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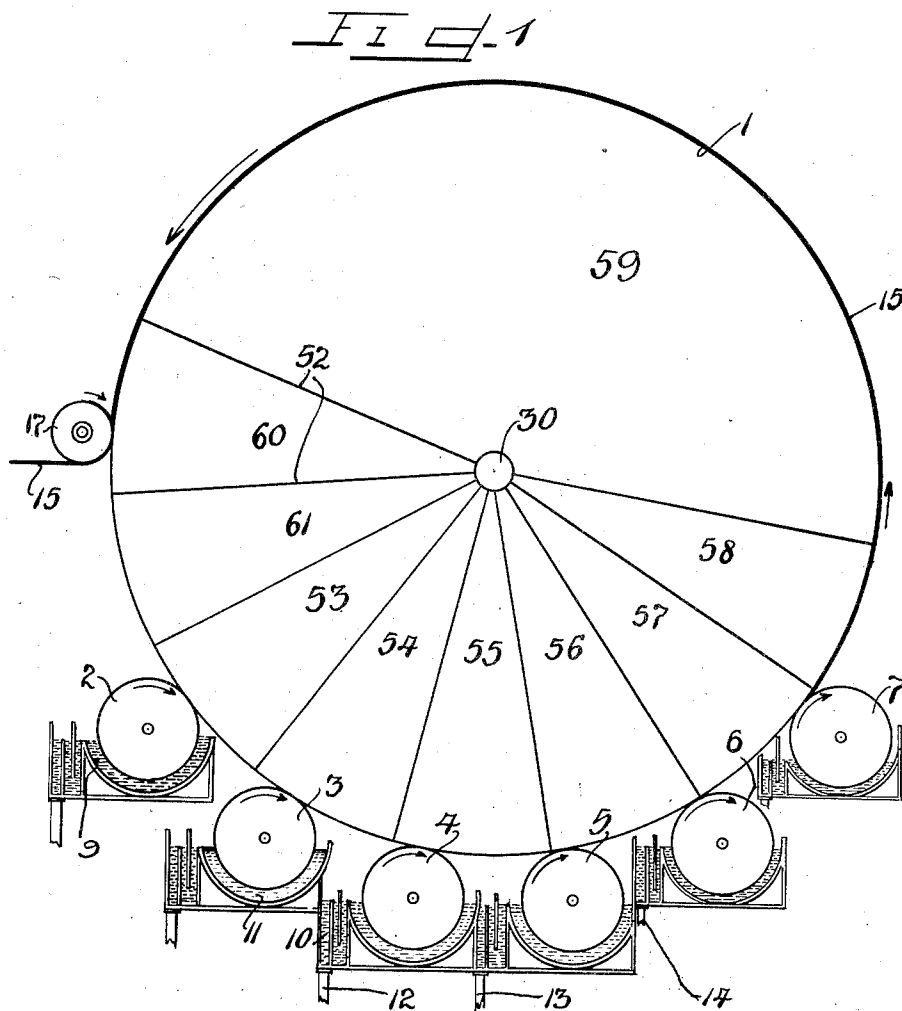
C. C. HERITAGE

1,746,255

BOARD MACHINE

Filed Nov. 16, 1927

3 Sheets-Sheet 1



INVENTOR

Clark C. Heritage

by

Charles D. Hill

Attys.

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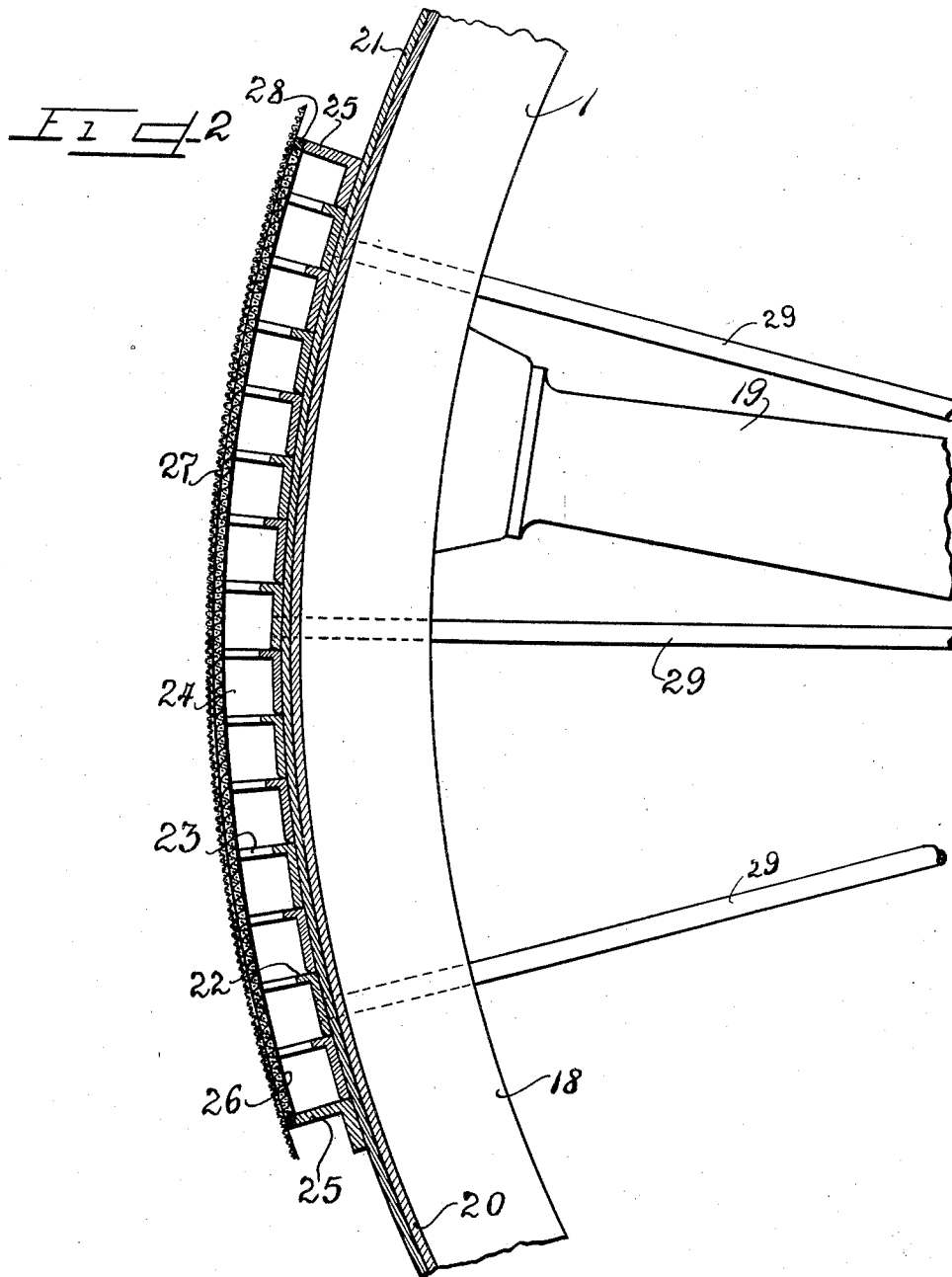
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3 Sheets-Sheet 2



INVENTOR
Clark C. Heritage
By *Charles H. Hill*
Attys.

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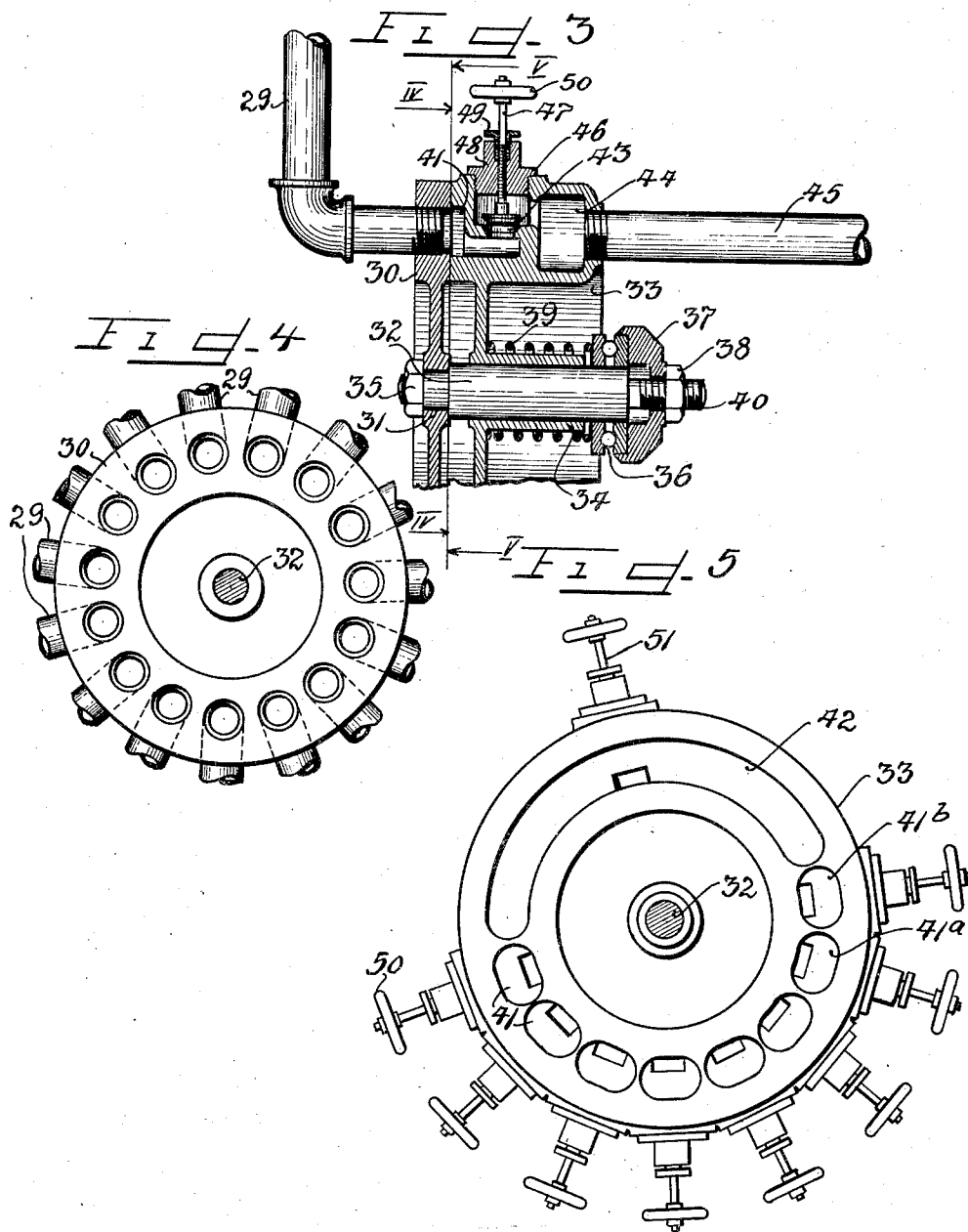
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BOARD MACHINE

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3 Sheets-Sheet 3



INVENTOR

Clark C. Heritage

by *Charles K. Hill* Attys.

UNITED STATES PATENT OFFICE

CLARK C. HERITAGE, OF CORNELL, WISCONSIN

BOARD MACHINE

Application filed November 16, 1927. Serial No. 233,552.

This invention relates to a board machine and more particularly to the construction of the wet end of a board machine.

In the standard type of board machine, the paper board is formed of a plurality of superimposed layers or webs, each separately formed on a cylinder mold and felted or bonded with the other layers by passing through suitable press rolls and the like while being carried upon so-called wet felts. The separate cylinder molds, usually seven in number, are made necessary partly because of the thickness of board to be made and partly by reason of the fact that the outer layers of the board are usually of different fibre composition than the interior layers and frequently the outer layers only are colored. The long lengths of wet felts required for transferring and carrying the wet sheet from the various cylinder molds to the press rolls are obviously very expensive in original cost and also in upkeep.

It is therefore an object of this invention to provide an improved construction for the wet end of a board machine wherein a relatively large suction drum performs the function of the wet felts as a carrier of the wet webs of paper and serves the further purpose of removing a considerable portion of the water from said webs.

It is a further object of this invention to provide a feltless wet end construction for board machines and thereby reduce considerably the cost of manufacture of paper board.

Other and further important objects of this invention will be apparent from the disclosures in the specification and the accompanying drawings.

This invention (in a preferred form) is illustrated in the drawings and hereinafter more fully described.

On the drawings:

Figure 1 is a diagrammatic side view of a wet end construction embodying the principles of my invention.

Figure 2 is an enlarged fragmentary sectional view of the suction drum used in my construction.

Figure 3 is a fragmentary sectional view

showing the valve construction on the suction lines.

Figure 4 is a sectional view taken on line IV—IV of Figure 3.

Figure 5 is a sectional view taken on line V—V of Figure 3.

As shown on the drawings:

The reference numeral 1 indicates a relatively large drum to which suction is adapted to be applied from any suitable vacuum pump or the like. A plurality of cylinder molds 2, 3, 4, 5, 6 and 7 are adapted to be disposed around the lower periphery of the suction drum 1 with their axes parallel with the axis of the roll 1 and with their peripheries in line contact with the periphery of the roll 1. Preferably the vacuum drum 1 is driven and the molds 2 to 7, inclusive, rotated by contact therewith. Said cylinder molds 2 to 7, inclusive, may be of the usual type used on cylinder machines for making board, each cylinder mold being positioned within a vat 9 of the usual type or of a slightly modified construction in accordance with the requirements of the particular type of board to be made. Stock 11 is supplied to certain of the vats 9 through pipes 12, 13, and 14. Other vats, as those in which the cylinder molds 2, 3 and 7 are positioned, may have separate stock intakes to supply other stock furnishes to each of these cylinder molds. With this construction, it will be apparent that by the application of suitable suction to the large cylinder mold 1 the separate webs of paper formed on each of the respective cylinder molds 2 to 7, inclusive, will be transferred to the surface of the drum 1 and bonded together in the form of a built-up web 15. The web 15 after traveling over the top half of the drum 1 is transferred from the suction drum 1 to the usual press felts by means of a roll 17 held in light contact with the surface of the suction drum 1.

Said suction drum 1 comprises a cylindrical drum having end rims 18 supported upon spokes 19. An imperforate cylindrical plate 20 extends between said rims 18 and is preferably formed of steel or iron to afford a support for the spaced outer foraminous coverings. A thin rubber gasket 21 lies against

the cylindrical plate 20 to form a resilient base for a plurality of angular shaped supporting and spacing members 22. Said members 22 extend longitudinally of the suction drum 1 in closely adjacent relation to each other and are provided with pressure equalizing openings 23 forming passageways between successive suction chambers 24 defined by said angular members 22. At definite intervals about the periphery of the suction drum 1 are positioned segmental division plates 25, also of angular formation, to divide the periphery of the drum 1 into different effective suction areas. A coarse mesh wire backing 26 of relatively heavy wire screen is adapted to be positioned upon the radially extending legs of the angle members 22 and 25 and a finer mesh wire facing 27 laid over the wire backing 26 and secured thereto in a manner known to the paper making art. A soft rubber frame 28 is preferably inserted between the ends of the segmental division plates 25 and the wire backing 26. Each of the segmental areas between adjacent division plates 25 is connected by means of one or more pipes 29, each pipe extending radially from an end hub plate 30 (Figures 3 to 5, inclusive).

The hub plate 30, which is suitably attached to the suction drum 1 and adapted to revolve therewith, is centrally apertured as at 31 to receive the reduced end of a shaft 32. A stationary plate 33 is also mounted upon said shaft 32 and for this purpose said plate is provided with an elongated bearing 34. On the inner end of said shaft 32 is positioned a nut 35 adapted to be threaded against said plate 30 and on the outer end a thrust bearing 36, secured in position by means of a cap 37 and nut 38. A coiled spring 39 incloses the elongated bearing 34 and exerts an outward pressure against the bearing 36, thereby tending to hold the revolving plate 30 closely against the stationary plate 33. The nut 38 on the outer threaded end 40 of the shaft 32 serves for adjustment purposes.

The stationary plate 33 is formed with a plurality of ports 41 adapted to register with the openings in the revolving plate 30 in which the pipes 29 are secured to control automatically the pressure conditions within the chambers 24. Said ports 41 occupy, however, only the lower half of the plate 33, a single elongated port 42 occupying the upper half of said plate 33. Each of the ports 41 communicates through a valve port 43 and a chamber 44 with a pipe 45 leading to a vacuum pump or other source of vacuum, except in the case of the ports 41^a and 41^b, which communicate with pipes 45 leading to a water supply and to the atmosphere respectively. Each valve port 43 is adapted to be controlled by a valve 46 having a valve stem 47 extending through a boss 48 and packing gland 49. Handles 50 are provided upon the

valve stems 47 for manual regulation of the valve port openings 43, so that the degree of vacuum in each of the segmental areas into which the suction drum 1 is divided may be independently controlled. A single valve 51 controls the valve port 43 leading to the elongated port 42.

It will thus be apparent that the suction mold 1 may be divided, as indicated by the lines 52 in Figure 1, into separate effective suction sectors, each sector being controlled by a separate valve 46. In the sector 53 controlling the portion of the periphery of the suction drum 1 in contact with the cylinder mold 2, a vacuum of approximately 4 inches of mercury might be maintained, while in the next adjacent sector 54 associated with the cylinder mold 3 a vacuum of 6 inches might be necessary in order that the web formed on cylinder mold 3 be transferred to the suction drum 1. In other words, each successive cylinder mold requires a slightly higher degree of vacuum as applied to the periphery of the suction drum 1 to take care of the increasing thickness of the web built up on the periphery of said suction drum 1. Sectors 55, 56, 57, and 58 might require 8 inches, 10 inches, 12 inches, and 16 inches of vacuum, respectively, while the sector 59, which includes substantially the entire upper half of the suction wall 1, might be maintained under 25 inches of vacuum. In the sector 60 in register with the port 41^b and controlling conditions at the time of the delivery of the web 15, no vacuum is applied so that pressure within this sector of the suction drum 1 may come to atmospheric conditions. In the sector 61 in register with the port 41^b, wash water is applied through one of the pipes 29 to the periphery of the suction drum 1 defined by said sector 61 to clean the wire before taking up a new web. In practice, showers might also be applied from the outside against the periphery of the suction drum 1 at this point to aid in keeping the wire meshes open.

It will thus be apparent that I have provided a wet end construction for board machines that eliminates the necessity of using expensive wet felts and at the same time delivers to the presses a web with a lower water content and better formation. It should also be noted that due to the compactness of the arrangement, the space required for the wet end is considerably less than in the usual type of board machine. The number of cylinder molds employed as well as their construction and the arrangements for feeding stock thereto may obviously be varied to suit the particular requirements of the paper board being made.

I am aware that many changes may be made, and numerous details of construction may be varied through a wide range without departing from the principles of this invention, and I therefore do not purpose limiting

the patent granted hereon, otherwise than necessitated by the prior art.

I claim as my invention:

1. A board machine, comprising a relatively large suction drum divided into a plurality of segments, cylinder molds disposed about the lower portion of said suction drum and in contact with the periphery thereof, and means for supplying stock to said cylinder molds for transference to said suction drum.

2. A board machine, comprising a relatively large suction drum, the surface of said drum being divided into separate suction areas, cylinder molds disposed about the lower portion of said suction drum and in contact with the periphery thereof, means for supplying stock to said cylinder molds, said cylinder molds being driven from said suction drum and caused to deposit stock upon said suction drum, and means for varying the effective vacuum in each of said suction areas.

3. A board machine, comprising a relatively large, horizontally disposed drum having a foraminous surface, means dividing said surface into separate areas, means for applying various degrees of suction to each of said areas, and means for feeding webs of paper stock to successive areas.

4. A board machine, comprising a suction drum, a foraminous surface covering therefor, segmental division plates dividing the surface into separate areas, means for applying various degrees of vacuum to said areas, and cylinder molds in contact with certain of said areas for feeding webs of paper stock thereto.

5. A board machine, comprising a suction drum having a foraminous surface covering, an imperforate support for said covering spaced therefrom, segmental division plates dividing the space so formed into separate suction chambers, means for maintaining various degrees of vacuum within said chambers, and means for feeding webs of stock to the surface of said suction drum.

6. A board machine, comprising a rotatably mounted suction drum having a foraminous surface covering, an imperforate cylinder within said surface, segmental division plates supporting and spacing said foraminous covering from said cylinder and forming separate suction chambers therebetween, an apertured revolving end plate secured to said suction drum, pipes leading from said suction chambers to said apertures, and a stationary plate resiliently held against said revolving plate and having valve controlled ports adapted to register with the apertures of said revolving plate.

7. In a board machine, the combination with a relatively large suction drum of a plurality of cylinder molds disposed in contacting relation to the periphery of said suction drum, and means for supplying various stock furnishes to said cylinder molds,

8. In a board machine, the combination with a relatively large suction drum of a plurality of cylinder molds disposed in contacting relation to the periphery of said suction drum, means for supplying various stock furnishes to said cylinder molds, and means for varying the degree of suction applied to different surface areas of the suction drum.

9. In a board machine, the combination with a relatively large revolving suction drum of a plurality of cylinder molds disposed in contacting relation to the periphery of said suction drum and driven thereby, and means for supplying various stock furnishes to said cylinder molds.

10. A board machine, comprising a rotatably mounted suction drum having a continuous foraminous surface, a non-foraminous member within said drum and spaced from said surface, means forming separate suction chambers between said surface and said member, means for creating various degrees of suction within said chambers and a plurality of web forming devices contacting said foraminous surface for depositing stock in web form upon said foraminous surface to form a continuous matted web of fibrous material.

11. A board machine, comprising a rotatably mounted suction drum having a continuous foraminous surface, a non-foraminous member within said drum and spaced from said surface, means forming separate suction chambers between said surface and said member, means for creating various degrees of suction within said chambers and a plurality of web forming devices for depositing stock in web form at predetermined points upon said foraminous surface to form a continuous matted web of fibrous material thereon.

In testimony whereof I have hereunto subscribed my name at Madison, Dane County, Wisconsin.

CLARK C. HERITAGE.