

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.

MACHINE FOR AND PROCESS OF WORKING PAPER-STOCK.

1,302,469.

Specification of Letters Patent. Patented Apr. 29, 1919.

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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, State of New Hampshire, whose post-office address is % Improved Paper Machinery Company, Nashua, New Hampshire, have invented an Improvement in Machines for and Processes of 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 machines for and process of working paper stock and has for its object the provision of improved methods and appliances which may be employed either in preparing the crude pulp from raw material or in working the crude pulp into a more refined state.

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

In the drawings:

Figure 1 is an elevation, principally in longitudinal section, showing a machine embodying one form of the invention;

Fig. 2 is a transverse, sectional elevation taken on the line 2-2 in Fig. 1;

Fig. 3 is a similar sectional elevation taken on the line 3-3 in Fig. 1;

Fig. 4 is an end elevation of the machine; and

Fig. 5 is a diagrammatic development of the rolls and feeding devices in the machine showing their action on the material fed to the machine.

Referring to the drawings and to the embodiment of the invention therein illustrated, I have shown the same exemplified in a machine intended primarily for refining crude pulp, although the same principles and substantially the same mechanism and appliances 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 generically termed paper stock) of widely different condition, such, for exam-

ple, as more or less unreduced fibrous material or pulp reduced to a more or less crude state.

Referring to the machine illustrated in the drawings, the same includes a body or casing, herein in the form of a cylindrical shell 6, supported upon bed pieces 7, the latter resting on the bed plate 8. The casing herein rests in the bed pieces 7 and is fixedly secured therein by the bolts 9, but, if desired, the casing might have a movement of rotation either with or without the rotation of the rolls, hereinafter referred to.

Herein the stock is introduced at one end of the casing through the inlet passage 10 and is progressively advanced through the same to the discharge chamber 11 and the discharge spout 12, after being subjected to a succession of crushing and rolling actions.

On its movement through the casing, the stock is subjected to a succession of crushing actions, preferably by means of rolls, the rolls being preferably though not necessarily arranged so that a true crushing action is obtained without any substantial grinding or abrasive action. While various devices might be employed for this purpose, herein there are provided one or more rolls extending lengthwise the cylinder and adapted to bear against the inner face or surface of the cylinder, the rolls being carried around the inside of the cylinder by suitable rotary supports so as to have rolling contact with the inner face of the cylinder and roll over and crush the stock in their movement.

While any number of rolls and rolls of any desired shape may be employed, herein two pairs of rolls are utilized, one pair consisting of the rolls 13 and 14 arranged diametrically opposite each other and the other pair consisting of the rolls 15 and 16 also arranged diametrically opposite each other, but located ninety degrees apart away from the rolls 13 and 14.

All four rolls are mounted upon shafts which have their ends journaled in boxes carried in the spiders 17 and 18. Each spider in turn is keyed to the shaft 19, the latter being mounted in the bearings 20 and 21 and being provided at one end with the fly wheel 22 and at the opposite end with the driving pulley 23. To support the bear-

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ing boxes for the rolls, each spider has bolted on the inside of its flange 4 guides 24 adapted to receive and guide the bearing boxes 25, which latter receive the shaft ends 26 for the rolls. The bearing boxes 25 are adapted to move radially outward or inward in their guides as indicated in Fig. 4, but are normally pressed outward by the springs 27. The result is that, as the spiders 17 and 18 are rotated through the driving shaft, the rolls are forced into rolling contact with the inner surface of the cylindrical shell both by centrifugal action and by the action of the springs 27, while the springs 27 permit the required yielding movement of the rolls and also hold them in position when the machine is at rest. While the rolls themselves might be independently driven, herein no further rotating agency is shown than the rolling contact of the rolls upon the face of the cylinder and the stock passing thereunder as the spiders are turned, the rolls being pressed outwardly by centrifugal force their pressure increases with the speed of the machine, so that the crushing action of the machine may itself be regulated by varying the speed.

The rolls 15 and 16 intermediate the rolls 13 and 14 are herein shown as extending part way only across the cylinder and located near the outlet end thereof, so that they act upon that portion of the stock which has already been partly disintegrated, crushed or refined. As the coarse materials enter the inlet of the machine they will tend to lift the rolls which they encounter and force them away from the surface of the cylinder more or less. By providing the intermediate rolls which engage only the more refined portions of the stock, such rolls are not subjected to the same degree of lifting action as the rolls 13 and 14, and the stock in the course of its travel through the machine and as it becomes more highly refined may thus be subjected not only to an increased rolling action, but one of greater intensity through the medium of the intermediate rolls 15 and 16, working as they do in closer contact with the surface of the cylinder.

The machine as illustrated is preferably a continuously fed machine, the stock being continuously fed through the inlet 10, advanced progressively through the machine and continuously delivered from the outlet 12. In order progressively to advance the stock through the machine between each crushing action of the successive rolls, suitable feeding devices are preferably employed. These may be of any suitable type, but herein I have shown secured to the driving shaft 19 a series of devices which form, in effect, a screw conveyer acting to convey the material from one end of the machine to the other while subjecting it to the repeated crushing actions.

Such conveyer devices are provided for the initial end of the cylinder in the form of inclined or helical vanes 29 (see Figs. 1 and 3) suitably cut away to avoid interference with the rolls 13 and 14 and with the shafts 26 for the rolls 15 and 16, these vanes being formed in units, each unit being mounted on a hub 30 and the hubs non-rotatably secured to the driving shaft 19. A series of similar units are employed for the last half of the cylinder except that the vanes 31 are further cut away to avoid interference with the rolls 15 and 16. The cylinder near its inlet end is partly closed by the end ring or cap piece 32 which prevents the escape or overflow of stock.

The action of the machine on the stock will be readily understood from the preceding description and particularly when taken in connection with the diagrammatic development illustrated in Fig. 5. Referring to Fig. 5, the stock on entering is subjected to the crushing action of the roll 13. Emerging from beneath the roll 13 it is engaged by the approaching part of the vane 29 which acts not only progressively to advance the material lengthwise the cylinder before delivery to the next roll 14, but also to scrape up and agitate the material in its flattened, sheet-like form and heap it up in front of the roll 14 in the form of a relatively thickened stream. The material is then again rolled and crushed by the roll 14 and the same action follows in the conveyance of the material from the roll 14 to the roll 13 as it did in its conveyance from the roll 13 to the roll 14. This action is repeated over and over again as the material is progressively advanced along the cylinder until it reaches the radius of action of the rolls 15 and 16. At that point the material delivered to the roll 13 is conveyed to the intermediate roll 15 before passing to the roll 14, and the material leaving the roll 14 is conveyed beneath the roll 16 before passing again to the roll 13.

It will be observed that the conveying devices progressively advance the stock beneath successive portions of the rolls so that the same stock meets the same roll always at an advanced position lengthwise the roll, and there is at all times an even distribution of the stock over the inner surface of the cylinder which is being progressively fed through the cylinder. If desired, the cylinder as well as the rolls may be revolved, thereby providing for an even wearing of the inside of the cylinder under the action of the rolls. The vanes 29 assisted to some extent by the rolls exert a centrifugal effect upon the stock and tend to throw it out and spread it evenly and distribute it along the inner surface of the cylinder, so that the distribution and the feed is uniform, fixed and certain.

Preferably the rolling of the stock is accomplished as herein by a true rolling action without any substantial abrading or grinding action, so that the stock is reduced or refined by a crushing action and without cutting, abrading or otherwise injuring the fibers.

It will be obvious that various other agencies and appliances may be employed for producing the crushing or rolling action herein described, and that the invention is not limited to the number, form or construction of the crushing agencies or the shape or arrangement of the body or casing of the apparatus or to the respective location of the crushing agencies or their relative or actual movements, but that various modifications and forms and arrangement of parts may be employed without departing from the spirit of the invention.

Claims:

1. A machine for working paper stock or other material wherein the material is fed continuously to the machine inlet and withdrawn from the outlet thereof, characterized by the employment of separate crushing and feeding devices acting in alternation which subject the material to repeated crushing actions with intervening feeding actions predetermined in amount whereby the material is positively fed through the machine and subjected to a predetermined crushing action.

2. In a machine for working paper stock or other material, the combination with a casing having an inlet and an outlet, of means for subjecting the material to repeated crushings, and mechanical feeding devices to advance the material in the casing in a direction from the inlet toward the outlet during the intervals between successive crushings.

3. In a machine for working paper stock or other material, the combination with a casing having an inlet and an outlet, the material being continuously fed to the inlet and withdrawn from the outlet, of rolling devices adapted to act repeatedly at separate intervals upon each portion of the material to crush the same, and mechanical conveying devices to advance the rolled material between successive crushings and present it at a more advanced position in the machine to the subsequent action of said rolling devices.

4. In a machine for working paper stock or other material, the combination with a casing presenting a materials-receiving surface and having an inlet and an outlet, the material being continuously fed to the inlet and withdrawn from the outlet, rollers operating in said casing and adapted to roll the material presented on said surface, and conveying devices acting during the intervals between successive rollings to scrape

and advance the rolled material a predetermined amount and present it at a more advanced point to the subsequent action of the rolling devices.

5. In a machine for working paper stock or the like, the combination of crushing devices adapted to repeatedly crush the material, said machine having an inlet and an outlet, and separate conveyer means for feeding the material a predetermined amount between successive crushings to subject the material to a predetermined crushing action while being advanced through the machine from the inlet to the outlet.

6. In a machine for reducing materials, the combination with a materials-receiving surface, crushing means to subject the material thereon to successive crushings, and independent mechanical feeding means to advance the material on said surface in a direction from the inlet toward the outlet a predetermined amount between successive crushings.

7. In a machine for working paper stock, the combination with a casing, rolling means in said casing, an inlet and an outlet, and means to feed stock from the inlet to the outlet to subject it to repeated rolling actions predetermined in number and amount.

8. In a machine for working paper stock or other material, the combination with a casing having an inlet and an outlet, the material being continuously conveyed to and from the machine, of crushing means for repeatedly crushing the material passing through the casing, and distinct mechanical feeding devices for conveying it through the casing between successive crushings.

9. In a machine for working paper stock, the combination with a cylindrical casing, a roll in contact with the inner surface of the casing and extending lengthwise the same, means for causing relative movement between the roll and the cylinder, an inlet and an outlet in said casing, and means for continuously feeding stock through the casing from the inlet to the outlet.

10. In a machine for working paper stock, the combination with a roll, a stock receiving surface over which the roll works, means for presenting stock to the roll on said surface, and means for progressively advancing the stock on the surface lengthwise the roll.

11. In a machine for working paper stock, the combination with a cylindrical casing, of one or more rolls therein extending lengthwise the casing, and means for repeatedly presenting paper stock to the same roll in said casing but at different progressively advanced points in its length.

12. In a machine for working paper stock, the combination with a casing, of crushing devices within the same, and conveying devices within the casing for progressively conveying the stock through the same and

acting after each crushing action repeatedly to subject it to the action of said crushing devices.

13. A machine for working paper stock having crushing rolls and mechanical feeding devices acting in alternation and dissimultaneously upon the stock.

14. In a machine for working paper stock, the combination with a cylindrical casing, of rolls mounted to move over the inner surface of said casing, said rolls being yieldably supported to permit their outward movement under centrifugal force, and intermediate mechanical conveying devices to advance the stock in said casing during the intervals between successive rolling actions.

15. In a machine for working upon paper stock or other material, the combination with a casing 6 having the inlet 10 and the outlet 12, of rolls 13-14 and the separate and intermediate conveying devices 29.

16. In a machine for working paper stock, the combination with a cylindrical shell, a plurality of rolls extending lengthwise said shell and in working proximity to the inner surface thereof, means to cause relative movement between the rolls and said shell, an inlet and an outlet for said shell, and conveying devices to advance the stock from the inlet toward the outlet between each rolling action.

17. A machine for working paper stock comprising a cylindrical shell having an inlet at one end and at outlet near the opposite end, a rotary shaft carrying inclined conveying and agitating veins for advancing material from the inlet toward the outlet, rollers arranged in working proximity to the inner surface of said shell and adapted repeatedly to crush the material entering said inlet, said material being advanced by said veins between successive actions of said rolls, and journal supports carried by said rotary shaft for said rolls.

18. In a machine for working paper stock, the combination with a casing, a roller in said casing, means whereby stock may be entered in said casing to be repeatedly crushed by said roller, means whereby the stock may be withdrawn from said casing, and means for progressively advancing the stock between successive crushings to be successively engaged by said roller at progressively advanced points in its length.

19. In a machine for working paper stock the combination with a casing having an inlet and an outlet, one or more rolls working in said casing to engage materials near the inlet end and one or more additional rolls adapted to engage materials only after being advanced from the inlet end toward the outlet end.

20. In a machine for working paper stock, the combination with a cylindrical casing having an inlet and an outlet, means for

feeding materials through said casing, one or more rolls extending lengthwise the casing to engage the materials for substantially their entire path between the inlet and outlet, and one or more rolls extending lengthwise the casing to engage materials only after being initially refined by said first roll or rolls.

21. In a machine for reducing material, the combination with a casing, of one or more crushing members within said casing, means for imparting to said crushing member an orbital path of travel within the casing to cause the same to act repeatedly upon the material distributed on the inner surface of the casing, and mechanical feeding means in said casing to advance the material during the intervals between successive crushing actions.

22. In a machine for reducing material, the combination with a stationary casing, of a crushing roll within said casing, means for giving said crushing roll an orbital path of travel to effect successive crushing actions upon the material contained on the inner surface of said casing, and means for feeding the material between successive crushings to present it to a more advanced point along said roll.

23. In a machine for reducing material, the combination with a casing, of a crushing roller within the casing, means for revolving said roller in an orbit to cause the same to pass over the inner surface of the casing and the material thereon while centrifugally pressed outward against the casing, and means for feeding the material after each crushing action to advance its position in said casing.

24. In a machine for disintegrating raw material, the combination with a casing of a crushing agency means for centrifugally distributing the stock evenly over the surface of the casing to subject it to the action of the crushing agency, and conveying means to advance the stock a predetermined distance along the surface of the casing after each crushing action.

25. In a machine for disintegrating raw material, the combination with a casing having an inlet and an outlet of a crushing agency for repeatedly crushing the same, means for centrifugally distributing the stock evenly over the surface of the casing to subject it to the action of the crushing agency, and feeding or conveying means for advancing the stock along the surface from the inlet to the outlet said means acting between successive crushings.

26. In a machine for disintegrating material in paper making, the combination with a casing having an inlet and an outlet, of means for distributing the material evenly over the inner surface of the casing, a crushing member adapted to act upon said

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evenly distributed material, and mechanical feeding means to advance the material from the inlet to the outlet.

27. The process of working continuously fed paper stock or other material, which consists in subjecting the same to a succession of crushing actions and maintaining a progressive, predetermined feeding movement during the intervals between successive crushing actions to and away from successively acting crushing agencies to secure thereby an aggregate crushing effect predetermined in amount.

28. The process of working paper stock or other material, which consists in applying the material to a surface, crushing the same thereon, advancing the material along said surface after being crushed, again crushing it in its advanced position, and continuing through a series of alternate crushing and conveying actions.

29. The process of working paper stock or other material, which consists in rolling the stock to crush the same, positively advancing the rolled stock after being rolled to present it again to the action of the same roller at a more advanced point in its length and continuing through a series of alternate rolling and advancing actions.

30. The process of working paper stock or other material, which consists in applying the material to a surface, rolling the same thereon, scraping the rolled material and advancing the same along said surface, again rolling it in its advanced position, continuing through a series of alternate rolling and scraping actions, and finally discharging it from said surface.

31. The process of working paper stock

or other material, which consists in forcing it outward by centrifugal action upon the inner surface of the surrounding casing to press it thereagainst, subjecting it while pressed thereagainst to a pressing action, thereafter and dissimultaneously subjecting it to a conveying action to advance it along the surface while still pressed against the same, and repeating the successive and alternate crushing and conveying actions.

32. The process of working paper stock or other material, which consists in pressing the stock against a member, crushing it while pressed thereagainst, thereafter dissimultaneously subjecting it to a conveying action to advance it while still pressed against the member, and repeating these alternate crushing and conveying actions.

33. The process of working paper stock or like material, which consists in advancing the stock with relation to crushing agencies, stopping the advance at intervals, and crushing the stock while the advance is stopped.

34. The process of working paper stock or like material, which consists in rolling the same only while it is motionless and mechanically conveying the material only before and after it has been rolled.

35. The process of working continuously fed paper stock or other material, which consists in subjecting the material to a succession of crushing actions and subjecting it to a positive mechanical feed between successive crushing actions.

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

ANTON J. HAUG.

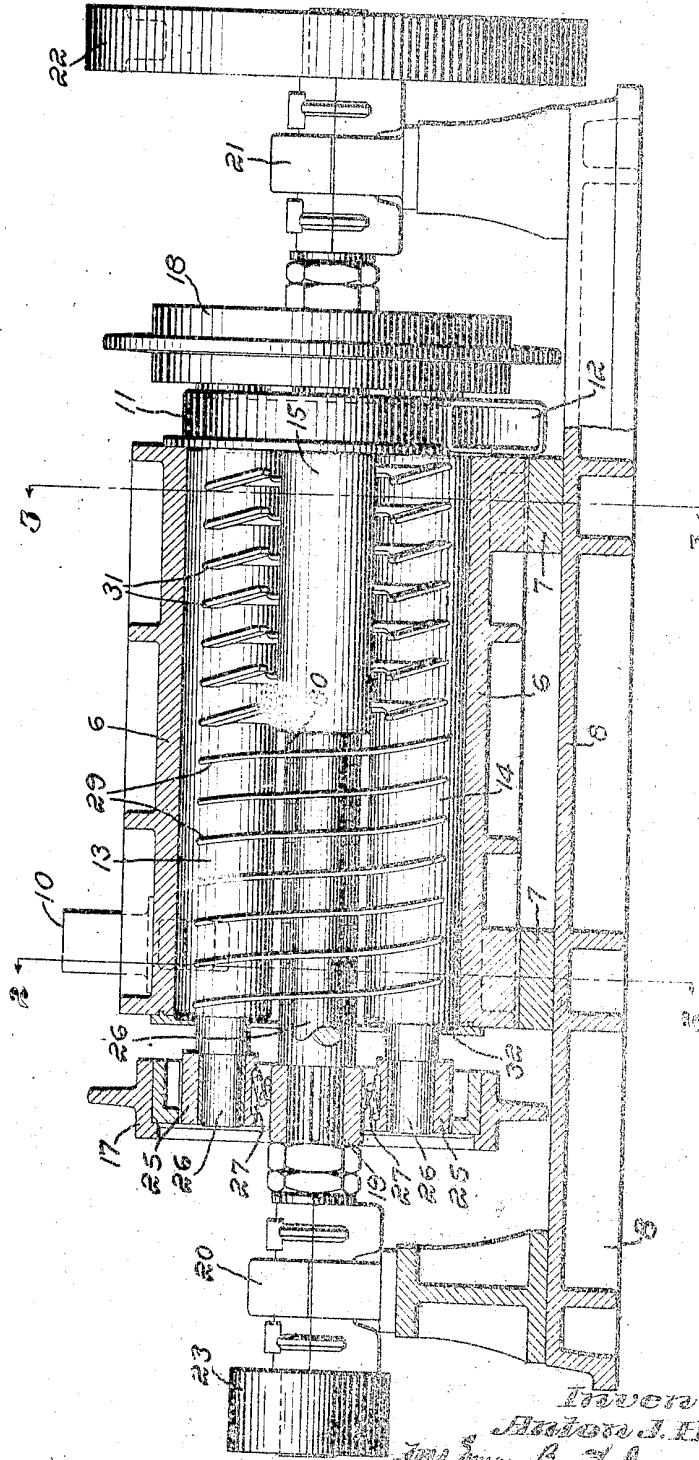
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 MACHINE FOR AND PROCESS OF WORKING PAPER STOCK.
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3 SHEETS—SHEET 1.

Fig. 1.



Inventor:
 Arthur J. Haug,
 by Harry Berth, James Hanson,
 Attorneys

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3 SHEETS—SHEET 2.

Fig. 2.

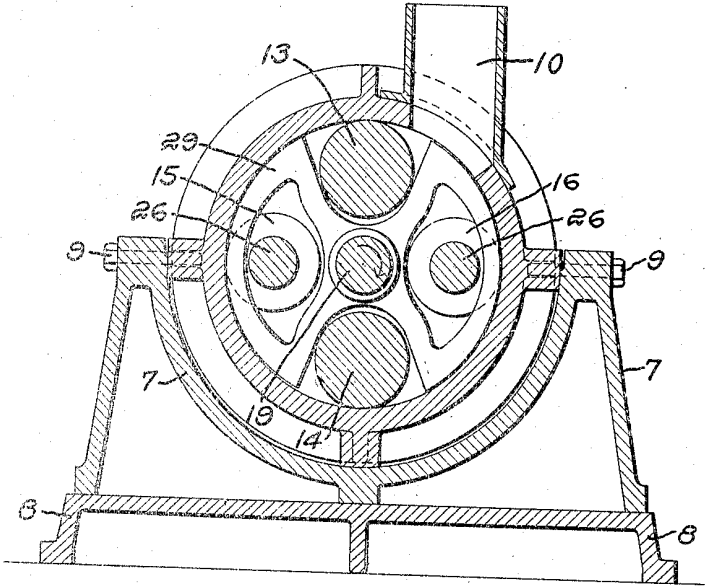
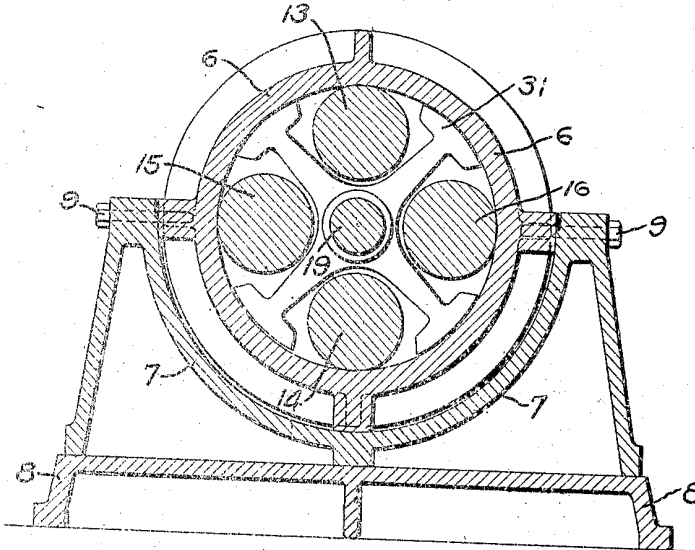


Fig. 5.



Inventor:
A. J. Haug.
By Harry Booth, James Harvey
Attys.

