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APPARATUS FOR MANUFACTURING PULP ARTICLES

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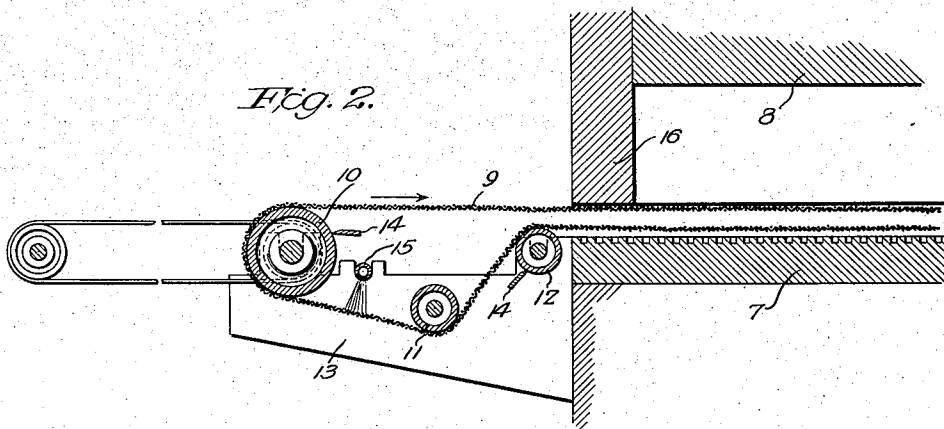
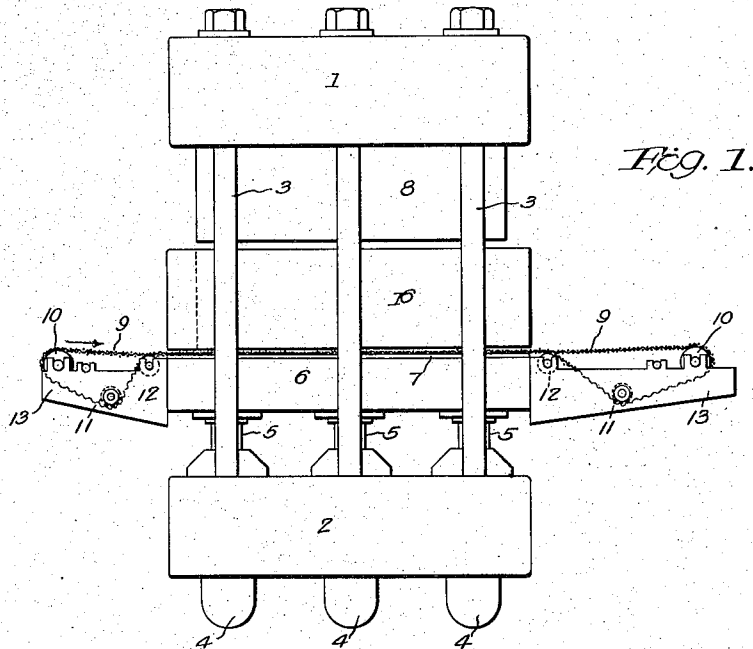
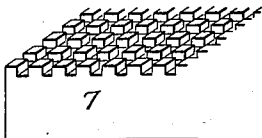


Fig. 3.



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APPARATUS FOR MANUFACTURING PULP ARTICLES.

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To all whom it may concern:

Be it known that I, DANIEL MANSON SUTHERLAND, JR., now a subject of the King of Great Britain, but who in 1922 filed my first papers for naturalization as a citizen of the United States, residing at Trenton, in the county of Mercer and State of New Jersey, have invented certain new and useful Improvements in Apparatus for Manufacturing Pulp Articles, of which the following is a specification.

My invention pertains to the manufacture of homogeneous pulp products, such as pulp or fiber boards, slabs and blocks, and its object is to attain the making of such articles expeditiously, of superior quality, and at relatively low cost, and to facilitate renewal and replacement of the "wire" or endless woven wire belt employed in apparatus for the manufacture of such products.

These ends are attained by a novel manner of mounting and utilizing the endless wire belt, whereby there is secured improved drainage during compression of the pulp, such drainage in turn facilitating adequate compression and permitting it to be effected with smaller expenditure of force or energy, and with lighter mechanism than has hitherto been employed or deemed practicable.

A preferred embodiment of my invention is illustrated in the accompanying drawings, in which:

Figure 1 is an elevation of a molding and pressing apparatus suitable to carrying out the invention;

Figure 2, a fragmentary view on a larger scale illustrating the arrangement of the fixed head and platen of a press and the endless wire belt or "wire" on which the pulp is deposited, molded, compressed, and delivered from the press; and

Figure 3, a view illustrating the grooving of the bottom member of the mold.

These figures are essentially diagrammatic in their nature, the general construction and usual details of machinery of the class being well known to those at all familiar with the art, and hence unnecessary to be illustrated here.

Referring first to Fig. 1, the numeral 1 indicates the upper member, 2 the lower member, and 3 the intermediate tie or stay rods of a hydraulic press frame, which may be of any approved design. The numeral 4 indicates a hydraulic cylinder, of which three are here shown, each provided with a ram

or piston 5, upon the upper ends of which pistons rests and is carried the platen 6 upon which, in turn, is placed the lower member or bottom 7 of the mold in which the article is to be shaped and compressed. The upper face of the member 7 is grooved as shown in Fig. 3, preferably both longitudinally and transversely, to provide channels for escape of liquid expressed from the pulp.

The upper member 8 of the mold is attached in any usual or convenient way to the upper frame member 1 of the press and remains fixed in position while in use, under the embodiment here illustrated, though in practice either the upper or the lower member of the mold, or both said members, may be arranged to move.

9 indicates an endless belt or broad band of woven wire, commonly termed the "wire," extending in an upper and a lower horizontal stretch just above the upper face of the lower member 7 of the mold, as shown in Fig. 2. At the opposite open sides or ends of the press, the wire or belt 9 is carried outward beyond the platen 6 and over and about a roll 10, thence inward and preferably slightly downward, to and beneath a second roller 11, thence upward and over a third roller 12, and finally over the platen as a continuous or endless belt or band, either woven as such, or as a web, cut to suitable length and joined at its ends. In this way two parallel stretches of the wire or belt 9 are formed, one slightly above and normally out of contact with the other, the lower stretch resting upon or slightly clearing the lower member 3 of the mold, as shown in Fig. 2.

The several rolls 10, 11 and 12 at each end of the platen 6 are journaled in plates or brackets 13, bolted or otherwise securely attached to said platen, and hence bodily movable with the platen and with the lower mold member 7 carried thereon. Longitudinal travelling motion is imparted to the wire or belt in any usual or convenient manner which will permit free rise and fall of the platen, rolls, wire, and mold member 7. Flexible shafting connected with a shaft of either roll 10, a belt passing from a driving belt-wheel at some distance from the press, to and about a belt-wheel on the shaft of such roll, or any equivalent drive, may be employed.

Some or all of the rollers 10, 11 and 12 are advisably furnished with scrapers or

doctor plate 14 to remove any pulp or other matter that may lodge upon or adhere to them, the rolls 10 and 12 being shown thus equipped, and spray nozzles 15 are provided for washing the wire belt and removing therefrom any adhering matter, thus keeping the meshes open and clear and affording free escape of liquid through the same. Such nozzles are here shown at a point between the rollers 10 and 11, arranged to discharge water downward upon the stretch of wire-cloth between said rollers. They may, however, be located at other points if desired, either instead of or in addition to being placed where shown in the drawings.

A deckle or rectangular frame 16, having substantially the outside dimensions of the lower member 7 of the mold, is provided, to form the side and end walls of the mold. When in place it rests upon the upper stretch of the woven wire belt 9, and presses the two stretches thereof into contact one with the other, and holds the lower stretch in close contact with said lower member of the mold.

The mounting of the wire in the manner shown is primarily for the purpose of bringing the two stretches or layers of woven wire parallel and in close proximity to each other, as best seen in Fig. 2, so that they may be pressed into and held in contact with each other and with the lower member of the mold; but by reason of the fact that said belt is wholly carried between the upper and lower members of the mold, and that the journals of the rolls 10, 11 and 12 can be readily lifted or removed from their bearings in the brackets or plates 13, the belt can be easily and quickly removed from the press when such removal is desirable. This overcomes the necessity of dismounting heavy and substantial portions of the framing of the press, or severing the wire belt, or disconnecting its ends if not woven in endless form, which several methods of removing the belt are costly in time and labor, and in material, if the belt be severed.

The apparatus being constructed and arranged as above described and the mold members, including the deckle, being properly positioned while the wire belt is at rest, pulp in suitable quantity is delivered into the mold, and the cylinders 4 are supplied with water in the usual manner. As the rams or pistons rise, the wire belt and the entire mold are carried upward, the deckle passing about and encompassing the upper mold member 8, and pressure being applied to the pulp confined within the mold. The liquid expressed from the pulp by such pressure, escapes through the meshes of the wire cloth, and drains off by way of the grooves in the upper face of the bottom member 7 of the mold.

It is found through actual test that by employing the two thicknesses or layers of wire gauze, placed one upon the other and both lying upon the upper grooved face of the mold bottom 7, the water or liquid content of the fluid pulp escapes much more freely than where a single layer is employed; and also that the solid portions of the pulp are less liable to find a lodgement in or to extend through the meshes of the wire. Owing to this freer drainage, less force is required to remove a given percentage of the liquid content, and as a consequence the construction of the press may be materially lighter than where a single layer of woven wire is employed between the pulp and the mold bottom.

The prominent feature of my invention, and the essential novelty of the mechanism or apparatus employed, hence consists in the arrangement of the woven wire belt or wire in such manner that its upper and lower stretches both pass between the upper and lower members of the mold, or between the platen and fixed bed or member of the press. Incidental to this main feature but itself important, is the mounting of the rollers about which the belt or wire is guided, whereby said rollers may be quickly and easily dismounted so that the belt or wire may be conveniently removed from the press for purposes of exchange or repair, and with equal facility be replaced in position. The roll journals may simply rest in bearings open at their upper sides or provided with removable caps, or where this cannot conveniently be done, a removable central rod or axle may have its ends seated in holes in the side frames or brackets 13, and held by end nuts, set screws, or other fastenings. Such removable axle may be conveniently employed in connection with the rollers 11. More or fewer rolls may be employed for guiding and supporting the wire, as found expedient, and this will naturally depend on the dimensions of the apparatus or other influencing causes.

While I have illustrated and described a hydraulic press, it is obvious that any well-known type of press suitable to the work may be employed, such as a screw press, toggle press, or the like.

The endless belt may extend any suitable distance beyond the ends of the platen 6, and can be utilized for carrying or aiding in carrying the deckle to its proper position and delivering the compressed sheet, slab or block out of the press. Its use also serves to give the two layers or thicknesses of wire beneath the pulp, and by reason of the travel of the upper and lower stretches in relatively opposite directions, it aids in dislodging any fibers or fibrous matters which may tend to catch in the meshes of either stretch of the wire, thus greatly facilitating

the cleaning of the belt, any particles adhering to the belt being washed off by the spray after being loosened by the relative movement of the two stretches of the wire.

5 What is claimed is:—

1. Apparatus for forming compressed pulp products, comprising a press having two members between which the pressing is effected, one movable toward and from the
10 other; means for effecting such movement; and an endless wire belt suitably supported and extending in two stretches between said press members, whereby the two stretches may be pressed into immediate contact and constitute a draining surface for
15 pulp introduced between said press members.

2. In apparatus for producing articles of pulp, a press having a movable platen and
20 an opposing bed; a mold placeable between the platen and the bed, and having one wall movable toward and from another; and an endless woven wire belt having its two stretches arranged to pass between said movable and opposing mold walls and to be
25 forced into close contact with each other when the press is operated, whereby a draining body consisting of two thicknesses of woven wire is afforded between the contents
30 of the mold and one of said opposing mold members.

3. In a press for molding and compressing pulp, the combination of a press frame; a movable platen and an opposing bed or
35 member; means for moving the platen toward and from said bed; an endless woven wire belt extending through the press between the platen and the opposing bed; and supporting and guiding rollers for said belt,
40 said rollers being readily removable from within the belt to permit removal of the belt from the press.

4. In apparatus for producing articles of pulp, a press comprising a main frame; a
45 movable platen and an opposing bed or member; plates or brackets carried by opposite ends of the platen and provided with bearings; rollers having journals or axles in said bearings and readily removable
50 therefrom; and an endless wire belt passing about and stretched between rollers of the respective brackets, the two stretches of said belt both extending between the bed and platen of the press in substantially
55 parallel relation and in close proximity one to the other.

5. In apparatus for producing articles of pulp, a press comprising a main frame; a
movable platen and an opposing bed or
60 member; plates or brackets carried by op-

posite ends of the platen and provided with bearings; rollers having journals or axles in said bearings and readily removable therefrom; and an endless wire belt passing about and stretched between rollers of
65 the respective brackets, and over and under intermediate rolls, the two stretches of said belt both extending between the bed and platen of the press in substantially parallel relation and in close proximity one to the
70 other.

6. Apparatus for molding and compressing pulp, comprising a press having a bed and a platen movable toward and from said
bed; rollers carried by and movable with
75 said platen; means for imparting rotary motion to one of said rollers; an endless woven wire belt carried about and stretched between rolls at the opposite ends of said
80 platen and about intermediate rolls, the two stretches of said belt passing between the bed and platen of the press in close proximity one to the other; scrapers in proximity to one or more of said rolls for removing
85 adhering matter therefrom; and a spray nozzle, one or more, arranged to deliver a spray across the belt during its travel and thereby to clear its meshes.

7. Apparatus for molding and compressing pulp, comprising a press having a bed
90 and a platen movable toward and from said bed; rollers carried by and movable with said platen; means for imparting rotary motion to one of said rollers; an endless
95 woven wire belt carried about and stretched between the rolls beyond opposite ends of said platen, the two stretches of said belt passing between the bed and platen members in close proximity one to the other;
100 and scrapers in proximity to one or more of said rolls for removing adhering matter therefrom.

8. Apparatus for molding and compressing pulp, comprising a press having a bed and a platen movable toward and from said
105 bed; rollers carried by and movable with said platen; means for imparting rotary motion to one of said rollers; an endless woven wire belt carried about and stretched between the rolls beyond opposite ends of said
110 platen, the two stretches of said belt passing between the bed and platen of the press in close proximity one to the other; and a spray nozzle arranged to deliver a spray
115 across the belt at a point between one of the belt-carrying rolls and the platen.

In testimony whereof I have signed my name to this specification.

DANIEL MANSON SUTHERLAND, Jr.