G. D. RYTHER.

MACHINE FOR REFINING PAPER STOCK.

APPLICATION FILED OCT. 30, 1915.

1,187,932. Patented June 20, 1916.

3 SHEETS—SHEET 1.

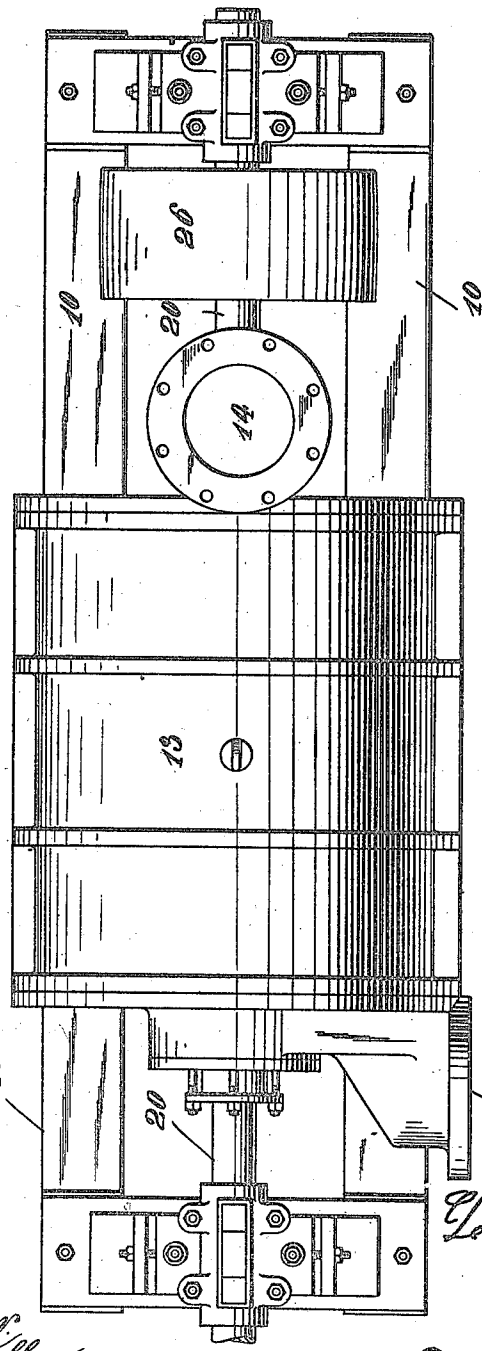


Fig. 1.

Witnesses:
Fred. Roeyer.
Louise Keller

George D. Ryther,
Inventor

By Henry Schreiter his Attorney

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3 SHEETS—SHEET 2.

Fig. 5.

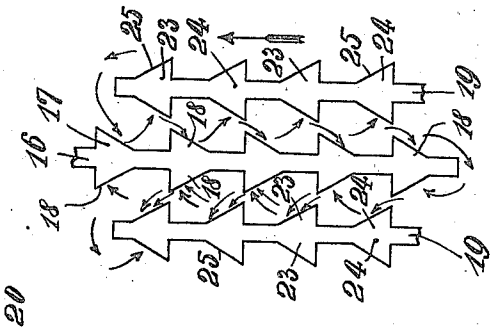
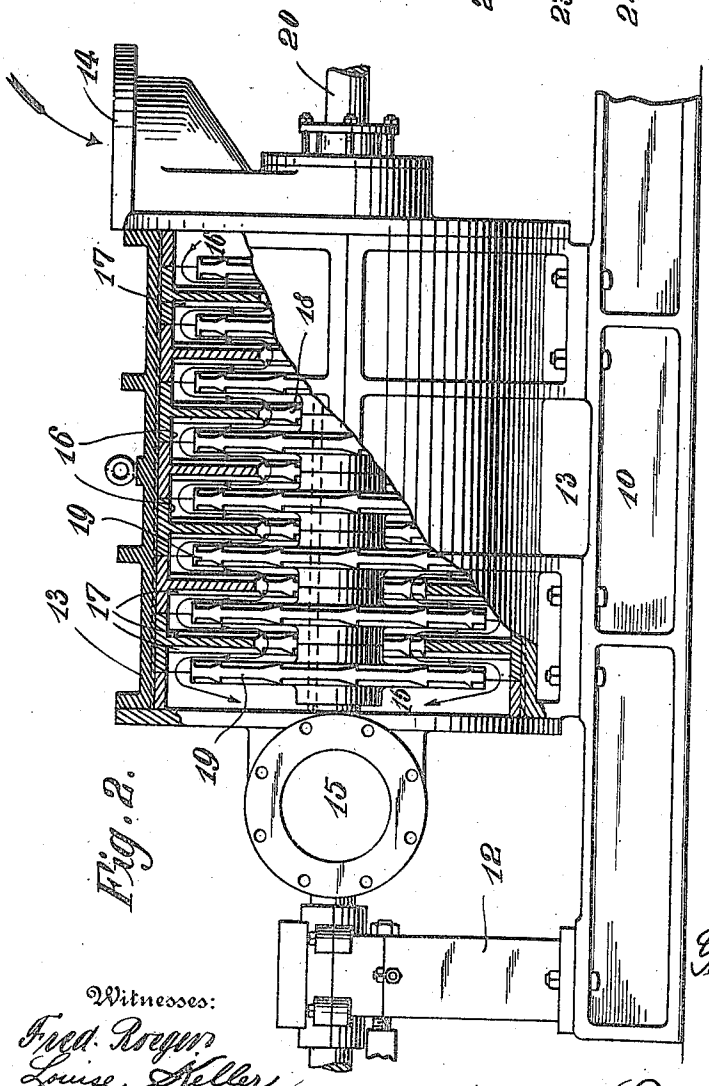


Fig. 2.



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3 SHEETS—SHEET 3.

Fig. 4.

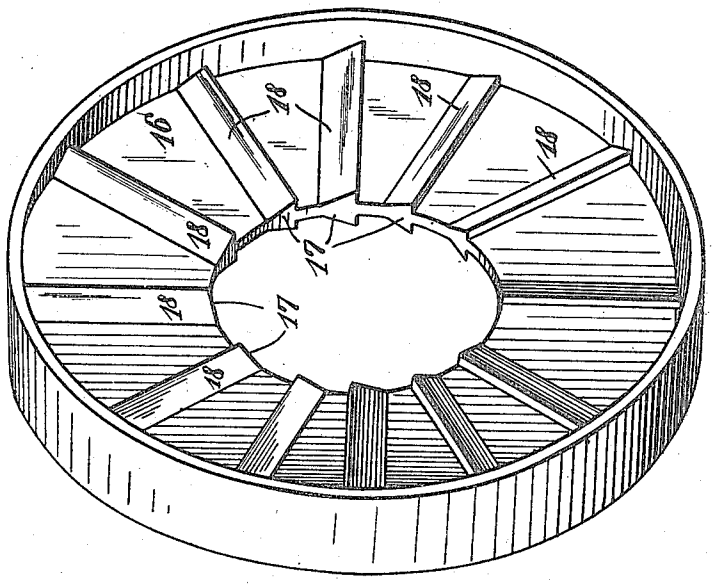
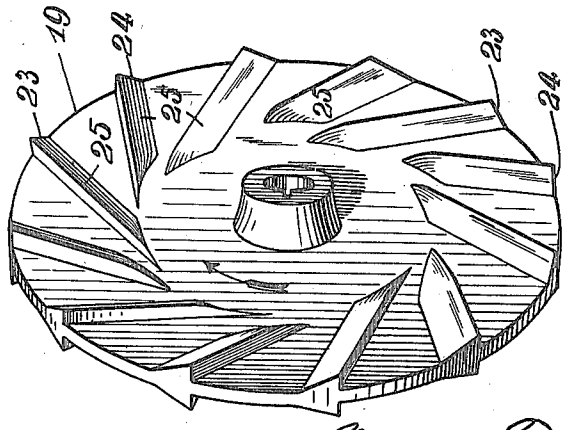


Fig. 3.



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UNITED STATES PATENT OFFICE.

GEORGE D. RYTHER, OF CARTHAGE, NEW YORK, ASSIGNOR TO RYTHER & PRINGLE CO., OF CARTHAGE, NEW YORK, A CORPORATION OF NEW YORK.

MACHINE FOR REFINING PAPER-STOCK.

1,187,932. Specification of Letters Patent. Patented June 20, 1916.

Application filed October 30, 1915. Serial No. 58,811.

To all whom it may concern:

Be it known that I, GEORGE D. RYTHER, a citizen of the United States, and resident of Carthage, in the county of Jefferson and State of New York, have invented a new and useful Improvement in Machines for Refining Paper-Stock, of which the following is a full, clear, and complete specification.

My invention relates to apparatus for the manufacture of paper. Its object is to effect the separating of the fibers, clumped in particles of coarsely beaten paper stock, without subjecting them to a grinding action as it is done in the paper stock refining machines, or jordans, as they are commonly called, and my invention consists of the hereinafter shown and described construction of the coöperating parts, and of their combination into a complete machine, for effecting the treatment of the paper stock, whereby the stated object of my invention is accomplished. The construction of my improved paper stock refining machine is based on the principle, that the further disintegrating of such coarsely beaten paper stock, and the separating of the fibers, shall be effected by causing the paper stock to be propelled between deflecting surfaces, and agitated by being thrown from one of the deflecting surfaces to the other, my tests and experiments having demonstrated the fact, that thereby a minute disintegration of the coarsely beaten paper stock, and the separating of the fibers, are effected, and the breaking or otherwise reducing the fibers avoided. The refining operation is also effected in shorter time, and requires less power for the driving of the machine, than when undertaken by grinding the paper stock in a jordan, or in stock refining machines of similar construction, in which the paper stock is subjected to a grinding action.

A machine constructed according to my invention is illustrated in the accompanying drawings, wherein—

Figure 1 is a plan view of the complete machine; Fig. 2 is a side elevation, partly sectional view thereof; Fig. 3 is a perspective view of one of the rotary deflecting plates, or "rotors"; Fig. 4 is a similar view of one of the stationary deflecting plates; and Fig. 5 a diagram, illustrating how the particles of paper stock are being acted upon during their progress through the machine.

The machine is mounted on a base 10, whereon the standards 12 and the casing 13 are set; the inlet and outlet connections of the casing, designated 14 and 15 respectively, are suitably flanged for connecting thereto of conduits (pipes) for conveying the paper stock to and from the machine. The casing 13 is cylindrical, and a series of annular flanges 16, provided with radial ribs 17, are set therein. The ribs 17 are triangular in cross-section, and are set to form inclined surfaces 18, upon which the particles of the paper stock are thrown and by which they are again deflected as indicated by arrows in Fig. 5. These ribbed flanges 16 are the stationary deflecting plates. The surfaces 18 of the ribs 17 lie in the path of the movement of the stock as it is propelled through the machine.

The rotary deflecting plates, or "rotors", 19, as I designate them, are similarly equipped with ribs 23 and 24 which are also triangular in cross-section, but are set at an angle to the radii of the rotors, and their inner ends are beveled to a point. They also form planes 25, ascending from the surfaces of the rotors, in the path of the flow of the stock from the inlet 14 toward the outlet 15 of the machine. The ribs 23 extend from the circumference of the rotors to about one-half of their radial width, and the shorter ribs 24, similarly shaped and arranged, are set in between them. The "rotors" 19 are keyed to the shaft 20 of the machine, alternating with the annular flanges 16, but do not contact therewith, a sufficient clearance being left between the edges of the ribs on the rotors 19, and on the annular flanges 16 to enable the particles of paper stock propelled through the machine to pass between them without being ground.

The shaft 20 is driven, and the rotary deflecting plates or rotors are rotated, by a belt from a transmission, the belt engag-

ing the pulley 26, keyed to the shaft. When the machine is driven, the rotors agitate the paper stock, assisting in propelling it through the machine, and cause it to be thrown, quite forcibly, against the slanting faces 18 of the radial ribs 17, set on the annular flanges 16, and by which the paper stock is again deflected against the slanting faces 25 of the ribs 23 or 24 of the rotors, and is thrown back again against the slanting faces 18 of the ribs 17. This operation, *i. e.* the throwing and deflecting of the paper stock, is shown by arrows in Fig. 5. It is progressively repeated during the whole tortuous passage of the stock, indicated by the arrows in Fig. 2, from the inlet to the outlet of the machine.

The paper stock to be refined (*i. e.* the fibers thereof separated) is fed to the machine through the inlet 14 by a pump (not shown) drawing it from the chest, into which the roughly beaten stock has been discharged from the beaters. The stock entering the machine at the inlet is drawn in, between the first rotor 19 and the first annular flange 16 down toward the hub of the rotor, then through the opening in the annular flange 16, and then up, toward the circumference of the casing, between the inlet face of the next rotor and the outlet face of the annular flange, and then over and down again, toward the hub of the rotor, and so on, to the outlet. In this course of its progress through the machine, the stock is propelled in a zig-zag line being constantly thrown, quite forcibly, by the rotors against the ribs of the stationary annular flanges, and by them deflected against the ribs of the rotors. By this operation the particles of the paper stock are thoroughly disintegrated, and the fibers are fully separated and drawn out. The stock thus refined may then be conveyed from the outlet by suitable piping to a chest, or to the screen of the paper making machine.

By the grinding of paper stock a considerable proportion of the fibers are broken up, and if the refining machine is not very carefully adjusted, a large proportion of the stock may be, what is termed, "killed", that is, ground to powder, and thus rendered useless for the purpose of paper making. Practical use of machines constructed according to my invention demonstrated the fact, that the roughly beaten stock is very finely disintegrated by the described operation. The fibers not being subjected to any grinding action, are not broken; they seem in fact to be drawn out and straightened. The practical use of the stock refining machine, herein shown and described, demonstrated also the fact, that only one-half, or less, of the power, consumed by a jordan or other grinding machine of the same capacity, is required to refine the same quantity of paper stock, and that the refining is effected also in a comparatively shorter time, and to a better advantage, without breaking, or in any way reducing, the fibers.

I claim as my invention:

1. A machine for refining partly beaten paper stock, comprising a casing provided with means for delivering the paper stock into it at one end, and for discharging it at the other end; annular flanges, set in the casing at intervals, a series of deflecting ribs on the flanges; a shaft mounted on bearings concentrically with the casing; a series of circular disks, mounted on the shaft in positions to alternate with the annular flanges in the casing; a series of deflecting ribs on the disks, and means for rotating the shaft; substantially as herein shown and described.

2. A machine for refining partly beaten paper stock, comprising a base, a cylindrical casing provided with means for delivering paper stock into it at one end, and for discharging it at the other end; annular flanges set in the casing at intervals and equi-distantly from each other; radially arranged deflecting ribs on the flanges; a shaft mounted concentrically with the casing and extending therethrough; a series of circular disks of smaller diameter than the interior diameter of the casing, set on the shaft equidistantly from each other, and alternating with the annular flanges in the casing; deflecting ribs on the disks, extending from the circumference thereof at an angle to its diameter, and means for rotating the shaft; substantially as herein shown and described.

3. A machine for refining partly beaten paper stock, comprising a base, a cylindrical casing provided with means for delivering the paper stock into it at one end, and for discharging it at the other end; a series of annular flanges set in the casing at equidistant intervals; deflecting ribs, triangular in cross-section, arranged radially on both sides of the flanges; two standards, one on each end of the base, a shaft mounted thereon, and extending centrally through the casing; a series of circular disks, mounted on the shaft equi-distantly from each other, and alternating with the annular flanges in the casing; deflecting ribs, triangular in cross-section, on both sides of the disks, and means for rotating the shaft; substantially as herein shown and described.

4. A machine for refining partly beaten paper stock, comprising a base, a cylindrical casing provided with means for delivering the paper stock into it at one end and for discharging it at the other end; a series of annular flanges set in the casing at equidistant intervals; triangular deflecting ribs arranged radially on the flanges; two standards, one on each end of the base, a shaft mounted thereon, and extending concen-

trically through the casing; a series of circular disks, mounted on the shaft equi-distantly from each other, and alternating with the annular flanges in the casing; triangular deflecting ribs set on the disks, at an angle to the diameters thereof, and forming planes ascending in the direction of the flow of the paper stock from the outlet through the casing; and means for rotating the shaft; substantially as herein shown and described.

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Witnesses:

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