No. 809,073. PATENTED JAN. 2, 1906.

W. McNAUGHT.

HEAD BOX FOR PAPER MACHINES.

APPLICATION FILED MAY 19, 1905.

2 SHEETS—SHEET 1.

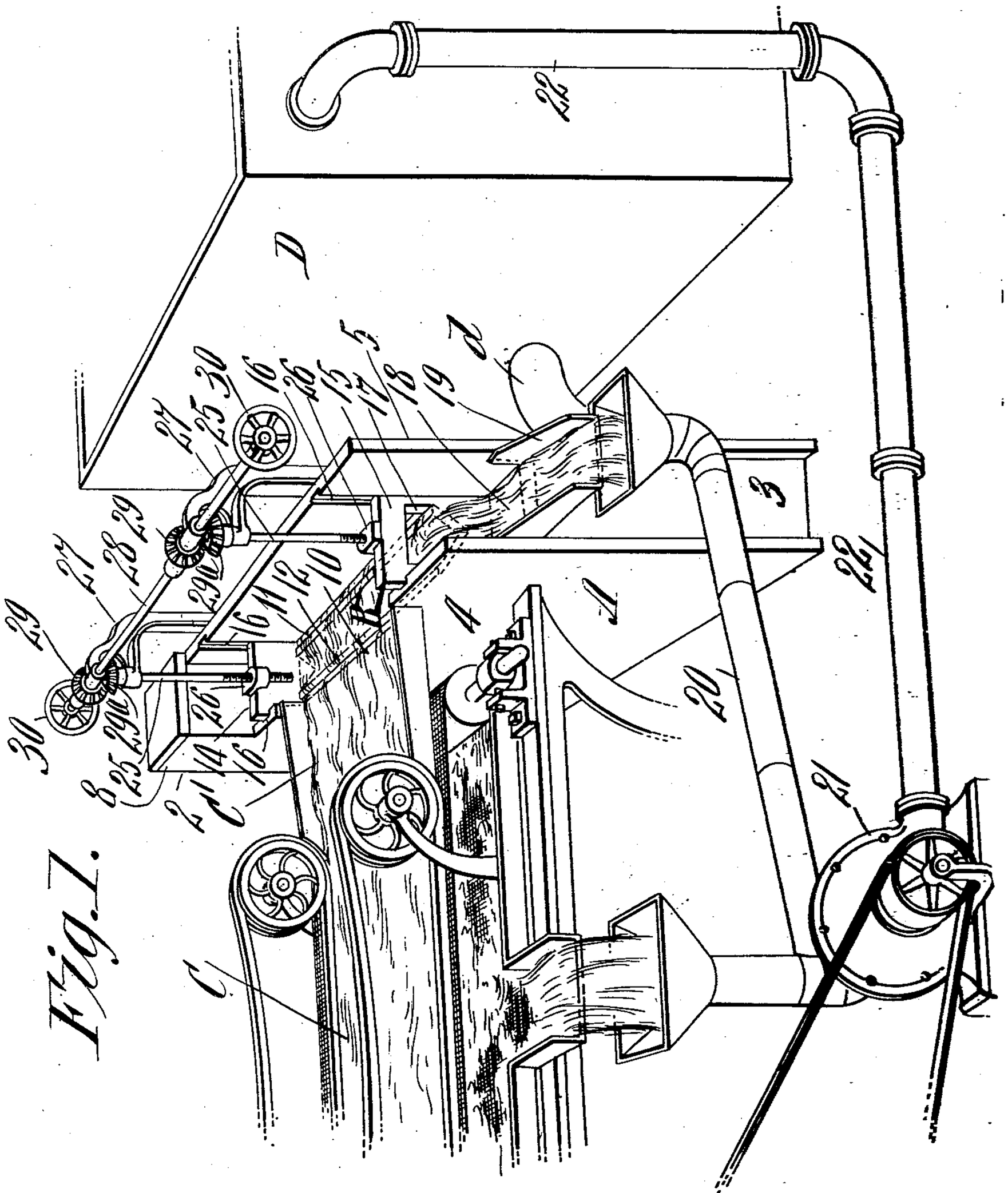

Fig. 1.

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2 SHEETS—SHEET 2.

Fig. 2.

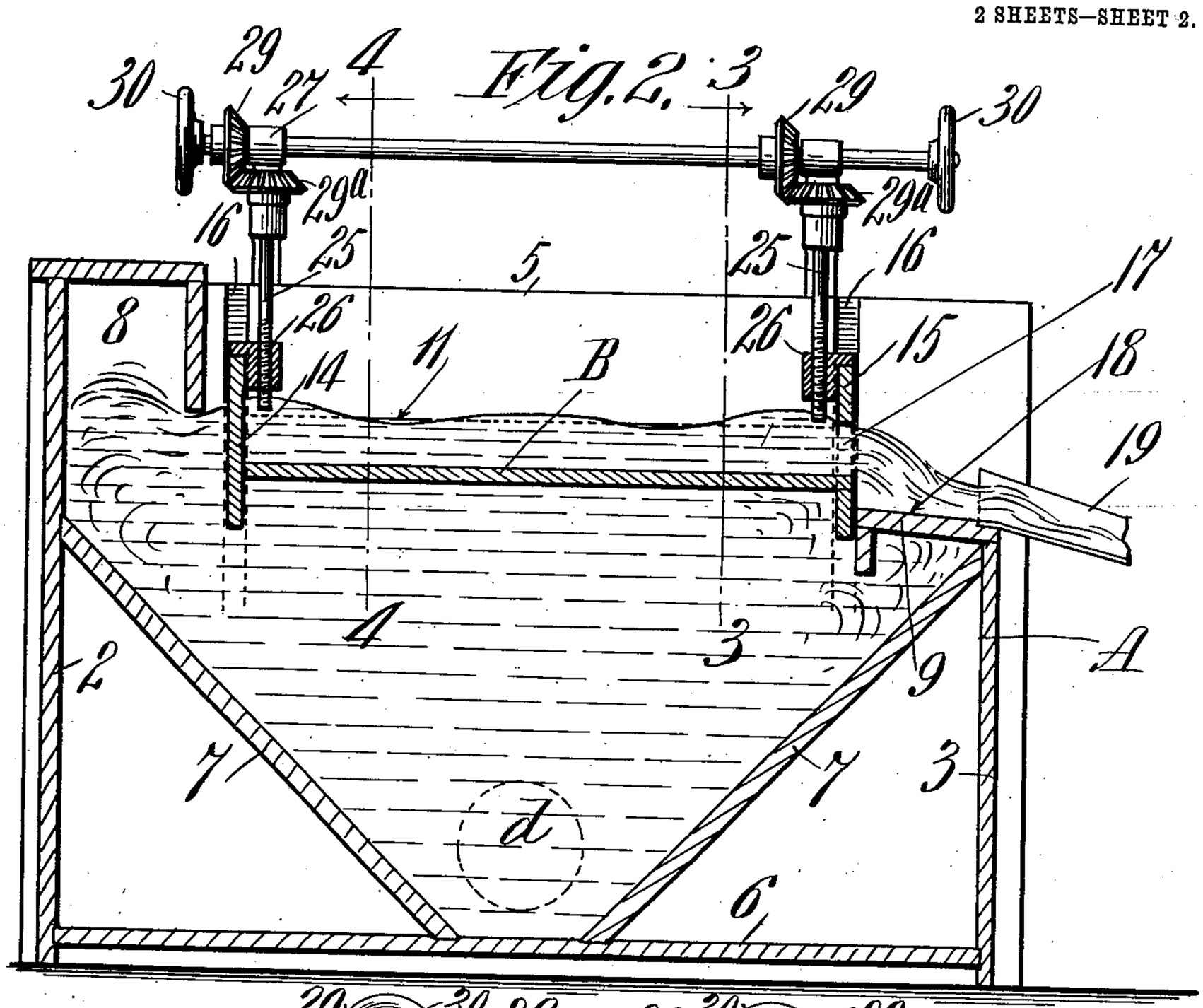


Fig. 3.

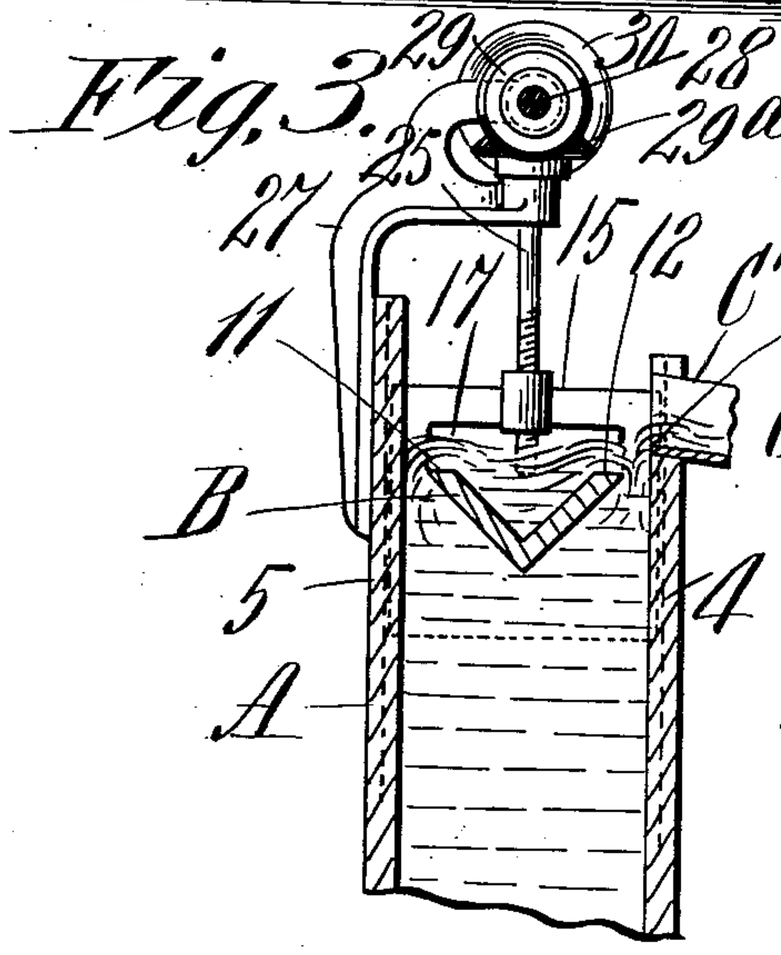
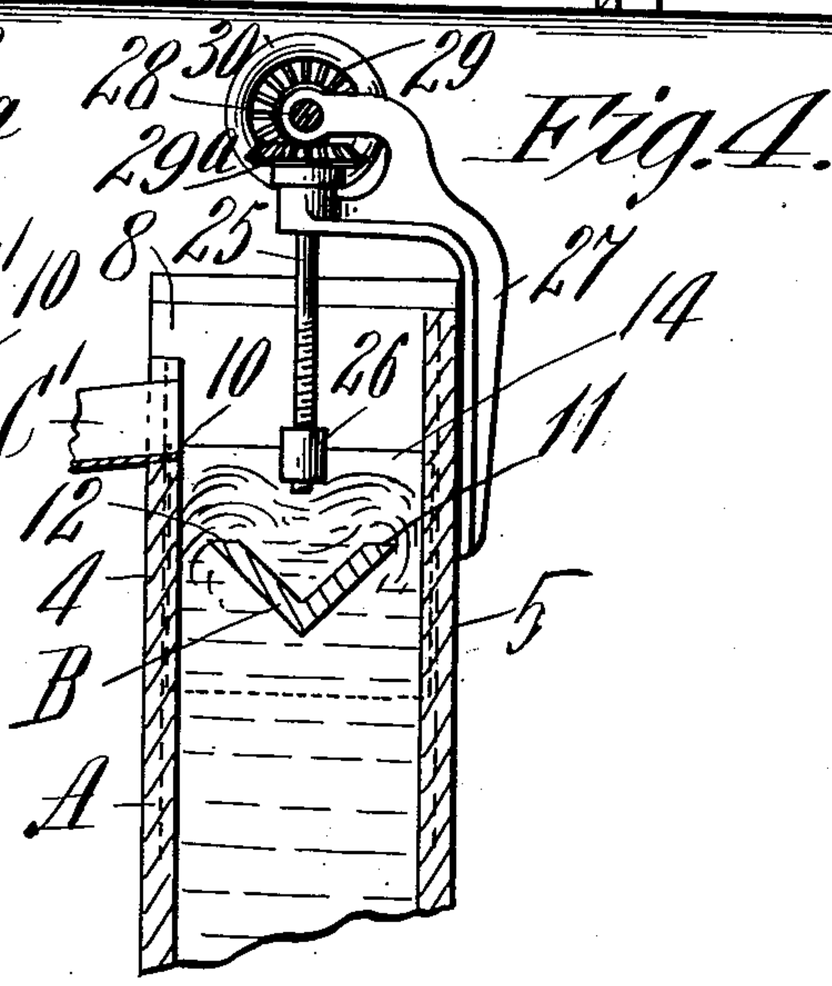


Fig. 4.



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UNITED STATES PATENT OFFICE.

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HEAD-BOX FOR PAPER-MACHINES.

No. 809,073. Specification of Letters Patent. Patented Jan. 2, 1906.

Application filed May 19, 1905. Serial No. 261,266.

To all whom it may concern:

Be it known that I, WILLIAM McNAUGHT, a citizen of the United States of America, and a resident of Holyoke, in the county of Hampden and State of Massachusetts, have invented certain new and useful Improvements in Head-Boxes for Paper-Machines, of which the following is a full, clear, and exact description.

This invention relates to improvements in head-boxes of paper-making machines, an object being to provide in a head-box adjacent the discharge-apron thereof a mechanically-operated flow-regulator and relief device therefor whereby an efficient control of the delivery of the saturated paper-pulp or "stuff" as received from a screen-box or other source of supply is attained.

Another object is to insure an even and uniform flow of the stuff to the paper-making machine, together with quick-operating means for the prevention of damage to the paper web in process of making by the clogging of the screen-box, causing thereby a too meager pulp delivery, or from the subsequent rush and excessive delivery on the clearing of the screen-box.

A further object of the invention in addition to those mentioned is the provision comprised in the delivery-regulating device of an adequate and improved means for quickly stopping all flow of stuff from the head-box to the paper-making machine. This capability of the invention is of great value in emergencies requiring a discontinuance of the flow of pulp to the machine and is an important adjunct to the first-mentioned capabilities of the invention.

The invention consists in the combination and arrangement of parts and the construction of certain of the parts, all substantially as hereinafter fully described, and set forth in the claims.

In the drawings, Figure 1 is a perspective view of a portion of a paper-making machine, the head-box thereof, in which is shown the improved regulator therefor, and a portion of the screen-box, together with coacting appliances therefor. Fig. 2 is a sectional elevation of the head-box as taken lengthwise centrally therethrough, (it being remembered, however, that such line of section while lengthwise of the head-box is transversely the running length of the paper-machine.) Fig. 3 is a cross-sectional view of the head-box, taken on a line 3 3, Fig. 2. Fig. 4 is a similar cross-section taken on line 4 4, Fig. 2, but as looking in an opposite direction from that of Fig. 3.

Similar characters of reference indicate corresponding parts in all of the views.

In the drawings, A represents a form of head-box such as commonly used in connection with Fourdrinier paper-machines and as equipped with the flow-regulating device B, which forms the subject of this invention. In Fig. 1 of the drawings this head-box is illustrated as in its operative position at the wet end of a Fourdrinier paper-making machine C and as connected thereto by the apron C'. A portion of a screen-box D is shown to the rear of the head-box A in this view of the drawings, and its outlet-pipe *d*, which is centrally located in the lower portion thereof, is shown as connecting with the inlet at a low point of the head-box A. (See also dotted lines in Fig. 2.)

The internal construction and arrangement of parts in various forms of head-boxes differ considerably, and this invention is to be considered applicable variously thereto. The head-box shown in the several figures of the drawings is of a well-known type and consists in a box-like casing, usually of wood, having narrow "ends" 2 and 3 (laterally of the machine) and broad rectangular front and rear "sides" 4 and 5, respectively, as they will be respectively termed. A bottom 6 has rising at divergent angles from its middle portion the sloping deflectors 7 7. A surface "steadying-box" 8 is provided at end 2 of the box, and a shallow and somewhat lower positioned steadying-box 9 has a similar surface steadying function at head-box end 3.

The operation of a head-box of the above description as commonly used is as follows: The stuff or pulp from the screen-box D entering the head-box A through pipe *d* is deflected upwardly by the inclined bottom portions 7 7 of the head-box. In practice this passage of the pulp through the head-box is very rapid, and the principal utility of the said head-box is to cause the spreading of the pulp received through the inlet-pipe *d* preparatory to its discharge over the apron C' onto the wire-cloth surface of a paper-machine. The spreading effect of the sloping bottom portions 7 7 on the rapidly-incoming pulp through pipe *d* of the head-box causes a reaction, accompanied by considerable ebullition at the end portions of said box, which is partly counteracted by the steadying effect

thereon of the boxes 8 and 9; but at times when an unusual quantity of pulp from one cause or another comes into the head-box through its inlet a disturbance of the surface of the stuff is caused that by reason of the unequal nature of the overflow onto the apron C′ produced at such times thereby causes (in spite of the usual slice-bars or similar eveners used on paper-machines) uneveness in the web. It also frequently happens that an accumulation of froth on the surface of the pulp within the head-box clogs and interrupts the free overflow therefrom onto the apron C′, and it has heretofore been necessary at such times for a machine-tender to climb to the top of the head-box and to manually clear away such accumulations.

The avoidance of damage to the web of pulp at the early stage of its formation from the above causes and the provision of an efficent means for preserving a perfect control of the pulp under all conditions in its passage through the head-box are assured by the overflow relief-trough B, which is prominently included in the subject-matter of this invention and is illustrated in the various figures of the drawings in its operative position within the head-box. This trough B is preferably V-shaped in cross-section, its lengthwise dimension being somewhat greater than the width of the apron C′ and its greatest transverse dimension less than the width of the head-box. The upper edge portions 11 and 12 of the trough are maintained about at a horizontal plane coincident with that of the edge 10 of apron C′. The trough ends of heads 14 and 15 are rectangular in form, the upper and lower edge portions of which extend somewhat above and below the trough, and the vertical side edge portions of these ends have vertical sliding engagements in vertical grooves 16 16 in the opposite side walls 4 and 5 of the head-box.

The end head 15 of trough B has an outlet-opening 17 formed therein, whereby there may be a pulp discharge from one end of the trough onto the slightly-inclined top board 18 of the low-positioned steadying-box 9. A trough 19, leading from this inclined surface 18, discharges into or is continued by a conduit 20, leading to the pump 21, from which the pulp thus discharged is conveyed back to the screen-box D through conduit 22, thus reclaiming all waste or overflow pulp from the head-box. This pump 21 and conduit 22 may be the same one as ordinarily provided on Fourdrinier machines for reclaiming the waste overflow and screenings from the deckle-inclosed web-forming portion of the machine and may be utilized to perform the additional duty of reclaiming the head-box discharge, although, of course, a separate circulating-pump may be provided in some cases.

A convenient means for vertically raising or lowering the relief-trough B and for maintaining the same in a level position is comprised in the vertical screw-shafts 25, which have engagement with the "nuts" 26, secured on the end heads 14 and 15 of the trough. The upper ends of said screw-rods are supported in stationary brackets 27, said brackets also supporting the horizontal shaft 28, which has the bevel gear-wheel 29 in mesh with the screw-rod bevel gear-wheels 29ª. Hand-wheels 30 on the ends of shaft 28 provide conveniently-accessible means for operating the mechanism described for adjusting the trough B in the head-box.

The operation of the above-described invention is as follows: In the event of the discharge of pulp from the screen-box D to the head-box A being excessive, and thereby causing an oversupply of pulp delivery to the paper-machine C over the apron C′, a slight lowering of the trough B within the head-box A by means of the hand-wheel-operated mechanism results in causing a greater or less portion of the surface pulp to overflow into the V-shaped trough B and thence through the relief-outlet 17 to the reclaiming appliances that connect with the screen-box D. If the supply of pulp as delivered becomes too slow, a slight elevation of the regulating-trough B results in a diminished overflow into the said trough and a corresponding increase of flow over apron C′. On a further diminution of pulp-supply to the head-box A the regulating-trough B may be raised so as to lift its edges 11 and 12 entirely above the surface of the pulp, rendering such trough non-effective on the pulp delivery from the head-box. If it becomes desirable to stop all flow of pulp to the paper-machine, a submerging of the trough B to a level considerably below the level of the apron C, as shown in Fig. 4 of the drawings, causes all of the pulp supplied from the screen-box D to flow into the trough B and from it through the relief-outlet 17 and thence back to the screen-box.

Various changes in forms and arrangements of parts may be made to adapt the apparatus forming the substance of this invention to different situations without departing from this invention, and the same is as well applicable to cylinder-machines as to Fourdrinier machines.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a paper-machine, the combination with a head-box having a pulp-inlet, and a pulp-outlet, and a lower-positioned relief-outlet, of a surface-regulating trough, having end closure heads, and guided for vertical movement within the head-box, and having a discharge-aperture, in one of its end closure-heads, communicating with the head-box relief-outlet, and means for regulating the height of said trough.

2. In a paper-machine, the combination with a head-box having a pulp-inlet, and a pulp-out-

let, and a lower-positioned relief-outlet, of a surface-regulating trough, having end closure-heads and guided for vertical movement within the head-box, and having a discharge-aperture in one of its end closure-heads, communicating with the head-box relief-outlet, means for regulating the position of said trough, and a pump connecting with said relief-outlet and delivering the pulp received therefrom to the rear of the head-box inlet.

3. In a paper-machine, the combination with a head-box having a pulp-inlet, and a pulp-outlet, and a lower-positioned relief-outlet, of a surface-regulating trough, narrower than the width of the head-box, having an opening or openings between it and the adjacent side wall or walls of the head-box, said trough having end closure-heads, guided for vertical movements within the head-box and having a discharge-aperture in one end closure-head, communicating with the head-box relief-outlet, and means for regulating the height of said trough.

4. In a paper-machine, the combination with a head-box having a rear-side pulp-inlet, a front-side pulp-outlet, and a lower-positioned endwise-located relief-outlet, of a surface-regulating trough guided for vertical movement within the head-box and having an opening at one end communicating with the head-box relief-outlet; and means for regulating the vertical position of said trough relatively to the head-box outlet.

5. In a paper-machine, the combination with a head-box having a rear-side pulp-inlet, a front-side pulp-outlet, and a lower-positioned, endwise-located, relief-outlet, of a surface-regulating trough guided for vertical movement within the head-box, and having an opening at one end communicating with the head-box relief-outlet, a pair of vertical screw-shafts engaging end portions of the trough, and having bevel gear-wheels on upper portions thereof, a horizontally-mounted shaft having bevel gear-wheels in mesh with the screw-shaft gears, and means for rotating said horizontal shaft.

6. In a paper-machine, the combination with a head-box having oppositely-paired vertical grooves 16, 16, in the walls thereof, having a pulp-inlet, an apron-provided pulp-outlet, and a lower-positioned relief-outlet, of a surface-regulating trough having end closure-heads which engage and are guided in the said grooves, a discharge-aperture in one end closure-head communicating with the head-box relief-outlet, means connected with said relief-outlet for conveying the pulp passed through said relief-outlet back of the head-box, and means for adjusting the height of the said trough.

7. In a paper-machine, the combination with a screen-box and the head-box forward thereof, and having a rear-side pulp-inlet in connection with the screen-box, a forward-side horizontal overflow-outlet, and an endwise-located relief-outlet opening at a level below the said overflow-outlet, of a V-shaped upwardly-open trough narrower than, and centrally and horizontally positioned within the upper portion of the head-box, with openings between its edges and the front and rear walls of the head-box, and having end heads in guiding engagements with the head-box walls and one of said heads having an opening in communication with the head-box relief-outlet opening, means for imparting vertical adjusting movements to said trough, a pump, a conduit, leading from the said relief-outlet thereto, and a conduit leading therefrom to the screen-box.

Signed by me at Springfield, Massachusetts, in presence of two subscribing witnesses.

WM. McNAUGHT.

Witnesses:
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G. R. DRISCOLL.