April 28, 1925. 1,535,834

A. J. HAUG

METHOD OF AND APPARATUS FOR WORKING PAPER STOCK

Filed April 6, 1921 6 Sheets-Sheet 1

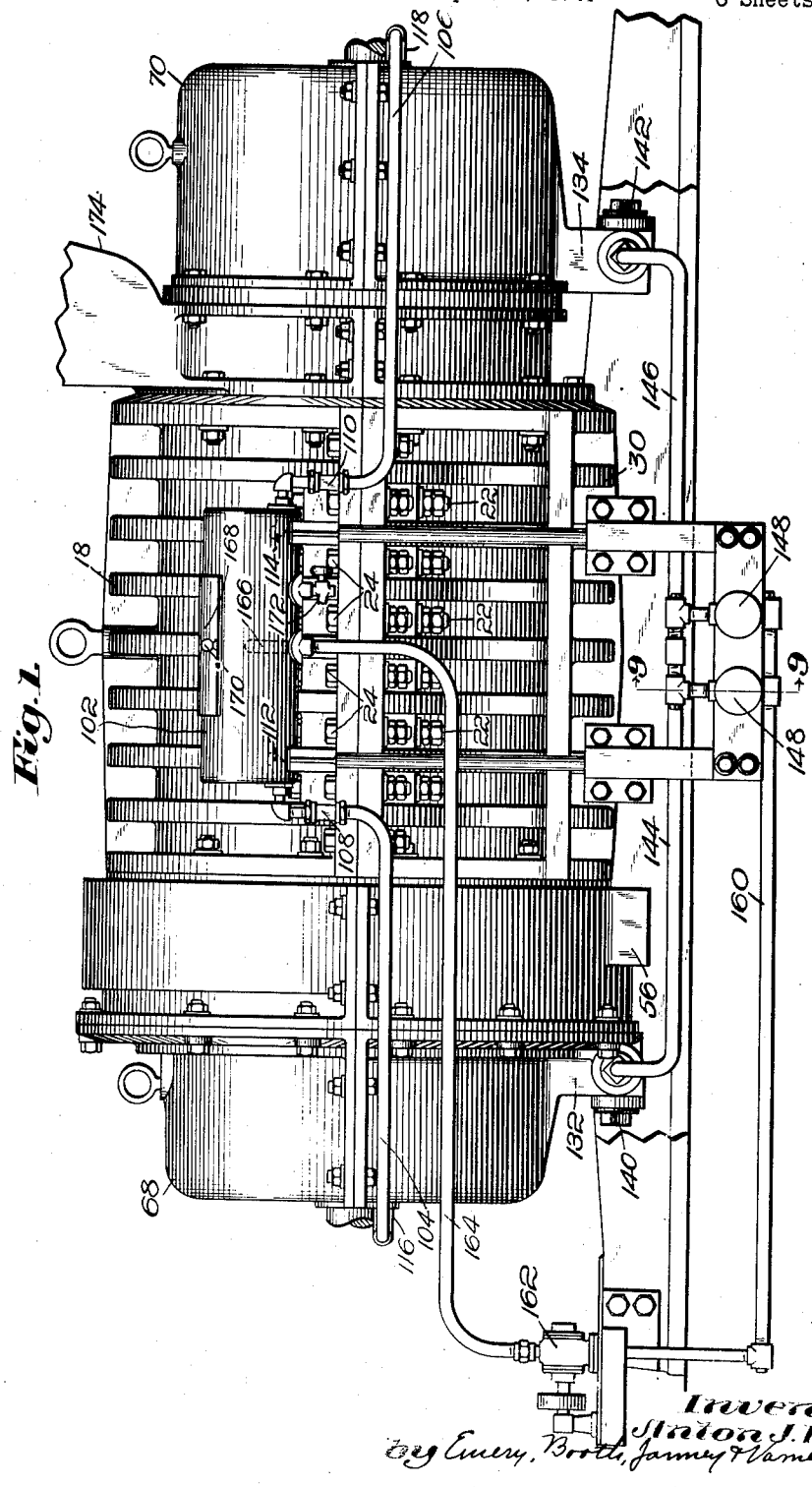


Fig. 1.

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Filed April 6, 1921 6 Sheets-Sheet 2

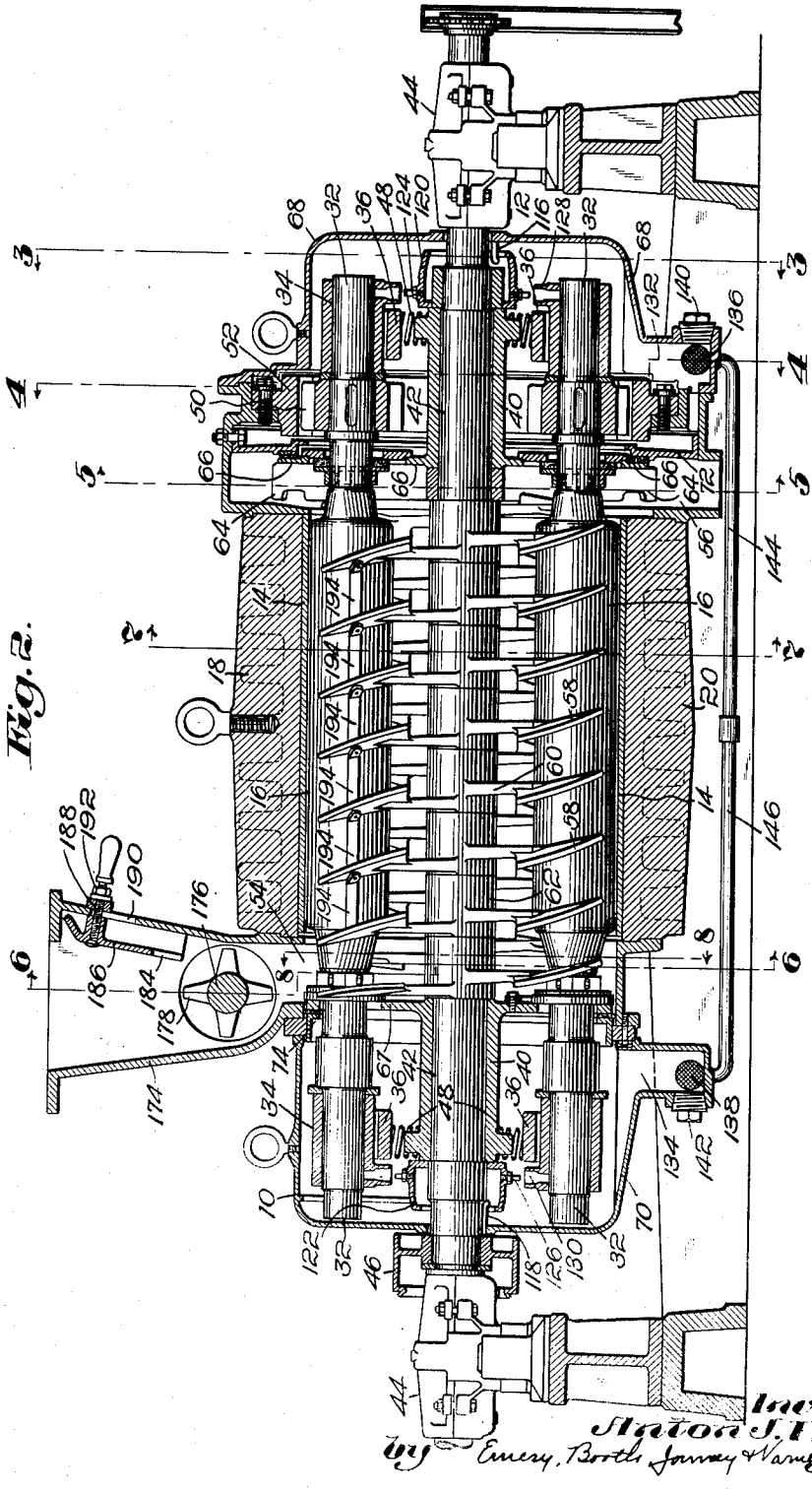


Fig. 2.

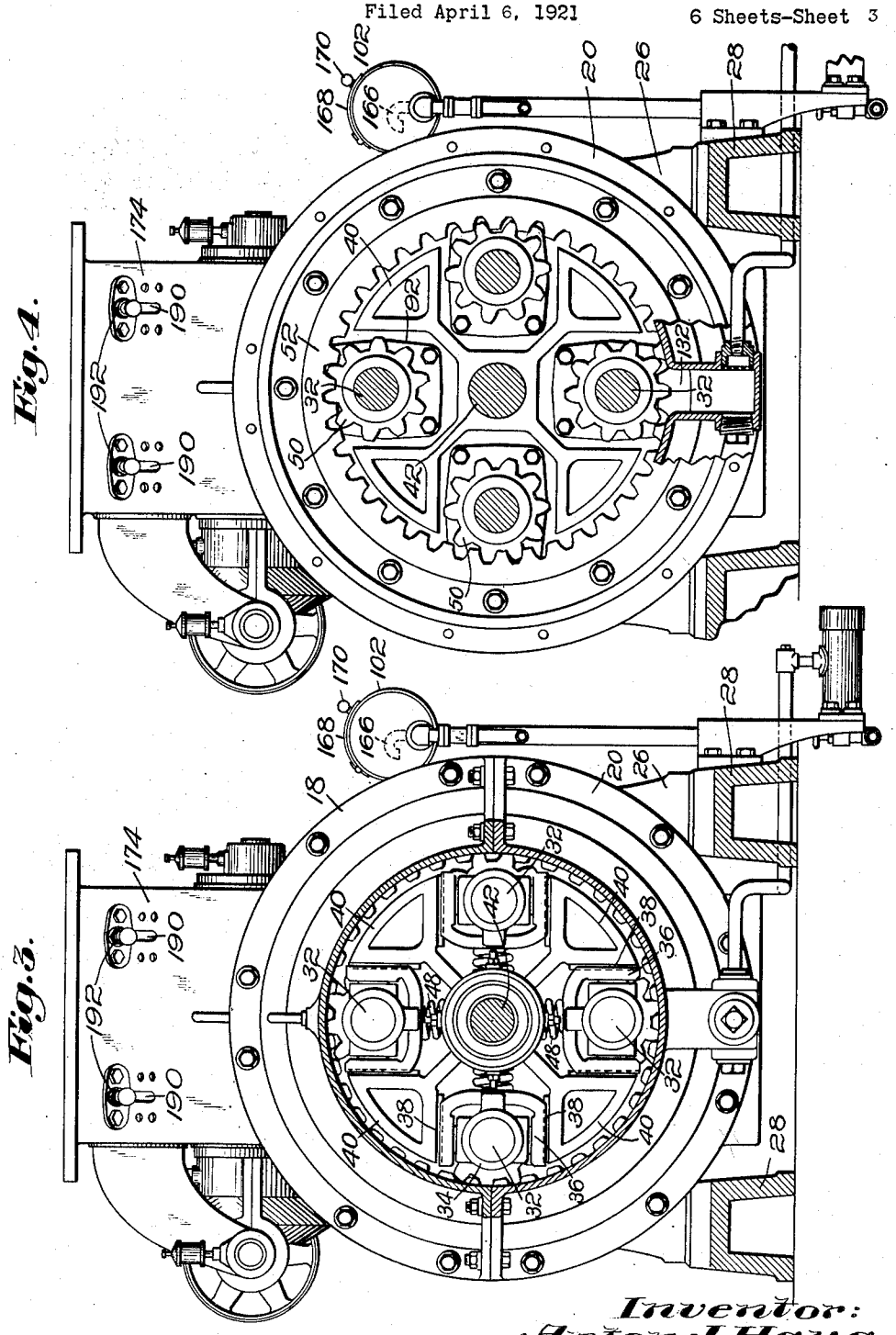
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April 28, 1925. 1,535,834

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METHOD OF AND APPARATUS FOR WORKING PAPER STOCK

Filed April 6, 1921 6 Sheets-Sheet 3



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April 28, 1925. 1,535,834

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METHOD OF AND APPARATUS FOR WORKING PAPER STOCK

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Fig. 6.

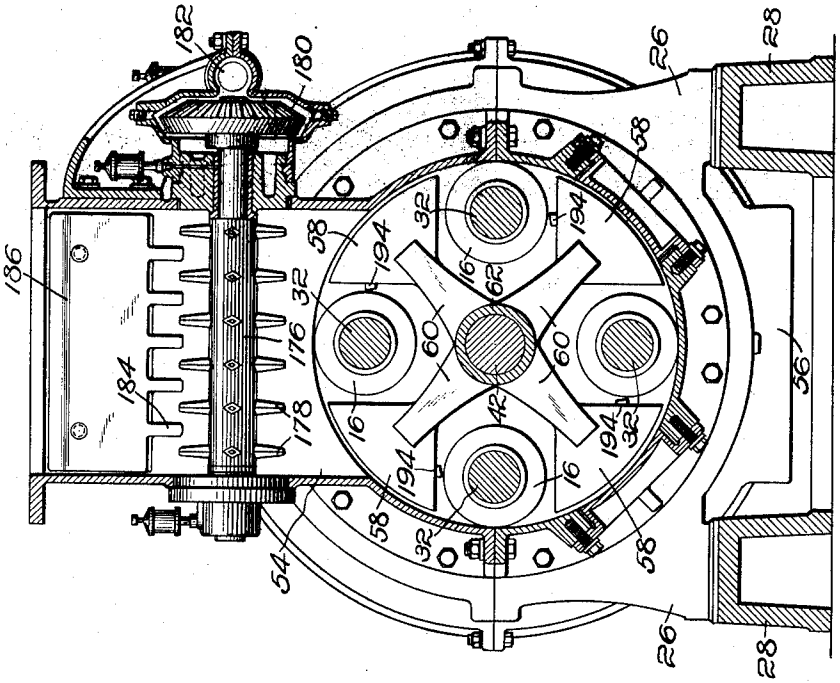
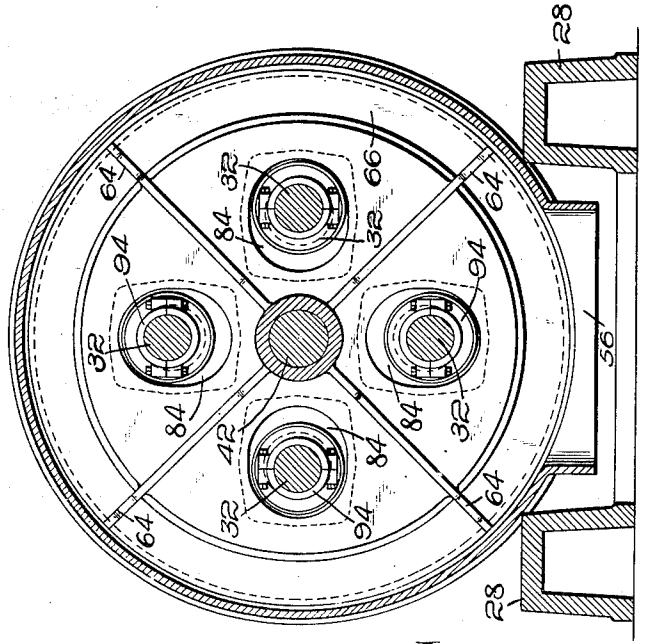


Fig. 5.



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METHOD OF AND APPARATUS FOR WORKING PAPER STOCK

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Fig. 8.

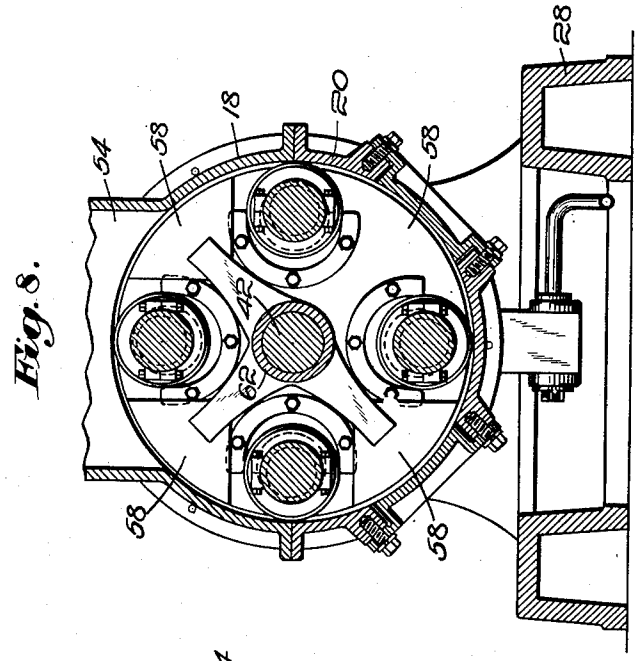
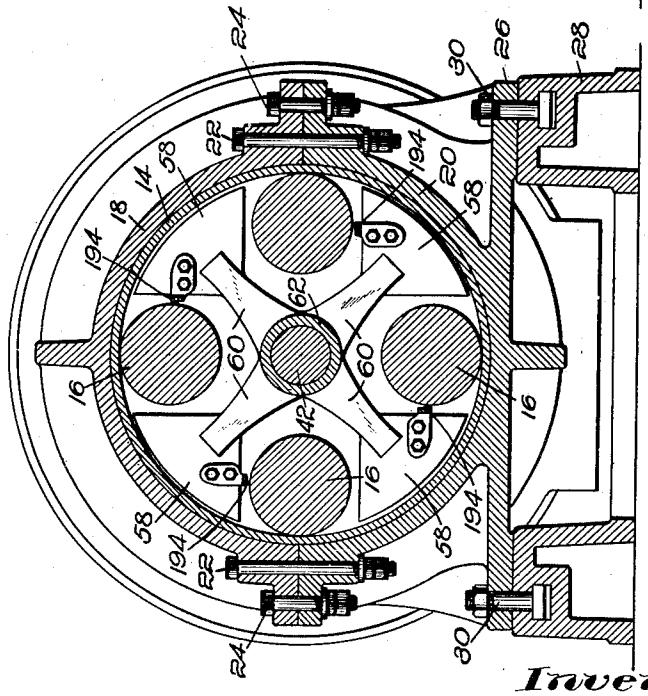


Fig. 9.



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METHOD OF AND APPARATUS FOR WORKING PAPER STOCK

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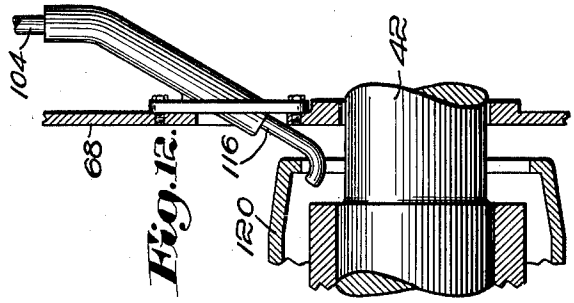


Fig. 12.

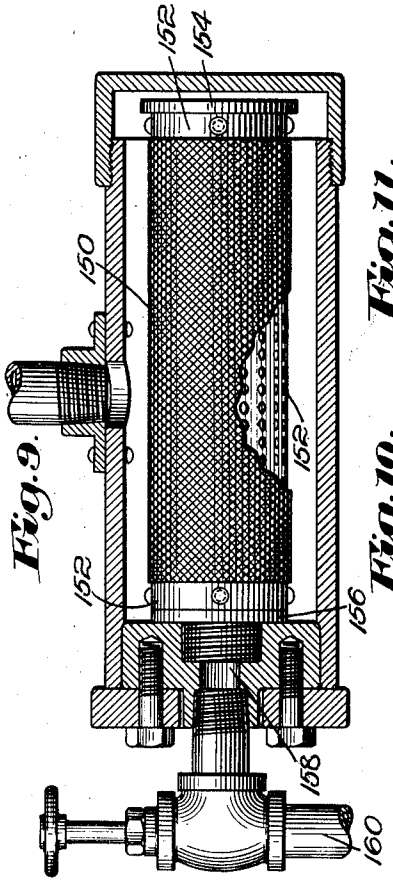


Fig. 9.

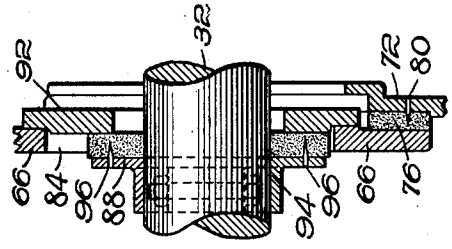


Fig. 11.

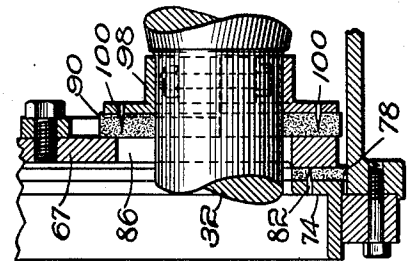


Fig. 10.

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Attys.

Patented Apr. 28, 1925. 1,535,834

UNITED STATES PATENT OFFICE.

ANTON J. HAUG, OF NASHUA, NEW HAMPSHIRE, ASSIGNOR TO IMPROVED PAPER MACHINERY COMPANY, OF NASHUA, NEW HAMPSHIRE, A CORPORATION OF MAINE.

METHOD OF AND APPARATUS FOR WORKING PAPER STOCK.

Application filed April 6, 1921. Serial No. 459,057.

To all whom it may concern:

Be it known that I, ANTON J. HAUG, a citizen of the United States, and a resident of Nashua, county of Hillsborough, and State of New Hampshire, have invented an Improvement in Methods of and Apparatus for Working Paper Stock, of which the following description in connection with the accompanying drawings is a specification, like characters on the drawings representing like parts.

This invention relates to methods of and apparatus for working paper stock and other materials, and has for its object the provision of improved methods and appliances which may be employed in preparing crude pulp from raw material, or in working the crude pulp to a more refined state,—say in working over the tailings or residue from screened stock and rendering it useful.

The invention will be best understood by reference to the following description, when taken in connection with the accompanying drawings of one specific embodiment thereof, while its scope will be more particularly pointed out in the appended claims.

In the drawings:

Fig. 1 is an elevation of a machine exemplifying the invention, and by means of which the method may be carried out;

Fig. 2 is a central, longitudinal sectional view of the same, looking in the opposite direction from Fig. 1

Fig. 3 is a sectional view on line 3—3 of Fig. 2, looking in the direction of the arrows on said line;

Fig. 4 is a sectional view on line 4—4 of Fig. 2, looking in the direction of the arrows on said line;

Fig. 5 is a sectional view on line 5—5 of Fig. 2, looking in the direction of the arrows on said line;

Fig. 6 is a sectional view on line 6—6 of Fig. 2, looking in the direction of the arrows on said line;

Fig. 7 is a sectional view on line 7—7 of Fig. 2, looking in the direction of the arrows on said line;

Fig. 8 is a sectional view on line 8—8 of Fig. 2, looking in the direction of the arrows on said line;

Fig. 9 is a sectional view on line 9—9 of Fig. 1, looking in the direction of the arrows on said line;

Fig. 10 is a detail sectional view on an enlarged scale of a portion of Fig. 2;

Fig. 11 is a detail sectional view on an enlarged scale of a portion of Fig. 2; and

Fig. 12 is a detail sectional view on line 12—12 of Fig. 2.

Referring to the drawings, and to the embodiment of the invention selected for exemplification, there is shown a machine of the general character exemplified by U. S. Letters Patent No. 1,302,469, issued to me April 29, 1919, and intended primarily for refining crude pulp, and especially tailings or rejections from a prior screening operation, although the same principle and substantially the same mechanism and appliance may be usefully employed in reducing raw materials to the form of a crude pulp, the machine being capable of useful employment in connection with materials (herein generally termed paper stock) of widely different condition, such for example as more or less unreduced fibrous material or pulp reduced to a more or less crude state.

Referring first to the general characteristics of the machine illustrated in the drawings, the same has relatively movable surfaces between which the stock is worked, the latter being subjected to a succession of crushing actions. In the present example, one of these surfaces is the internal cylindrical surface of a cylindrical shell 14 (see Fig. 7), within which one or more, herein four cylindrical rolls 16 are arranged lengthwise of the shell and adapted for cooperation with the internal surface of the latter. The desired rolling action is furnished by causing relative turning movement of the rolls and shell, although in the present instance, the latter is fixed and the former are revolved by mechanism presently to be described.

Herein the shell is a preferably continuous lining for a casing comprising upper and lower separable parts 18 and 20, secured together by sets of bolts 22 and 24 (see Fig. 7). The lower part is conveniently supported by providing the same with feet 26 resting upon and bolted to a base 28, as by bolts 30.

The rolls 16 are provided with shafts 32 (see Fig. 2), journaled at both ends in bearings 34 mounted to move radially inward

and outward, and to rock about axes extending tranversely of the axes of said shafts. To this end, each bearing (see Fig. 3) is trunnioned at opposite sides in a yoke 36, and the latter is mounted to slide radially in pairs of guides 38 provided in a spider 40. Each of the spiders is keyed to a main drive shaft 42, the latter being mounted in bearings 44 at opposite ends of the machine, and being provided at one end with a pulley 46 which is used to drive the rotary feeding device hereinafter described. When, therefore, the shaft 42 is rotated, it carries with it the spiders 40, yokes 36, bearings 34, shafts 32 and rolls 16, thus causing the latter to revolve about within the cylindrical shell 14. Centrifugal force is relied upon to produce the crushing action, due to the tendency of the rolls to fly out against the internal surface of the shell, while they are being revolved, but herein springs 48 are provided (see Figs. 2 and 3) to prevent the uppermost roll from falling when the machine is stopped.

Naturally, the outward pressure of the rollers against the internal surface of the shell will cause the rolls to be rotated about their own axis as they are revolved about the axis of the main shaft, and in some classes of work this action alone may be relied upon to produce the turning motion of the rolls. Under some circumstances, however, it is desirable to have a positive turning motion imparted to the rolls, and in such case this may be accomplished by planetary gearing including a set of pinions 50 keyed on the shafts 32, and meshing with an internal gear 52, the latter being fixed to the casing. If true rolling motion of the rolls against the shell is desired, the pitch circle of the internal gear will be the same diameter as the internal surface of the shell, but if it is desired to have the rolling action accompanied by a rubbing or abrasive action, this may be accomplished by making the pitch circle of the internal gear larger or smaller in diameter than the internal surface of the shell.

The machine herein exemplified is continuous in its action, and to that end, the stock is introduced at one end of the casing through an inlet passage 54 and is discharged from the other end of the casing through the outlet 56. In order progressively to advance the stock from the machine between each crushing or reducing action of the successive rolls, suitable feeding devices are preferably employed. Herein these comprise a series of devices which form in effect a mechanical screw conveyor acting to convey the material from one end of the machine to the other, while subjecting it to the repeated reducing action of the rolls. In the present example, these conveyor devices are in the form of inclined or helical vanes 58, best shown in Fig. 2, suitably placed to avoid interference with the rolls, and herein carried by arms 60 (see Fig. 7) of spiders whose hubs 62 are non-rotatably secured to the drive shaft 42. The conveyor as thus constituted extends lengthwise of the drum beyond the effective portions of the rolls into the inlet chamber, so that as soon as the stock is delivered to the latter it becomes subject to the action of the conveyor. At the opposite end of the machine in the outlet chamber, blades or paddles 64 are provided (see Figs. 2 and 5) carried by the adjacent spider 40, the blades or paddles rotating within the chamber and tending to work the material out through its outlet. These blades herein are conveniently formed integrally with a flange 66 mounted on the hub of the spider 40. There is a similar flange 67 at the inlet end of the machine, but it has no blades.

The ends of the shafts 32 and their bearings, as well as the driving mechanism, are enclosed by similar housings 68 and 70, and the interiors of each are separated from the pulp chamber by partitions 72 and 74. In practice, it is found that if no packing is provided at these points, the pulp works into the transmission and bearing chambers, gets into the bearings and gears, and clogs up the spaces, so that after a time it is necessary to stop the machine and clean it out. This is especially troublesome in the case of the employment of a lubrication system such as that presently to be described, as the pulp mixes with the oil and clogs the oil pipes as well as the strainers. An important feature of my present invention is the provision of packing which prevents substantial leakage of the pulp from the pulp chamber into the bearing housings, and on the other hand prevents oil from working from the latter into the former. In the present example, there is provided a packing in the form of a felt ring 76 interposed between the flange 66 and the partition 72 (see Fig. 11), and similarly a packing ring 78 is interposed between the flange 67 and the partition 74 (see Fig. 10). These rings may be held against turning movement by spurs 80 and 82 projecting from the partitions 72 and 74 into the rings. The flanges 66 and 67 are provided with openings 84 and 86 for the shafts 32, said openings being of sufficient size to allow the shafts to move radially in and out in the operation of the machine. These openings would permit the escape of pulp were it not for the provision of packing herein in the form of felt washers 88 and 90 encircling the shafts. The washers at the outlet end of the machine are interposed between plates 92 secured to the flange 66 and collars 94 secured to the shafts 32 (see Fig. 11), and they are caused to turn with the shafts by

spurs 96 carried by the collars and projecting into the washers. At the inlet end of the machine, a similar arrangement is provided, but the washers 90 are interposed between the flange 67 and collars 98 encircling the shafts and carrying spurs 100 which project into the washers.

Another important feature of my invention is the lubrication system which will now be described, reference being had at first to Fig. 1. An oil reservoir 102 placed in an elevated position is intended to contain a supply of oil which is fed by gravity through two outlet pipes 104 and 106 preferably having sight feeds 108 and 110. These pipes are provided within the reservoir with upturned inlets 112 and 114 at some distance above the bottom of the reservoir, thereby to avoid taking in sediment which gravitates to the bottom of the reservoir. These pipes lead in opposite directions to the ends of the machine, where they are provided with suitable outlets herein nozzles 116 and 118, one of which is shown in detail in Fig. 12 secured to the housings 68 and 70, respectively. These nozzles discharge into central chambers conveniently in the form of oil rings 120 and 122 (see Fig. 2) concentric with the shaft 42 and preferably secured thereto as by being bolted to the spiders. Each of these rings has an open end into which the corresponding nozzle delivers a continuous supply of oil, and they present annular channels having outlets 124 and 126, which deliver oil into receptacles 128 and 130 provided therefor and carried by bearings which they lubricate (see Figs. 2 and 3). Since the oil rings rotate with the spider which carries the bearings, a continuous supply of oil is provided for the latter, while still permitting a radial movement of the shafts and bearings. Some of the oil naturally finds its way to the gearing and lubricates the latter.

All of the oil which drains from the mechanism is caught by the housings 68 and 70, and is received in drainage pockets 132 and 134 at the bottoms of the latter (see Fig. 2), where it is preferably strained by screens 136 and 138 preferably located in the sides of the pockets, as this position is best calculated to prevent any foreign matter such as pulp from clogging them. The pulp gravitates to the bottoms of the chamber, where it may be cleaned out by the use of clean-out plugs 140 and 142.

The oil is taken from the drainage pockets through pipes 144 and 146 to one or more, herein two filters 148, one of which is shown in detail in Fig. 9, where it is passed through fine wire fabric 150, which encircles and is supported by a perforated tube 152, having one end closed by a cap 154 and its other end supported by a cap 156 having an outlet 158. From the latter, a pipe 160 leads to the inlet of a power-driven pump 162 (see Fig. 1), whose outlet is connected by a pipe 164 to the reservoir 102, where it has a downwardly directed outlet 166 (see Figs. 3 and 4). The reservoir is normally closed by a suitable cover 168, herein hinged to the body of the reservoir, and provided with a handle 170 by means of which it may be opened to renew the supply of oil from time to time. A drain-cock 172 (see Fig. 1) may be provided at the bottom of the reservoir to drain the sediment therefrom.

In the present embodiment, the stock is delivered to the inlet 54 by a hopper 174, which to assist the uniformity of feed is provided with a rotary feeding device 176, best shown in Fig. 6, presenting radially projecting feeding fingers 178, which assist in the delivery of the stock to the inlet chamber, while at the same time checking any tendency toward an excess delivery, as well as assisting in breaking apart any thick masses or bunches of stock. Suitable means are provided for driving the feeding device, herein a bevel gear 180, which meshes with a corresponding gear (not shown) carried by a shaft 182.

The fingers on the rotary feed device cooperate with other members, such as fingers 184 carried by an adjustable plate 186, best shown in Fig. 2, the same being provided with a pin 188 mounted to slide vertically in a slot 190, in which it is held adjustably fixed by a nut 192. By this means, the plate may be moved vertically to any desired position within the range of adjustment, thereby causing the fingers 184 to enter to a greater or less extent between the rotary fingers 178, or to be withdrawn beyond their path if desired. By this means, the rate of feed may be regulated within suitable limits.

The operation of the machine as thus far described will be readily understood. The stock on entering the cylinder is subjected to the crushing and reducing action of one of the rolls. Emerging from beneath the first roll, it is engaged by the approaching part of a conveyor blade 58, which acts not only progressively to advance the material lengthwise of the cylinder before delivery to the next roll, but also to scrape up and agitate the material in its flattened sheet-like form, and heap it up in front of the next approaching roll in the form of a relatively flattened mass. The material is then again rolled and crushed by the next adjacent roll, and the same action is repeated over and over again. The conveying devices progressively advance the stock between successive reducing action lengthwise of the rolls, so that the same stock meets the same roll at an advanced position lengthwise of the machine.

In handling some grades of stock, it is found that the latter tends to cling to the rolls, and not to the shell. The surface of the latter remains practically clean. Under these circumstances, the propeller blades would be ineffective for feeding. The stock would continue to build up on the roll until it produced a coating so thick that it would break apart, whereupon the propeller blade would feed it along. As the stock would continue to build up and the rolls recede from the shell, an increasing amount of power would be required to drive the machine, sometimes amounting to an overload of from 50 to 100 per cent. As soon as the coating on the rolls would break apart, the latter would fly out again against the shell, and the machine would speed up, and this action be continued over and over again. This produced an irregular action of the machine, and it lacked the desired uniformity, since under different conditions at different times, the stock would break loose from the rolls with different amounts of accumulation on the rolls. Moreover, when a thick coating is built up on the rolls, the crushing action is so diminshed that the slivers on the outer layers of the coating do not receive the necessary crushing action, and it follows that the stock would tend to come through the machine in an insufficiently crushed condition.

This difficulty is entirely overcome by the provision of scrapers 194 (see Figs. 2 and 7) carried by the conveyor blades 158 and preferably separated from their respective rolls by a slight clearance,—in practice from $\frac{1}{16}$ to $\frac{1}{8}$ of an inch. The action of the scrapers is to prevent the stock from building up on the rolls beyond a certain amount. It follows that a uniform feed and uniform crushing action is maintained, and the amount of power required to drive the machine is kept within reasonable limits, the variation in practice not exceeding 10 per cent., as compared with 50 to 100 per cent. without the use of these scrapers.

It has been found in practice that a broad scraper blade creates too much reaction and requires too great power, owing to the stock building up on the blade. Therefore, a narrow or wire-like formation of the scraper such as that shown in the drawings is preferred as it simply breaks up the coating within a certain height, without causing clogging. The coating then drops off against the conveyor blades, by which it is again carried forward to another point, where it receives another rolling or crushing action. The conveyor blades and scrapers rotating as they do with the shaft 42 are assisted in their action upon the stock by the centrifugal force exerted thereagainst which causes the detached stock to fly out against the inner surface of the shell 14. The scrapers, therefore, constitute an important improvement in the treatment of any stock which has a tendency to stick to the rolls.

Having thus described one embodiment of my invention, but without limiting myself thereto, what I claim and desire by Letters Patent to secure is:

Claims.

1. In a machine for working paper stock or other material having an inlet and outlet the combination of relatively movable parts having opposed surfaces between which the material is subjected to a crushing action, and means for limiting the amount of material adhering to both surfaces throughout while progressively advancing the material toward the outlet end of the machine.

2. In a machine for working paper stock or other material, the combination of relatively movable parts having opposed surfaces between which the material is subjected to a crushing action, devices closely related to one surface for removing material therefrom, and devices closely related to the other surface for removing material from said other surface.

3. In a machine for working paper stock or other material, the combination of a cylindrical shell; one or more rolls whose cylindrical surfaces cooperate with the internal cylindrical surface of said shell to subject the material to a crushing action, and means engaging the material on the rolls to prevent the same from building up on said rolls beyond a certain amount.

4. In a machine for working paper stock or other material, the combination of relatively movable parts having opposed surfaces one of which is an internal cylindrical surface and the other a cooperating roll, means to cause relative movement of said surfaces to subject the material to a crushing action, and means to break up substantially the entire coating of material adhering to the roll.

5. In a machine for working paper stock or other material, the combination of a roll having a planetary movement, a curvilinear stock-receiving surface over which said roll works, means for presenting stock to said roll on said surface, and means also having a planetary movement for scraping stock off said roll throughout and impelling it toward said surface.

6. In a machine for working paper stock or other material, the combination of relatively movable parts having opposed surfaces between which the material is subjected to a crushing action, and means for progressively advancing the material along said surfaces step by step, said means including means for limiting the amount of material adhering to both surfaces throughout.

7. In a machine for working paper stock or other material, the combination of a cylindrical shell, one or more rolls whose cylindrical surfaces cooperate with the internal cylindrical surface of said shell to subject the material to a crushing action, means for conveying material lengthwise of said roll or rolls, and means carried by said conveying means, to prevent the material from building up on said rolls beyond a certain amount.

8. In a machine for working paper stock or other material, the combination of a cylindrical shell, one or more rolls whose cylindrical surfaces cooperate with the internal cylindrical surface of said shell to subject the material to a crushing action, obliquely disposed blades for conveying material lengthwise of said roll or rolls, and scrapers carried by and interposed between said blades to scrape the material from said roll or rolls.

9. In a machine for working paper stock or other material, the combination of a cylindrical shell, one or more rolls whose cylindrical surfaces cooperate with the internal cylindrical surface of said shell to subject the material to a crushing action, means for conveying material lengthwise of said roll or rolls, and scraping means extending lengthwise of said roll or rolls for scraping the material therefrom.

10. In a machine for working paper stock or other material, the combination of a casing having a cylindrical, internal surface, one or more rolls therein adapted to roll along said surface and to crush the material between said rolls and said surface, and means engaging material adhering throughout said roll or rolls to limit the amount thereof.

11. The process of working paper stock or other material which is characterized by subjecting the same to a crushing action between opposed surfaces and removing material from both surfaces throughout by a centrifugal scraping action.

12. In a machine for working paper stock or other material, the combination of two bodies between which the material is worked, one of said bodies being rotary, a bearing for supporting said rotary body, and planetary driving means for said body interposed between said bearing and said body.

13. In a machine for working paper stock or other material, the combination of two bodies between which the material is worked, one of said bodies being a roll having a planetary movement and provided with a shaft, a bearing for said shaft, and driving means for said shaft, interposed between said bearing and said body.

14. In a machine for working paper stock or other material, the combination of two bodies between which the material is worked, one of said bodies being a roll provided with a shaft the latter being adapted to revolve with a planetary movement, a bearing for said shaft, and driving means for said shaft, including a gear secured to said shaft intermediate said bearing and said body.

15. In a machine for working paper stock or other material, the combination of a plurality of bodies by which the material is worked, one of said bodies being a hollow cylinder and the others being rolls extending lengthwise of and within said cylinder, shafts projecting beyond the ends of said rolls, bearings for said shafts, means for maintaining said bearings properly spaced, and gearing for imparting a relative rolling motion to said cylinder and rolls to cause the latter to travel along the former, said gearing being interposed between said bearings and said rolls.

16. In a machine for working material, the combination of means presenting a chamber wherein the material is worked, means within said chamber for working the material, driving means without said chamber for driving said means within said chamber, a housing providing an enclosing chamber for said driving means, and packing means to prevent material from working from said first chamber into said second chamber.

17. In a machine for working material, the combination of means presenting a chamber wherein the material is worked, means within said chamber for working the material, driving means without said chamber for driving said means within said chamber, a housing for said driving means, a driving connection relatively movable parts through which said driving connection passes and permitting transverse movement thereof during operation of the machine, said relatively movable parts presenting a partition between said chamber and and the interior of said housing, and packing means between said parts.

18. In a machine for working material, the combination of a hollow cylinder presenting a chamber wherein the material is worked, means including a roll within said chamber for working the material, a driving shaft, driving means without said chamber, a housing for said driving means, and means through which said shaft passes presenting a fluid-tight separation between said chamber and the interior of said housing while permitting transverse movement of the shaft.

19. In a machine for working material, the combination of a hollow cylinder presenting a chamber wherein the material is worked, means including a roll within said chamber for working the material, driving means without said chamber for driving said roll, a housing for said driving means,

means presenting two relatively rotatable walls separating said chamber from the interior of said housing, and packing means interposed between said walls.

20. In a machine for working material, the combination of a hollow cylinder presenting a chamber wherein the material is worked, means including a roll within said chamber for working the material, a shaft projecting from the end of said roll, driving means without said chamber for driving said shaft, a housing for said driving means, means presenting two relatively rotatable walls separating said chamber from the interior of said housing, packing material interposed between said walls, a collar carried by said shaft, and packing material encircling said shaft and interposed between said collar and one of said walls.

21. In a machine for working material, the combination of means presenting a chamber wherein the material is worked, means within said chamber for working the material, driving means without said chamber for driving said means within said chamber, a housing for said driving means, means for supplying lubricant to the interior of said housing to lubricate said driving means, and means presenting a fluid-tight separation between said chamber and the interior of said housing.

22. In a machine for working paper stock or other material, the combination of means for working the material, driving mechanism therefor, and an oil circulating system for said driving mechanism.

23. In a machine for working paper stock or other material, the combination of means for working the material, driving mechanism therefor, and an oil circulating system for said driving mechanism, said system including means for separating the oil from the paper stock.

24. In a machine for working paper stock or other material, the combination of means for working the material, driving mechanism therefor, and an oil circulating system for said driving mechanism, said system including means for straining the oil after it has passed said driving mechanism and before it is again delivered thereto.

25. In a machine for working paper stock or other material, the combination of means for working the material, driving mechanism therefor, and an oil circulating system for said driving mechanism, including a reservoir from which oil gravitates to said driving mechanism, and a pump for returning the oil to said reservoir.

26. In a machine for working paper stock or other material, the combination of means for working the material, driving mechanism therefor, and an oil circulating system for said driving mechanism, including a reservoir from which oil gravitates to said driving mechanism, means for straining the oil after it has passed said mechanism, and a pump for returning the oil to said reservoir.

27. In a machine for working paper stock or other material, the combination of means for working the material, driving mechanism therefor including shafts, bearings for said shafts, and lubricating means including a central chamber from which oil is distributed to said bearings.

28. In a machine for working paper stock or other material, the combination of means for working the material, driving mechanism therefor including shafts which revolve about a center, bearings for said shafts, a rotating carrier for said shafts, and lubricating means including a central chamber from which oil is distributed to said bearings.

29. In a machine for working paper stock or other material, the combination of means for working the material, driving mechanism therefor including shafts which have a planetary motion, bearings for said shafts, a rotating carrier for said bearings, and lubricating means including a rotating part presenting a central chamber and outlets supplying oil to said bearings.

30. In a machine for working paper stock or other material, the combination of means for working the material, driving mechanism therefor including shafts which have a planetary motion, bearings for said shafts, a rotating carrier for said bearings, and lubricating means including a rotating part presenting a central chamber having outlets supplying oil to said bearings, and means including a non-rotating part supplying oil to said chamber.

31. In a machine for working paper stock or other material, a casing having a curved stock-receiving surface, one or more rolls within the casing, means for moving the rolls through an orbital path within the casing, and a scraping device cooperatively related to substantially the entire length of the roll.

32. In a machine for working paper stock or other material, a casing having a curved stock-receiving surface, one or more rolls within the casing, means for moving the rolls through an orbital path within the casing, and a narrow wire-like scraping device cooperatively related to the roll.

33. A machine for working paper stock having a casing presenting a curved stock-receiving surface, one or more rolls within the casing, means to cause the roll to move over the curved surface in an orbital path, and scraping devices for the roll and for the surface also movable in an orbital path and adapted to remove the accumulated material and impel it against the stock-receiving surface.

34. A machine for working paper stock or other material comprising a cylinder and roll, means for causing the roll to travel over the interior surface of the cylinder, and scraping devices traveling with the roll and operatively related, one to the surface of the cylinder and another to the roll.

35. In a machine for working paper stock, the combination with means presenting a chamber wherein the material is worked, means within said chamber for working the material and comprising one or more rolls having each a movement of rotation about its axis and movement in an orbital path, driving mechanism for imparting said movement to said roll including a driving shaft extending into said chamber, said shaft and roll being capable of transverse outward or inward movement, and a partition between the chamber and the driving means having a suitably packed orifice to prevent the escape of paper stock therethrough while permitting said transverse movement.

36. A machine for working paper stock having a casing with one or more rolls, said roll being adapted to travel through an orbital path through the interior of said casing and supported to permit a radial inward and outward movement under variations of centrifugal force, driving mechanism, a partition separating the chamber from said driving mechanism, a shaft extending through said partition, and provision for permitting the necessary radial inward or outward movement of said shaft while preventing the escape of stock from said chamber.

37. In a machine for working paper stock or other material, the combination with means for working the material including one or more rolls adapted to operate, a stock working chamber, planetary gearing for imparting to said rolls both a movement of rotation and a movement through an orbital path, a housing enclosing said gearing, a partition separating the same from the stock working chamber, and an oil circulating system for feeding oil to said planetary gearing.

38. A machine for working paper stock having a stock working chamber and one or more rolls therein, planetary driving gearing for one or more driving shafts for said rolls, the latter having a planetary motion, a bearing or bearings for said shaft or shafts, means separating said driving gearing from the working chamber, and lubricating means including a central chamber from which oil is distributed to said bearing or bearings.

In testimony whereof, I have signed my name to this specification.

ANTON J. HAUG.