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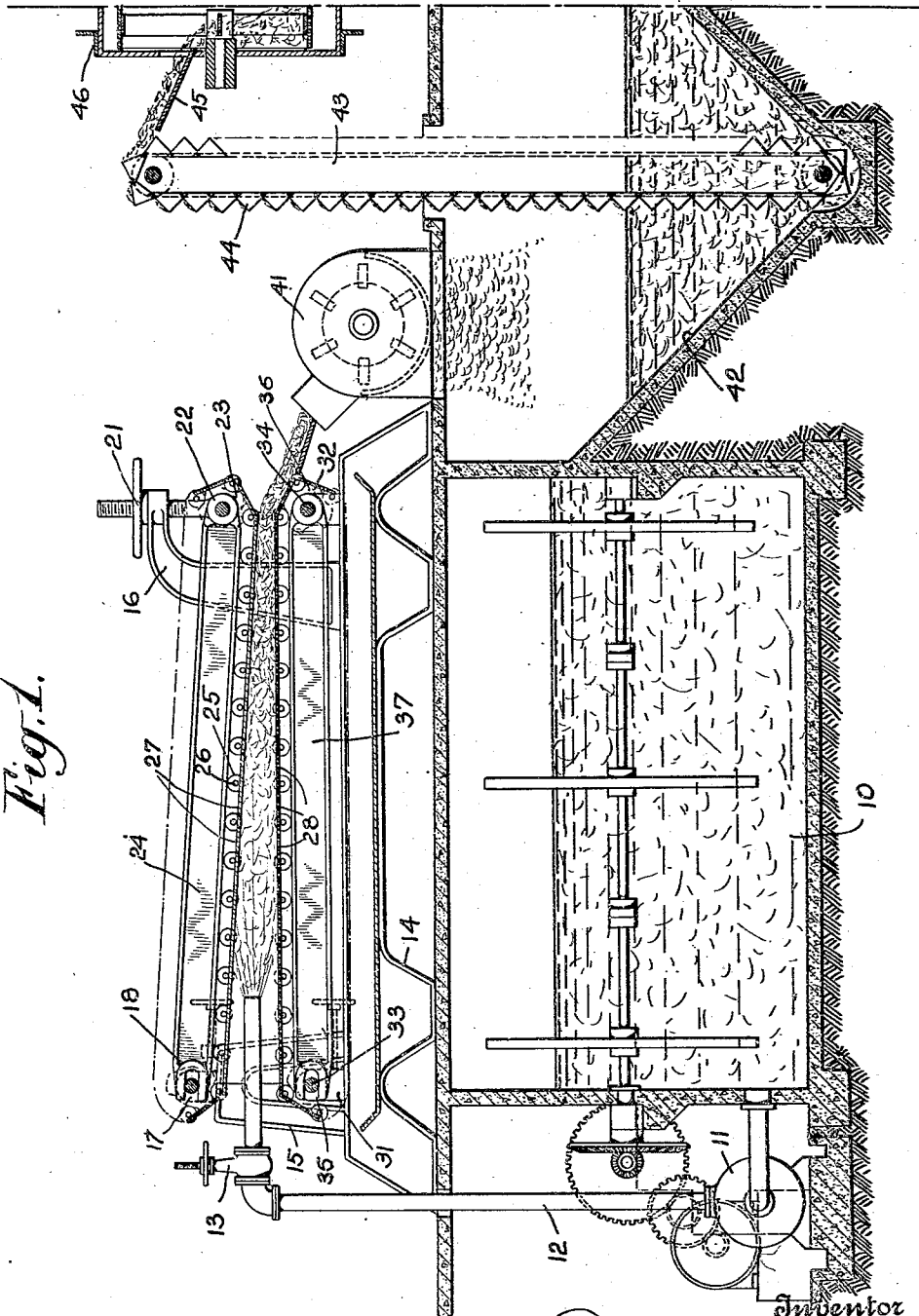
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1,742,410

MANUFACTURE OF ARTIFICIAL TIMBER AND THE LIKE

Filed May 26, 1927

4 Sheets-Sheet 1



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By his Attorneys

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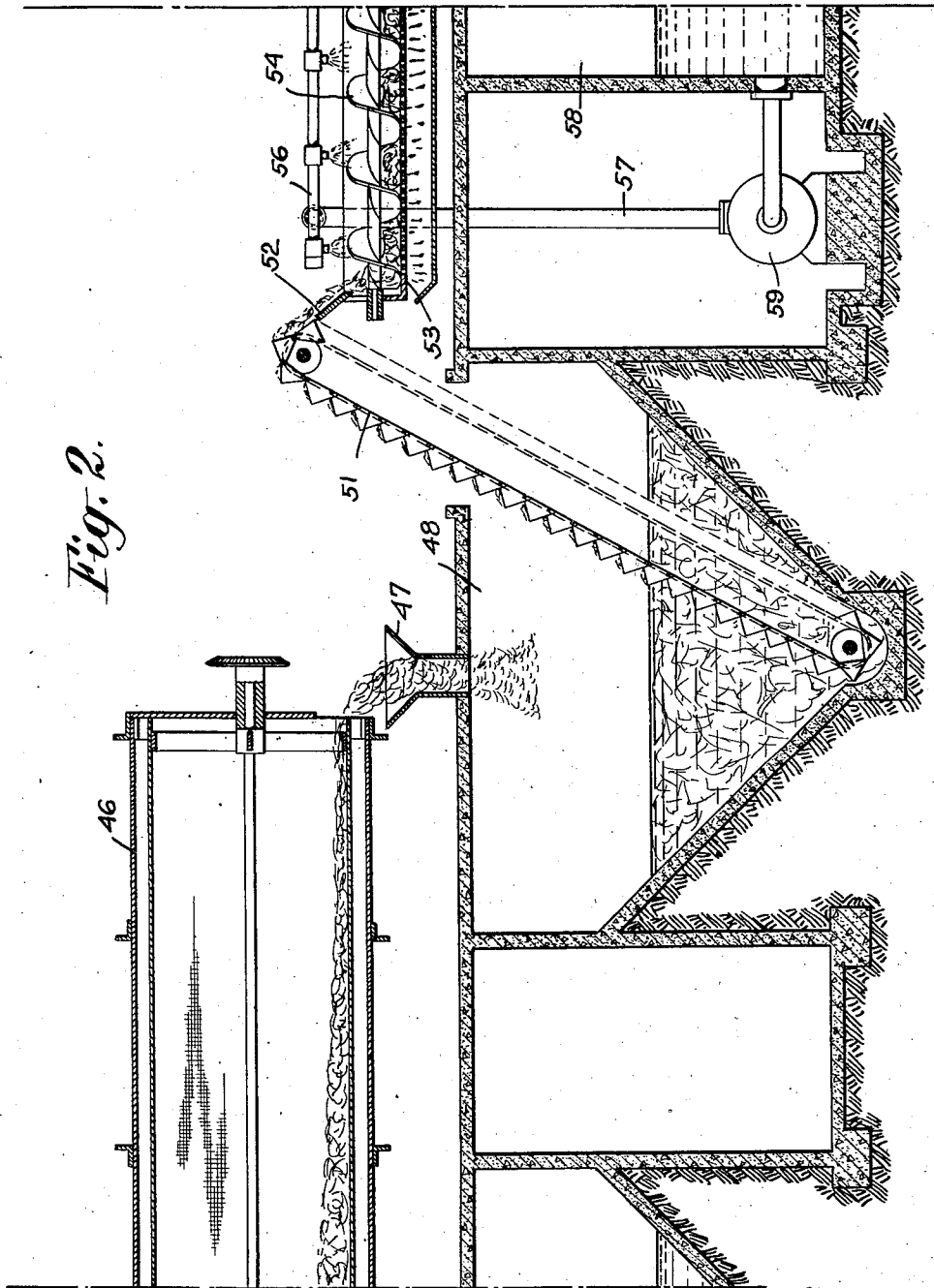
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4 Sheets-Sheet 3

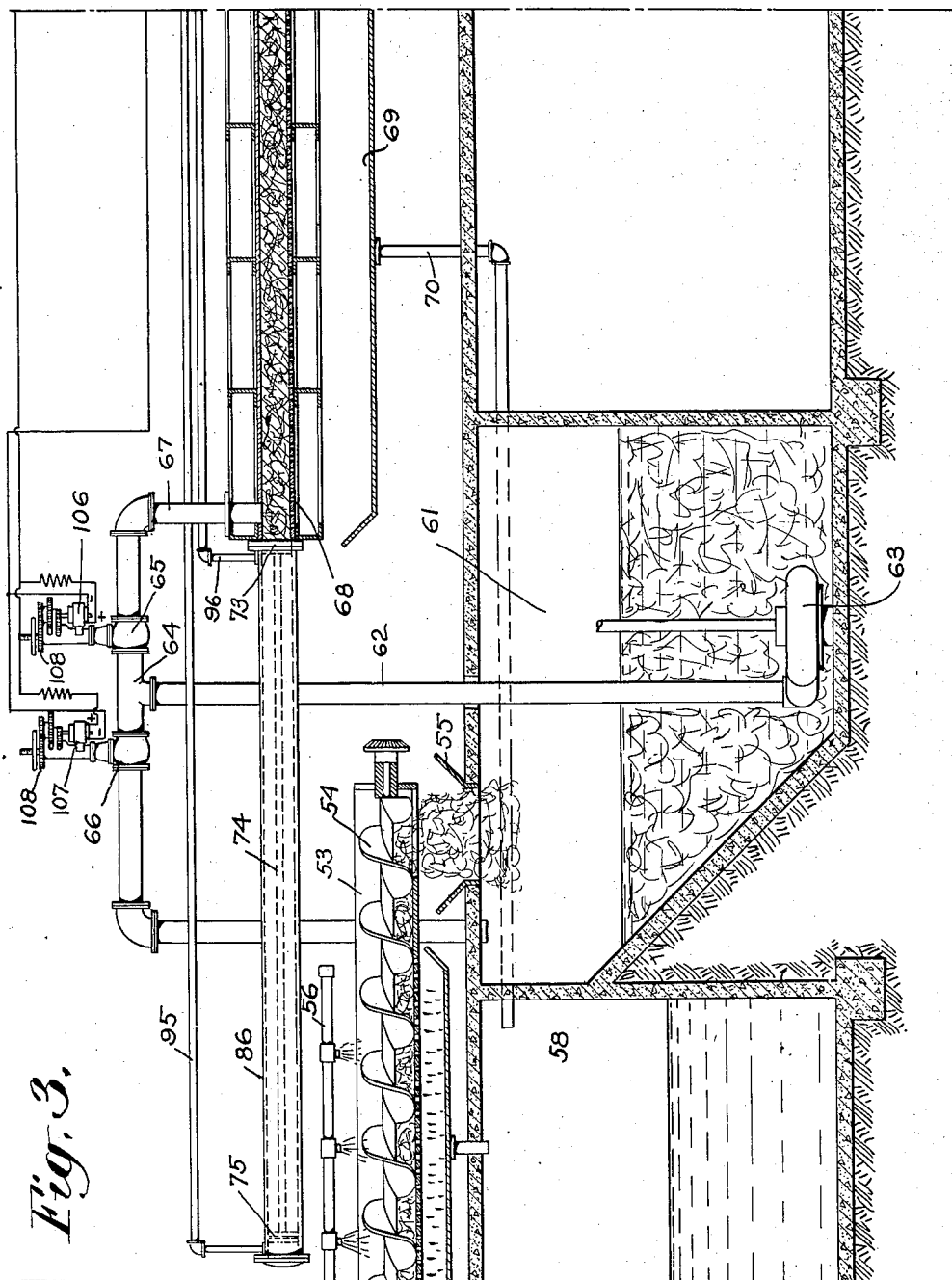


Fig. 3.

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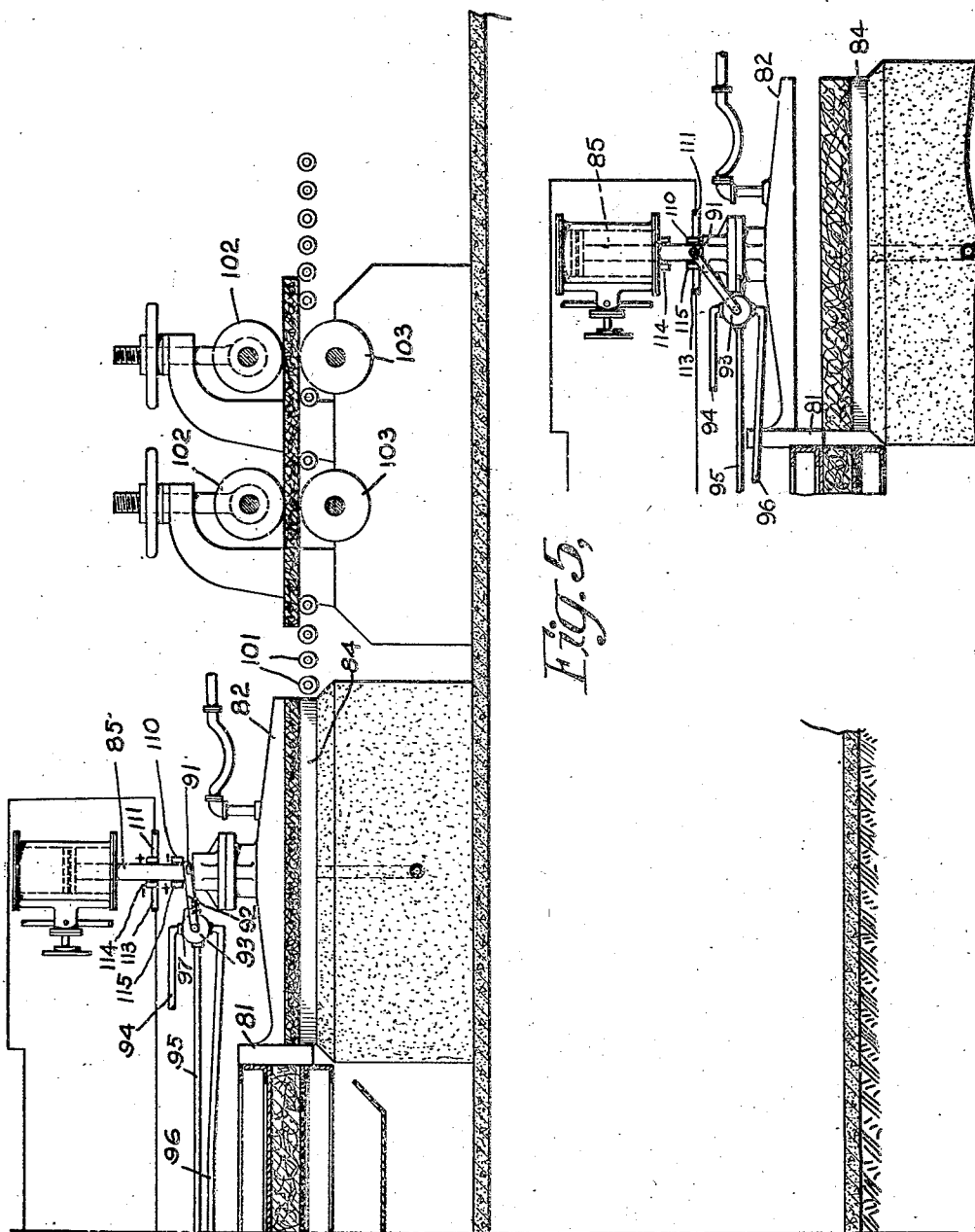


Fig. 4.

Fig. 5.

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UNITED STATES PATENT OFFICE

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MANUFACTURE OF ARTIFICIAL TIMBER AND THE LIKE

Application filed May 26, 1927. Serial No. 194,290.

This invention relates to the manufacture of timber, lumber, railroad ties, and the like, from fibrous stock prepared in accordance with application Serial No. 194,288, filed by Arthur E. Millington on the 26th day of May, 1927.

One object of the invention is to provide a mechanism which will produce strong, dense material from the kind of stock indicated, and which will be highly resistant to decay and attack by insects.

Another object of the invention is to provide a novel process for producing the finished material, such as timber, lumber, railroad ties, and the like, which is thoroughly protected by a preservative.

Another object of the invention is to provide a new, long-lasting product which may be in various forms, such as lumber, timber, railroad ties, and cross arms used for supporting telegraph and telephone wires.

With the foregoing and other objects in view the invention comprises the novel steps of the process, and a mechanism which may be used for carrying out the process to produce a new product. Apparatus suitable for carrying out the process is shown in the accompanying drawings, in which:

Figs. 1, 2, 3 and 4 are complementary views which collectively show a preferred form of the complete apparatus employed, with some of the parts in section and others omitted for the sake of clearness.

Fig. 5 is a view of some of the mechanism shown in Fig. 4, but shows some of the parts in different positions.

In the drawings, the tank 10 may be and preferably is one of the stock tanks used in the installation shown and described in the Millington application above mentioned, from which the fibrous stock is withdrawn for delivery to the board-forming machine referred to in said application and described in detail in an application Serial No. 194,289, filed by Arthur E. Millington on the 26th day of May, 1927.

As stated in the application first referred to, the fibrous material forms about a 2 per cent suspension in water. In the present embodiment, this water and material is with-

drawn from the tank by centrifugal pump 11, and delivered by one or more pipes 12 between the cooperating sections of a caterpillar press. A valve 13 in the pipe controls the delivery to the press. The caterpillar press comprises a frame 14, with uprights 15 and 16. The upright 15 is provided with a portion 17 used as a bearing for a sprocket wheel 18. The uprights 16 are threaded near their upper ends to support an adjustable apparatus 21 comprising a bearing 22 for the trunnion of a sprocket wheel 23.

Supported between or by the portions 15 and 16 of the framework are tracks 24, serving to back up and guide rollers 25 on the ends of rods 26, which rods serve as the pivotal connection between sections 27 of the caterpillar tread. Each section 27 of the tread comprises a strong perforated plate 28.

Attached to the lower part of the framework 14 are extensions 31 and 32, which support the trunnions 33 and 34 of sprocket wheels 35 and 36, like the wheels 18 and 23 previously mentioned. The sprocket wheels 35 and 36 support a caterpillar chain, which is the same in all essential particulars as the upper chain or tread. The top run of the lower tread or chain is backed up and supported by rails 37.

The sprocket wheels 18 and 36 are driven in any suitable way at a sufficient speed to effect a travel of about ten linear feet per minute of the upper and lower caterpillar treads. The stock is delivered between the treads of the caterpillar members with substantially no pressure, and the water carrying the fibrous material will rapidly filter through the treads. The speed of the treads, and the rate of flow, are in such a relation that before the material has been carried very far from its entering point, enough of the free flow water will have left through the caterpillar for the cooperating treads to begin a compressing or compacting action without forcing the stock back toward the point of delivery.

The adjustment 21 is designed to raise and lower the sprocket 23 so as to change, to any extent desired, the angular relation of the lower run of the upper caterpillar tread with

respect to the corresponding portion of the lower tread. As illustrated, the treads converge from the point where the stock enters, and by the time the stock passes a position opposite the sprockets 23 and 35, the material will have been compacted sufficiently for it to be very dense and with all of the free flow water pressed out.

After the material leaves the caterpillar members it is directed into the throat of a hammer shredder or refiner 41, so adjusted as to have a minimum refining action. The only purpose of the refiner is to loosen or fluff the fibers. As the fluffed material leaves the shredder 41 it drops into a storage bin 42, having its sides converging toward a central point at the bottom of the bin. Working in the bin is a chain conveyor 43 carrying suitable buckets 44 for raising the material from the bin 42 and delivering it to a chute 45 leading into a rotary drier 46. This drier comprises the usual steam-heated jacket, with an internal rotating shell, and the drier is so positioned with reference to a horizontal line as to effect delivery of the dried material to a hopper and chute 47, guiding the material into a tank 48. When the apparatus is being used to manufacture railroad ties, cross arms, or other material where such a protection is necessary, the tank 48 contains a mixture of coal tar creosote and sufficient oil to cause a thorough saturation of the fibers with the coal tar creosote. Running from the bottom of the tank 48 is a bucket conveyor 51, which at its upper end delivers the creosoted material to a chute 52 terminating at its lower end in a semi-cylindrical shell or trough 53. Rotating in this shell or trough is a screw conveyor 54, turning in the proper direction to advance the material to a hopper and chute 55.

Positioned above and extending substantially the full length of the screw conveyor 54 is a system of showers 56, supplied through one or more pipes 57 with coal tar creosote with its oil content. This creosote and oil substance is about the same as that previously mentioned, and is carried in a tank 58. The creosote oil is forced from the tank 58 to the showers 56, by a high-pressure centrifugal pump 59.

It should be stated at this point that the creosote oil in the tanks 48 and 58 are kept at a high temperature by means of steam jackets or pipes in or around the walls of the tanks. The exact temperature is not important, except that it should be high enough to keep the creosote oil liquid and in conditions readily to saturate the fibrous material.

The semi-cylindrical shell or trough 53 under the screw conveyor 54 is perforated for the greater part of its length. The liquid creosote oil is showered upon the fiber while it is being agitated as well as advanced by the

screw conveyor, the sprays delivering a sufficient volume of the oil to effect a very thorough saturation. Any excess thereof leaves through the perforated bottom of the trough 53 and is returned to the tank 58.

The hopper and chute 55 conducts the impregnated or saturated fibrous material into a storage tank 61 from which it is withdrawn through a pipe 62 connected to an exhaust fan or pump 63 and delivered to a pipe header 64. The pipe header carries two valves 65 and 66, the construction and purpose of which will be set forth in detail later on. It is sufficient at this time to say that the valve 65 controls the delivery of the stock to the next working point in the apparatus, while the valve 66 controls the return of unused or unwanted stock to the tank or bin 61. The pipe 67, controlled by the valve 65, leads to one end of a forming mold or box 68. The interior of this forming box may be of any configuration suitable for the product which it is desired to make, but will generally be of rectangular form. The sides and bottom of the forming box 68 are composed of steel plates containing numerous perforations. A catch-basin 69 under the forming box is connected, by means of a pipe 70, with one or the other of the creosote tanks.

Working in the interior of the forming box 68 is the head 73 of a hydraulic ram, the head being connected by a shaft 74 to the piston 75. When enough material has been delivered by the pipe 67 to the forming box 68 to fill the latter, the ram is driven forward, thereby compacting the material within the box and incidentally squeezing out any free liquid. At this stage of the operation the material and the creosote oil will have cooled so that the creosote will tend to harden and free the oil. The pressure exerted by the ram will force out the oil content and leave the creosote behind in the compacted mass.

A head block 81 forms one end of the forming box 68, the block being rigid with the platen 82 of a hydraulic press. After the compacting operation in the forming box has been completed, the platen 82 is raised in the manner hereinafter explained, carrying with it the block 81 and opening the end of the forming box 68. The piston 75, operating the ram in the forming box 68, then completes a full forward stroke, thereby pushing the formed mass from the forming box to the table 84 cooperating with the platen 82. The piston 75 is then moved back to its starting point, withdrawing the ram from the forming box 68 to permit a refilling of the box, and before the piston 75 again starts on its forward or pressure-exerting movement the platen 82 and block 81 are lowered so that the block will close the end of the forming box and the platen 82 will begin to exert its pressure. It will be noted that the block 81 is of sufficient length vertically to close the

end of the box, even though the platen has not been given its entire downward stroke. This is necessary because the travel of the platen is necessarily slow, and it is desirable to close the forming box as soon as the material begins to enter the box.

The platen 82 is raised and lowered by any suitable hydraulic mechanism, but, regardless of the type, should be capable of exerting a great total pressure, approximately 400 tons being satisfactory, upon the material under the platen.

The piston 75, operating the ram 73, and the platen 82 should operate in a timed relation to get the best results, and in the present embodiment this timed relation is effected automatically by devices intermediate the piston 85 supporting the platen 82 and the piston chamber 86 containing the devices for operating the ram 73. These intermediate devices will next be described.

Pivoted at 91 to the piston 85 is one end of a lever 92 connected to operate a four-way control valve 93, which in turn controls the operation of the ram 75. Entering the valve is a supply pipe 94, and pipes 95 and 96 lead from the valve to opposite sides of the piston in the ram cylinder 86. When the piston 85 and lever 92 are in the positions shown in Fig. 3, the pipe 96 will be open to the exhaust 97 and the supply pipe 94 and pipe 95 will be in communication, so the the pressure exerted will drive the ram 75 the rest of its distance to the right (Fig. 3) and push the formed mass of material from the forming box and deposit it on the bed or table 84 of the hydraulic press. When the piston 85 and platen 82 start their descent, the lever 92 will be turned to the position shown in Fig. 4 and set the valve so that the pipe 95 will be in communication with the exhaust and a connection will be established between the supply pipe 94 and pipe 96. The pressure fluid flowing through the pipe 96 will thereupon drive the piston back to its starting point, or to the left (Fig. 3), thereby clearing the forming box ready for a refilling of the box. The downward movement of the platen 82 will also, as before stated, close the end of the box, and this is done before any of the material flowing into the box can escape from the open end of the box.

After the platen 82 has performed its work, the slab of pressed material is removed from the bed 84 of the hydraulic press by driven rolls 101, and carried by said rolls to the successively operating press rolls 102 cooperating with rolls 103. The slab is pushed from the bed 84 by the oncoming material from the forming box 68, but as soon as the rolls 101 become effective, further travel of the material is accomplished by the rolls 101 as described. After leaving the final press rolls 102-103, the material is carried by rolls 104 to drying and finishing operations.

In order to control the flow of material to the forming box in proper sequence with the operations of the platen 82, the valves 65 and 66 are electrically operated and the operation is controlled by the piston 85 of the flat bed hydraulic press. The work of operating the valves is performed by motors 106, 107, connected by suitable gearing 108 with the valve stems. The motors are of the reversible type and operate either to open or close the valves.

The operations of the valves, and the reversal of the current to each, is controlled by two pairs of contact bosses or blocks carried by the piston 85, the blocks in each pair being preferably so spaced apart and so positioned with respect to the contacts controlled by the other pair, that when either the valve 65 or 66 is closed, the other will at the same time be open. Electrically operated gate valves and controls therefor resembling generally the ones used in this construction, are well known and need not be described in great detail. It is sufficient for present purposes to say that the block 110 cooperates with a contact 111 to establish a circuit resulting in opening the valve 65, while the downward travel of the piston 85 will cause the block 110 to establish connection in a circuit which will drive the motor 106 in the opposite direction and close the valve. The block 113 establishes contacts or closes circuits at 114 and 115 for the valve 66, in the same way as described in connection with the operation of the valve 65. It is apparent that this valve construction and method of operating it will cause delivery of stock to the forming box 68 when the platen 82 has descended far enough to close the open end of the box, while the valve 66 will be operated to open the overflow when the platen has been elevated to allow the formed block or timber to be pushed from the forming box. The platen and the box therefore operate in a definite timed relation with reference one to the other, so that the mechanism is substantially automatic, so far as the forming and pressing, as well as the progress of the material through the mechanism, is concerned.

In addition to effecting an automatic operation in the desired sequence, the timing of the operation of the valves 65 and 66 provides either a feed or an overflow at all times for the material coming through the pipe 64, thereby preventing any likelihood of the pipe clogging.

In the manufacture of some forms of the material it is desirable that the material be compacted or compressed to a greater degree than is possible in pressing operations where the creosoted material is cold. To provide a way of doing this additional compacting, the platen 82 is connected, by a hose or other flexible connection, to a steam supply, and the platen is constructed as a hot box. The bed

or table 84 cooperating with the platen 82 is also of the hot-box type. In the operation of the hydraulic press the material is compacted while cold, until the free oil is forced out, after which the steam is turned on to heat the platen and bed, and further compacting pressure then applied by the platen.

For certain purposes, particularly where the material is to be given a superficial coating of some kind, it may be unnecessary to use the creosoting apparatus in treating the fibers. For preparing such material the creosoting operations are omitted, but the rest of the mechanism and process is employed. The product resulting will be extremely dense and strong, but will of course not have the preservative qualities of the creosoted product.

The product has been described in rather general terms as timber, lumber, and the like, but it is to be understood that these terms are not intended as limitations. As a matter of fact the material, in the form of sheets or timbers, can be cut up to provide pieces of any suitable shape and for any desired purpose. As an example, the material may be cut up into wedges which may be used in place of the wooden wedges now used to partially fill up worn holes in ties before driving in the spikes. The new creosoted material is highly effective for such use, not only serving to give a good bond between the tie and the spike, but also serving to plug up the hole around the spike so as to prevent water from seeping in and causing further damage to the tie.

One highly desirable characteristic of the new product is that it is without grain and also has no crevices or openings permitting water to enter. In other words, it is a very dense, uniform structure, in which each fiber is individually protected, and the protected fibres compacted to make up a uniform body having no tendency to split or check. The material will nevertheless lend itself to building operations and the like, as it may readily be sawed and trimmed according to the use to which it is to be put.

In describing the invention it has been necessary incidentally to explain in considerable detail the construction and operation of the mechanism, the steps of the process, and the resulting product. It is thought, therefore, that a summary of these various features may be omitted.

While the various features involved have been discussed in considerable detail, it is not the desire to be limited to such details except as they may be included in the claims which follow.

What is claimed is:

1. A process of the character described, comprising the saturation of loose wood fibers with hot coal tar creosote oil, and compressing the saturated fibres in an unheated press

to compact the fibers and extract the oil from the fibrous mass and creosote.

2. A process of the character described comprising the heating of a volume of coal tar creosote oil, saturating loose wood fibers therewith, and compressing the saturated fibers in an unheated press having perforated portions of such size as to retain the fibers in the press.

3. A process of the character described comprising the heating of a volume of coal tar creosote oil, stirring in the same fibrous material while maintaining the mixture of fibrous material and creosote oil in heated condition, to effect saturation of the material, allowing the saturated material to cool sufficiently to free the oil content of the creosote, and forming the material in a press constructed to permit the freed oil to escape from the press.

4. A process of the character described comprising the heating of a volume of coal tar creosote oil, saturating fibrous material with the heated oil, allowing the saturated material to cool sufficiently to free the oil content of the creosote, and pressing out the oil as an incident to compacting the fibrous material into the desired form.

5. A process of the character described, comprising the heating and stirring together of coal tar creosote oil and wood fibers to form a highly fluid mixture, agitating the mixture to effect a thorough saturation of the fibers by said oil, pressing the saturated fibers in unheated presses constructed to compact the fibers and squeeze out the oil, and subjecting the mass to further pressure in the presence of heat.

6. A process of the character described comprising pressing water-saturated wood fibers to extract the water, loosening the pressed fibers to a fluffy condition, subjecting the loosened fibers to hot coal tar creosote oil, and compressing the saturated fibers in an unheated press to compact the fibers and extract the oil from the compressed material.

7. A process of the character described comprising pressing water-saturated wood fibers to extract the water, loosening the fibers to a fluffy condition, subjecting the loosened fibers to hot coal tar creosote oil to saturate the fibers, compressing the saturated fibers in an unheated press to compact the fibers and force the oil from the mass, and subjecting the mass to further pressure in the presence of heat.

8. As an article of manufacture, a substitute for timber and the like composed of wood fibers which have been first treated with coal tar creosote and afterwards compressed to give the desired density.

9. As an article of manufacture, a substitute for timber and the like composed of compressed wood fibers and containing a distributed amount of coal tar creosote in excess

of fifty pounds of creosote for each cubic foot in the article.

10. As an article of manufacture, a substitute for timber and the like composed of highly compressed wood fibers and having all of the fibres therein individually protected by a weatherproof and insect-proof material.

11. A process of the character described comprising pressing water-saturated wood fibers to extract the water, loosening the fibers to a fluffy condition, subjecting the loosened fibers in that condition to the effective action of a preservative substance, and forming the fibers into a compacted mass by pressure.

In testimony whereof I hereto affix my signature.

ARTHUR E. MILLINGTON.