressively through it while being subjected to the required pressure or heat, or pressure and heat, and thus form a steady stream of production into and out from the machine. This mode of operation is to be distinguished from the commonly practiced method wherein the layers of material are placed between the stationary platens of a press and there subjected to the required pressure and then removed after the platens have been drawn apart.

Another object of my invention is the provision of a plurality of longitudinally spaced fluid pressure chambers positioned directly against a traveling platen permitting products, traveling through the machine, to be successively subjected to a plurality of pressures, temperatures, or pressures and temperatures.

Another object of my invention is to provide continuously traveling platens which provide a substantially uniform pressure, cross sectionally considered, on the articles which are run through the machine. This permits an entirely new use of an endless platen press and permits the use of such a device on plywood and the like where

such uniform pressure is necessary to provide a uniform glue bond.

Another object of my invention is the production of great unit surface pressure, or such pressure and heat, on material between traveling platens with very low mechanical friction between the traveling platens and the supporting means therefor.

Another object of my invention is to provide continuously operated means for moving together complementary parts of traveling moving dies and to provide the desired temperature and pressure to such dies.

In general, I attain these objects by having two endless flexible traveling belts, such as metal belts, arranged to run with their adjacent outside faces substantially parallel and separated by an amount determined by the thickness of the material being treated, and having fluid pressure chambers or pans positioned directly against equal portions of the belts on their surfaces opposite their adjacent sides with the joint between the edges or rims of the chambers and the belts sealed with flexible packing; thus when steam, water, air, oil or other fluid is introduced in the chambers the belts will be thrust toward each other exerting uniform pressure on material introduced between them while they may at the same time be traveling across the chambers with no more friction between the belts and their supporting means than that produced by the packing and the fluid in the chamber.

The above mentioned general objects of my invention, together with others inherent in the same, are attained by the devices illustrated in the following drawings, the same being preferred exemplary forms of embodiment of my invention, throughout which drawings like reference numerals indicate like parts:

Figure 1 is an elevation of the machine with part of the side of the pressure chambers cut away for a sectional view;

Fig. 2 is a view with parts shown in end elevation and parts sectionalized on the line 2—2 in Figure 1, to expose the chambers and packing means;

Fig. 3 is an enlarged fragmentary sectional view substantially on broken line 3—3 of Figure 1 of packing or sealing means positioned between the edges of fluid pressure chambers and traveling belts;

Fig. 4 is a detached fragmentary plan view of the packing means as it might appear with the packing strip removed;

Fig. 5 is an enlarged fragmentary vertical sec-

tional view through the packing or sealing means at one side of the machine;

Fig. 6 is a view similar to Fig. 5 showing a means which may be used for closing the space between the edges of two traveling belts;

Fig. 7 is a fragmentary sectional view showing an alternative form of packing means;

Fig. 8 is a longitudinal sectional view of a modified form of my invention, showing a plurality of longitudinally spaced fluid pressure chambers positioned directly against a traveling platen, with parts being omitted or broken away for the purpose of clearness;

Fig. 9 is a longitudinal sectional view of a modified form of my invention showing fluid pressure means directly against a traveling platen used in combination with a mechanically supported belt, parts being omitted or broken away for purposes of clearness; and

Fig. 10 is a longitudinal sectional view of a still further modified form of my invention illustrating my invention adapted to be used with complementary parts of traveling dies urged together and attaining desired temperatures by fluid pressure means.

Referring to Figure 1 of the drawings, the frame of the machine may comprise a casting 1, together with the four attached legs 3. The four screws 4, each having two thrust collars 5, 5 fixed thereon and free to rotate in the bearings formed by lugs 2, are threaded through four lugs 6 which are integral with the casting 1. Two bearing brackets 8, 8 are secured to one end of each of castings 1 and 7 to support the shafts 9, 9 on which are mounted the pulleys 10, 10 and the drive sprockets 11, 11. To the opposite ends of each of the castings 1 and 7 are secured two brackets 12, 12 each of which supports a hinged bearing 13 in which may rotate the shafts 14, 14 carrying the pulleys 15, 15. The four brackets 12 are arranged near their bases to form a seat for one end of the compression springs 16, which are adjustably seated at their opposite ends against the hinged bearings 13.

The traveling endless belt, such as metal belt 17, is supported by the two upper pulleys 10 and 15, and the traveling endless metal belt 18 is supported by the two lower pulleys 10 and 15. Proper tension of the belts 17 and 18 is secured by means of the springs 16 against the hinged bearings 13, which are free to swing on the pivots 19, thus allowing the pulleys 15 to move longitudinally of and tighten up the belts 17 and 18.

Sprockets 11, 11 are mounted on shafts 9, 9. An endless driving belt, for example a chain 20, is led around the upper sprocket 11 and the small driving sprocket 21. The sprocket 21 is attached through a suitable speed reduction device 21' to a source of power, as electric motor 22. The sprockets and chain are so located as to cause the lower side of the chain 20 to engage teeth on lower sprocket 11, thus causing the sprockets 11, 11 to rotate in opposite directions when power is applied and driving the belts 17, 18 through the shafts 9, 9 and pulleys 10, 10, the adjacent faces of the belts moving forward at the same rate, in the direction of the arrows.

Each of the four rotatably mounted screws 4 is preferably provided with a relatively fine thread of small pitch and each of the screws 4 has secured on its lower end one of the similar worm gears 23. Each of the worm gears 23 meshes with one of four similar worms 24. The

worms 24 are mounted on the respective ends of and are driven by the shafts 25, 25, which shafts are journaled in the four bearings 26 secured to the casting 1. (See details shown in section in Fig. 2.) The sprockets 27, 27 of equal size are attached to adjacent ends of shafts 25, 25. Each of the sprockets 27 is connected to one of the sprockets 28 by means of an endless belt, as a chain 30. The sprockets 28 are connected to a suitable source of power as reversible motor 29. Thus the screws 4 may be turned and by means of threads of the four lugs 6 engaging with screws 4, the lugs 6 and the whole upper section of the machine supported thereon comprising the casting 1 and equipment mounted thereon may be raised or lowered at will through application of power 29 in the desired direction, by means of the transmission mechanism described, making it convenient to obtain rapid and minute adjustment of the opening between the adjacent parallel faces of the belts 17 and 18.

Referring to the part of Fig. 2 cut away in section, the castings 1 and 7 will be seen to have their opposite adjacent portions similarly recessed to form fluid pressure chambers 47 and 48, except that ribs or bars 42 are arranged across the chamber in casting 1 and have their sides level with the top of casting 1 thus forming a flat support against the under surface belt 18. Both castings 1 and 7 have their edges around the four sides of the fluid pressure chambers 47 and 48 arranged in relatively close spaced relation with opposite surfaces of the belts 18 and 17 respectively. The belts 18 and 17 comprise adjacent sides of the fluid pressure chambers 47 and 48.

Continuously around the edges of castings 1 and 7 are block retaining means in the nature of the channels 31, 31 in which are placed a series of blocks 32 (shown in Figs. 1 to 6, inclusive) interlocking by means of the transverse tongues and grooves 33 as shown in plan in Fig. 4, but free to move vertically and urging the fibrous packing material 34 into contact with the belts 17 and 18 from the effect of pressure, as of the leaf springs 35 acting between a wall of the channels 31 and the blocks 32. Each spring may be connected with its companion block by means of the dowels 36. Such structure permits any fluid which may escape from the fluid pressure chambers 47 and 48 into the channels 31 to augment the pressure of springs 35 in urging the packing 34 against the belts and forms a flexible seal entirely around the edges of and enclosing the said fluid pressure chambers. The packing material used is preferably high pressure packing material, the exact nature depending upon the fluid and temperature used and may be fabric impregnated with molded rubber or gutta percha, graphite, leather or other well known packing material.

The blocks 32, fibrous material 34 and springs 36 may comprise only one form of suitable sealing means, therefore I do not wish to confine myself to this sealing means alone.

Another form of packing means is shown in Fig. 7, where a channel 43 is used in place of the channel 31 shown in the preceding figures. A plurality of blocks 44 in said channel 43 are urged toward the traveling belts, as belt 17, by means of springs, as compression spring 45. A substantially L shaped packing means 46, which functions similar to an ordinary cup leather is secured to the blocks 44. The fluid pressure in the chambers, together with the pressure of

springs 45, maintains a fluid seal between the packing means 46 and the traveling belt 17.

In Fig. 6, 38 represents a section of an angle bar which may be secured to casting 7 and project between both edges of belts 17 and 18 for the purpose of permanently separating the belts at their edges, and also, to confine soft materials being processed to a limited width.

Referring again to Figure 1, the inlet pipes 37, 37 communicate with the fluid pressure chambers 48 and 47 formed between belt 17 and casting 7 and between belt 18 and casting 1, respectively, and may have their opposite ends connected to a regulated and controlled source of fluid pressure.

If the products being run through the machine require a predetermined temperature during pressing, an outlet pipe 39, 39 shown in Figure 1 may be added to the chambers and a fluid of desired temperature may be continuously circulated through the chambers under pressure sufficient to develop between the belts the required pressure, thus permitting the fluid pressure medium to be utilized as the heat producing medium.

Should the materials being treated have a tendency to buckle or distort out of a plane, this may be overcome by adjusting the pressure in the chambers or the pressure in the lower chamber may be reduced below that in the upper chamber by an amount necessary to cause belt 18 to lie against the level surfaces of the bars 42 in Fig. 2.

In Figure 1, 40 is an object to be pressed by my machine and may be, for example, a unit consisting of a plurality of sheets of wood veneer with glue in dry powder form spread over the joints between the sheets. With the belts traveling at the desired rate, a method of operation may be to feed the unit in between the traveling metal belts where sufficient heat will be encountered to melt and solidify the glue and simultaneously sufficient pressure between the belts, (in this case approximately 170 lbs. per square inch, has been found practical) will bring the fibers of the veneer into that intimate contact essential to produce an economical and permanent joint. The material leaves the machine as at 41 completely finished. My device is particularly useful for use in such a process as the device permits uniform pressure and heat, thereby providing a uniform glue bond free from weakened sections and at the same time provides for a continuous process. In specifically pointing out the applicability of my invention for use in pressing veneer using dry glues, it is not to be inferred that my device is not equally useful where wet glues are used.

While in many instances it is preferable to have two traveling belts 17 and 18, it is to be understood that where the character of the product permits, a single belt, such as one of the belts 17 or 18, may be used alone.

Referring to Fig. 8, the device here illustrated differs primarily from the devices illustrated in the preceding figures, in that a plurality of longitudinally spaced fluid pressure chambers are shown, rather than the single fluid pressure chamber shown in the preceding figures. For that reason, and in the interest of simplicity, much of the supporting means is broken away and the description will be generally limited to such novel features. A plurality of longitudinally spaced fluid pressure chambers 51 are disposed directly against endless traveling platens 52. Fluid pressure packing 53 surrounds the edges of the fluid pressure chambers 51. Preferably

inlet pipes 54 and outlet pipes 55 connect each chamber with a separate suitable source of fluid pressure not shown. By providing a plurality of chambers, each of which is connected to a separate source of fluid pressure, each chamber may be subjected to the desired pressure and temperature and the product traveling through the machine may be successively subjected to a plurality of pressures, temperatures, or pressures and temperatures. Such apparatus permits a product to be successively subjected to a plurality of temperatures and pressures, or temperature or pressure so that the product may leave the machine completely processed.

Referring to Fig. 9, I have illustrated a modification of my invention, where only one endless traveling platen receives its pressure from a fluid pressure source, and the other endless traveling platen is mechanically supported. The endless traveling platen 56 is supported in a manner similar to the endless traveling platen 17 shown in Figure 1 of the drawings. A fluid pressure chamber 57 is positioned directly against such traveling platen, similar to the chamber 48 in Figure 1. Fluid pressure packing 58 surrounds the edges of the chamber 57 and forms a fluid seal between the edges of the chamber and the endless traveling platen 56. An endless link belt 59 may be in the form generally used in mechanical pressure devices employing traveling belts. This link belt is supported by sheaves 60. Preferably rollers 61 are rotatably mounted on the inside of the link belt 59 and serve as antifriction means in supporting the link belt 59 on the bed plate 62. To provide a continuous support which will be uninterrupted by spaces between the links, I preferably provide an endless metal belt 63 directly over the link belt 59. This metal belt 63 may be supported on sheaves 64. The above embodiment illustrates the use of a single metal traveling belt which forms one wall of a fluid pressure chamber used in connection with mechanical means supporting a product while traveling adjacent said endless platen.

Referring particularly to Fig. 10, I have shown a still further modification of my invention where endless traveling platens 65 form a wall of fluid pressure chambers 66 and are provided with fluid pressure packings 67, all in accordance with the preceding figures. Complementary parts 68 and 69 are supported respectively by chains 70 and 71. Chains 70 and 71 are mounted for rotation on sheaves 72, 72 and 73, 73, respectively. The chains 70, 71 and platens 65, 65 may be driven by means such as illustrated in Figs. 1 and 2 of the drawings, and in the interest of brevity are not here shown. A plastic requiring heat and pressure in processing the same may be inserted into the parts 68. As the chains 70 and 71 move synchronously through the device the complementary parts 68 and 69 are properly positioned and fluid pressure in the chambers 66 urges such members toward each other and the desired temperature may be simultaneously applied so that the plastic in traveling through the machine will be subjected to the desired temperature and pressure and be delivered from the machine in completed form, at the right hand end of the machine as respects the showing in Fig. 10.

In the event phenol condensation products are processed in the apparatus shown in Fig. 10, a plurality of spaced apart chambers 66 will be useful to successively subject the product to a plurality of pressures, temperatures, or pressure

and temperatures to the end that the phenol condensation product will leave the machine completely processed.

Obviously, changes may be made in the forms, dimensions and arrangement of the parts of my invention, without departing from the principle thereof, the above setting forth only preferred forms of embodiment.

I claim:

- 10 1. In a pressing machine, adjacent traveling belts forming opposing platens, and means forming with said belts fluid pressure enclosing chambers, said means being positioned directly against corresponding opposite areas of the belts.
- 15 2. In a pressing machine, traveling belts forming opposing platens, means forming with said belts fluid pressure enclosing chambers, said means being positioned directly against corresponding opposite areas of the belts, and flexible sealing means positioned between the edges of the chamber forming means and the belts.
- 20 3. In a pressing machine, two similarly traveling belts forming opposed platens, means forming with said belts fluid pressure chambers, said means being positioned directly against equal opposed surfaces of the belts, means sealing the edges of the chamber forming means against the belts, and means to change the distance between the belts.
- 30 4. In a pressing machine, a traveling belt, means forming with said belt a fluid pressure enclosing chamber, said means being positioned directly against said belt, sealing blocks, block retaining means, packing material between said sealing blocks and said traveling belt, and spring means urging the said sealing blocks and packing material thereon against said traveling belts.
- 35 5. In a pressing machine, a traveling belt, means forming with said belt a fluid pressure enclosing chamber, said means being positioned directly against said belt, a plurality of sealing blocks operatively positioned between the belt and the chamber forming means and having interlocking tongue and groove connections, and block retaining means.
- 45 6. In a pressing machine, a traveling belt, means forming with said belt a fluid pressure enclosing chamber, said means being positioned directly against said belt, means forming a sealing receptacle adjacent the edges of the chamber forming means, a plurality of rows of sealing blocks having tongue and groove connections with each other extending transverse of the blocks in said receptacle, packing material between said sealing blocks and said traveling belt, and means urging the said sealing blocks and packing material thereon against said traveling belts.
- 50 7. In a pressing machine, a traveling belt, means forming with said belt a fluid pressure enclosing chamber, said means being positioned directly against said belt, means forming a sealing receptacle adjacent the edges of the chamber forming means, sealing blocks in said receptacle, packing material between said sealing blocks and said traveling belt, and spring means bearing upon said blocks urging the said sealing blocks and packing material thereon against said traveling belts.
- 60 8. In a pressing machine, traveling belts forming opposing platens, means forming with said
- 70

belts fluid pressure enclosing chambers, said means being positioned directly against corresponding opposite areas of the belts, and means longitudinally extending on each edge of the belts for restraining material being pressed from escaping transversely of the belts.

9. In a pressing machine, an impervious metallic traveling belt forming a relatively high pressure pressing platen; means forming with said belt a fluid pressure enclosing chamber for retaining fluids under relatively high pressures operable directly against one face of said belt; and means supporting a product to be subjected to relatively high pressures in operative position as respects the opposite face of said belt and for traveling movement therewith.

10. In a pressing machine, an impervious traveling belt forming a pressure platen; means forming with said belt a fluid pressure enclosing chamber, said means being positioned directly against one face of said belt; a plurality of sealing blocks operatively positioned between the belt and the chamber forming means; block retaining means; and means supporting a product to be pressed in operative position as respects the opposite face of said belt.

11. In a pressing machine, an impervious metallic traveling belt forming a relatively high pressure pressing platen; means forming with said belt a plurality of longitudinally spaced fluid pressure enclosing chambers, for retaining fluids under relatively high pressures operable directly against one face of said belt; means supporting a product to be subjected to relatively high pressures in operative position as respects the opposite face of said belt and for traveling movement therewith; and means adapted to connect each of said chambers with a suitable source of fluid under pressure at the desired temperature, whereby material to be pressed may be subjected to a plurality of pressures and temperatures.

12. In a pressing machine, an impervious metallic traveling belt forming a relatively high pressure pressing platen; means forming with said belt a plurality of longitudinally spaced fluid pressure enclosing chambers for retaining fluids under relatively high pressures operable directly against one face of said belt; means sealing the edges of the chamber forming means against said belt; means supporting a product to be subjected to relatively high pressures in operative position as respects the opposite face of said belt and for traveling movement therewith; and means adapted to connect each of said chambers with a suitable source of fluid under pressure at the desired temperature, whereby material to be pressed may be subjected to a plurality of pressures and temperatures.

13. In a pressing machine, an impervious metallic traveling belt forming a relatively high pressure pressing platen; means forming with said belt a fluid pressure enclosing chamber for retaining fluids under relatively high pressures operable directly against one face of said belt; another traveling belt disposed in spaced relation to said first mentioned belt and positioned to receive between said belts a product to be subjected to relatively high pressures; and means supporting said other belt.

FREDERICK A. NICHOLSON.