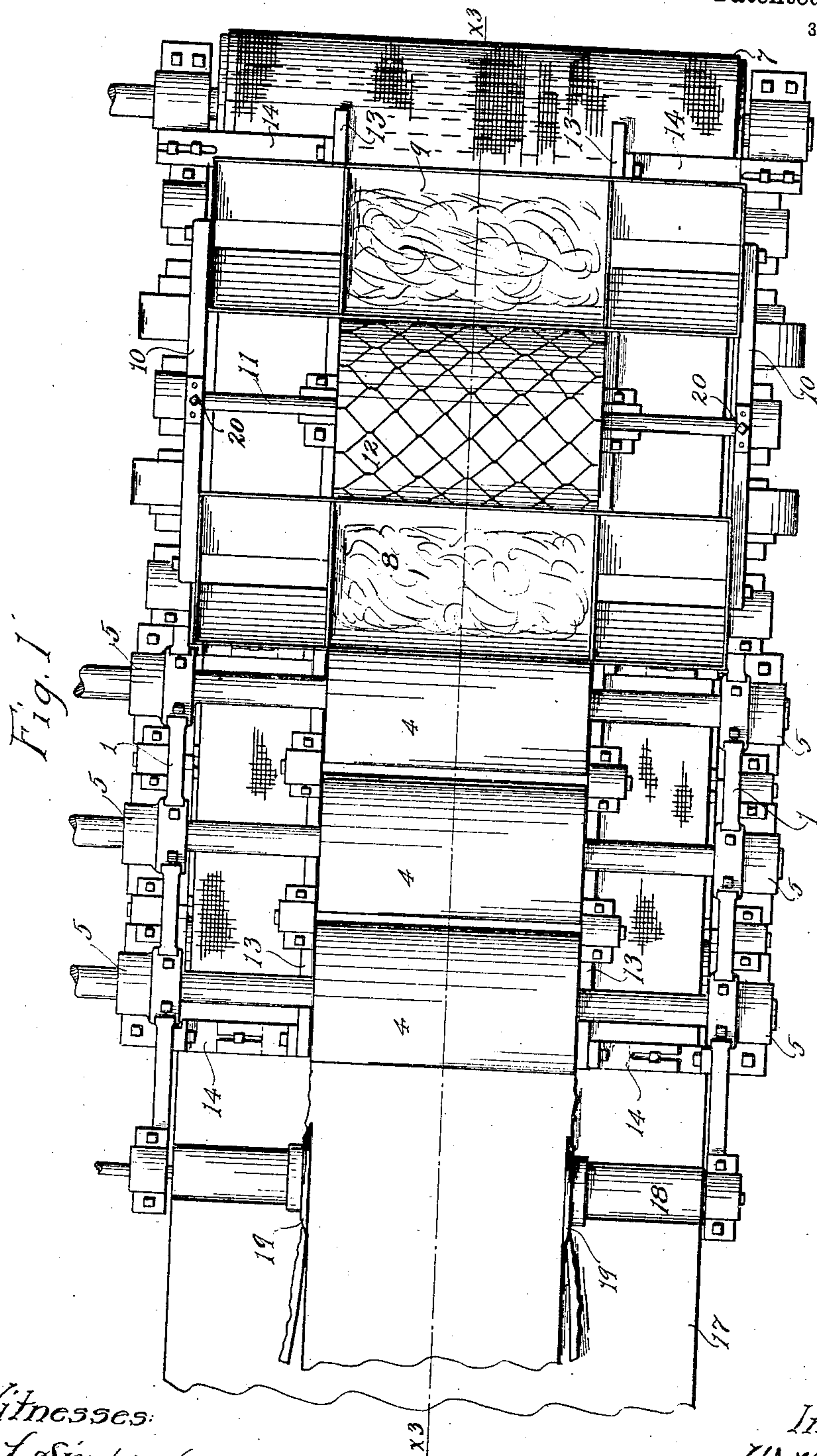


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 APPARATUS FOR PRODUCING REINFORCED PULP BOARD.  
 APPLICATION FILED FEB. 5, 1907.

921,674.

Patented May 18, 1909.  
 3 SHEETS—SHEET 1.



Witnesses:  
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 A. H. Opsahl.

Inventor:  
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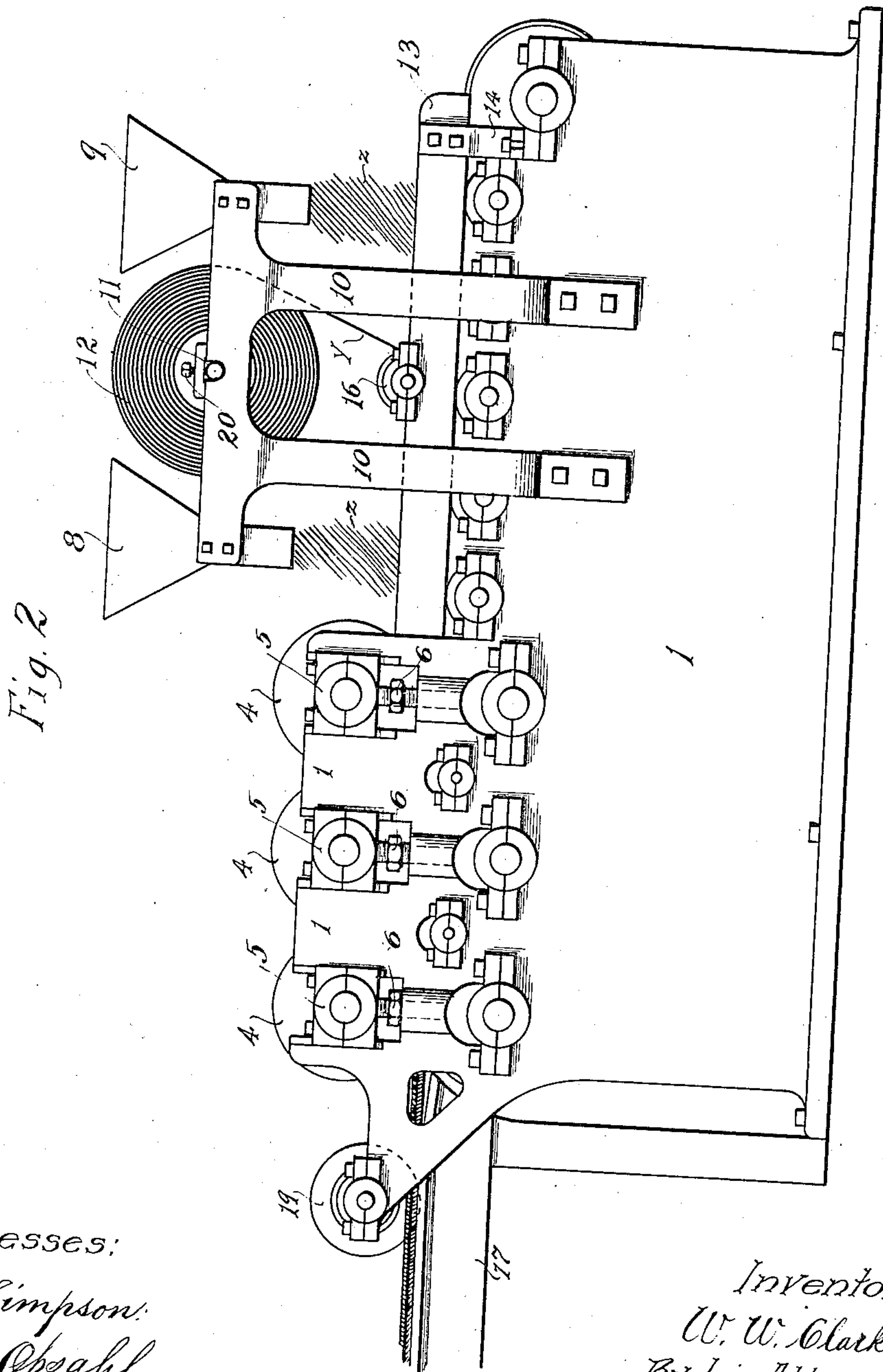


Fig. 2

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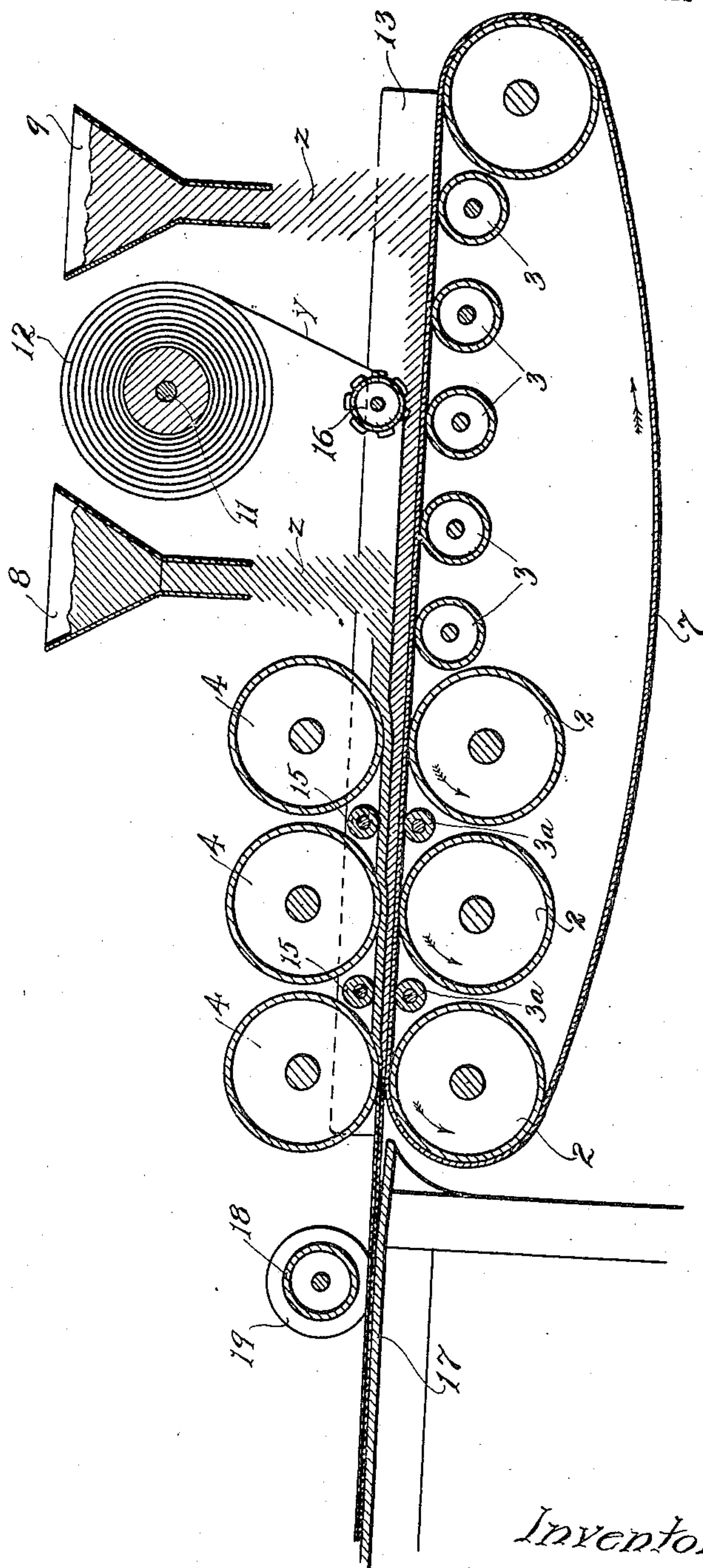
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Fig. 3



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# UNITED STATES PATENT OFFICE.

WILLIAM W. CLARK, OF MINNEAPOLIS, MINNESOTA.

## APPARATUS FOR PRODUCING REINFORCED PULP-BOARD.

No. 921,674.

Specification of Letters Patent.

Patented May 18, 1909.

Application filed February 5, 1907. Serial No. 355,803.

*To all whom it may concern:*

Be it known that I, WILLIAM W. CLARK, a citizen of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Apparatus for Producing Reinforced Pulp-Board; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My present invention has for its object to provide a simple process and apparatus or machine for producing reinforced pulp board, and to this end it consists of the novel steps of treatment and the novel devices and combinations of devices hereinafter described and defined in the claim.

An apparatus of novel construction for carrying out the novel process herein disclosed and claimed is illustrated in the accompanying drawings, wherein like characters indicate like parts throughout the several views.

Referring to the drawings, Figure 1 is a plan view of the improved apparatus or machine, some parts being broken away. Fig. 2 is a side elevation of the improved apparatus or machine; and Fig. 3 is a vertical section taken through the machine on the line  $x^3 x^3$  of Fig. 1.

This improved process is a continuous process in which wood pulp is simultaneously applied to opposite sides of a reticulate woven wire reinforcement, and is pressed together so as to unite the fibers through the interstices or openings in the metallic reinforcement. The pulp, after it has been applied to the opposite faces of the woven wire reinforcement and pressed together, is further and successively compressed until it is brought to the proper compactness and thickness.

The machine involves a suitable framework indicated by the numeral 1. In suitable bearings in the sides of the frame 1, the shafts of bed forming rollers 2, 3 and 3<sup>a</sup> are journaled. The rollers 2 are comparatively large and are preferably in the form of hollow cylinders. Directly overlying but spaced above the three large rollers or cylinders 2 at the left, are similar rollers or cylinders 4, the shafts of which are also journaled in suitable bearings in the sides of the frame 1. The

three pairs of cylinders 2-4 at the left constitute the compression members, and the said pairs are spaced closer and closer together, successively from the right toward the left. As shown, the shafts of said upper cylinders 4 are journaled in adjustable bearing boxes 5 mounted in suitable seats in the frame 1, and subject to adjusting screws 6, so that the spacing of the cooperating members of the pairs of compression cylinders or rollers may be varied at will.

An endless reticulate carrier belt 7 runs over the bed rollers 2, 3 and 3<sup>a</sup>. Above that portion of the belt 7 which runs upon the rollers 3 is a pair of pulp supplying hoppers 8-9, both of which, as shown, are supported from the frame 1 by brackets 10. Loosely journaled on the upper portions of the brackets 10 between the hoppers 8 and 9 is a spindle 11 upon which is wound a roll of woven wire fabric 12 which is to constitute the metal reinforcement to the pulp board.

Extending longitudinally of the machine, at the ends of the upper cylinders 4, is a pair of gage plates 13 which, as shown, are secured to the sides of the frame 1 by adjustable brackets 14. Journaled in these gage plates 13 there is, as shown, a pair of small rollers 15 located between the upper cylinders 4 and cooperating with the small underlying rollers 3<sup>a</sup> to prevent buckling of the board. The spacing of the pairs of rollers 3<sup>a</sup>-15 must, of course, correspond approximately to the spacing of the cylinders 2-4 at the right thereof with respect to Fig. 3. Also journaled in the gage plates 13 is an idle wire guiding roller 16 that is preferably provided with projections adapted to pass through the openings in the wire fabric to prevent slipping and to hold the fabric spread out to the proper width while it is being fed between the upper and lower strata of the pulp. The pulp is indicated by the character  $z$ . Any suitable and well known means may be provided for positively driving the lower cylinders 2, or the lower cylinders 2 and upper cylinders 4, so that under the rotation thereof in the direction of the arrows marked thereon in Fig. 3, the pulp and the interposed wire fabric will be positively fed from the right toward the left with respect to Fig. 3, and preferably onto a receiving table 17. When the said rollers are thus driven, the carrier belt 7 will, of course, also be driven in the direction of



the arrow marked adjacent thereto in Fig. 3, and the pulp being applied thereto from the two hoppers 8 and 9 will spread out, the one stratum falling directly onto the said belt 7 and being carried under the wire fabric *y*, while the other stratum will fall upon and be spread out over the upper surface of the said wire fabric or metal reinforcement. By the first pair of compression cylinders 2—4, the pulp will be slightly compressed, and by the second pair toward the left, the pulp will be further compressed, and by the third pair (any desired number of pairs of which rollers may be employed) the pulp will be compressed to its final density and thickness required in the board which is being manufactured. Furthermore, under this compression, while the pulp is moist, the fibers thereof will be commingled through the openings in the wire fabric, so that the upper and lower strata of the fabric becomes practically integral.

Mounted in suitable bearings on the table 17, there is preferably a roller 18 that is provided with laterally spaced trimming disks 19 which cut the edges off from the board which is forced under the same and over the table 17.

To secure the best results, the wire fabric is embedded between the upper and lower portions of the pulp board in the process formation while it is under initial tension; and to accomplish this, means is shown as provided for putting the spindle 11 under friction. As shown in Fig. 2, this frictional device is in the form of a set screw 20 passed through one of the brackets 10 and impinging against and at the end of said spindle. A metallic reinforcement thus embedded in the board under initial tension will resist, in the first instance, even the slightest strain upon the board, whereas a wire fabric embedded loosely and with slack between the parts,

would resist such strains only after its wires have been drawn taut.

To make board of different widths would, in the construction illustrated, require a substitution of upper cylinders 4 and rollers 15 and 16 of different lengths and would require the proper lateral adjustments of the gage plates 13 with respect to each other.

What I claim is.

In a machine for making reinforced pulp board, the combination with several pairs of compression rollers, the members of said pairs being set successively closer and closer together in the direction of the travel of the material to be compressed, of an endless reticulate carrier belt arranged to run between the upper and lower compression rollers, a guide arranged to direct the reinforcing fabric between said upper and lower compression rollers, means for delivering the pulp directly onto said carrier belt for application to the lower face of said reinforcing fabric, independent means for delivering pulp directly onto the upper face of said reinforcing fabric, and rigid guide rails arranged to confine and form the edges of the pulp body of said board, whereby the pulp applied to the upper and lower faces of said reinforcing fabric will be successively compressed to final compactness and thickness with a continuous action, will be caused to unite between the meshes of said reinforcing fabric, the surplus water will be gradually pressed from said pulp and the pulp body of the board will be formed with parallel edges, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM W. CLARK.

Witnesses:

MALIE HOEL,

F. D. MERCHANT.