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H. D. LORIA.

METHOD AND APPARATUS FOR THE MANUFACTURE OF CARD OR PULP BOARD.

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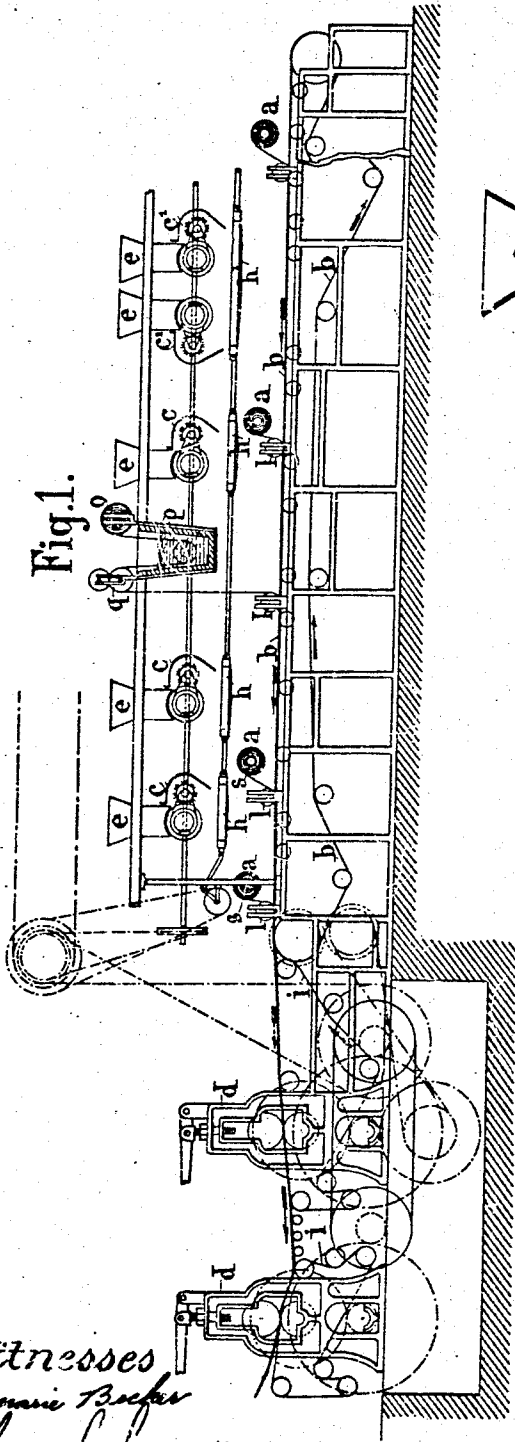


Fig. 1.

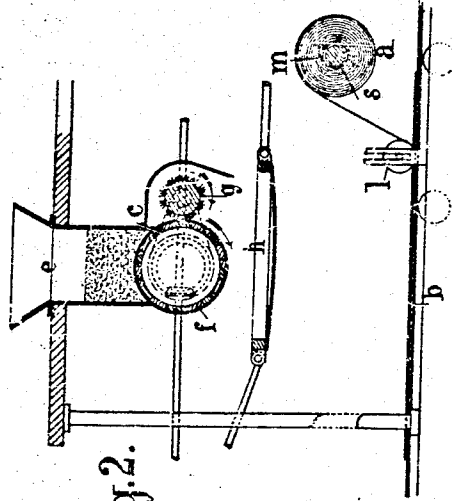


Fig. 2.

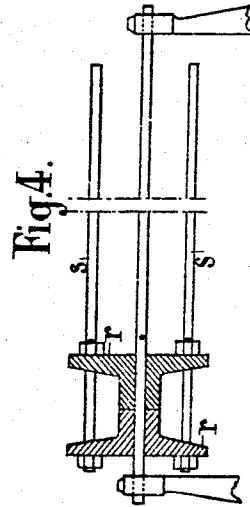


Fig. 4.

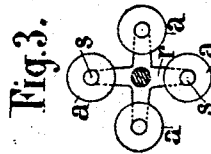


Fig. 3.

Witnesses
Amari Becker
Mary E. Lowell

Inventor
 HOWARD DIEUDONNÉ LORIA
 per *Joseph Becker*
 Attorney

UNITED STATES PATENT OFFICE.

HOWARD DIEUDONNÉ LORIA, OF ORCHAMPS, FRANCE.

METHOD AND APPARATUS FOR THE MANUFACTURE OF CARD OR PULP BOARD.

No. 807,753.

Specification of Letters Patent.

Patented Dec. 19, 1905.

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To all whom it may concern:

Be it known that I, HOWARD DIEUDONNÉ LORIA, engineer, a citizen of France, residing at Orchamps, Jura, France, have invented a new and useful Method of and Apparatus for the Continuous Manufacture of Card or Pulp Board, of which the following is a specification.

My invention relates to the manufacture of pulp-board—that is, of a paper product formed by the assemblage of two or more webs of pulp; and my invention consists in so modifying the processes heretofore used that the apparatus needed may be greatly simplified and made to act continuously and to perform nearly all operations automatically, so as to require the lowest possible amount of attendance.

It has already been proposed to manufacture cardboard or pulp-board by superposing sheets or webs of paper-pulp which bind themselves together when passed through the press; but in order that this spontaneous binding action shall take place it is necessary to employ sheets only incompletely formed and extremely wet, containing about eighty-five per cent. of water. These sheets have almost no cohesive force, so that it is indispensable to superpose them immediately on their delivery from the roller or flat-table machines by which they are produced. It is necessary then to have as many machines of this kind as there are of sheets or plies to be superposed, which reduces to very narrow limits the number of sheets which it is possible to superpose in practice. This number is equally limited by the fact that it is impossible to pass a sufficient number of sheets in sufficiently-wet condition through the press without crushing and destroying them. This process therefore is not well adapted for the manufacture of thick pulp-board. For thin pulp-board it is not economical, by reason of the multiplicity of machines necessary, and it does not give good results, for the sheets have so little strength that they frequently tear, although supported by felts. Moreover, the drying of such pulp-board is very costly by reason of the great quantity of water to be extracted. For the same reason the pulp-board produced lacks in strength and compactness.

The method and machine forming the subject of this invention while avoiding the drawbacks above indicated render possible the continuous manufacture of cardboard or pulp-board of all thicknesses by the superposition

of undried webs of pulp. Instead of employing, as has been done heretofore, webs of pulp incompletely formed containing about eighty-five per cent. of water I superpose webs completely formed containing about thirty-five to fifty per cent. of water only. The said webs are not subjected to any preliminary drying operation, for it is easy to obtain them directly on flat-table machines, for instance. Heretofore it has not occurred to any one to adopt this method of producing cardboard, and that because webs in this condition do not bind together on simply being passed through the press. I have, however, discovered, and this is a very important feature of my invention, that the binding effect is easily produced at the time of passage through the press if the webs be powdered or sprinkled with a dry powder, such as flour or dry glue or paste in powder form. At the time of passage through the press the moisture in the pulp is absorbed by the paste and renders it adhesive, and so cements the webs together. This effect is then obtained without increasing the water content of the webs. As there is only a small quantity of water present, the drying is effected easily and at small cost, and the final product is dense and strong.

Webs containing about forty or fifty per cent. of water may be easily rolled and kept in rolls and they may all be produced in a single machine to be employed later in the manufacture of pulp-board by the present process. Their cohesion is sufficient to enable them to be unrolled and superposed automatically by simple drawing action. It is also possible by this method to make pulp-board of considerable thickness, for whatever may be the number of webs superposed they are quite able to sustain the action of the press without injury.

The nature of the product may be varied at will by changing the nature of the principal material of all or part of the webs. It is thus easy to armor or strengthen the cardboard by interposing webs of any suitable nature—such as fabrics formed of vegetable, animal, or mineral fibers—or such webs may equally constitute one or both of the external faces of the pulp-board.

In loading pulp-board it has been customary to add the inert matter in the pulp, thus incorporating it in with the sheets themselves. This is evidently detrimental to strength. The new process while not excluding the above

operation, if it be desired, permits of interposing the loading material between the webs by mixing the same, for instance, with the cementing agent.

5 The invention is illustrated, by way of example, in the annexed drawings, Figure 1 of which is a side elevation, more or less diagrammatic, showing the improved machine for carrying out the described process. Figs. 10 2, 3, and 4 are details hereinafter referred to.

In Fig. 1, *a a a* represent rolls of pulp. These rolls are formed on metallic tubes *m*, Fig. 2, slipped over rods *s*. The rolls *a* are thus mounted transversely of the machine, so as to be able to turn on their axes to permit the webs to unroll under the action of a slight drawing effort exerted thereon. They may be subjected to braking action, so as to lay the webs with any desired degree of tension. The sheets 20 unrolled from the rolls *a* are superposed, as shown, and are carried along by the endless moving belt *b*. The heavy cylinders *l* press with all their weight on the webs, thus insuring the unrolling of the latter and their being 25 carried along by the belt *b*. Between each two roll-supporting rods *s s* is a distributor *c*, of colloidal material. In the following description it may be presumed to be ordinary flour. These distributors serve to powder the successive webs with flour before they are covered by the following webs. The sheet so 30 formed by the superposition of the webs, the number of which will correspond with the thickness of pulp-board to be obtained, is finally passed between the cylinders of a press 35 *d* or through several presses *d* in succession, and then it is led to the drying-chamber. If the number of webs to be superposed is considerable, it may be desirable to arrange such 40 presses *d* at intervals throughout the length of the machine, so as to secure the cementing together of a certain number of webs already superposed before adding new webs.

The distributors *c* may be constructed in any suitable manner. In the example shown, 45 Fig. 2, they comprise a hopper *e*, containing flour, the bottom of which hopper is closed by a cylinder *f*, provided with circular or helical grooves. When turned in the direction 50 indicated by the arrow, this cylinder carries some flour in the grooves and the flour is detached and subdivided by the brush *g*, which rotates at a high speed. The flour falls on a reciprocating screen *h*, and the latter delivers 55 it at a uniform rate in finely-divided state to form an even layer on the web moving beneath.

As stated above, loading material may be mixed with the cementing agent. This may 60 readily be done by arranging alongside each other two distributors *d' d'*, Fig. 1, one for the cementing agent and the other for the loading material. The pulverulent products supplied by these two distributors fall together on the 65 mixing and dividing screen *h'*, which effects

the mixing thereof and also distributes them uniformly on the web passing beneath.

The cylinders of the presses *d* may, if desired, be coated with felt, or, if preferred, an endless felt, such as *l'*, may pass between one 70 of the cylinders and the sheet being pressed.

To permit continuous operation of the machine, the supports for the pulp-rolls may be arranged and constructed as in Figs. 3 and 4 to receive several rolls of pulp which are em- 75 ployed in succession. The said supports may be recharged during operation. Figs. 3 and 4 show an arrangement for this purpose which will be understood without further explanation. Instead of being fixed in the rotating 80 heads *v*, the roll-supporting rods may be mounted so as to rotate therein on their own axes.

It is stated above that the process admits of simultaneously interposing one or several 85 layers of fabric or other strengthening material between the layers of the pulp-board or else of covering the pulp-board with layers of this kind during manufacture. Such means is shown in Fig. 1, where— 90

o is a bobbin from which the strengthening material is unrolled in the shape of sheets, ribbons, or parallel threads which are passed into and through the sizing-trough *p*, then between the washing-rollers *q*, and then laid on 95 the first layers of pulp-roll carried by the belt *b*, to be subsequently covered by the last layers. The trough *p* may contain liquid paste or glue in hot or cold condition; but if there be a distributor *c*, of colloidal material, pro- 100 vided immediately in front of and immediately beyond this arrangement a tank filled with water is all that is necessary.

The machine above described, which is relatively inexpensive as regards construction and 105 maintenance, may be completed by the addition of calendering and glacing rolls, cutting apparatus, and the like, thus constituting a machine adapted to perform continuously and automatically nearly all the operations re- 110 quired for the complete manufacture of card or pulp board, and thereby greatly reducing the manual labor heretofore required for producing pulp-board of any thickness.

What I claim as my invention, and desire to 115 secure by Letters Patent, is—

1. In an apparatus for the manufacture of pulp-board in continuous sheets, the combination of an endless belt having the whole part of its working face substantially flat and sup- 120 ports arranged at intervals for supporting a plurality of rolled webs of pulp transversely over the said flat part of the belt, said webs being sufficiently dry to be unrolled onto said belt; and hoppers arranged between said rolls 125 of pulp, each of said hoppers being adapted to hold an adhesive material and gradually drop the same onto the web that passes under it.

2. In an apparatus for the manufacture of pulp-board in continuous sheets, the combina- 130

tion of an endless belt having the whole part of its working face substantially flat and supports arranged at intervals for yieldingly holding a plurality of pressure-rolls over the said flat part of the belt, and other supports for supporting the same number of rolled webs of pulp, said webs being sufficiently dry to be unrolled onto the said belt by the said pressure-rolls, and hoppers arranged between said pressure-rolls, each of said hoppers being adapted to hold an adhesive material and gradually drop the same onto the web that passes under it.

3. In an apparatus for the manufacture of pulp-board in continuous sheets, the combination of an endless belt having the whole part of its working face substantially flat and supports arranged at intervals for supporting a plurality of rolled webs of pulp transversely over the said flat part of the belt, said webs being sufficiently dry to be unrolled onto said belt; and hoppers arranged between said rolls of pulp, each of said hoppers being adapted to hold an adhesive material and gradually drop the same onto the web that passes under it; and a continuously-acting press arranged opposite the delivery end of said belt.

4. In an apparatus for the manufacture of pulp-board in continuous sheets, the combination of an endless belt having the whole part of its working face substantially flat and supports arranged at intervals for yieldingly holding a plurality of pressure-rolls over the said flat part of the belt, and other supports for supporting the same number of rolled webs of pulp, said webs being sufficiently dry to be unrolled onto the said belt by the said pressure-rolls, and hoppers arranged between said pressure-rolls, each of said hoppers being adapted to hold an adhesive material and gradually drop the same onto the web that passes under it; and a continuously-acting press arranged opposite the delivery end of said belt.

5. In an apparatus for the manufacture of pulp-board in continuous sheets, the combination of an endless belt having the whole extent of its working face substantially flat, and supports arranged at intervals over said flat part for yieldingly holding a plurality of pressure-rolls over said belt, and other supports for supporting the same number of rolled

webs of pulp, said webs being sufficiently dry to be unrolled onto said belt by the said pressure-rolls, and hoppers arranged between said pressure-rolls, each of said hoppers being adapted to hold a powdered substance and to gradually drop the same onto the web of pulp that passes under it.

6. In an apparatus for the manufacture of pulp-board in continuous sheets, the combination of an endless belt and supports arranged at intervals for supporting a plurality of rolled webs of pulp transversely over said belt, said webs being sufficiently dry to be unrolled onto said belt; and hoppers arranged between said rolls of pulp, each of said hoppers being closed at the bottom by a rotary brush; and vibrating sieves under said hoppers.

7. In an apparatus for the manufacture of pulp-board in continuous sheets, the combination of an endless belt and supports arranged at intervals for supporting a plurality of rolled webs of pulp transversely over said belt, said webs being sufficiently dry to be unrolled onto said belt; and hoppers arranged between said rolls of pulp, each of said hoppers being adapted to hold an adhesive material, and one or more other hoppers arranged next to the first and adapted to hold a loading material, a rotary brush closing each of the hoppers, and a sieve under each hopper or pair of hoppers adapted to catch and distribute the material dropped thereon from the hoppers.

8. The method of manufacturing pulp-board in continuous sheets, consisting in forming rolls of damp pulp-web sufficiently dry to prevent adhesion and to secure sufficient cohesion for unrolling them by traction; superposing such webs in succession by applying pressure to each separate web before the next web is applied to form a gradually-growing thickness of pulp-board; and coating every applied layer except the last with a dry adhesive; finally applying pressure to the completed pile of webs.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

HOWARD DIEUDONNÉ LORIA.

Witnesses:

EMMANUEL ORDLUE,
LUCIS SIMOY.