# UNITED STATES PATENT OFFICE.

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## PAPER-MACHINE.

1,284,668. Specification of Letters Patent. Patented Nov. 12, 1918.

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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 c/o Improved Paper Machinery Company, Nashua, New Hampshire, have invented an Improvement in Paper Machines, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawing representing like parts.

This invention relates to paper machines and more particularly, though not exclusively, to machines for working paper stock. While as to many of its features it may have different and varied applications, in the form herein shown it is embodied for illustrative purposes in a machine for screening paper stock.

The invention will be best understood by reference to the following description when 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 a central, longitudinal, sectional elevation of the inlet end of a screen embodying one form of the invention;

Fig. 2 is a similar view showing the remaining portion of the screen;

Fig. 3 is a transverse, sectional elevation taken on the line 3—3 of Fig. 1;

Fig. 4 is a central, sectional plan, showing the stock delivery passages near the inlet end of the screen;

Fig. 5 is a transverse, sectional elevation taken on the line 5—5 in Fig. 2, showing the stock delivery passages thereat; and

Fig. 6 is an end sectional view taken on the line 6—6 in Fig. 1 but on a reduced scale.

Referring to the drawings and to the embodiment of the invention therein submitted for illustrative purposes, I have there shown the same as embodied in a paper pulp screen, the main screening member of which is comprehended in a screen drum. While the latter may be of any desired shape and may be either rotatable or fixed, herein the same is rotary in form and polygonal in shape. For this purpose end plates 1 and 2 (Figs. 1 and 2) are provided, these being joined near their peripheries by a series of plates or ribs 3 extending the entire length of the screen, the flanged ends 4 of said ribs being bolted or otherwise secured at equally spaced distances near the periphery of the end plates 1 and 2, thereby forming with said end plates a skeleton frame for the screen drum. The end plates are polygonal in form, containing herein sixteen sides, and the connecting ribs 3 are so located and shaped that in conjunction with the end plates each adjacent pair forms a support to which one or more flat, rectangular, perforated screen plates 5 may be secured, the latter forming the shell or body of the screen. Each longitudinal rib 3 has its outer edge beveled to fit the flat screen plate applied thereto, and the screen plates are clamped to the beveled edges of the ribs by means of exterior plates or bars 6 having their inner faces shaped to correspond to the bevel on the ribs 3 and bolted thereto at suitable intervals. The corners between the ribs 3 are closed by members 7 which may be blocks of wood, the overlying edges of the screen plates 5 being preferably secured thereto by suitable means such as the clamping plates 8.

Preferably, the interior of the screen is subdivided into compartments or pockets which are adapted to retain separate, individual batches or quantities of stock. These pockets may be of any suitable shape or size, and if desired, each pocket may be subdivided lengthwise the screen into separate compartments, but herein the pockets extend uninterruptedly, the entire length of the screen drum, being formed by the ribs 3 in conjunction with the perforated screen plates 9, the latter being suitably secured at intervals to rectangular openings in the ribs, each rib with its plate constituting a radial, foraminous, partition wall, and these walls in conjunction with the flat plates 5 of the drum 1, being well adapted, as will appear, for the effective agitation of the stock during the rotation of the drum.

The screen is supported upon suitable bearings, the same herein comprehending the series of rollers 10 (Figs. 1, 2 and 6) mounted on the pins 11, the latter supported at each side of the rollers by the fixed plates 12—12. The screen at opposite ends rests upon the rollers 10 through the intermediate cylindrical journal members 13 and 14, respectively, the latter bolted to the end plates

1 and 2. To rotate the screen the latter is provided with suitable driving means such as the driving pulley 15 fixedly secured on one of the journal members such as 14.

The roller supporting plates 12 may be supported in any suitable manner but are herein fixed on a hollow, central, cylindrical member 16 which forms a fixed hollow core extending the entire length of the screen and is fastened non-rotatably at opposite ends of the screen upon the fixed supports 17 and 18.

In the described form of screen the stock is preferably delivered to the screening surface under a certain amount of impact, such for example as would arise from dropping it on the screen. Herein the stock enters from any suitable source of supply and under a suitable head or pressure through a stock inlet passage. One end of the hollow, central core or pipe 16 is herein utilized for the inlet, a stock inlet chamber 20 (Fig. 1) being formed at the end of the pipe and closed by the plug or partition wall 21 located part way along the pipe. This chamber 20 is provided with a lateral feed delivery opening 22 (Figs. 1 and 3) located near the descending side of the drum, the direction of rotation being right-handed as viewed in Fig. 3 and as indicated by the arrow therein. Although it might extend for a greater length than shown, for reasons hereinafter referred to, the delivery opening 22 extends for a relatively short portion only of the length of the drum.

The stock entering the chamber 20 flows out the opening 22 on a plate 23 and thence over a curved, deflecting plate 24 (Figs. 3 and 4), from which it drops into an underlying pocket of the drum and charges such pocket with a quantity of the stock for a distance equal to the length of the delivery opening 22. As the drum rotates the charged pocket will pass out of the range of the delivery plate 24, the next pocket will then receive its charge, and so on, as the successive pockets are presented in turn to the delivery.

The stock being delivered to the descending pocket at one side of the axis of rotation, its impact and weight assist in turning the drum. The impact of the stock on the screening surface is particularly effective in securing an efficient screening action, and especially so in the described form of screen where it is immediately followed by an agitation of the stock within the pocket. Such agitation might be obtained by any movement of the screening surface, but in the described form of screen is secured specifically by the rotation of the drum. It is further intensified by the provision and shape of the pockets, the stock tending first to strike the undermost partition wall and slide down the same to the bottom of the pocket as the wall approaches a vertical position, thence to slide along the flat bottom of the pocket as the latter starts to ascend, thence flowing radially inward on the opposite wall of the pocket as the latter approaches a horizontal position, finally dropping off the edge of said side wall when the elevation and inclination of the latter become sufficient.

The impact of the stock against the descending pocket wall is facilitated by the curved, deflecting plate 24 which accelerates the movement of the stock thereat. During the impact and agitation of the stock within the pocket, the screened stock passes off through the screening plates 5 into the underlying tank 25 and thence out through any suitable outlet 26 (Fig. 6). The tailings or residue are automatically removed from the pockets of the screen, this, in the illustrated form of screen, being secured by the gravitation of the tailings from the pockets as the latter ascend during the rotation of the screen. As the pockets ascend the unscreened residue tends to drop out unassisted, although overhead shower pipes may be employed to assist this movement if desired.

In the illustrated form of screen, following the described screening operation, the unscreened residue is then again rescreened and preferably subjected to impact and agitation similar to that described in the first screening, such rescreening being repeated as many times as required.

In the described embodiment of the invention, the tailings are applied to a second screening surface by utilizing the gravity or head produced by dropping the tailings out of the ascending pockets of the drum to force them to a position where they are again dropped into the descending pockets of the screen drum and herein the descending pockets of the same screen drum, but at an advanced point longitudinally therein.

In the illustrated form of screen the tailings in gravitating out from the pocket are assisted by suitable deflecting devices to flow into the mouth of a passage which leads again to the descending side of the drum, at which point the stock flows into the descending pockets over a deflecting plate similar to the preceding delivery or deflecting plate 24, and forming in effect an extension of the plate 24. The overflowing stock drops into the successive pockets on the descending side of the drum as before, and the same operation is again repeated, an advanced section of the drum being utilized for this rescreening of the tailings.

Referring to the specific details illustrated, the central pipe or core 16 has formed beneath it a semi-cylindrical chamber suitably positioned to form a succession of helical stock supply passages. Referring

more particularly to Figs. 1, 2, 3 and 4, this chamber is formed by a series of castings 30, 30ª, 30ᵇ, etc., having flanged ends which are bolted together so as to form a continuous underlying shell. These castings are of a generally semi-cylindrical shape, being provided at one side with the curved, deflecting plates 24, 24ª, etc., referred to, and at the other side with substantially flat plates or shelves 31, 31ª, etc., which assist in catching the dropping tailings. The cylindrical portion of each casting is provided with the diagonally arranged rib or wall 32, 32ª, etc., which fits close to the bottom wall of the core 16 and divides the semi-annular space between the core and the casting into two parts. The arrangement is such (Figs. 1, 3 and 4) that a helical stock-conveying passage is provided, the mouth stock-entrance end 33 of which is on the ascending side of the drum beneath the dropping tailings and the delivery end 34 of which is on the descending side of the drum and wholly within the next adjacent section or casting. The opening which would correspond to the stock delivery outlet for the first section or casting is permanently closed by the closure plate 23 already referred to.

The sections or castings of the conveyer member are secured to the core or pipe 16 by being bolted to other sections or castings which overlie the said pipe, the overlying sections being provided with suitable deflecting devices for deflecting the dropping tailings, and also with end or partition walls which separate the stock being passed through one section from that being passed through the adjoining section. Such overlying sections comprise each the transverse end walls 40, 40ª—40ᵉ, and 41, 41ª—41ᵉ, each of which has bottom flanges bolted to adjacent flanges on the underlying sections. Joining the end walls 40 and 41 of each section is a deflecting plate 42 adapted to deflect back to the entrance opening 33 of the tailings conveyer passage any stock which is carried beyond the uppermost position of the pocket. These is also provided the longitudinal, curved, connecting plate 43 which prevents any of such rejected stock from flowing back on the ascending pockets. The space above the underlying conveyer sections and between their end walls 40 and 41 is unobstructed except by the deflecting plate 42 and the retaining plate 43.

It will thus be seen that the tailings as they drop out of the pocket over any one section gravitate down toward the entrance 33 to the conveyer passage and flow under the influence of their head through the helical passage underneath the pipe and up out of the discharge opening 34 of the next adjacent section over the deflector plate 24 and into the succession of pockets on the next adjoining portion of the drum. These tailings are then carried around, rescreened, and the unscreened residue again discharged on the discharge side of the drum, being then similarly conveyed to the next adjacent section, and so on, progressively, through the drum and through a succession of screening operations. The arrangement of the successive sections of the conveyer, with the exception of the last section (hereinafter referred to), is substantially the same except that the length of the screening sections may, as shown, diminish toward the end, this for the reason that a portion only of the stock is rejected at each screening and only a fraction of the original stock reaches the end. The capacity of each section is therefore shown reduced for successive stages.

Preferably the tailings or thickened residue from each screening are thinned down before being subjected to the next screening. While this may be accomplished by various means, herein it is done by spraying the tailings with white water, the latter being directed upon them by means of a shower pipe 50 as they are discharged from the ascending pockets and entering the helical conveyer.

The shower pipe 50 extends lengthwise through and within the screening drum and is provided with one or more openings 51 through which the white water may be discharged upon the tailings. Herein the openings are arranged laterally, the water being discharged against a plate 52 (Fig. 3) by which it is deflected downwardly upon the descending tailings, commingling with them and thinning them down so that the rescreening operation becomes more effective. The discharge of white water from the pipe is effective upon the tailings delivered at each stage, except the last, so that the rescreening is performed in each instance with the thinned down residue.

Referring to the details of the shower pipe 50, the latter is supported at the inlet end of the screen upon a bracket 53 clamped to the end wall 40 of the overlying conveyer section and at the opposite end to a similar bracket 54 clamped to the end wall 41ᵉ. The white water is introduced into the pipe 50 through a T connection 55 near the discharge end of the drum, such T having the depending pipe connection 56. The pipe 56 communicates with a water chamber 57 in the lower part of the central, hollow core 16 at which point the latter is separated into upper and lower chambers by the partition wall 58 (Figs. 2 and 5). The water chamber 57 is closed at its inner end by means of the plug or partition wall 59, but at its outer end communicates with a chamber in the casting 60 which has the supply pipe 61 connected to any suitable source of white water.

In order to provide a ready means of

cleaning the shower pipe 50, the latter has at each end a plug 62 between which and the inner face of the rotating end plate of the screen there is a slight clearance. Each plug is provided with a small opening 63 which in one position of the screen may be brought into registration with a removable plug 64 in the end plate. By removing the plugs 64 access can be had to the shower pipe for cleaning the same. The normal leakage of the water through the opening 63 is unimportant.

When the rescreened residue reaches the last section or compartment, as the tailings are discharged from the descending pockets they are deflected into a discharge passage 70 (Figs. 2 and 5) and conveyed by the outlet spout 71 to any suitable tank or receptacle. The passage 70 is formed in the upper part of the pipe 16 by means of the partition wall 58 referred to. For the delivery of the tailings the last overlying conveyer section is formed as shown in Fig. 5, wherein it will be seen that the deflector plate $42^f$ has a corresponding and oppositely directed plate 72, the two plates being so located and arranged that the dropped tailings are conducted down into the chamber 70 around and about the water pipe 56 which extends up through the end of said chamber. The retaining plate $43^f$ covers the space between the deflector 72 and the flat plate $31^f$ so that all the final tailings are deposited in the hopper-like receptacle presented by the deflector plates $42^f$ and 72.

Referring to Fig. 4, it will be seen that the several underlying conveyer sections are provided with small, rectangular, flat plates 35, $35^a$, etc. These extend to the edge of the rib 32 in each case and prevent the tailings which are dropped in one compartment from entering the supply passage leading to the same compartment. Similar plate 36, $36^a$, are provide to overlie the ribs at the discharge ends of the several passages to prevent the stock fed to the descending side of the drum in one compartment from entering the supply passage for the next adjacent compartment.

It has been found that repeatedly screening the same stock gives a somewhat different grade of stock for successive screenings. If it is desired to grade the stock according to the screenings, the tank 25 may be provided with transverse partition walls to separate the stock screened in one compartment from that screened in another, and transverse partition walls may also be provided within the screen drum itself to separate the stock in one portion of a pocket from the stock being rescreened in another portion of the same pocket. Such partition walls are not herein shown, however, and for ordinary purposes they are not required in the screen drum since the screening of the stock is so rapid that the stock in the different portions of the same pocket tends to keep separated.

Perforations of progressively decreasing size in the screen plates might also be availed of as the stock passes through successive screening stages in the drum, but for ordinary purposes the plates may be the same as regards size of perforations in the different portions of the drum.

It will be observed that in the described form of machine the stock entering one end of the screen drum is delivered to the screening surface under impact, is agitated thereon and withdrawn therefrom. In a thinned down condition it is then subjected to a screening under impact and agitation, this being followed if desired by as many successive screenings as may be required.

It will be observed that the bearings for the screen drum are open or exposed and accessible. Nevertheless, such provision is made that no oil from the bearings can leak out and mingle with either the screened or the unscreened stock, and provision is also made so that the unscreened stock or the waste cannot mingle with the screened stock, this being accomplished without the necessity of packings. This end is attained by a system of coöperating, deflecting rings as follows: Unscreened stock which tends to work toward the joint between the core 16 and the drum head tends to be caught upon the circumferential shelf 80, whence it overflows into an annular channel formed by the disk-shaped plate 81 secured to the core and, gravitating to the bottom of that plate, flows back over the edge of the channel into the screen drum. Such of the unscreened stock as may pass this barrier enters a chamber 82 between the bearing plate 12, but is prevented from entering the bearings by radial drain openings 83 in the chamber through which the stock gravitates into a position outside of the screened stock tank 25. Both unscreened stock and any oil which may drop through the drain openings 83 is prevented from entering the screened stock tank by means of the bell-shaped deflector 84, as well as the conical shield 85. The latter also serves to throw back into the tank for the screened stock any stock which may drop on the shield near the top thereof after having been carried up by the screen drum itself.

While for purposes of illustration I have herein shown and described one specific embodiment of the invention, it is to be understood that the same is submitted for illustrative purposes only and that extensive deviations may be made from the specific construction shown, the form and relative arrangement of parts and the specific application made of the invention, all without departing from the spirit thereof.

Claims.

1. A pulp screen for screening paper stock in stages comprising a screen drum, a central, cylindrical, fixed core having a semi-cylindrical chamber beneath the same, end heads for the drum journaled about said core, means for rotating the drum, a stock inlet passage entering the drum through one end of the core and having a lateral feed delivery opening extending for a portion only of the length of the drum and adapted to deliver stock therefrom on the descending side of the drum, stock lifting plates secured to the interior of the drum, the stock being screened and the unscreened residue lifted and dropped by said lifting blades on the ascending movement of the latter, means for diluting the thickened residue, means for rescreening the latter including conveying means comprising a passage arranged helically around and beneath the core in said semi-cylindrical chamber and having an entrance to receive the diluted tailings from the preceding screening, together with deflecting walls to deflect tailings thereto and having an exit opening at a point axially advanced lengthwise the drum from which the diluted tailings are delivered again to the descending side of the drum, thereby to subject them to a repetition of the screening and discharging action, means for successively and progressively repeating the described dilution and rescreening as required, and means for withdrawing the final tailings.

2. A pulp screen for screening paper stock in stages comprising a polygonal screen drum having flat, perforated blades forming the body or shell thereof, means for rotating the drum, means for delivering stock under impact to a screening surface thereof, said means comprising the stock inlet passage entering the drum and having a lateral feed delivery opening located near one end thereof but extending for a portion only of the length of the drum and adapted to deliver stock therefrom on the descending side of the drum, perforated lifting blades secured to the interior of the drum and co-operating with the shell of the drum to form a series of internal pockets adapted to agitate and screen the stock during the rotation of the drum, the unscreened residue being dropped out of the pockets on the ascending movement of the latter, means for diluting the thickened residue, means for rescreening the diluted residue including conveying means, comprising a passage arranged in a helical path and having an entrance to receive the diluted residue from the preceding screening, and a discharge opening again to deliver the said residue upon the descending side of the drum at a point axially advanced therein, thereby to subject it to a repetition of the screening and discharging action, means for successively repeating the described dilution and rescreening as desired while advancing the stock through the drum, and means for discharging the final tailings.

3. A pulp screen comprising a drum having stock lifting blades, means for rotating the drum, means for delivering stock to one end thereof whereby the stock is screened and the residue lifted and dropped by the blades on the ascending movement of the latter, means for diluting the thickened residue, means for rescreening the diluted residue including one or more passages arranged in succession in a helical path and having an entrance to receive the diluted tailings from the preceding screening, together with deflecting walls to deflect the tailings therein, and having also a discharge exit opening to deliver said tailings again upon the descending blades of the drum at a point axially advanced therein, thereby to subject it progressively to one or more repetitions of the screening and discharging action, and means to withdraw the final tailings.

4. A rotary screen having stock lifting blades and means for redelivering to the screen the unscreened residue discharged from said blades and subjecting the same to a rescreening action, the same including a conveyer formed in sections and providing one or more passages arranged in a helical path and having an entrance to receive the tailings from the preceding screening, together with deflecting walls to deflect the tailings therein and having also a discharge exit opening again to deliver stock on the descending side of the drum at a point axially advanced therein, thereby to subject it to a repetition of the screening and discharging action, and means for withdrawing the final tailings.

5. A screen comprising a drum, a central, cylindrical, fixed core having a semi-cylindrical chamber beneath the same, means for feeding stock to one end of said drum through said central core, means for advancing the unscreened residue through the drum and rescreening the same by stages comprising one or more passages arranged helically around and beneath the core in said semi-cylindrical chamber having an entrance to receive the tailings from the preceding screening and also a discharge exit opening again to deliver the stock to the drum thereby to subject it to a repetition of the screening action, and means for diluting the unscreened residue prior to the repetition of each screening action.

6. A paper pulp screen having a rotary screen drum, a central, cylindrical core member, means for feeding stock to the drum, means for withdrawing the final tailings therefrom, and means for progressively advancing the unscreened residue through the

drum comprising one or more conveyer passages arranged in a helical path and contained within a chamber adjacent said core.

7. A rotary, polygonal screen having stock lifting blades whereby the stock is screened and the residue lifted and discharged by gravity, and a succession of conveying passages to advance the residue progressively and repeatedly through the drum to subject the same to a succession of rescreening actions, and means to withdraw the final tailings.

8. A paper stock screening apparatus comprising a rotary screen having interior pockets, means for supplying stock to said pockets, means for rotating said member to cause the discharge of the unscreened residue as the pocket ascends, and means for delivering said unscreened residue again to the descending pocket of a rotary screening member.

9. In a paper pulp screening apparatus, comprising a rotary screen drum, containing inwardly projecting lifting walls, means to feed stock to said drum, the unscreened residue being lifted and discharged from the walls through the rotation of the drum, and means to subject the residue to a similar screening and lifting action.

10. In a paper pulp screening apparatus, the combination with a rotary screen drum containing inwardly projecting lifting walls, means to feed stock to the drum, the unscreened residue being lifted and discharged from the walls through the rotation of the drum, and means to subject the residue to a succession of similar screening and lifting actions.

11. The combination with a rotary screen drum containing inwardly projecting lifting walls, means to feed stock to said drum, the unscreened residue being lifted and discharged from the walls through the rotation of the drum, means to dilute the residue, means to cause the diluted residue to gravitate again upon the walls of the screen drum and to be subjected again to a similar screening and lifting action whereby the unscreened residue is advanced progressively through the drum.

12. In a paper screening apparatus, the combination with a rotary screening drum provided with foraminous lifting blades, stock delivery means for delivering stock upon said blades, the same being screened, lifted and the residue dropped by the rotation of the drum, means for diluting the residue, delivery means to deliver the diluted residue again to the drum at a point advanced lengthwise the same to provide for a repetition of the screening and lifting operation and subject the unscreened residue to a repetition of said screening, lifting and diluting actions.

13. A rotary screen drum provided with foraminous lifting blades, means to deliver stock to the same, the same being screened, lifted and the residue dropped by the rotation of the drum, delivery means to convey and drop the diluted residue again upon the drum and the blades at a point advanced lengthwise the same to provide for a succession of repetitions of said screening, lifting and diluting actions.

14. A rotary screen drum having stock lifting blades, means for feeding stock to one end of said drum, the stock so fed being screened and the residue lifted and discharged by said blades, and means to deliver the unscreened residue discharged from said blades again to the said blades at an advanced point in said drum.

15. A rotary screen drum having stock lifting blades, means for feeding stock to one end of said drum, the stock so fed being screened and the residue lifted and discharged by said blades, and means again to deliver the unscreened residue discharged from said blades to the drum at an advanced point lengthwise the same and subjecting said residue to a further screening and lifting action.

16. A rotary screen drum having stock lifting blades, means for feeding stock thereto, said stock being screened and the residue being screened, lifted and dropped through the rotation of the drum, means to dilute the residue, and conveying means to convey the same to another position lengthwise the drum, and a repetition of the screening and lifting action.

17. A rotary screen drum having stock lifting blades, means for feeding stock thereto, said stock being screened and the residue lifted and discharged by said blades, means within said drum for diluting the said residue, and means for rescreening and lifting the diluted residue.

18. A rotary screen drum having lifting blades, means to deliver stock within said drum on the descending side thereof, the stock being screened and the residue lifted and discharged from said blades, and means to convey the residue to said drum again on the descending side thereof.

19. A rotary screen drum having stock lifting blades, means to deliver stock within the drum on the descending side thereof, the stock being screened and the residue lifted and discharged by said blades through the rotation of the drum, means to dilute the unscreened residue, and conveying means to convey the diluted residue to a point lengthwise advanced on the drum and drop the same again on the descending side thereof.

20. A pulp screen for screening paper stock comprising a polygonal screen drum having flat, perforated walls forming the body or shell thereof, and stock lifting plates within the drum, a central, fixed, cylindrical

core, end heads for the drum by which the same is journaled upon said fixed core, and means for delivering stock into the drum through said core.

21. A pulp screen for screening paper stock comprising a polygonal screen drum having flat, perforated walls forming the body or shell thereof, stock lifting plates within the drum, a central, fixed, cylindrical core, end heads for the drum by which the same is journaled upon said fixed core, means for delivering stock into the drum through said core, and means for withdrawing the tailings from the opposite end of the drum also through said core.

22. A rotary screen drum having a central, cylindrical, fixed core, drum heads at opposite ends of the drum, journal bearings for said drum heads, and stock feeding means within the core.

23. A rotary screen having foraminous stock lifting blades forming interior pockets within the same, means for delivering stock within said drum, a head at each opposite end of the drum, and journaled bearing on which said heads are mounted.

24. A rotary screen having means for delivering stock within the same at one side of the axis thereof, and a curved deflecting plate to accelerate the delivery of the stock thereto.

25. A rotary screen having interior stock lifting blades, means for rotating the screen, means to deliver stock to the descending side of the screen, and a curved deflecting plate to accelerate the delivery of the stock thereto.

26. A rotary screen drum having an end head at each end, journal bearings upon which said heads are mounted rotatably to support the drum, a pulp supply inlet entering said drum through the bearing at one end, a tailings discharge passage through the bearing at the opposite end, and a shower water discharge device also within the drum.

27. A rotary screen drum having end heads, journal bearings upon which said heads are journaled rotatably to support the drum, a hollow member extending into the drum through one of said bearings and containing a tailings discharge passage and a white water discharge device also within the drum and communicating with a source of supply also in said hollow member.

28. A rotary screen drum having a shower pipe fixed within the same, means for supplying shower water thereto, end heads for said drum, said shower pipe having an open end located in close proximity to the walls of one of said heads, and a cleaning opening in said head adapted to be brought into registration with the end of said pipe.

29. In a device of the class described, the combination with a rotary screen drum of open journal bearings for said drum, a screened stock outlet, and deflector plates to prevent the entrance of oil from the bearing into the screened stock.

30. In a device of the class described, the combination with a rotary screen drum, a fixed bearing member around which said drum rotates, leaving a joint between the drum and the fixed bearing member exposed to the interior of the screen, and deflector plates to prevent the exit of unscreened stock through the joint between said drum and said fixed member.

31. In an apparatus of the class described, the combination with a rotary screen drum of a fixed member about which said drum rotates, deflector plates to prevent the exit of the unscreened stock from the joint between said drum and said fixed member, means to withdraw the stock facing said deflecting plates, and means to deflect the conveyed stock away from the screened stock outlet.

32. In a pulp screen, the combination of a screen drum, a stock inlet, means for utilizing the head of the stock to turn the drum, and means for again applying the unscreened residue to the screen and utilizing the same to assist in turning the drum.

33. In a pulp screen the combination with a rotary screen drum of a stock inlet, means for repeatedly directing the stock against the drum to utilize the head thereof to turn the drum.

34. In a pulp screen, the combination with a rotary screen drum of a stock inlet and means for applying the stock and again the unscreened residue to the drum at one side of the axis of rotation thereof to exert a rotary impelling effect upon the drum.

35. In a pulp screen, the combination with a rotary screen, a pulp inlet, means to dilute the unscreened residue and means to apply the diluted residue again to the screen at a point to exert a rotary impelling effect upon the screen.

36. A pulp paper screening apparatus comprising a rotary screening surface having pockets thereon, means to feed stock to said surface whereby said stock is lifted, screened and discharged, a further rotary screening surface also provided with pockets to which the discharged residue is delivered, and means for repeating the screening and lifting operation.

37. A rotary screening drum having pockets, means for delivering stock to said pockets whereby the stock is agitated, lifted and discharged, and means to receive the discharged residue and divert it to pockets in a different part of said screen for a repetition of the screening operation.

38. A pulp screen for screening paper stock in stages, comprising a screen drum, stock lifting walls secured to the interior of the drum, means for rotating the drum

whereby the stock is screened and the unscreened residue lifted and dropped by said lifting walls, means for diluting the thickened residue, means for rescreening the latter, including means to receive the discharged residue and divert and deliver it to pockets in said drum at a more advanced point therein for a repetition of the screening and discharging action, and means for progressively repeating the described dilution and rescreening as required.

39. A pulp screen for screening paper stock in stages, comprising a screen drum, stock lifting walls secured to the interior of the drum, means for rotating the drum whereby the stock is screened and the unscreened residue lifted and dropped by said lifting walls, means for rescreening the thickened residue, including means to receive the discharged residue and divert and deliver it to pockets in said drum at a more advanced point therein for a repetition of the screening and discharging action, and means for progressively repeating the described dilution and rescreening as required.

40. A pulp screen for screening paper stock in stages, comprising a screen drum, stock lifting walls secured to the interior of the drum, means for rotating the drum whereby the stock is screened and the unscreened residue lifted and dropped by said lifting walls, means for diluting the thickened residue, means for rescreening the latter, and means for progressively repeating the described dilution and rescreening as required.

41. A pulp screen for screening paper stock in stages, comprising a screen drum, stock lifting walls secured to the interior of the drum, means for rotating the drum whereby the stock is screened and the unscreened residue lifted and dropped by said lifting walls, means for diluting the thickened residue, and means for rescreening the latter, including means to receive the discharged residue and divert and deliver it to pockets in said drum at a more advanced point therein for a repetition of the screening and discharging action.

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

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PAPER MACHINE.

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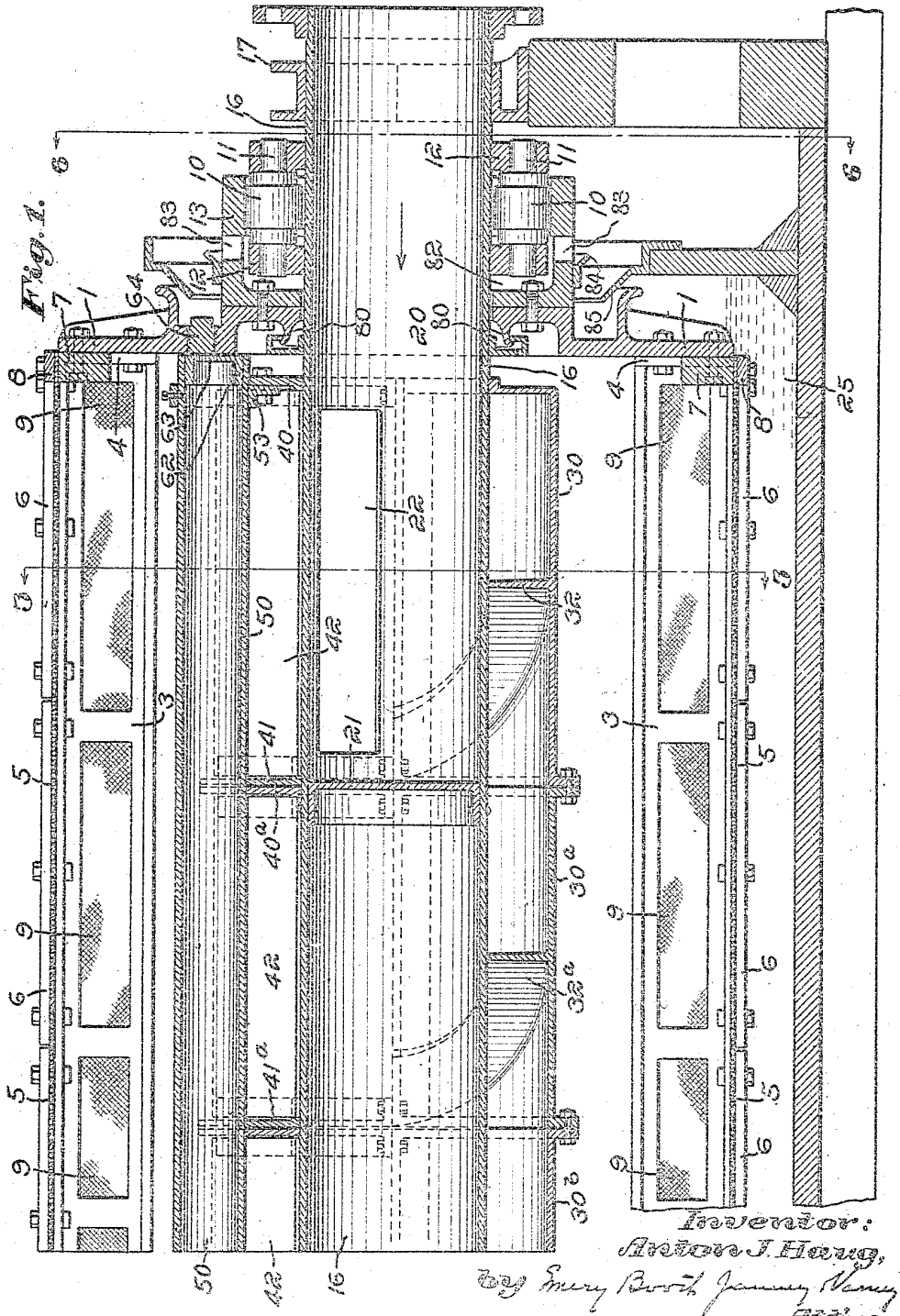
4 SHEETS—SHEET 1.

Fig. 1.



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4 SHEETS—SHEET 2.

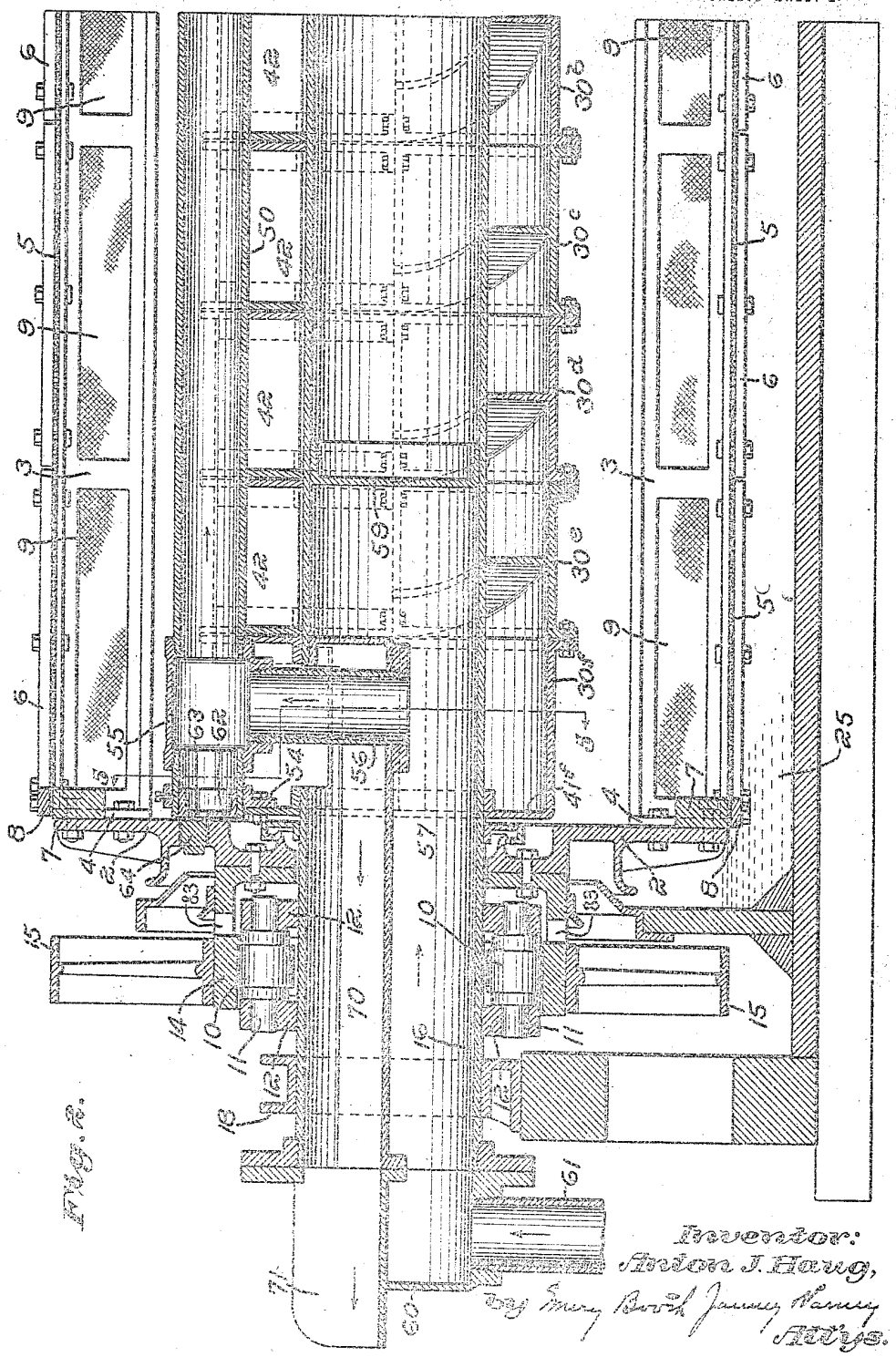

Fig. 2.

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Fig. 4.

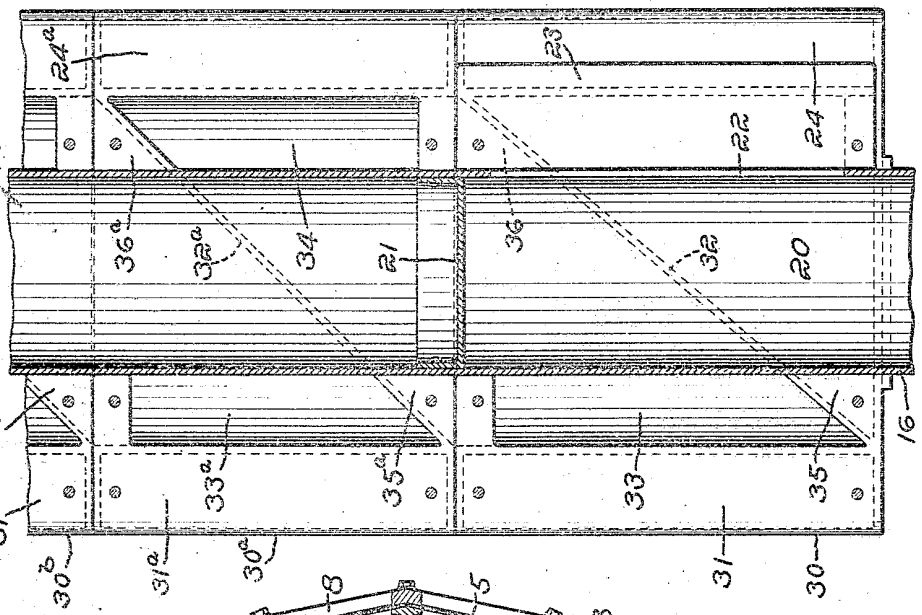


Fig. 5.

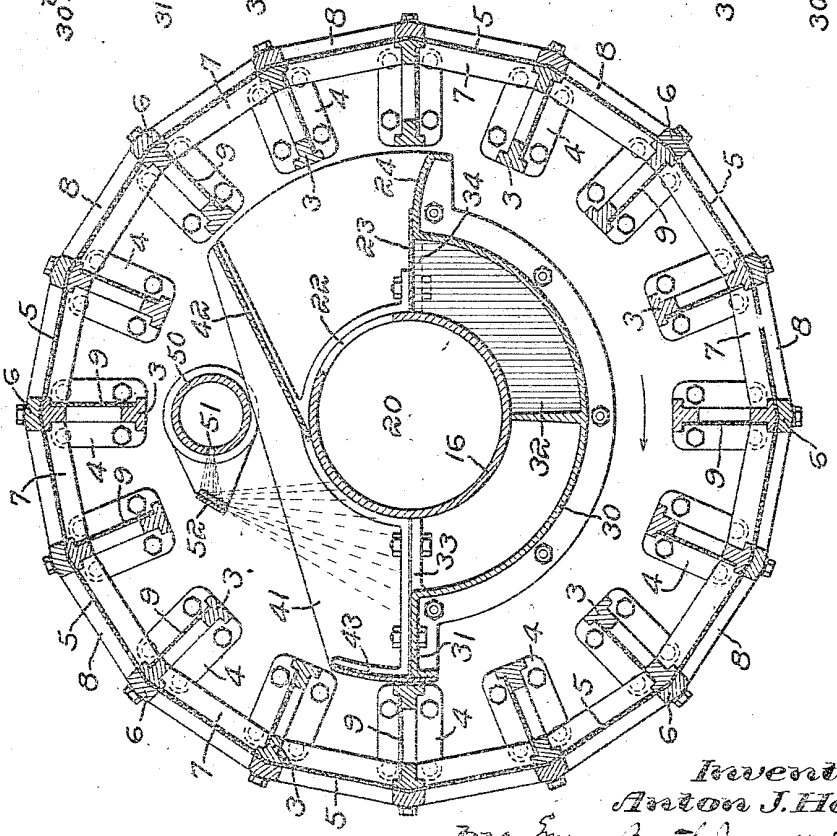


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Fig. 6.

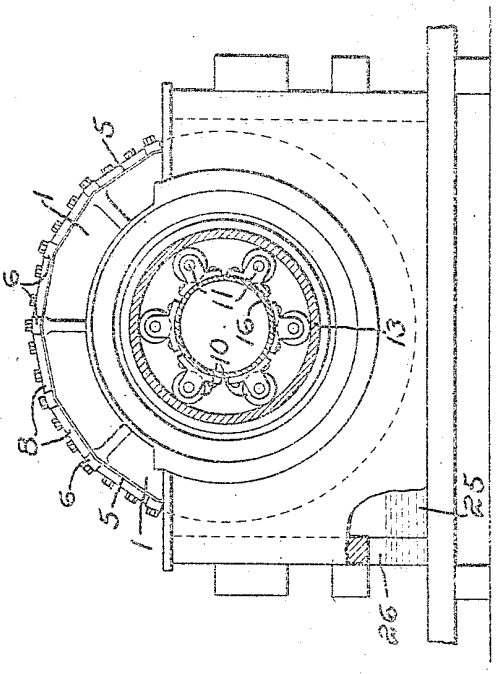
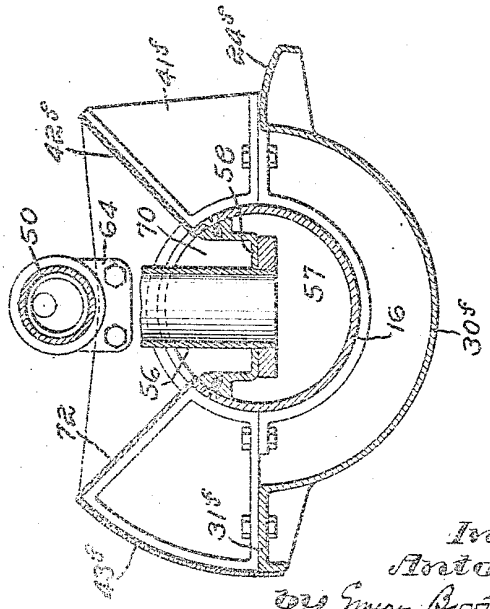



Fig. 5.

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