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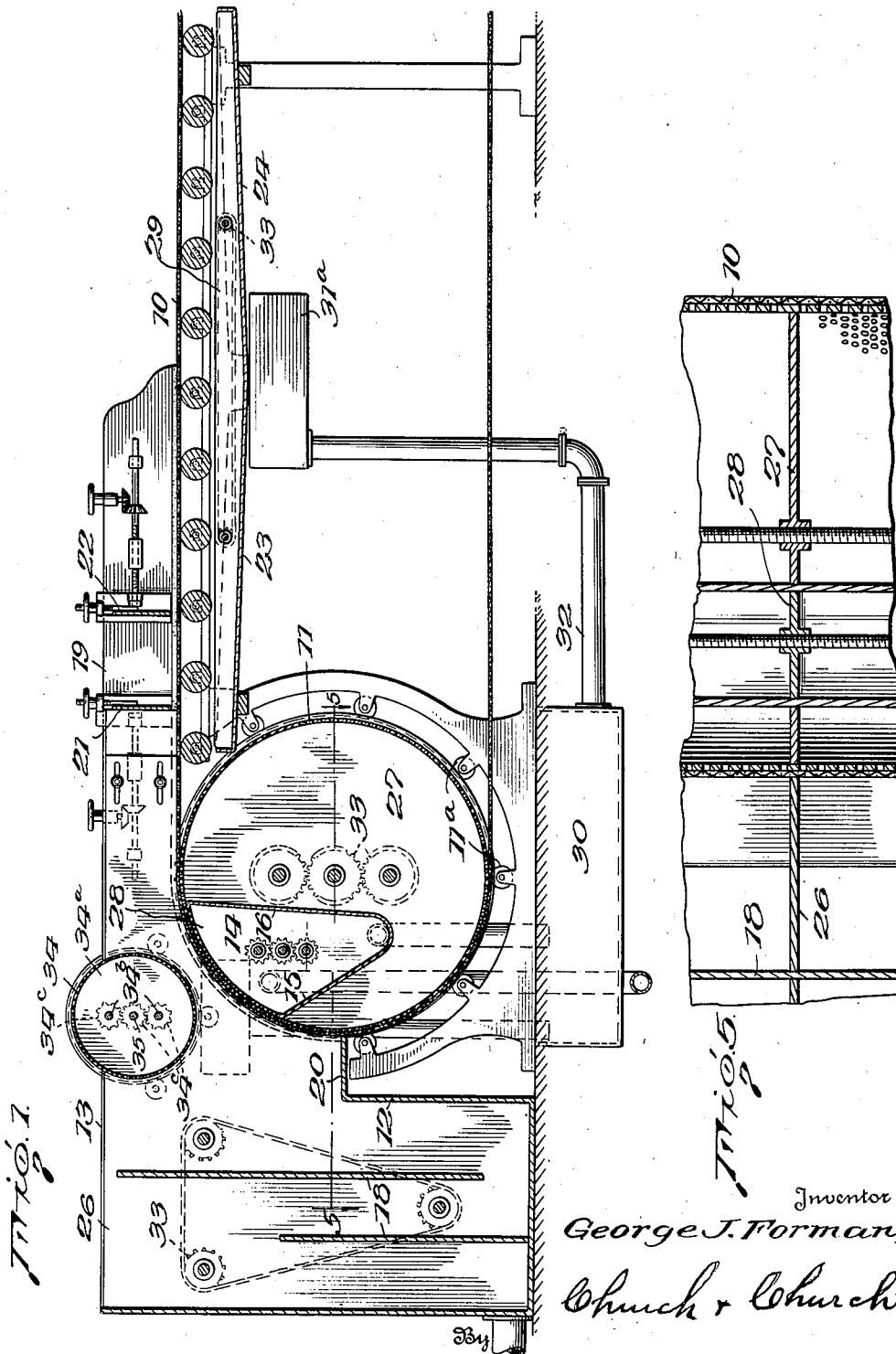
G. J. FORMAN

2,185,913

PAPER MAKING MACHINE

Filed July 19, 1935

3 Sheets-Sheet 1



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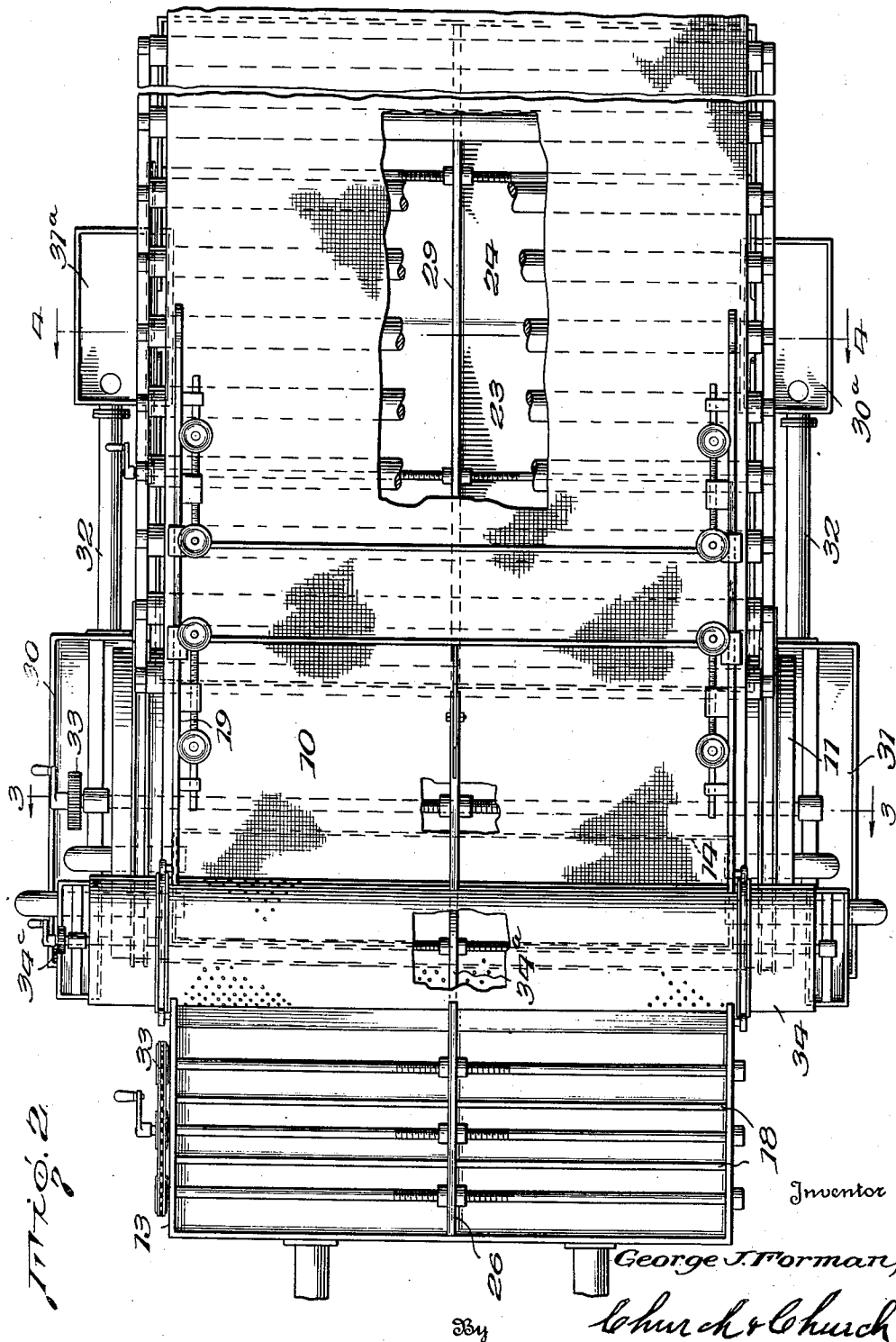
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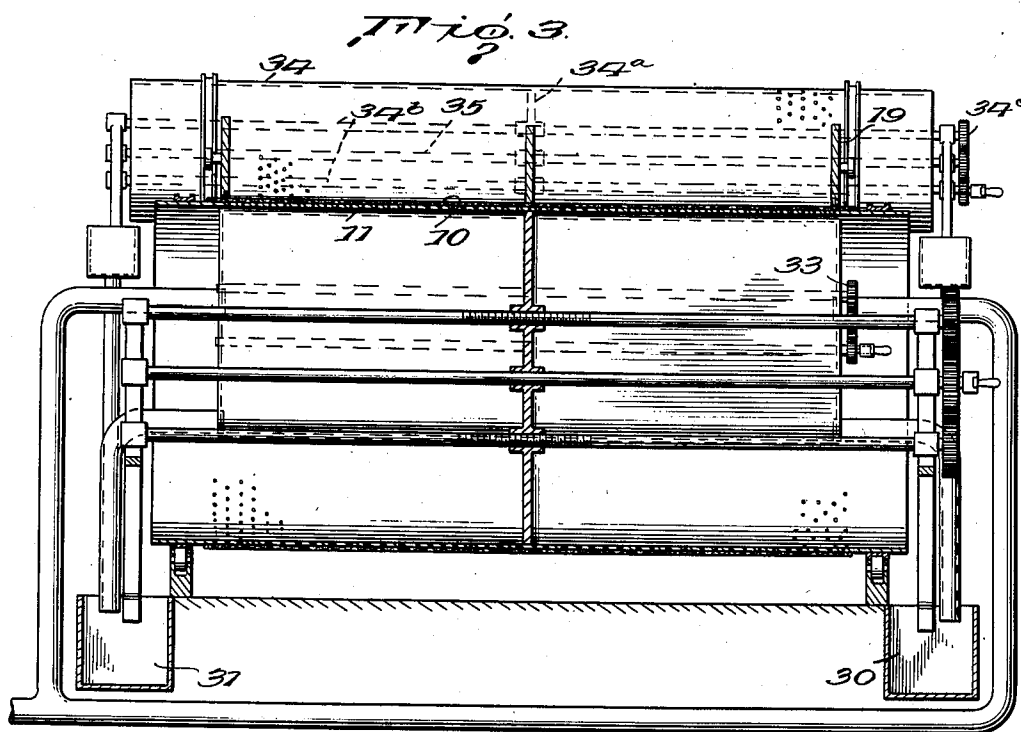
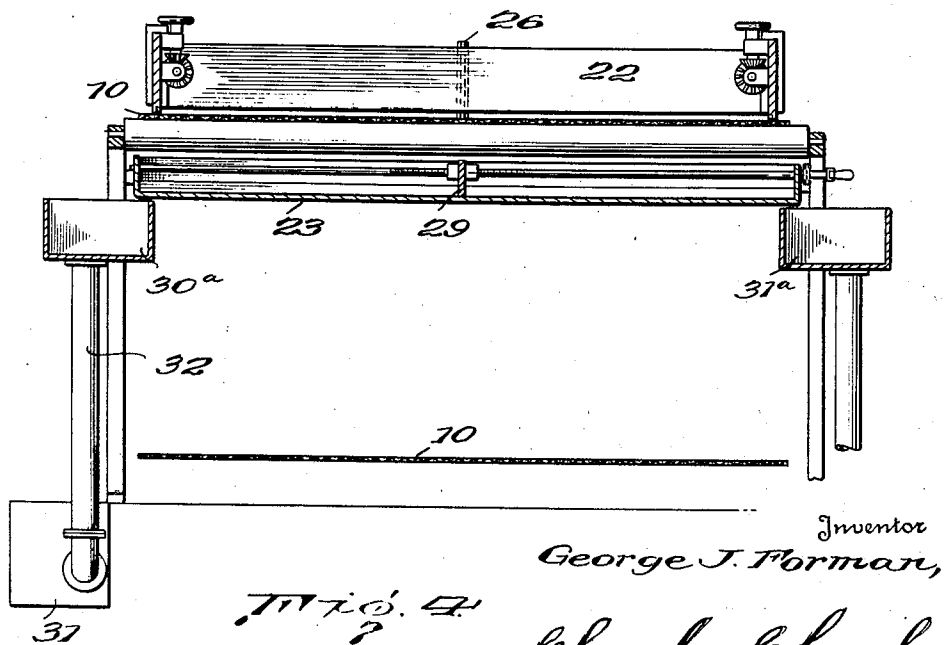
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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

2,185,913

PAPER MAKING MACHINE

George J. Forman, Montville, Conn.

Application July 19, 1935, Serial No. 32,295

1 Claim. (Cl. 92-44)

This invention relates to improvements in paper-making machines.

Primarily, the object of the invention is to provide a paper-making machine on which paper of unusual strength can be produced, the machine being especially adapted for the production of heavy paper board and wall board.

More specifically, the invention contemplates a paper-making machine in which the principles of the usual cylinder forming machines and Fourdrinier machines are used conjointly for the production of comparatively heavy paper.

A further object is the provision of a paper-making machine wherein two or more different stocks or colors of paper can be run on the machine at the same time, side by side, and joined together at any suitable point transversely of the entire web, so as to produce in a single web papers of different stocks or colors of any desired width.

Another object is to provide a paper-making machine wherein stock having a large water content can be used, a feature which is essential for the production of strong or heavy paper.

With these and other objects in view, the invention consists in certain details of construction and combinations and arrangements of parts, all as will hereinafter be more fully described and the novel features thereof particularly pointed out in the appended claim.

In the accompanying drawings, illustrating the preferred embodiment of the present invention—

Figure 1 is a vertical sectional view taken longitudinally of the paper-forming belt or transversely of the cylinder carrying the belt on which the paper stock is deposited from the flow box, portions of the machine toward what might be termed the discharge terminal of the forming belt being omitted;

Fig. 2 is a top plan view of the structure shown in Fig. 1;

Fig. 3 is a detail vertical sectional view on the line 3-3 of Fig. 2; and

Fig. 4 is a vertical sectional view taken transversely of the forming belt on the line 4-4 of Fig. 2.

Fig. 5 is a detail horizontal sectional view of line 5-5 of Fig. 1.

The web of paper is formed from liquid paper stock deposited on an endless, traveling, foraminous forming belt 10 adapted to travel around a perforated cylinder 11 journaled to revolve on an axis extending parallel to what will be termed the front wall of the paper stock flow box 13. If

desired, the cylinder is supported on guide rollers 11^a. Preferably, the belt 10 extends in horizontal lower and upper reaches from the cylinder 11. Within the cylinder 11 there is a vacuum chamber 14 comprising front and rear walls 15, 16, both arranged at an angle to the horizontal for purposes which will be later described. Suitable exhausting means (not shown) are provided in connection with said vacuum chamber for the purpose of withdrawing from said chamber water entering the same from stock carried by the belt 10.

The flow box 13 is provided with baffles 18 and its portions 19 project beyond the front wall 12 and a considerable distance over the belt 10 and beyond the cylinder 11. In order to build up or form, on the belt 10, as it travels around cylinder 11, a strong, heavy paper web, the apron 20, projecting forwardly from the front wall 12 of the flow box and which defines the lower limit of the area over which the stock has access to the traveling belt, engages said belt at a point below the front wall 15 of the vacuum chamber. By maintaining the liquid stock in the flow box at a level above the upper reach of the belt 10, stock is deposited on the belt from the point at which the apron 20 engages said belt to a point beyond where the upper reach of belt 10 leaves cylinder 11. To prevent loss of stock, suitable packing may be provided along the lower edge of the sides 19 of the flow box and one or more gates 21, 22, are arranged transversely of the belt between the two sides 19 of the flow box.

Due to the extended area of the belt 10 exposed to stock in the box, paper of substantially any thickness can be formed. The gates 21, 22, will, of course, be adjusted vertically to accommodate the thickness of paper being produced at any one time. The gates may also be provided with means for adjusting them longitudinally of the belt. Also, a paper of high grade can be produced because the arrangement described permits the use of a large volume of water in the stock. For instance, by reason of the apron 20 being positioned below the front wall 15 of the vacuum chamber, a portion of the water will drain from the stock into cylinder 11. Then, from the front wall 15 to the rear wall 16 of the vacuum chamber, water will be extracted from the stock by means of the vacuum in said chamber. Further, due to the weight imposed by the stock on the fibers adhering to the belt, additional water will be expressed from the web being formed after it passes the rear wall 16 of the vacuum compartment. A portion of the water

expressed from the web at this time will enter cylinder 11 but the greater portion of it will be collected in reservoirs 23, 24, located beneath the upper reach of the belt. In other words, water will be extracted from the stock initially by gravity; then, by suction; and, after the web passes the rear wall 16 of the vacuum chamber, by the combined action of pressure and gravity.

In order to permit the production of two grades or colors of paper on the present machine, if desired, the flow box is divided into a plurality of compartments by a partition 26, and the cylinder 11 is likewise provided with a partition 27, while a partition 28 is provided within the vacuum compartment 14. The partition 26 in the flow box extends outwardly over the cylinder 11 and upper reach of the forming belt 10, with its outer extremity engaging against the gate 21, and beneath the upper reach of said belt there is a partition 29 dividing the collecting receptacles 23, 24, longitudinally of the belt. With this arrangement, two different grades of stock or two stocks of different colors can be supplied to the two compartments formed in the flow box by partition 26 and the two different stocks will form into two separate strips of paper web on the belt until the web passes the last one of the gates 21, 22, being used, whereupon the two separate strips will merge into a single web due to the fact that substantially the entire water content has been removed at that time. By reason of the cylinder 11 being provided with partition 27, the liquid recovered from the two stocks, particularly if they are of different colors, will be recovered separately, one end of the cylinder discharging into a reservoir 30 and the opposite end into a reservoir 31. Likewise, water draining onto collectors 23, 24, will drain into receptacles 30^a, 31^a, which communicate with receptacles 30, 31, through conduits 32. The partition 28 in the vacuum compartment 14 will, of course, require the use of two connections, preferably connected to a single pump, as indicated in Fig. 3.

In the case of each one of the partitions in the flow box; cylinder 11; vacuum chamber 14; and for the drain boards 23, 24, means are preferably provided for adjusting all of said partitions laterally of the belt. Such means may take any desired form and are indicated more or less diagrammatically in the present instance at 33, separate adjusting means being provided for each one of the partitions. It will be appreciated, of course, that in adjusting any one partition, all of

the others will be adjusted to position all of them in alinement. By having them adjustable, the two different grades or colors of paper can be made of any desired width. For instance, with the machine having a forming belt of, say, 80 inches in width, two separate strips of 50 and 30 inches, respectively, can be formed, or any other widths can be made by simply adjusting the several partitions.

It will be observed that the wall 16 of vacuum compartment 14 is practically vertical and wall 15 substantially so. Therefore, after the force of the vacuum has extracted the water from the web of stock on the belt, the disposition of these front and rear walls facilitates the flow of the water toward the lower portion of the compartment from which it is removed and recovered.

To further aid in extracting water from the stock as it forms into the web on the forming cylinder, a perforated cylinder 34 is arranged in the upper portion of the flow box longitudinally of the forming cylinder 11 and in close proximity to the latter. A certain amount of water will be expressed from stock passing between the two cylinders, a portion of said water entering the vacuum compartment 14 and a portion entering said cylinder 34. A partition 34^a is also provided in cylinder 34 to maintain water of different stocks separated and said partition is adjustable longitudinally of said cylinder on a guide rod 35 by screws 34^b operable by gears 34^c.

What I claim is:

In a paper-making machine, the combination of a stock flow box, a perforate cylinder on a horizontal axis paralleling one side wall of said box, an endless traveling belt extending partially around said cylinder and extending from said cylinder in horizontal upper and lower reaches, said cylinder and belt being located exteriorly of said box, a vacuum chamber within said cylinder for removing liquid from stock on said belt, two opposite side walls of the box extending beyond and overhanging said cylinder beside said upper reach of belt, means positioned beyond said cylinder preventing excess stock flowing over the upper reach of said belt between said opposite side walls, and a feeding apron projecting from the first-mentioned box wall into proximity to the belt around the cylinder in substantially the same horizontal plane of the cylinder axis and below said vacuum chamber.

GEORGE J. FORMAN.