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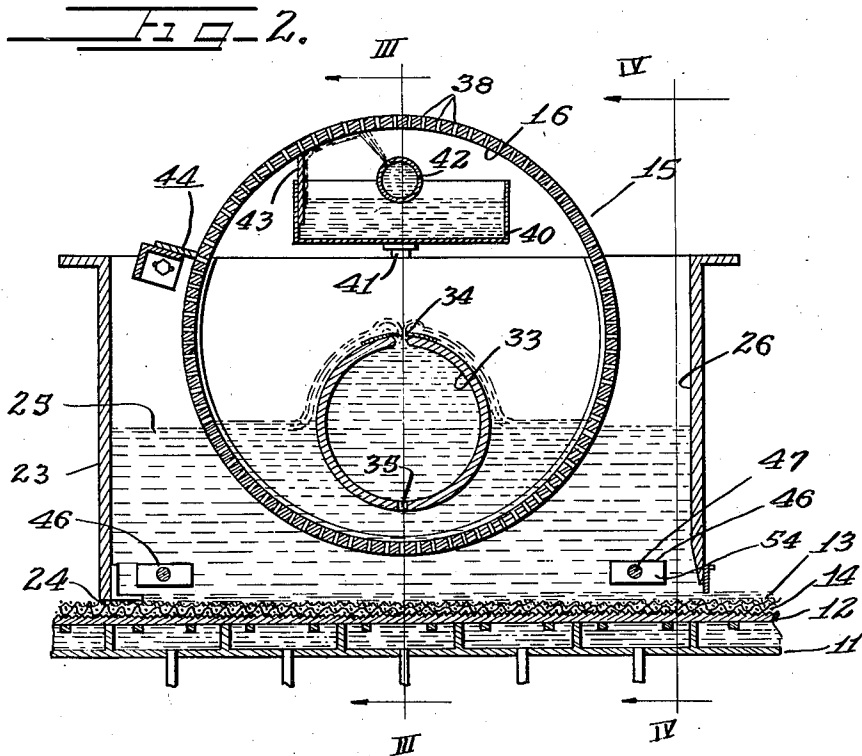
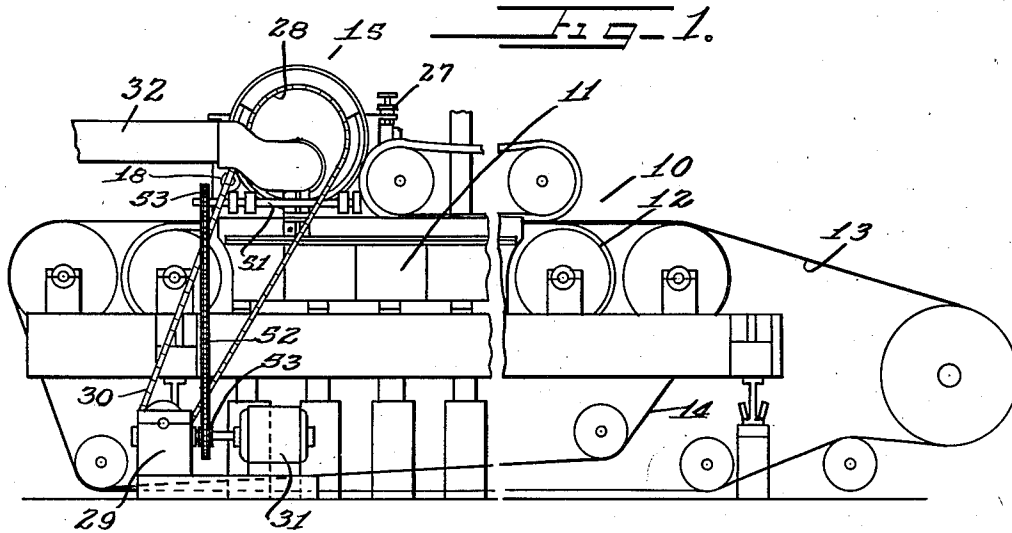
E. E. BERRY

1,880,688

PAPER MAKING MACHINE

Filed Dec. 29, 1930

2 Sheets-Sheet 1



INVENTOR
Earl E. Berry.

By Charles H. Hill Att'y.

Oct. 4, 1932,

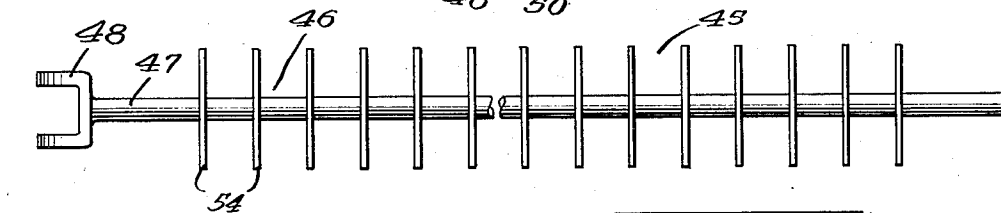
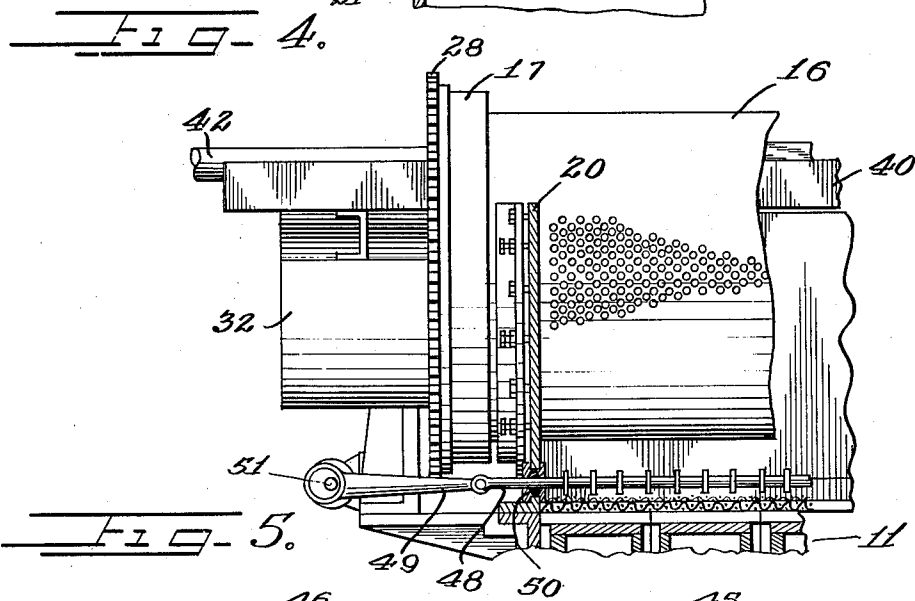
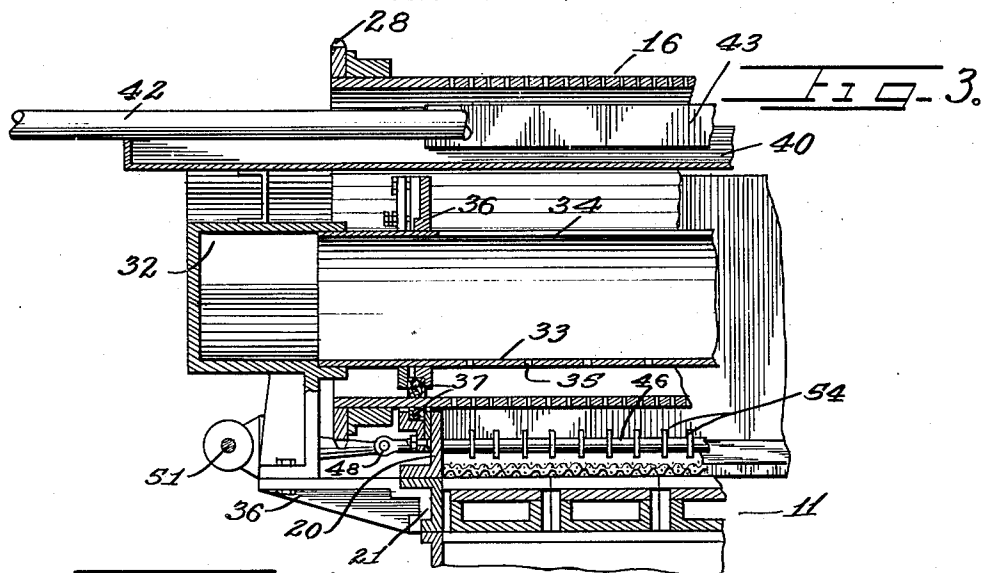
E. E. BERRY

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PAPER MAKING MACHINE

Filed Dec. 29, 1930

2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

EARL E. BERRY, OF BELOIT, WISCONSIN, ASSIGNOR TO BELOIT IRON WORKS, OF BELOIT, WISCONSIN, A CORPORATION OF WISCONSIN

PAPER MAKING MACHINE

Application filed December 29, 1930. Serial No. 505,355.

This invention relates to a paper making machine and more particularly to fiber distributing, evening and crossing devices as used in connection with the forming part of a paper machine.

In a copending application, entitled "Paper making machine," Serial No. 378,236, filed July 15, 1929, I have described a novel type of paper making machine wherein the stock upon its flow onto the forming wire is immediately subjected to suction and a substantially continuous suction is applied to the forming wire until a moist web has been formed. I have also described in my copending application entitled "Paper making machine," Serial No. 496,446, filed November 17, 1930, a particularly advantageous type of stock distributing device for use in a paper machine such as disclosed and claimed in my earlier application.

The present invention relates to improvements in connection with the type of paper machine disclosed in the applications referred to and these improvements include more particularly the use of novel means for effecting the crossing of the fibers to obtain a well formed sheet of paper.

It is therefore an object of this invention to provide improved fiber crossing means in combination with the forming part of a paper machine.

It is a further important object of this invention to provide improved fiber crossing means in connection with the flow of stock onto the forming part of a paper machine wherein the stock is immediately subjected to suction and an initial deposit of fibers takes place before the stock flows out from under the slice or slices.

Other and further important objects of this invention will be apparent and 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 broken, front side elevational view of the forming portion of a paper machine embodying the principles of my inven-

tion, shown more or less diagrammatically.

Figure 2 is an enlarged fragmentary sectional view taken longitudinally of the forming part of the machine and transversely of the stock distributing device.

Figure 3 is a fragmentary sectional view taken substantially on line III—III of Figure 2.

Figure 4 is a fragmentary sectional view taken substantially on line IV—IV of Figure 2.

Figure 5 is a broken top plan view of a fiber crossing device embodying the principles of my invention.

As shown on the drawings:

The type of paper making machine, indicated generally by the reference numeral 10, is described in detail in my copending application Serial No. 496,146 previously referred to and therefore only a brief description is deemed necessary here. The main elements of the paper machine 10 are a stationary, sectional suction device 11, an endless perforated flexible belt 12 trained over the open top of said suction device 11 and hydraulically balanced with respect thereto, and a forming wire 13 associated with the traveling cover or belt 12 and supported upon said traveling belt or cover 12 through a wire 14 of coarser mesh.

A stock delivery means, indicated generally by the reference numeral 15 is mounted over the head end of the suction device 11. Said stock delivery means 15 includes a cylinder 16 mounted for rotation directly above the suction device 11 and extending transversely of the forming wire 13 and beyond the edges thereof. The cylinder 16 is equipped at each end with an annular supporting ring 17 mounted to rotate on rollers 18, which in turn are supported on a suitable frame structure.

The frame structure for supporting the cylinder 16 suitably comprises a pair of end walls 20 resting on and supported from side rails 21 of the machine. A wall 23 (Figure 2) also secured to the end walls 20 and spaced at its lower edge above the forming wire 13, as at 24, extends transversely of the wire to serve as a retaining wall for a pond

of stock 25 that is created above the forming wire 13. One or more slices 26 forms an adjustable fourth retaining wall for the pond of stock 25, the slice being also supported from the end walls 20 and being vertically adjustable by suitable mechanism 27. Any suitable means may be employed for rotating the cylinder 16 at different speeds, such means being here shown as a sprocket wheel 28 on the cylinder 16 driven through reducing gears 29 by a sprocket chain 30 from an electric motor 31.

Stock is delivered by means of a pipe 32 into the interior of the rotating cylinder 16 through one or both ends thereof by means of a conduit 33 extending the full length of the cylinder and having on its upper side a longitudinally extending slot 34. Said conduit 33 is provided on its under side with a plurality of spaced apertures 35. Brackets 36 secured to the side rails 21 serve to support the respective ends of the conduit 33. It should be understood that any suitable means may be employed for preparing the stock for delivery to the interior of the cylinder 16.

The longitudinal slot 34 and the spaced apertures 35 allow the escape of stock both upwardly and downwardly, the apertures 35 serving to prevent any settling out and accumulation of stock in the lower portion of the conduit. As indicated in Figure 2, the stock fills the conduit 33 and discharges through the longitudinal slot 34 down over the sides of said conduit into the rotating drum 16, building up a head of stock within the drum. The amount of head depends primarily on the adjustment of the slice and the rate of delivery of stock to the conduit. While I prefer to discharge the stock into the interior of the drum through the agency of a tubular conduit of suitable diameter, it will be understood that my invention contemplates the use of any suitable trough structure or other means for delivering and distributing the stock into the rotating cylinder through one or both ends thereof.

The stock is confined at the ends of the rotating cylinder 16 by the end walls above mentioned, each of which has an inner section 36 supported from the conduit 33. Escape of stock through the joints between the walls and the periphery of the cylinder 16 and between the interior of the cylinder 16 and the inner wall sections 36 is prevented by suitable packing 37.

The stock delivery cylinder 16 is of a foraminous construction throughout its length intermediate the inner section walls 36 and in its preferred embodiment comprises a cylinder having rows of small holes 38 closely arranged together and through which the stock flows into the pond 25 defined by the walls 20, 23 and the slice 26. These holes 38 provide nozzle-like delivery

orifices which serve to mix the fibers of the stock as it passes through and to break up any bunches or collections of fiber, if any should reach this point on the machine. The stock thus flows onto the wire in a condition of uniform distribution and with absence of any eddy currents.

In connection with the rotating cylinder 16, there is provided in the interior thereof a trough 40 with an outlet pipe 41 and a shower pipe 42 mounted above said trough for cleaning the interior of the cylinder. A doctor 43 adjustably mounted from one wall of the trough 40 is adapted to scrape against the interior surface of the rotating drum 16 to cause any dirt or water adhering thereto to flow down into the trough 40. A similarly adjustable doctor 44 is mounted externally of the drum 16 to scrape against its outer surface.

The mechanism thus far described is substantially that disclosed and claimed in my copending application entitled "Paper making machine", Serial No. 496,146, filed November 17, 1930. My present invention is directed principally to a fiber crossing device that is preferably used in connection with the mechanism of that application as just described, although it will be understood that this fiber crossing device about to be described may also be used with paper making equipment of different construction.

The fiber crossing device, indicated generally by the reference numeral 45, comprises one or more reciprocally mounted agitating members 46 (Figures 2 to 5 inclusive). Each of the reciprocating members 46 comprises a bar 47 having at one end a clevis 48 for connection with an inner end of an eccentric rod 49. For this purpose, the bar 48 extends through an end wall 20 provided with a suitable packing gland 50. The eccentric rod 49 is connected to a shaft 51 driven by means of a chain 52 and sprockets 53 from the shaft of the motor 31. Each of the fiber crossing devices 46 is provided with a plurality of spaced blades or arms 54 mounted transversely of the bar 47. Said fiber crossing devices 45 are positioned in close proximity to the forming wire 13 and extend transversely of the direction of said forming wire. Reciprocal movement of the fiber crossing devices causes the blades 54 to create gentle eddy currents in the stock lying directly above the forming wire 13 and these eddy currents result in a general crossing of the fibers and the formation of a well matted web.

As is well known, the general direction of the fibers in a body of stock flowing onto a Fourdrinier machine is that of the flow of stock, with the result that paper formed on Fourdrinier machines is distinctly weaker in tensile strength in a direction across the

machine than it is in a direction with the machine.

The construction of my device for uniformly distributing the stock onto the forming wire and the use of my fiber crossing mechanism greatly eliminates the normal tendency of the fibers to assume a direction parallel to the direction of travel of the forming wire. In the first place, the pond of stock 25 is relatively quiescent, so that the conditions for the deposit of fibers on the wire are similar to those obtaining in hand making paper operations. In the second place the stock in the pond 25 is immediately subjected to suction, with the result that an initial deposit of fibres is effected before the stock passes under the slice. The proximity to the wire of the reciprocating fiber crossing devices makes possible a maximum fiber crossing effect, since the fibers after having their directions changed are immediately deposited and caused to bond and interlace with other fibers. The result is an unusually well-formed sheet having exceptionally great strength in an across-the-machine direction.

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. In combination with means creating a pond of stock over the forming portion of a paper machine, fiber crossing means submerged in said pond comprising a bar having spaced transverse blades secured thereto and means for reciprocating said bar in close proximity to said forming portion.

2. In a paper machine, a forming part including a wire and suction means operatively associated therewith, means defining a pond of stock over said wire while subject to suction and reciprocally mounted fiber crossing means within said pond in close proximity to said wire.

3. In a paper machine, a forming part including a wire and suction means operatively associated therewith, means defining a pond of stock over said wire while subject to suction and reciprocally mounted bars having transverse blades within said pond in close proximity to said wire.

4. In a paper machine, a forming part including a stationary suction device, a forming wire traveling thereover, means defining a pond of stock at the head end over said forming wire and suction device and fiber crossing means reciprocally mounted for movement within said pond in close proximity to said forming wire.

5. In a paper machine, a forming part including a stationary suction device, a form-

ing wire traveling thereover, means defining a pond of stock at the head end over said forming wire and suction device and bars having transverse blades reciprocally mounted for movement within said pond in close proximity to said forming wire.

6. In a paper machine, a forming part including a stationary suction device, a forming wire traveling thereover, means including a slice defining a pond of stock at the head end over said forming wire and suction device and fiber crossing means reciprocally mounted for transverse movement within said pond in close proximity to said forming wire.

7. In a paper machine, a forming part including a suction device, a traveling forming wire operatively associated therewith, walls including a slice defining a pond of inflowing stock above a portion of the forming wire subjected to suction, bars extending through side walls into said pond and having on their inner portions spaced blades transversely arranged in proximity to the forming wire and means connected to the outer ends of said bars for reciprocating said bars.

8. In a paper machine, a forming part including a suction device, a traveling forming wire operatively associated therewith, walls including a slice defining a pond of inflowing stock above a portion of the forming wire subjected to suction, bars extending through side walls into said pond and having on their inner portions spaced blades transversely arranged in proximity to the forming wire, means connected to the outer ends of said bars for reciprocating said bars and means for distributing stock uniformly the entire width of said pond.

9. In the manufacture of paper including the process of applying paper stock to the forming wire of a paper machine from a pond formed above the wire, the step comprising gently agitating the stock in close proximity to the forming wire to cause the stock fibers to become thoroughly crisscrossed and to form a well matted deposit on said wire.

10. The process of manufacturing paper which comprises supplying paper stock to a forming wire from a pond located above the wire, gently agitating the stock in said pond at a point in close proximity to the forming wire to aid in the formation of a well matted sheet and applying suction through said wire to remove water from the stock thereon.

In testimony whereof I have hereunto subscribed my name at Beloit, Rock County, Wisconsin.

EARL E. BERRY.