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CENTRIFUGAL PULP SCREEN.

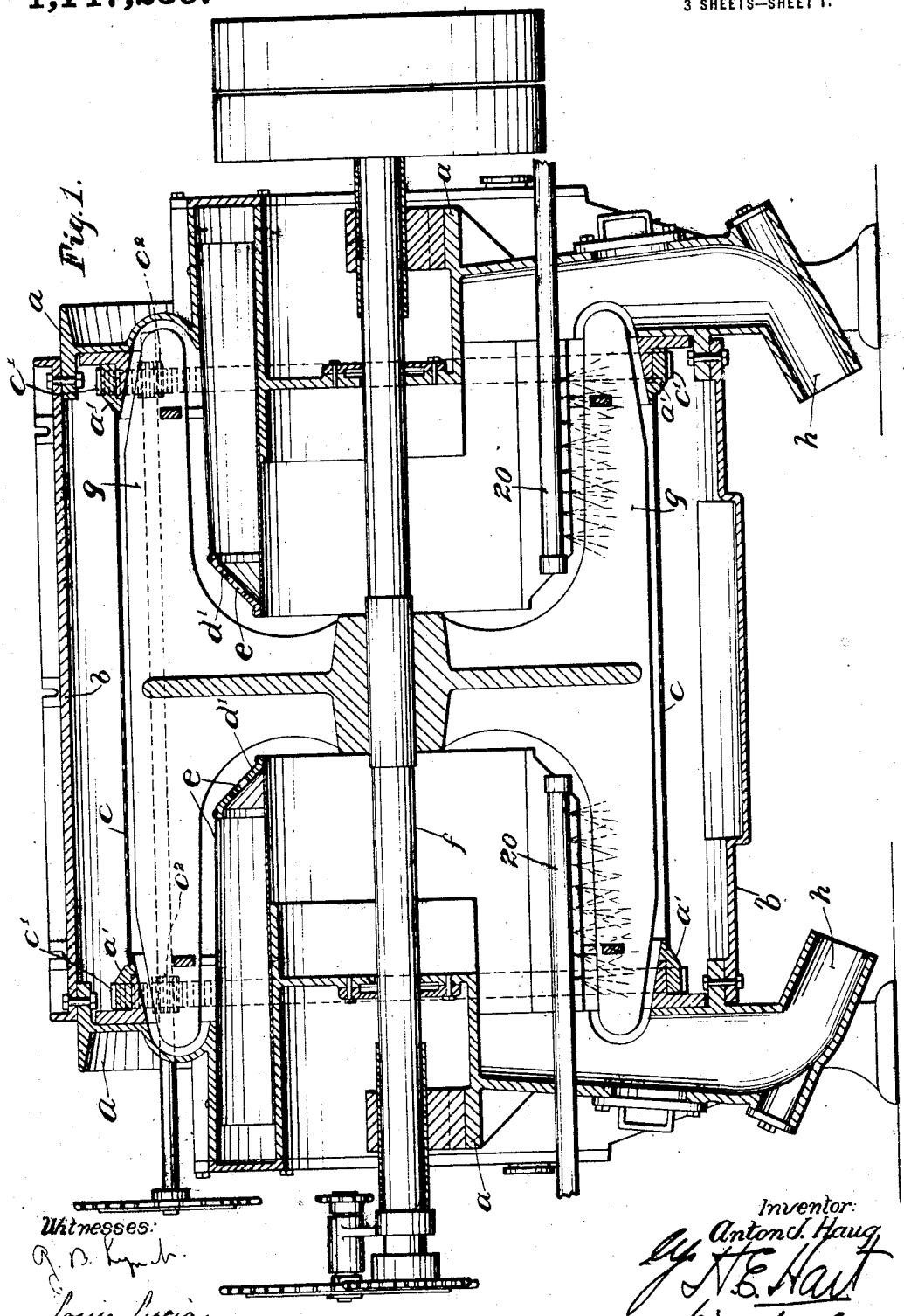
APPLICATION FILED JUNE 29, 1910.

1,147,239.

Patented July 20, 1915.

3 SHEETS—SHEET 1.

Fig. 1.



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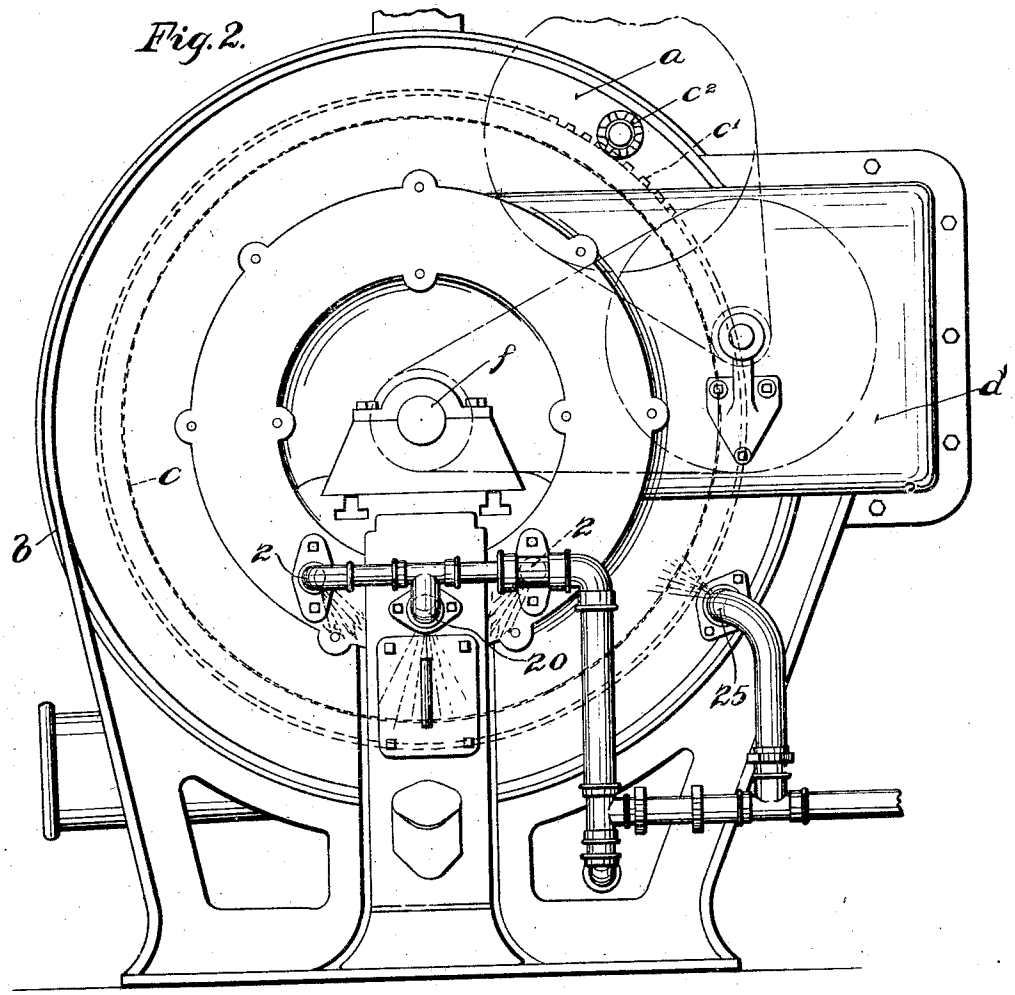
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3 SHEETS—SHEET 2.

Fig. 2.



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CENTRIFUGAL PULP SCREEN

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3 SHEETS—SHEET 3.

Fig. 3.

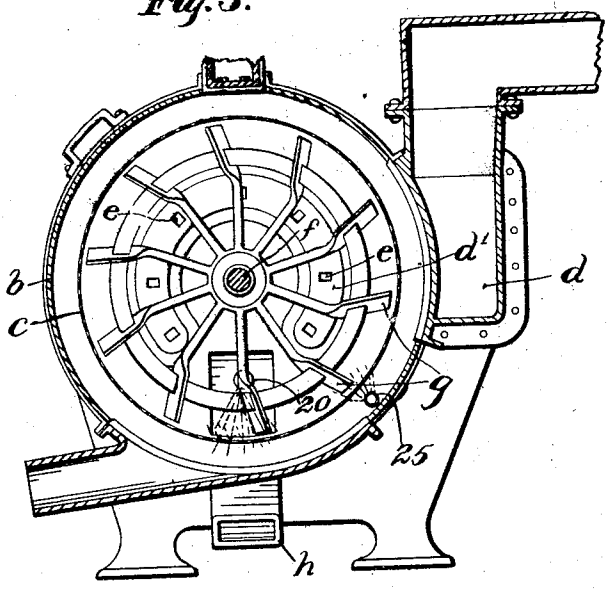
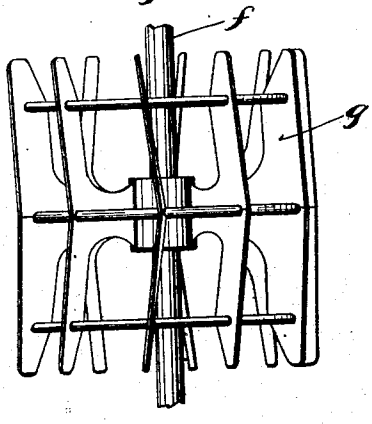


Fig. 4.



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UNITED STATES PATENT OFFICE.

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CENTRIFUGAL PULP-SCREEN.

1,147,239. Specification of Letters Patent. Patented July 20, 1915.

Continuation of application Serial No. 545,886, filed February 24, 1910. This application filed June 29, 1910. Serial No. 569,457.

To all whom it may concern:

Be it known that I, ANTON J. HAUG, a subject of the Emperor of Germany, and a resident of Nashua, in the county of Hillsboro, State of New Hampshire, United States of America, have invented certain new and useful Improvements in Centrifugal Pulp-Screens, of which the following is a specification.

The object of my invention is to produce a centrifugal screen having certain features of novelty and advantage, particularly as relates to the method of feeding the pulp to the screen.

My invention is illustrated and described as embodied in a machine for screening paper pulp and the object of the invention is in general to increase the efficiency of machines of this character and to produce a machine having certain features of novelty in its construction and mode of operation.

This application is a continuation of my prior application Serial No. 545,886, filed Feb. 24, 1910.

In the drawings—Figure 1 is a side view in central vertical section of a machine embodying my invention. Fig. 2 is an end view of the same. Fig. 3 is a transverse sectional view, the impeller being shown in full lines. Fig. 4 is a detailed view of the impeller.

Machines of this general type and the purpose for which they are used are generally known and it will suffice here to say that they are utilized to separate the fibers of pulp which are suitable to be made into paper from the larger or coarser fibers, slivers, etc., which are not suitable for such use. In general machines of this type comprise a casing within which is mounted a screen which may or may not be rotatable. Within this screen there is a shaft which rotates at a quite high rate of speed and carries an impeller with blades extending the length of the screen for the purpose of throwing the stock with force against the screen. The stock is fed into the interior of the screen, thrown by the blades against the screen, and the fine fibers are forced through the screen, the coarser particles which cannot get through the screen, working their way out of the ends. These coarser fibers are led into separate conduits from the screened fibers where they are discharged from the machine.

The machine illustrated is of the horizontal type and the frame is made up of the end castings *a a*, and the cylindrical casing *b* secured to the end castings; the cylindrical screen *c* is of smaller diameter than the casing and is supported at its ends on annular flanges a^1 projecting inwardly from the end walls. As shown each end of the screen is provided with a gear c^1 and is adapted to be driven by the pinion c^2 which in turn may be driven in any desired manner.

d is a main supply tank located at one side of the machine and having branches d^1 d^1 extending around to each end of the machine communicating with parti-annular spouts *e e* which project through the end wall of the frame into the interior of the screen. The outer surfaces of these feed spouts near their inner ends are perforated to provide passages through which the stock can be fed to the interior of the screen, the size and number of the perforations being reduced toward the lower ends of the spouts in order to provide an even distribution of stock to the screen.

Extending centrally through the machine and supported in suitable bearings is a shaft *f* at the center of which is a hub supporting a spider, to the outer edge of which are secured impeller blades *g*. These blades extend to either side of the center, and partly fill the spaces between the spouts and the screen. When seen in edge view they are oppositely inclined from the center outwardly, this inclination being to the rear with respect to the direction of rotation of the blades, for purposes which will be hereinafter set forth.

h h are the sliver outlets arranged at each end of the machine into which the unscreened materials are delivered. As the pulp is delivered from the feed spouts to the interior of the screen it is picked up by the blades and thrown forcibly against the screen drum. The screening operation is practically an instantaneous one occurring at the moment of impact of the pulp on the screen, and such stock as is not screened at this first impact will be carried away with the slivers and lost unless further means are provided for subjecting it to the screening action.

It will be understood that the stock is originally fed to the screen near its central portion, and because of the inclination of the blades it is thrown against the screen at a slight angle to its surface, and the general direction which is imparted to it is toward both ends of the screen drum. The screening operation is a continuous one and there is a continuous stream of pulp being thrown against the screening drum, and in consequence the unscreened particles which lodge on the inner surface of the screen are continually forced toward the ends of the screen to the sliver outlets.

In order to prevent the waste of good stock, which might otherwise be carried away with the slivers, I project into each end of the screen, and preferably underneath the center, shower pipes 20—20, which are arranged inside of the impeller blades and are pierced on the side next to the impeller blades. The water as it comes from these pipes is picked up by the impeller blades and thrown against the screen in the form of a spray, washing through the screen any stock which is collected on the interior of the screen and is being carried along with the slivers. This is a continuous screening operation to which all of the stock which was not screened at the first impact is subjected, and the result is a very greatly increased efficiency in the screening operation by which the loss of pulp is minimized.

Another advantage in the use of the oppositely inclined blades is that the slivers travel from the center toward each end of the screen instead of having to travel the full length of the screen thus making it possible to maintain the inner surface of the screen drum in a cleaner condition, and so materially increase the efficiency of the machine.

In the structure illustrated and described herein the screen drum is intended to rotate in the direction opposite to that of the impeller, and in order to prevent the slivers from traveling around and around on the inner surface of the screen, and also to wash back into the screen any particles of fiber which have become wedged, I provide a shower pipe 25, which is located within the casing outside of the screen, and extends the length of the screen. This shower pipe is arranged to project the water against the upwardly moving side of the screen just beyond the point where the interior pipes 20—20 are arranged, and washes the thickened stock which may have collected on the inner surface of the screen down under the interior shower pipes 20—20, where they are subjected to the spraying action of the water delivered by these pipes.

In order to prevent the settling of the pulp in the feeding spouts and maintain the stock as fed to the screen in uniform condition I introduce at the outer end of each spout jets of air, water, or the like, through the pipes 2, 2, preferably under a pressure which is greater than the pressure of the pulp in the inlets, with the result that this water washes any thickened or settled pulp out of the spouts into the screen. These jets are projected toward the lowest points of the feed spouts in order to thoroughly cleanse them.

The screening of the pulp stock to be used in the manufacture of paper is of great importance. It is essential that the screening be done thoroughly and uniformly, that all stock which is suitable for use shall be passed through the screen, that the stock not suitable for use shall be prevented from passing through the screen and that the screening operation shall be accomplished in the shortest possible space of time.

The machine herein illustrated and described possesses features of material advantage over those heretofore used in the following particulars. The feeding of the pulp into each end of the machine and the graduation of the outlet apertures in the feed spouts insure an even distribution of the stock to the impeller blades. The opposite inclination of the blades insures the cleaning of the inner surface of the screen in the shortest possible time by causing the slivers to travel toward each end of the screen, and in connection with the double end feeding of stock to the machine greatly increases the capacity of the machine without the use of additional power. Furthermore the opposite inclination of each of the blades tends to balance them, reducing the end thrust and wear of the parts. The use of the interior shower pipes reduces to a minimum the loss of pulp, and insures a most thorough screening, particularly when utilized in connection with the outside shower pipe 25.

The arrangement of the main supply tank at one side of the machine with branches extending to each end and communicating with the feed spouts is of advantage both as regards the small amount of floor space required for the machine and in insuring uniformity of distribution of the stock to each end of the machine and to the screen. The provision for thinning any stock which has collected in the feed spouts and for washing out the feed spouts by water jets under a higher pressure than the pressure with which the stock is fed into the spouts insures the maintenance of the machine in a condition of the greatest efficiency.

It is to be remembered that the paper stock is quite expensive and that the losses of good stock which would occur if the screening operation were not thoroughly and effectively carried out would amount to considerable sums each working day. It is of the utmost importance therefore that pro-

vision be made for establishing and maintaining the highest possible efficiency of machines of this type and the herein illustrated and described machine has been designed with this end in view.

I claim—

1. In a machine of the character described the combination with the casing, a screen drum located therein, a stock inlet communicating with the interior of said screen drum, a pulp outlet communicating with the interior of said casing, a plurality of sliver outlets communicating with the interior of said screen drum, a rotatable paddle blade support, oppositely arranged paddle blades supported thereby, said paddle blades being inclined rearwardly from end to end toward said sliver outlets, whereby the unscreened stock is caused to travel in opposite directions on the inner surface of said screen drum toward said sliver outlets.

2. In a machine of the character described, the combination with a casing, a screen drum located therein, a stock inlet communicating with the interior of said screen drum, a pulp outlet communicating with the interior of said casing, a plurality of sliver outlets communicating with the interior of said screen drum, a rotatable support, and means supported thereby and interposed between said stock inlet and the interior surface of said screen drum for causing the unscreened stock to move in opposite directions along the inner surface of said screen drum toward said sliver outlets.

3. In a machine of the character described the combination with a casing, a cylindrical rotatable screen mounted therein, means for rotating the same, a feed spout extending into said screen, a shaft carrying paddle blades located between said spout and said screen, a shower pipe extending into said screen inside of said paddle blades and adapted to deliver water thereto, and a second shower pipe arranged in proximity to the exterior of said screen drum at a point beyond the first outward pipe in the direction of rotation of the screen.

4. In a centrifugal pulp screen of the horizontal type, a casing, a cylindrical screen mounted therein, pulp inlets arranged at each end of the machine and extending into the interior of the screen and spaced therefrom, sliver outlets at each end of the machine in communication with the interior of the screen drum, a pulp outlet in communication with the interior of the casing, a shaft extending through said casing, paddle blades supported from said shaft centrally of the machine and arranged in pairs extending toward the ends of the machine, said paddle blades being located in and adapted to rotate through the space between the screen drum and the pulp inlets, said blades being inclined from end to end rearwardly with respect to their direction of rotation, whereby the unscreened materials are caused to travel toward each end of said screen drum, and shower pipes projecting into said screen drum from each end of the machine and located inside of said paddle blades and adapted to supply water thereto as and for the purposes specified.

5. A machine of the character described comprising a casing, a cylindrical screen mounted therein, a supply tank arranged at one side of said casing, feed pipes extending from said tank to each end of said casing and discharging within said screen at each end thereof.

6. In a machine of the character described the combination with a casing and a cylindrical screen mounted therein, of parti-annular feed spouts extending into said screens from each end thereof, the outer surfaces of said spouts which lie within said screen having discharge orifices near their inner ends.

7. In a machine of the character described, the combination with a casing and a cylindrical screen mounted therein, of parti-annular feed spouts arranged at each end of said casing and extending within said screen, the opposite ends of said spouts being oppositely inclined, discharge apertures through the exterior walls of the inner ends of said spouts, the capacity of said discharge orifices increasing from the lower to the upper parts of said spouts.

8. In a machine of the character described, the combination with a casing and a cylindrical screen located therein, of a rotary impeller located within said screen, said impeller comprising a hub and blades supported therefrom, said blades when seen in edge view being oppositely inclined from the center rearwardly with respect to their direction of rotation.

9. In a machine of the character described a casing, a cylindrical screen mounted within said casing and supported thereby, a rotary shaft supported in suitable bearings in said casing and extending through said screen, and an impeller comprising a hub secured to said shaft centrally of the length of said screen, arms projecting radially from said hub, and blades extending from opposite sides of said arms and located in proximity to the inner surface of said screen.

10. In a machine of the character described a casing, a cylindrical screen mounted within said casing and supported thereby, a rotary shaft supported in suitable bearings in said casing and extending through said screen, and an impeller comprising a hub secured to said shaft centrally of the length of said screen, arms projecting radially from said hub, and blades extending from opposite sides of said arms and located in proximity to the inner surface

of said screen, said blades being inclined rearwardly with respect to their direction of rotation.

11. In a machine of the character described, the combination with a casing, a cylindrical screen mounted therein, feed spouts extending through the end walls of said casing within said screen, the inner ends of said spouts being spaced from one another and the exterior surfaces thereof being spaced from said screen, of a rotary impeller located within said screen and comprising a hub, arms extending radially from said hub between the ends of said spouts, and blades secured to and extending laterally from near the ends of said arms and located between the exterior surfaces of said spout and said screen.

12. In a machine of the character described, the combination with a casing and a cylindrical screen located therein, of a parti-annular feed spout extending within said screen and a fluid supply pipe extending into the lower parts of said spout for the purposes specified.

13. In a machine of the character described, the combination with a casing, a screen drum located therein, means for introducing stock within said drum, a pulp outlet in communication with the interior of the casing, a sliver outlet in communication with the interior of the drum, and means for feeding the stock in opposite directions within said drum.

14. In a machine of the character described, the combination with a casing, a screen drum located therein, means for introducing stock within said drum, a pulp outlet in communication with the interior of the casing, a sliver outlet in communication with the interior of the drum, and means for feeding the stock in opposite directions within said drum, said means comprising oppositely arranged rotatable paddle blades within the drum inclined in opposite directions with reference to the direction of rotation from the ends of the drum toward an intermediate point therein.

15. In a centrifugal screen of the horizontal type, a casing, a cylindrical screen mounted therein, pulp inlets arranged at each end of the screen and extending into the interior of the screen and spaced therefrom, sliver outlets at each end of the screen in communication with the interior of the screen drum, a pulp outlet in communication with the interior of the shaft, a rotatable paddle blade support and paddle blades supported thereby located in and adapted to rotate through the space between the screen drum and the pulp inlets, said blades being inclined from end to end rearwardly with respect to their direction of rotation whereby the unscreened materials are caused to travel toward each end of said screen drum.

16. In a centrifugal pulp screen of the horizontal type, a casing, a cylindrical screen mounted therein, pulp inlets arranged at each end of the screen and extending into the interior of the screen and spaced therefrom, a sliver outlet in communication with the interior of the screen drum, a pulp outlet in communication with the interior of the casing, a rotatable paddle blade support, paddle blades supported thereby located in and adapted to rotate in the space located between the screen drum and the pulp inlets, said blades being inclined from end to end rearwardly with respect to their direction of rotation whereby the unscreened materials are caused to travel in opposite directions.

17. In a centrifugal pulp screen of the horizontal type, a casing, a cylindrical screen mounted therein, pulp inlets arranged at each end of the machine and extending into the interior of the screen and spaced therefrom, sliver outlets at each end of the machine in communication with the interior of the screen drum, a pulp outlet in communication with the interior of the casing, and means for causing the unscreened materials to travel toward each end of the drum from the intermediate portion thereof.

18. A machine of the character described comprising a casing, a cylindrical screen mounted therein, a supply tank arranged exterior but contiguous to the casing, feed pipes extending from said tank to each end of said casing and discharging within said screen at each end thereof, sliver outlets communicating with each end of the screen, a pulp outlet communicating with the interior of the casing and paddle blades inclined with relation to the direction of rotation for propelling the unscreened material in opposite directions within said screen toward said sliver outlets.

19. A machine of the character described comprising a casing, a cylindrical screen mounted therein, a supply tank arranged exterior but contiguous to said casing, feed pipes extending from said tank to each end of said casing and discharging within said screen at each end thereof, a sliver outlet, means communicating with the interior of the screen, a pulp outlet communicating with the casing and paddle blades inclined with relation to the direction of rotation for moving the unscreened material within the screen in opposite directions from the feed pipes.

20. In a machine of the character described, the combination with a casing, a cylindrical screen located therein, sliver outlet means communicating with the interior of said screen, pulp outlet means communicating with the casing, and a rotary impeller located within said screen comprising a rotary support and opposite sets of blades

carried thereby, the blades at opposite ends of the impeller when seen in edge view being oppositely inclined from the center outward with respect to their direction of rotation.

21. In a machine of the character described, the combination with a casing, a cylindrical screen mounted therein, feed spouts extending through the end walls of said casing within said screen, the inner ends of said spouts being spaced from one another and the exterior surfaces thereof being spaced from said screen, a sliver outlet communicating at each end with the interior of the screen, a pulp outlet communicating with the casing, and a rotary impeller located within said screen comprising a rotary paddle blade support between the ends of the spouts and blades secured to and extending laterally from said support in opposite directions and located between the exterior surfaces of said spout and said screen.

22. In a machine of the character described, the combination with a casing, a cylindrical screen mounted therein, feed spouts extending through the end walls of said casing within said screen, the inner ends of said spouts being spaced from one another and the exterior surfaces thereof being spaced from said screen, a sliver outlet communicating at each end with the interior of the screen, a pulp outlet communicating with the casing, and a rotary impeller located within said screen comprising a rotary paddle blade support between the ends of the spouts and blades secured to and extending laterally from said support in opposite directions and located between the exterior surfaces of said spout and said screen, said blades being inclined rearwardly with reference to the direction of rotation from said central support toward their ends.

23. In a machine of the character described, the combination with a casing of a cylindrical screen mounted therein, means for delivering stock to the interior of the screen through opposite ends thereof and directing the same toward the middle thereof, sliver outlets at opposite ends of the screen, a pulp outlet communicating with the casing, and impelling means working within the screen to move the unscreened materials from the middle of the screen toward opposite ends thereof to the sliver outlets thereat.

Dated this 2nd day of June, 1910.

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