

(No Model.)

2 Sheets—Sheet 1.

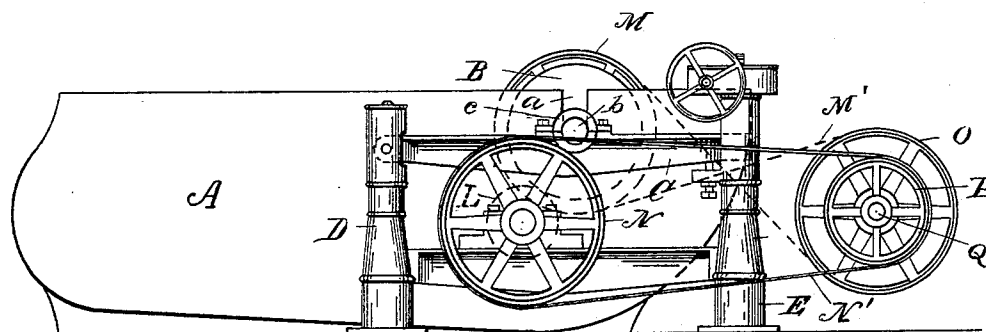
A. P. BROWN.

MACHINE FOR REDUCING PAPER STOCK TO PULP.

No. 569,321.

Patented Oct. 13, 1896.

FIG. 1.



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FIG. 3

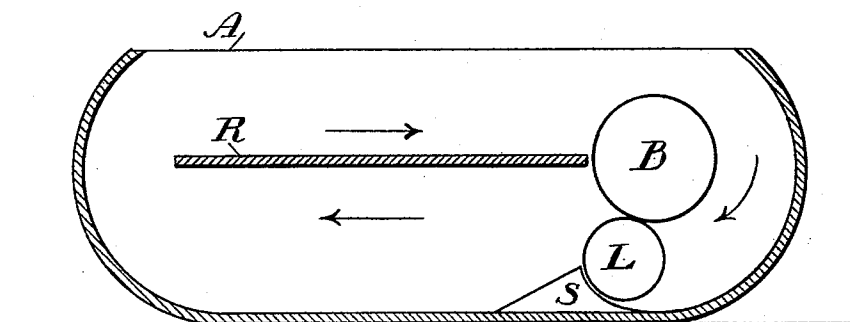


FIG. 2.

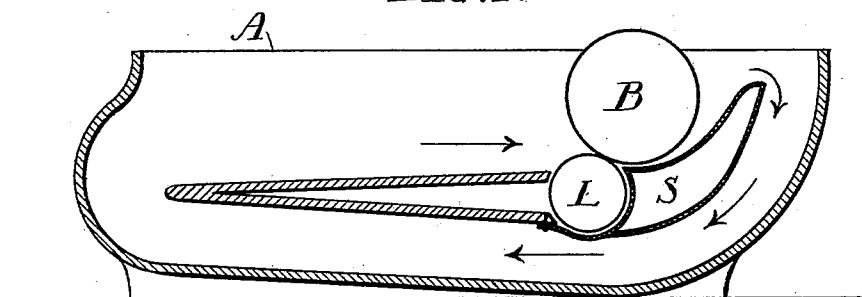
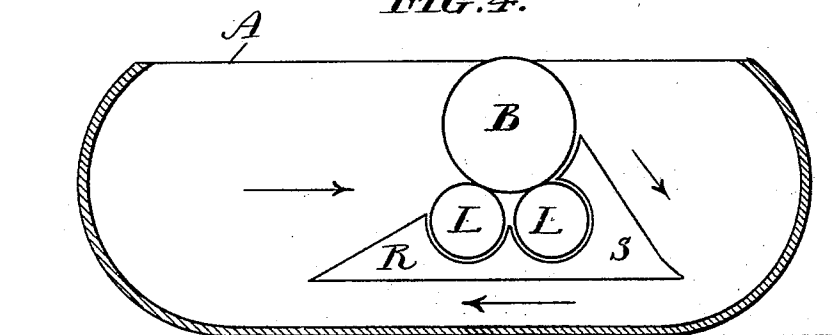


FIG. 4.



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UNITED STATES PATENT OFFICE.

AUGUSTUS P. BROWN, OF FORT MADISON, IOWA.

MACHINE FOR REDUCING PAPER-STOCK TO PULP.

SPECIFICATION forming part of Letters Patent No. 569,321, dated October 13, 1896.

Application filed January 12, 1895. Serial No. 534,645. (No model.) Patented in England January 23, 1895, No. 1,615, and in France January 23, 1895, No. 244,564.

To all whom it may concern:

Be it known that I, AUGUSTUS P. BROWN, a citizen of the United States, residing at Fort Madison, in the county of Lee and State of Iowa, have invented certain new and useful Improvements in Machines for Reducing Paper-Stock to Pulp, (for which I have obtained Letters Patent in England and France, said Letters Patent being dated January 23, 1895, and numbered, respectively, 1,615 and 244,564,) of which the following is a specification, reference being had to the accompanying drawings, which are made a part hereof, and in which—

Figure 1 is a side elevation of a machine embodying the invention in its preferred form. Fig. 2 is a vertical longitudinal section thereof. Figs. 3 and 4 are vertical longitudinal sections of machines embodying the generic feature of the invention under two modifications.

In reducing paper-stock to pulp in the manufacture of paper perfection is attained not by pulverizing or comminuting the stock, but by disintegrating it, or, in other words, separating its integrant fibers from each other. This result is best accomplished by the use of a revolving bed-plate (as distinguished from the fixed bed-plate) working in conjunction with a beater-roll, the bed-plate and beater-roll being preferably driven at different surface speeds.

I am well aware that I am not the first to use a beater-roll and revolving bed-plate driven at different surface speeds; but, on the other hand, I believe that prior to my present invention no one ever constructed or proposed to construct a machine in which these parts were so related to each other and to a midfeather, which divides the interior of the tank into two passages located one above the other, that they kept the material constantly circulating through said passages.

I am aware of a prior United States patent showing a machine in which the midfeather is vertical and divides the interior of the tank into two circulating-passages located one beside the other, in one of which the beater-roll and so-called "revolving bed-plate" are located, the bed-plate being in contact with the

side of the beater-roll and having less than half of its circumference submerged.

I am aware of another United States patent showing a machine in which there are two rolls located one above the other and co-operating in the treatment of stock; but this machine has other parts so arranged that the rolls cannot keep up the necessary circulation, and with a knowledge of this fact the patentee has shown his machine as provided with a propeller for producing the circulation.

The object of the present invention is to provide a machine having a beater-roll and a revolving bed-plate so located with relation to each other and to the midfeather that they not only disintegrate the stock, but they also cause it to circulate through the two passages, located one above the other, into which the midfeather divides the interior of the tank; and in accomplishing this object I have found it necessary to completely submerge the revolving bed-plate and locate it below the beater-roll, and, in addition to this, to so locate the midfeather with relation to these rolls and the tank that it divides the interior of the tank into two passages located one above the other and bearing such relation to the rolls that their "bite" is opposite the end of one of said passages. In addition to this, where the revolving bed-plate is located above the lower one of the two passages, so that the material must circulate below it, its lower side must be covered or protected in order to prevent it from interfering with the circulation of the material, in the manner hereinafter described.

The invention consists in the features of novelty that are particularly pointed out in the claims hereinafter.

A represents a vat or tank, which may not be different in construction from the tanks or vats heretofore used in pulp-machines. In its opposite sides it is provided with vertical slots or openings *a*, through which passes the shaft *b* of a beater-roll *B*, which latter may be of the customary construction. The shaft *b* is journaled in boxes *c*, that are carried by beams *C*, each of which is pivotally supported at one end by an upright *D* and at the other end by an upright *E*, through the medium of

suitable adjusting mechanism, but as no novelty is claimed for this adjusting mechanism it is not shown in detail.

L is a second roll which is or may be in all respects similar in construction to the beater-roll already described and which I prefer to designate as a "revolving bed-plate." These two rolls are so geared that they revolve in opposite directions, (or, in other words, so that their adjacent faces move in the same direction,) but at different surface speeds, the beater-roll having preferably three times the surface speed of the revolving bed-plate. These two rolls act to draw or pull the stock apart rather than to cut or grind it, and this peculiar action produces a fibrous pulp very much superior in quality to the pulp that is produced by a beater-roll acting in conjunction with a fixed bed-plate. The beater-roll and revolving bed-plate are shown only diagrammatically; but it will be understood that they are to have such features upon their peripheries as will best adapt them for the work to be done. Ordinarily they are provided with spirally-arranged blades, but this is a matter which is left to the discretion of the engineer. The mechanism shown in the drawings for driving them consists simply of pulleys M and N, fixed to their shafts, and belts M' and N', embracing said pulleys, and pulleys O and P, respectively, which are fixed to the main driving-shaft Q, the diameters of the several pulleys being determined by the desired surface speeds of the rolls.

Within the tank is a partition R, technically known as a "midfeather," which terminates at one end in proximity to one of the rolls and terminates at the other end some distance from the end of the tank, so as to leave between them a sufficient space for circulation, said midfeather being located above the bottom of the tank and below the water-line thereof, so as to divide the interior of the tank into two passages, located one above the other, for the circulation of the material.

In Fig. 3 the midfeather is shown as being truly horizontal and located between the horizontal planes of the highest and lowest points on the periphery of the beater-roll, so that the circulation is between the rolls, thence horizontally beneath the midfeather, thence upward past the end of the midfeather, thence horizontally over the midfeather and beater-roll, thence downward between the beater-roll and the end of the tank, and thence again between the rolls, &c., a backfall S being arranged in the discharge side of the rolls and in proximity to the lower one for aiding the circulation.

In Fig. 2, which shows the preferred form of the invention, the midfeather and backfall are located upon opposite sides of the revolving bed-plate, and in this case the circulation is between the rolls, thence over the backfall, thence downward between the backfall and the end of the tank, thence horizontally beneath the backfall and midfeather,

thence upward between the end of the midfeather and the end of the tank, thence horizontally over the midfeather, and thence again between the rolls, &c.

The machines shown in Figs. 2 and 4 differ principally in that only one revolving bed-plate is shown in Fig. 2, while two are shown in Fig. 4. There is also a slight difference in construction of the backfall and midfeather, but in both the action of these parts is substantially the same.

In all these several embodiments of the invention the same principle is involved. The rolls are so related that they give the material an impetus in a substantially horizontal direction, and the backfall and midfeather are so disposed as to facilitate the circulation. In each instance the backfall is arranged on the discharge side of the rolls and opposite the lower one, and in each instance the bite of the rolls is opposite the end of one of the circulating-passages. As shown in Fig. 3, it is opposite the lower passage, and the material is thrown into said passage as it leaves the rolls, and as shown in Figs. 2 and 4 it is opposite the upper passage, and the action of the rolls is to draw or suck the material through said passage. It should also be noted that where the revolving bed-plate is located above the lower passage its under side is covered or protected, so as to prevent it from acting upon the material in said passage. Experiments have shown that where the revolving bed-plate is located in this position and its under side is not prevented from acting upon the material in the lower passage the necessary circulation will not be kept up and the machine is practically inoperative. This is because the material which comes in contact with the lower side of the revolving bed-plate will be carried up between said bed-plate and the adjacent end of the midfeather, thereby not only diverting it from its course through the lower passage, but in addition discharging it into the upper passage in such a direction as to hinder and prevent the material from flowing to the bite of the rolls. It is for this reason that the under side of the revolving bed-plate is covered or protected when it is located above the lower passage.

Having thus described my invention, the following is what I claim as new therein and desire to secure by Letters Patent:

1. In a pulp-machine the combination of a tank, a midfeather located above the bottom of the tank and below the pulp-line thereof so as to divide its interior into two passages located one above the other, a horizontal beater-roll, a roll located beneath the beater-roll and serving as a revolving bed-plate, and means for revolving said rolls in opposite directions, said rolls being located with their bite below the pulp-line and opposite one of the passages aforesaid and said midfeather terminating at one end in proximity to one of the rolls and at the other end a sufficient

distance from the end of the tank to leave a space for circulation, substantially as set forth.

2. In a pulp-machine the combination of a tank, a midfeather located above the bottom of the tank and below the pulp-line thereof so as to divide its interior into two passages located one above the other, a horizontal beater-roll, a roll located beneath the beater-roll and serving as a revolving bed-plate, and means for revolving the rolls in opposite directions, the revolving bed-plate being located opposite one end of the midfeather so as to bring the bite of the rolls below the pulp-line and opposite the end of the upper circulating-passage, a space being left between the other end of the midfeather and the end of the tank for circulation, substantially as set forth.

3. In a pulp-machine the combination of a tank, a midfeather located above the bottom of the tank and below the pulp-line thereof so as to divide its interior into two passages located one above the other, a horizontal beater-roll, a roll serving as a revolving bed-plate located beneath the beater-roll and opposite one end of the midfeather so as to be between the upper and lower circulating-passages, means covering the lower side of the

revolving bed-plate and means for revolving the rolls in opposite directions, the bite of the rolls being located below the pulp-line and opposite one end of the upper passage, and space being left between the midfeather and the end of the tank for circulation, substantially as set forth.

4. In a pulp-machine the combination of a tank, a horizontal beater-roll, a roll located beneath the beater-roll and serving as a revolving bed-plate, a midfeather terminating at one end in proximity to the revolving bed-plate and at the other end some distance from the end of the tank, said midfeather being located upon the receiving side of the rolls, above the bottom of the tank and below the pulp-line thereof so as to divide the interior of the tank into two passages located one above the other, a backfall located opposite the revolving bed-plate and on the discharge side of the rolls, and means covering the lower portion of the revolving bed-plate, substantially as set forth.

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Witnesses:

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