

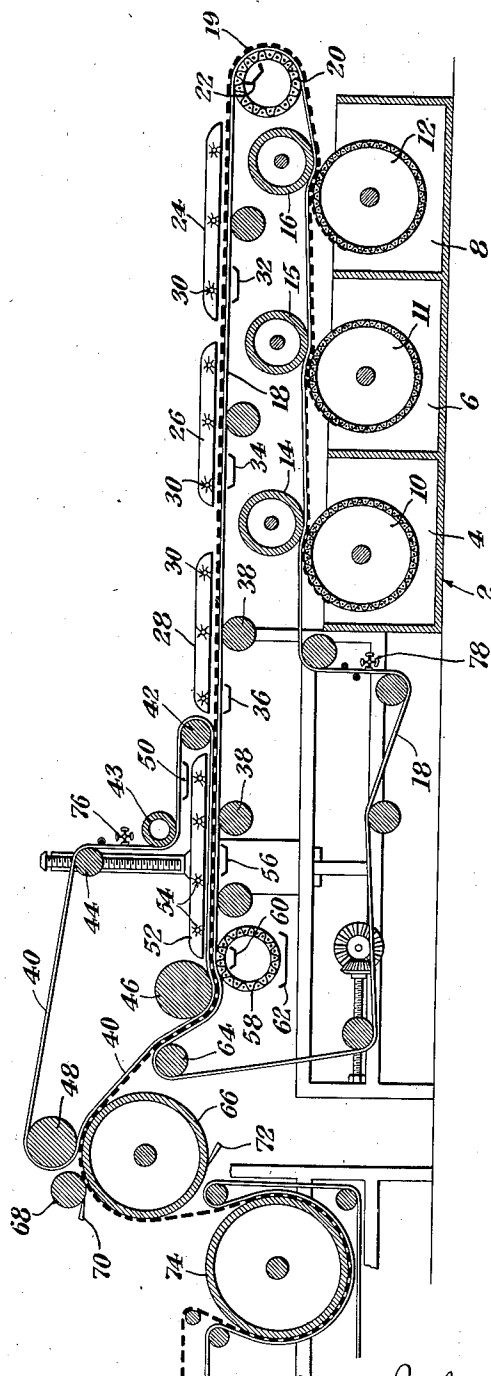
July 9, 1935.

J. D. TOMPKINS

2,007,551

METHOD OF AND APPARATUS FOR MAKING PAPER BOARD

Filed Jan. 31, 1933



INVENTOR-
John D. Tompkins
BY
Prindle, Bean & Mann
ATTORNEY-

UNITED STATES PATENT OFFICE

2,007,551

METHOD OF AND APPARATUS FOR MAKING
PAPER BOARD

John D. Tompkins, Valatie, N. Y.

Application January 31, 1933, Serial No. 654,428

11 Claims. (Cl. 92—38)

This invention relates to the manufacture of paper boards.

One object of my invention is the provision of a method of making paper boards.

Another object of my invention is the provision of an apparatus for making paper boards.

A further object of my invention is the provision of a method whereby paper board is made by subjecting wet pulp to the action of a suction device and then to the action of radiant heat and suction.

A further object of my invention is the provision of a method of making paper boards by removing a large percentage of the moisture of the newly formed web before subjecting the web to mechanical pressure so that the sheet is not broken and the fibres are not rolled out of position.

Other objects will be in part hereinafter pointed out and in part obvious.

To the accomplishment of the foregoing and such other objects as may hereinafter appear, this invention consists in the construction, combination, and arrangement of parts and the method hereinafter described and then sought to be defined in the appended claims, reference being had to the accompanying drawing forming a part hereof, and which shows merely for the purpose of illustrative disclosure, a preferred embodiment of my invention, it being expressly understood, however, that various changes may be made in practice within the scope of the claims without digressing from my inventive idea.

In the drawing:—

The figure represents a partial central vertical sectional view of an apparatus adapted to be used according to my invention.

Paper board is manufactured by providing a plurality of paper webs to form a multiple-layer sheet. When the paper webs are so collected, the layer sheet is a mass of very wet pulp saturated with water. The mass is so soft that it is liable to be crushed and the sheet broken if the mass is passed through heavily weighted presses to remove the water. Also if the mass is submitted to such a pressure the fibres are rolled out of position and as a result the sheet structure is seriously weakened. If the apparatus is run at slow speeds, the above objections are minimized somewhat but not entirely eliminated. I have found that by using my invention, I can safely increase the speed of production and at the same time improve the quality of the paper board product.

Referring now to the drawing, the reference

character 2 designates a paper pulp container having three sections or compartments, 4, 6 and 8. In the sections the forming cylinders 10, 11 and 12 are rotatably mounted for forming a preliminary paper board sheet. Cooperating with cylinders 10, 11 and 12 are couch rolls 14, 15 and 16. Positioned between the cylinders 10, 11 and 12 and couch rolls 14, 15 and 16 is the wet lower felt 18 which is adapted to receive the wet newly formed paper board mass 19 on its lower face. The first cylinder 10 attaches a layer of a wet web on the bottom face of the lower felt as the felt is passed between cylinder 10 and roll 14. The lower felt then passes between cylinder 11 and the second couch roll 15 where a second layer is placed on the first layer. Likewise a third layer is placed on the first two layers by cylinder 12 and the third couch roll 16. While I have shown three forming cylinders it is to be expressly understood that I am not to be limited thereto as the number may be varied within limits to produce paper board of different thicknesses without digressing from my inventive concept.

After leaving the last forming cylinder 12 and the last roll 16, lower felt 18 with its attached paper board mass passes over a suction roll 20 provided with a suction box 22 to remove free water from the paper board mass. In passing over suction roll 20 the direction of the travel of the felt is changed so that the paper board mass is now on top of the felt and the web is carried along in a substantially horizontal position. Positioned above the paper board web are elongated heat reflectors 24, 26 and 28 each provided with a plurality of electric or other heating devices 30. The direction of travel of the newly formed paper board is from right to left looking at the drawing. Beneath the lower felt 18 and near the left hand end of each reflector 24, 26 and 28, the suction boxes 32, 34 and 36 are provided. The arrangement of each set of reflectors and suction boxes is such that the surface of the paper board is first heated by radiant and reflected heat from heating devices 30 and the air above the paper board is heated before suction is applied. This arrangement ensures removal of a large percentage of the moisture without disarranging the fibres of the newly formed paper board. The rollers 38 are located beneath lower felt 18 to support the paper board and felt in their passage past the heaters and reflectors and suction boxes.

After passing under reflector 28, the newly formed paper board is carried between the lower felt 18 and an upper felt 40. The upper felt 40

passes over guide rolls 42, 43 and 44, upper pressure roll 46 and pressure separating roll 48. A suction box 50 is provided for upper felt 40 for removing water therefrom before the felt comes in contact with the newly formed paper board. Located between guide roll 42 and upper pressure roll 46 is a fourth heat reflector 52 provided with a plurality of heaters or heating elements 54. The heat generators heat the air above the upper felt and also the upper felt so that the heat does not strike the paper board directly. Intermediate the ends of the reflector 52 and beneath the lower felt is a suction box 56.

Substantially beneath the left hand end of reflector 52 and beneath the lower felt 18 is a lower suction press roll 58 having a suction box 60 therein and a gutter 62 thereunder. Cooperating with press roll 58 is the upper press roll 46. The paper board is still carried between upper felt 40 and lower felt 18 but after the paper board passes upper press roll 46 the paper board is transferred to the lower face of the upper felt 40 and lower felt 18 then passes downwardly over guide rolls 64. Upper felt 40 with the paper web pass upwardly and between pressure separating roll 48 and drying calender roll 66. At this point the paper web leaves upper felt 40 and is transferred to the drying calender roll 66. Beyond this point a calender roll 68 is provided for pressing the paper web against drying calender roll 66. A scraper 70 is provided for calender roll 68, and a scraper 72 is provided for roll 66. From the drying calender roll 66 the paper board sheet is conducted to a series of heating and drying rollers or drums only one 74 of which is shown.

A beater 76 is shown for the upper felt and a similar beater 78 is shown for the lower felt for removing bits of paper or other foreign material from the felts.

By heating and partially drying the newly formed paper board, I form a preliminary set in the component parts of the paper board so as to hold them together. By using my invention the amount of water in the paper board is lessened and the finer fibres together with the pulp loadings which have heretofore been pressed into the meshes of the lower wet felt are preserved. Furthermore, the fibres of the sheet are not rolled out of position when going through pressure rolls due to the preliminary treatment and a stronger and better paper board product is obtained.

What I claim is:

1. In a device for the manufacture of paper boards, the combination of a plurality of forming cylinders, a plurality of couch rolls and a lower felt cooperating with said cylinders, a suction roll for said lower felt, an upper felt adapted to cover a portion of the surface of a paper board mass on said lower felt, press rolls for applying pressure to said felts and a drying cylinder, said upper felt carrying a newly formed paper board from said lower felt to said drying cylinder.

2. In a device of the character described, a plurality of forming cylinders, couch rolls and a lower felt cooperating therewith to form a multiple layer paper board mass, a suction roll over which said lower felt passes, and heating and suction devices for applying heat to a newly formed paper board on said lower felt, said heating devices being so positioned that the heat is applied prior to the application of the suction.

3. In a device of the character described adapted for the manufacture of paper boards,

the combination of a plurality of forming cylinders, a plurality of couch rolls, a lower felt adapted to pass between said cylinders and said rolls, a suction roll over which said lower felt passes, heat generators and reflectors, and suction boxes located beneath said lower felt and beneath said generators and reflectors.

4. In a device of the character described, the combination of a plurality of forming cylinders, couch rolls, a lower felt cooperating with said cylinders and couch rolls to form a multiple layer paper board mass, a suction roll over which said lower felt passes, a plurality of heating and suction devices, and a suction pressure roll beneath said lower felt and substantially below the rear end of said last heating device.

5. In a device of the character described, a lower felt, means for forming a wet paper board mass thereon, means for applying suction to said lower felt, means for heating a paper board mass on said felt, another means for applying suction to the lower felt to remove moisture therefrom, a press roll, and a suction pressure roll cooperating with said press roll for removing additional moisture from the lower felt and a paper board mass thereon.

6. A method of making paper board, which comprises, forming a relatively thick wet paper board mass of multiple layers and applying heat to such paper board mass to form a preliminary set in the component parts, prior to subjecting the paper board to mechanical pressure.

7. A method of the character described adapted for the manufacture of paper boards, which comprises, forming a relatively thick wet paper board mass of multiple layers and applying heat to the exposed upper surface of such paper board mass to form a preliminary set in the component parts, prior to subjecting the newly formed paper board to mechanical pressure.

8. A method of manufacturing paper board, which comprises, forming a relatively thick wet paper board mass of multiple layers, applying suction to remove moisture, applying heat and then applying suction to form a preliminary set prior to subjecting the newly formed paper board to mechanical pressure.

9. A method of making paper board which comprises, forming a relatively thick wet paper board mass of multiple layers, heating the air above the wet paper board mass and then applying suction to form a preliminary set in the component parts of the paper board mass before subjecting the newly formed paper board to mechanical pressure.

10. A method of making paper board, which comprises, forming a multiple layer paper board mass on a pervious carrier member, applying suction to the paper board mass to remove moisture, causing heated air to be passed through the body of the relatively thick layer of paper board to form a preliminary set in the paper board before subjecting the paper board to mechanical pressure.

11. A method of making paper board which comprises, forming a multiple layer paper board mass on a pervious carrier member, applying suction to the under side of the carrier member to remove moisture from the paper board mass, drawing heated air through the paper board mass at a plurality of places to effect a preliminary set in the newly formed paper board and then subjecting the newly formed paper board to mechanical pressure.

JOHN D. TOMPKINS.