No. 787,955. PATENTED APR. 25, 1905.

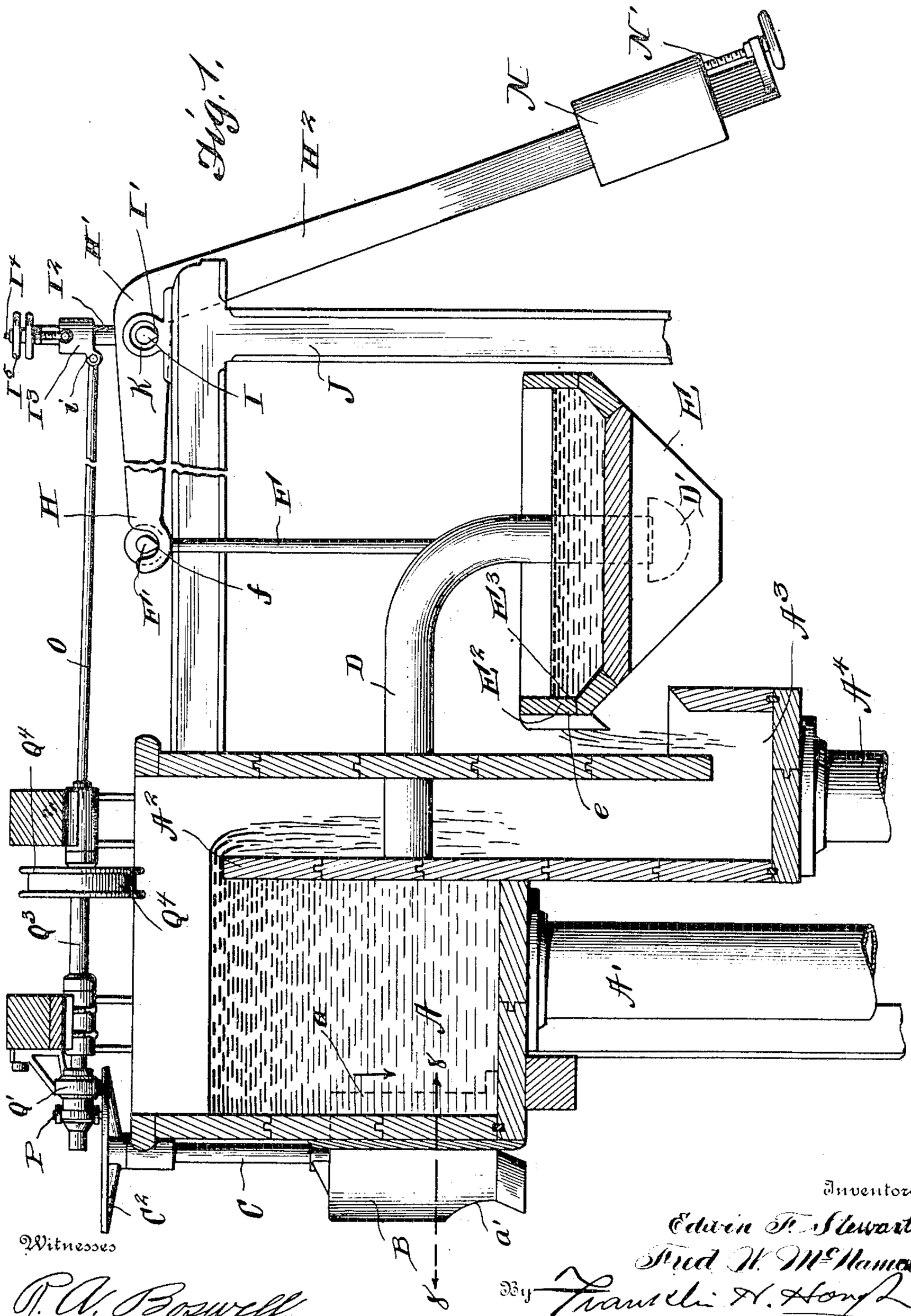
E. F. STEWART & F. W. McNAMARA.

AUTOMATIC STOCK REGULATOR.

APPLICATION FILED OCT. 21, 1904.

4 SHEETS—SHEET 1.

Fig. 1.



Witnesses

P. A. Boswell.

Clara S. Davenport

Inventors

Edwin F. Stewart

Fred W. McNamara

By Franklin H. Hough

Attorney

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Fig. 2.

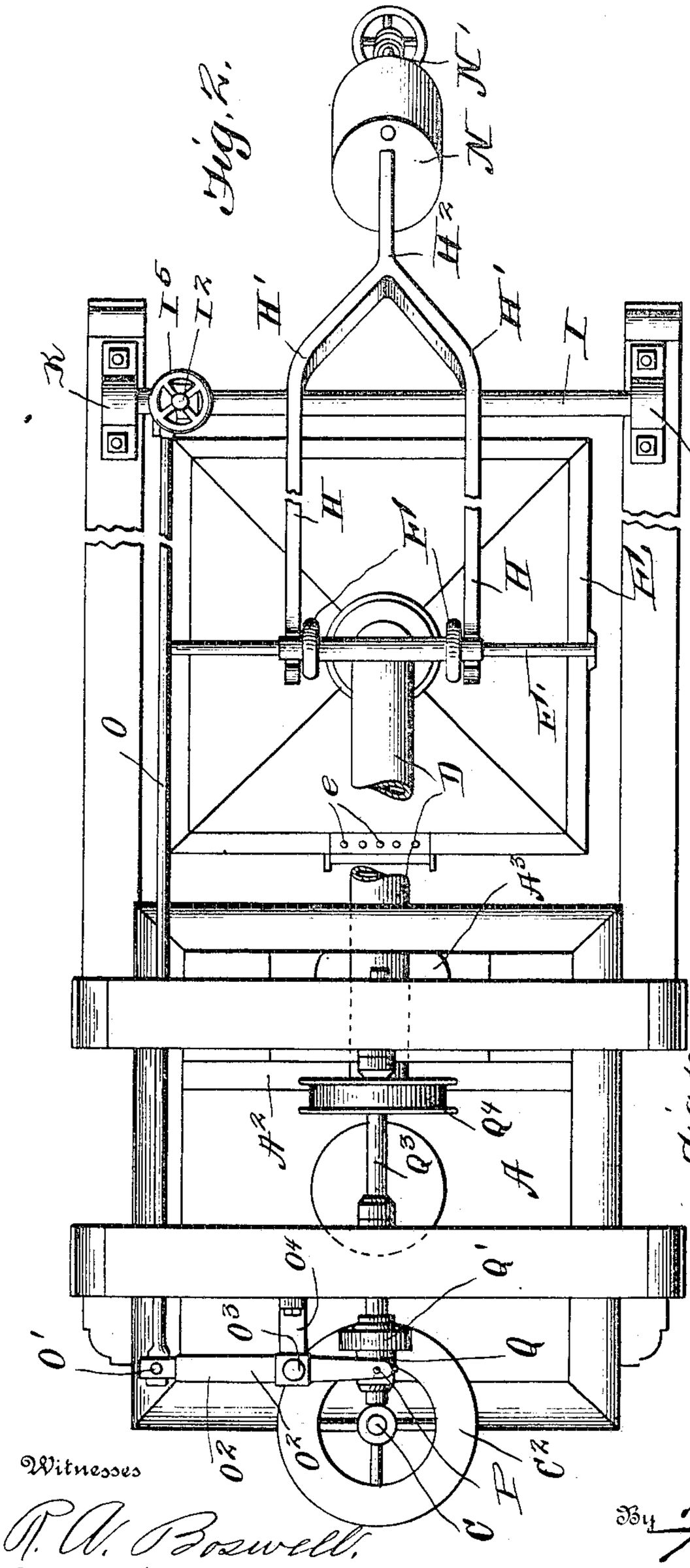


Fig. 11.

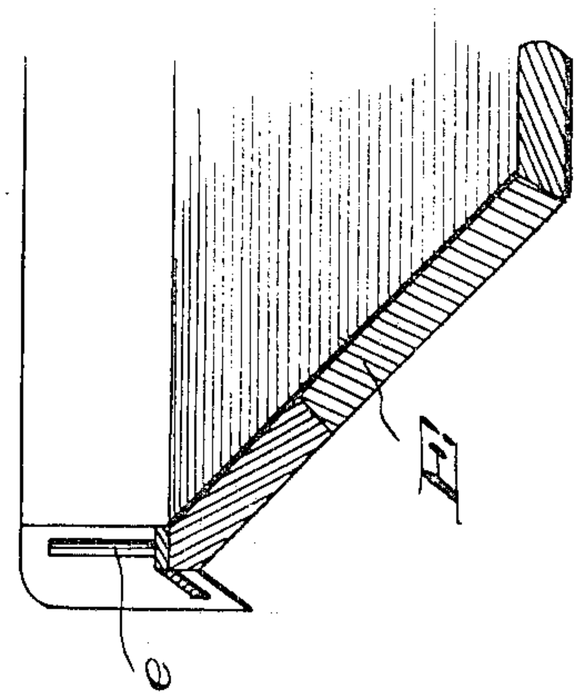
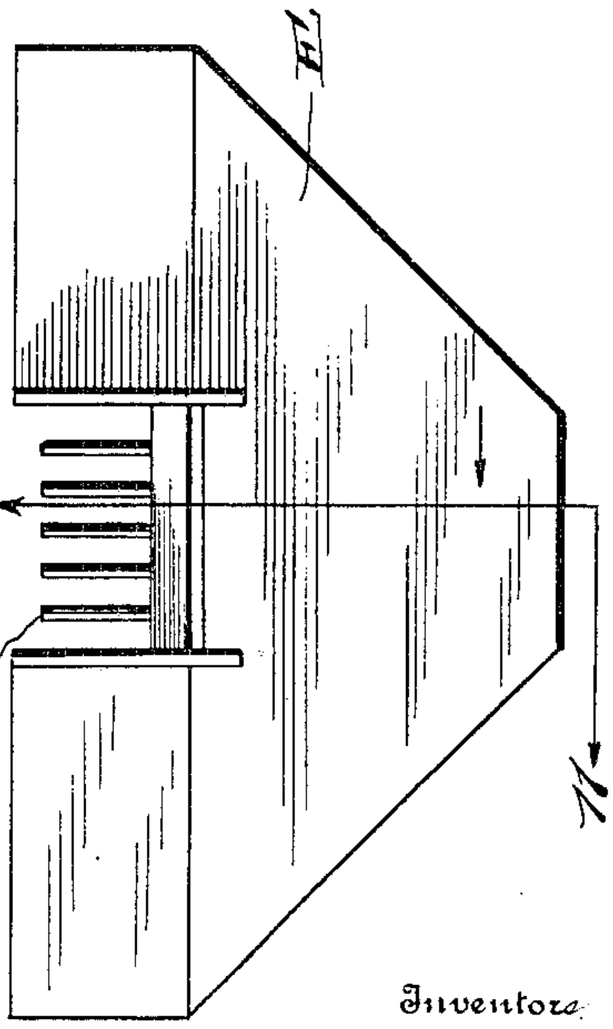


Fig. 10.



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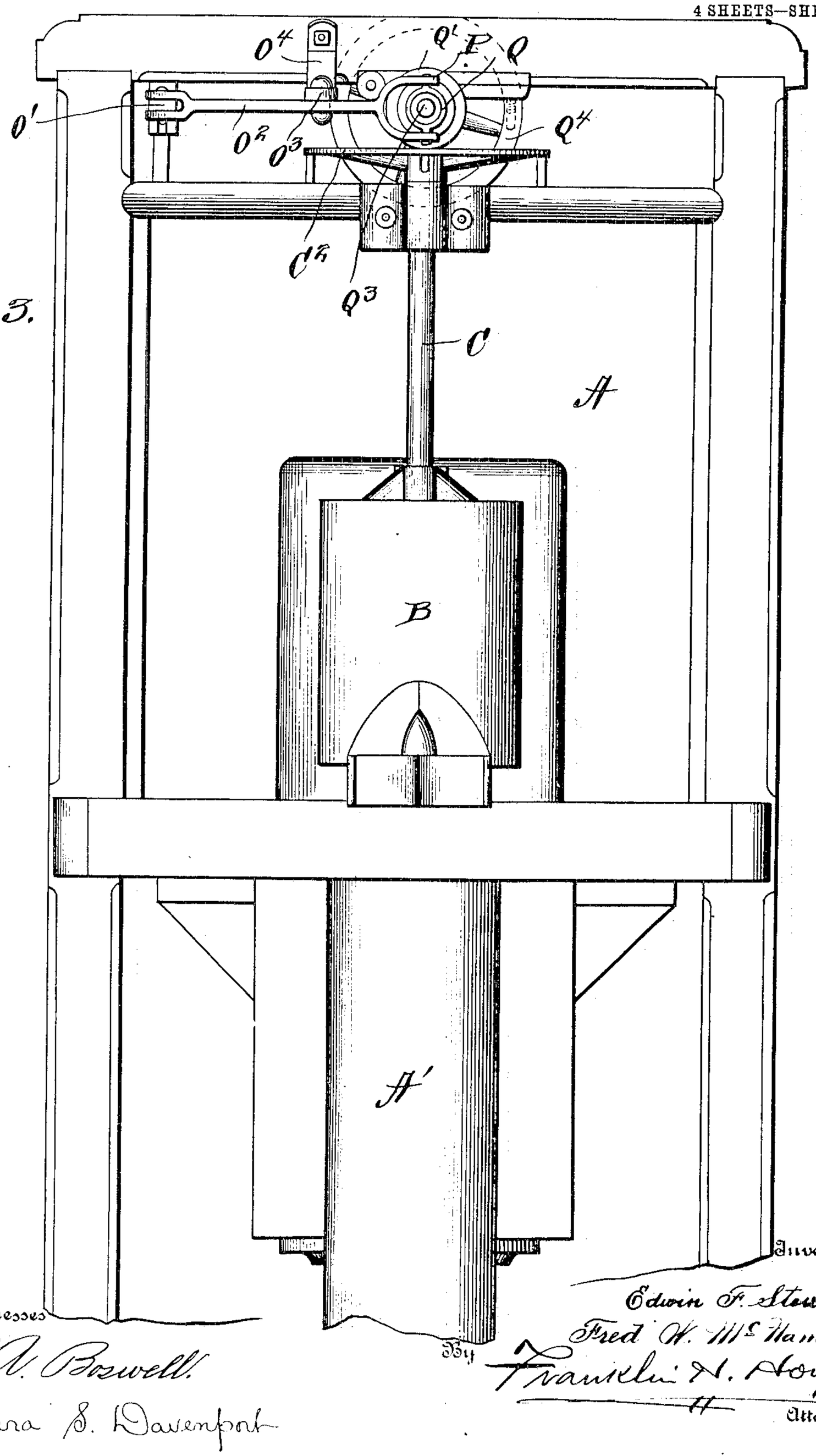
4 SHEETS—SHEET 3.

Fig. 3.



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4 SHEETS—SHEET 4.

Fig. 5.

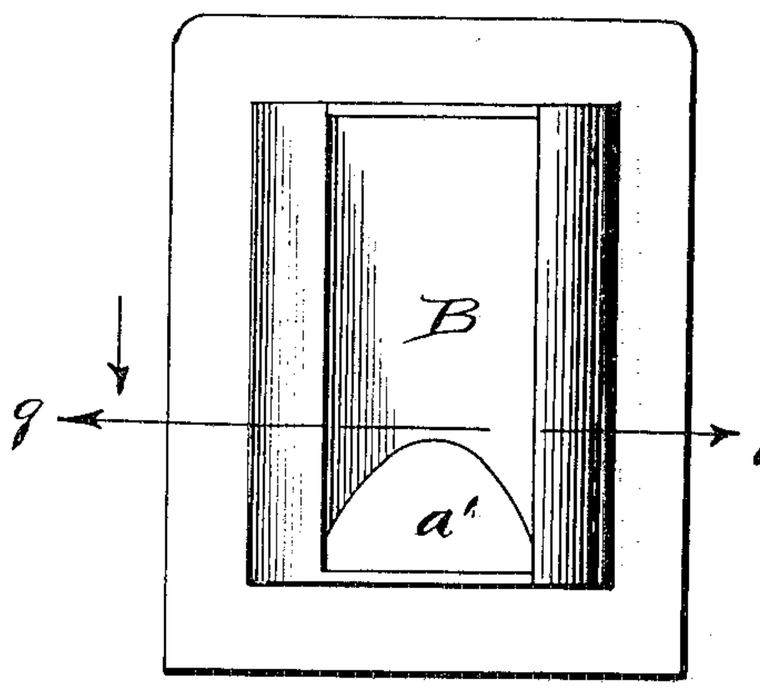


Fig. 4.

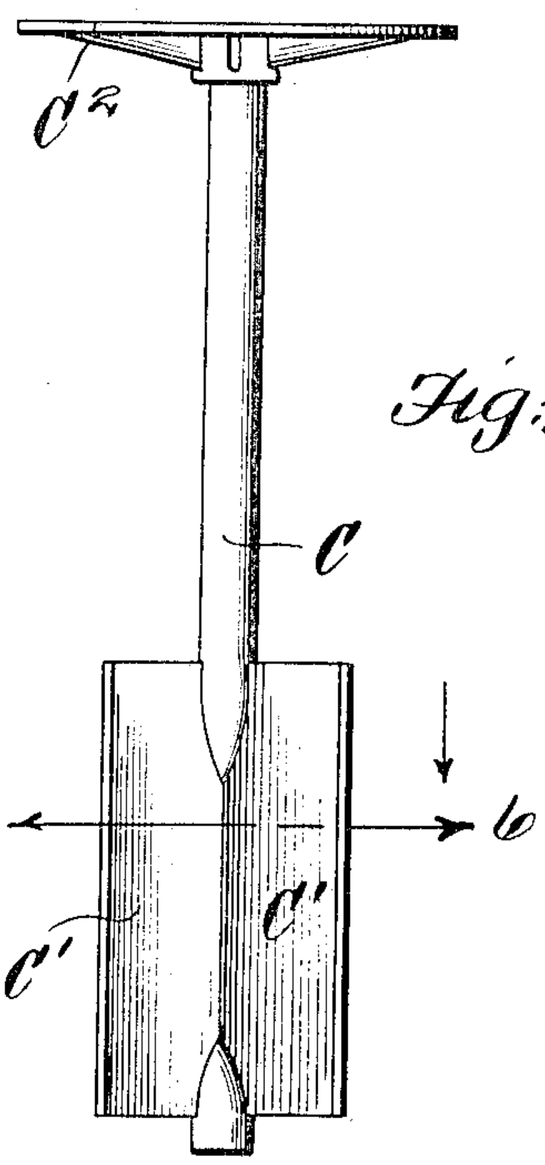


Fig. 7.

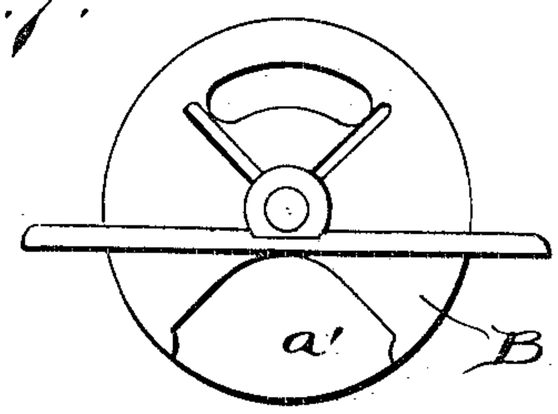


Fig. 6.

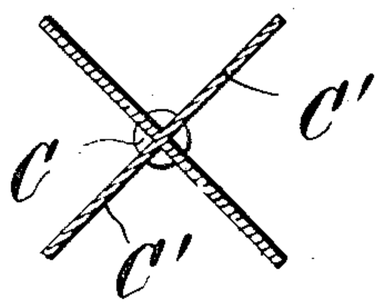


Fig. 8.

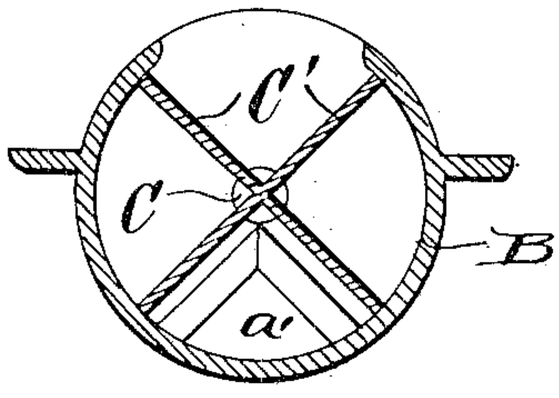
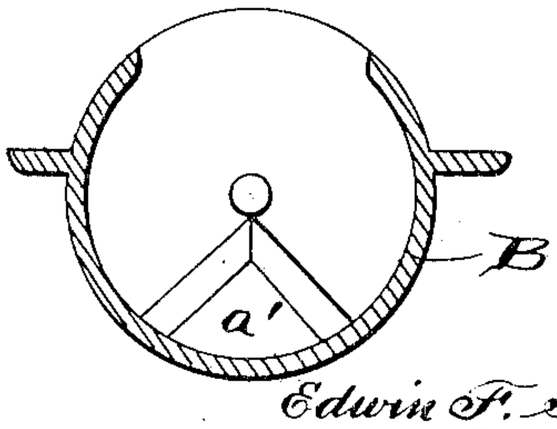


Fig. 9.



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UNITED STATES PATENT OFFICE.

EDWIN F. STEWART AND FREDERICK W. McNAMARA, OF MADISON, MAINE.

AUTOMATIC STOCK-REGULATOR.

SPECIFICATION forming part of Letters Patent No. 787,955, dated April 25, 1905.

Application filed October 21, 1904. Serial No. 229,463.

To all whom it may concern:

Be it known that we, EDWIN F. STEWART and FREDERICK W. McNAMARA, citizens of the United States, residing at Madison, in the county of Somerset and State of Maine, have invented certain new and useful Improvements in Automatic Stock-Regulators; and we do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to new and useful improvements in automatic stuff (stock) regulating devices; and the object of the invention is to govern the quantity of the paper-making material supplied to a paper-making machine irrespective of the speed thereof or of the percentage of fiber in the stuff-supply, so that the sheet of paper may at all times be of a uniform weight and thickness.

The invention consists, further, in various details of construction and in combinations and arrangements of parts, which will be hereinafter fully described and then specifically defined in the appended claims.

Our invention is illustrated in the accompanying drawings, which, with the letters of reference marked thereon, form a part of this application, and in which drawings similar letters of reference indicate like parts in the views, in which—

Figure 1 is a central vertical section through our apparatus, parts being shown in elevation. Fig. 2 is a top plan view of the apparatus. Fig. 3 is an end elevation. Fig. 4 is an enlarged detail view of a wing-gate. Fig. 5 is an enlarged detail view in elevation of the measuring-cylinder. Fig. 6 is a cross-sectional view on line 6 6 of Fig. 4. Fig. 7 is a top plan view of the stock-measuring cylinder, showing the air and stock inlets. Fig. 8 is a cross-sectional view through the stock-measuring cylinder on line 8 8 of Fig. 1. Fig. 9 is a sectional view on line 9 9 of Fig. 1. Fig. 10 is a side elevation of a flow-box; and Fig. 11 is a sectional view through the flow-box, taken on line 11 11 of Fig. 10.

Reference now being had to the details of the drawings by letter, A designates a stuff-box, into which a pipe A′ empties, through which stuff enters said box, coming from any suitable source of supply. Mounted in an aperture or opening in one wall of said stuff-box is a measuring-cylinder B, a portion of said cylinder projecting, as shown clearly in the drawings, outside of the box, while the part of the cylinder that projects into the box has an opening *a*, through which the stuff is allowed to freely flow into the cylinder. At a location diametrically opposite the flow into said cylinder is an exit-opening *a′*. (Shown clearly in Fig. 1 and in the details of the drawings.) Mounted to rotate within said measuring-cylinder is a shaft C, having radial wings C′ thereon. A detail of said shaft and wings is shown clearly in Fig. 4 of the drawings and also in the sectional view through Fig. 4, in which the wings are shown as positioned equidistant and at right angles to one another. The length of two of said wings, which are in alinement with each other, is equal to the entire diameter of the measuring-cylinder and is adapted to snugly wipe against the smooth inner surface of said cylinder. It will be observed that the opening into the measuring-cylinder for the admission of stuff is of large area in order to allow the stuff to freely flow into one of the compartments formed by a pair of said wings which will be substantially equal to one-fourth of the capacity of said cylinder.

Leading from the stuff-box is a pipe D, which opens into the flow-box E, as shown in Fig. 1 of the drawings. Said flow-box is supported by means of rods F, which are fastened to the sides of the box, and the upper ends are connected to a cross-piece F″, which has a knife-edge *f*, adapted to rest in hooks H in arms H′ of a lever H^2. A fulcrum-shaft I is connected to said lever and has a knife-edge I′, which rests upon the inner circumference of eyes K, which are supported on the frame J of the apparatus. A counterbalanced

weight N is adjustably held upon one end of said lever H^2 and may be adjusted to different positions thereon by means of a screw N'.

Rising from the shaft I is a post I^2, having a collar I^3 adjustably mounted thereon and held in an adjusted position by means of a screw I^4, having an adjusting-wheel I^5 thereon. Pivoted to a lug *i*, which projects from the collar I^3, is a rod O, which is pivotally connected at O' to a lever O^2, which in turn is pivoted at O^3 upon an arm O^4. (Shown in Fig. 2 of the drawings.) One end of said lever is bifurcated, the arms of which are pivoted at P to a loose collar engaging the hub Q of a friction-pulley Q'. Mounted at the upper end of the shaft C in suitable bearings upon the frame of the apparatus is a horizontally-disposed rotatable disk C^2, against the upper surface of which the friction-pulley Q' is adapted to contact. Said pulley Q' is splined upon a stub-shaft Q^3, mounted in suitable bearings, and Q^4 designates a driving-pulley which is fixed to rotate with said shaft Q^3, whereby power may be applied to the shaft to rotate the same, power to rotate the measuring-cylinder being applied from the constant speed-line of the paper-machine, so that its speed is always proportional to the speed of the paper-machine and the consistency of the stuff. Said stuff-box is provided with an overflow or backfall A^2, whereby the overflow may fall into a stuff-box A^3 and through a pipe A^4 return to the stuff-chest. The overflow from the flow-box E is so arranged that any stuff from the flow-box making exit at the overflow E^2 will also fall into the stuff-chest, as shown clearly in Fig. 1 of the drawings. A weir E^3 is placed in the side of the box near the backfall and has a row of vertical pins *e* set at intervals along the entire length of the weir, which are designed to offer more or less resistance to the overflow stock.

Referring to Fig. 1 of the drawings, it will be observed that the lower end of the pipe D is provided with a hemispherical shield D', centrally located at its orifice, with the concave side toward the outflowing stock, the use of which shield is to turn the force of the overflow stock away from the bottom of the flow-box, thus preventing any change in equilibrium from the downward force of the flow. From the construction shown it will be observed that a vertical movement of the counterbalanced flow-box will be communicated to the friction-pulley Q', causing the same to rotate against the upper surface of the friction-wheel C^2 near to or farther from the center thereof, accordingly as it may be desired to cause the apparatus to run faster or slower.

In operation paper-stock from the stuff-chest in the form of a mixture of fiber and water of varying consistency enters the stuff-box A through the pipe A', and as there is a considerably greater amount of stock entering than is necessary to supply the machine the box fills to a point near the top and the surplus overflows into another compartment and is returned to the chest. The part of the paper-stock which comes to the paper-machine enters the measuring-cylinder B, which portion of said cylinder projects within the box and fills the compartment intermediate two of the wings C'. As the shaft C rotates a measured quantity of the stuff is brought so that it will make exit through the outlet *a'* through the bottom of the cylinder B, and the discharged stuff may be conveyed to the paper-machine in any suitable manner.

It will be observed that the inlet to the cylinder B is at all times submerged, and the speed of the revolving wings is such as to insure the perfect filling of each compartment formed by two wings. It will be observed in the device shown and described that a certain number of cubic inches of paper-stock will be delivered to the paper-machine for each unit of distance which the machine travels and that a variation of speed in the machine will produce a variation in the number of cubic inches of stock delivered by the measuring device to the machine. In general practice it has been found that the chief cause for the variation in the thickness of paper running on the machines is the variations in the consistency of the stock as it is delivered from the beating-engine to the stuff-chest or in the difficulty of maintaining uniformity in the mixture of fiber and water which constitutes the stock flowing to the machine. To overcome the variation in the amount of fiber delivered to the machine by reason of the variation in the consistency of the stock, a novel feature is employed in connection with the measuring-cylinder whereby a greater percentage of fiber in the stock is made to reduce or a lesser amount to increase the speed of the measuring device to such an extent that the actual amount of fiber delivered shall always be approximately uniform. To produce this effect, a continuous sample of stock in the stuff-box is at all times entering the flow-box through the pipe D and after filling the box to a certain height overflows through the obstructing-weir described, returning to the chest with the surplus discharge at the backfall E^2.

The flow-box, it will be observed, is a shallow hopper-shaped receptacle and is balanced and held in position by the adjustable counterweight, and by the provision of the weir provided with a row of vertical pins at intervals a resistance is offered to the overflowing stock. From the construction shown it will be observed that a vertical movement of the box as suspended from the lever will communicate motion to the friction-pulley Q' through the medium of the supporting-rods F, the lever, the fulcrum-shaft K, the post I', and

the rod O, upon which said pulley Q′ is mounted. As the friction-pulley Q′ is moved toward the center or circumference of the flat disk C^2 the speed of the wheel will be varied, as will be understood, thus regulating the feeding of the stock to the paper-machine. The counterweight N upon the angle-lever H^2 may be adjusted to hold the box in a level position when full of stock having a certain percentage of fiber in its composition. The speed of the friction-pulley may be adjusted by means of cone-pulleys, so that the revolving shaft C, with the wings thereon, will deliver the required amount of stock to the machine to form a sheet of paper of the required weight and thickness.

If the consistency of the stock should remain the same, the flow-box would maintain the same vertical position, which would hold the friction pulley or gear in the same position on the friction-disk C^2, and the speed of the measuring device would vary with the speed of the machine; but should the consistency of the stock or the percentage of fiber in the mixture increase, making what is commonly termed "thick stuff," the resistance of the weir would become proportionately greater and more head would be required to force the flow through the weir, which would increase the quantity of the stock in the flow-box and add to its weight, whereby it would drop to a point where it would again be balanced by the counterweight. As the flow-box falls the motion is communicated to the friction-pulley by the connecting-rod and pivoted lever, so that the pulley moves on the counter-shaft to a point slightly farther from the center of the friction-disk, reducing in this way the speed on the revolving shaft to the point where it will deliver the same amount of fiber as it did before the stock became thick.

Should the stock in the flow-box become thin, the reverse of the above operation would occur, and the speed of the rotary wing-shaft would be increased, so that the same quantity of fiber would be delivered to the machine for each unit of speed that it travels.

The measuring-cylinder, it will be observed, is designed to deliver to the paper-machine a certain volume of stock from the chest for each unit of length in the sheet of paper being made and is arranged so that the volume of stock supplied is always proportionate to the speed of the machine. By the flow-box the speed of the measuring device is changed so that it is proportional to the actual quantity of paper-making material or fiber contained in the volume of stock measured.

While we have shown a particular detailed construction of apparatus illustrating the features of our invention, it will be understood that we may vary the details of the apparatus, if desired, without in any way departing from the spirit of the invention.

Having fully described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. An automatic stock-feeding apparatus for paper-machines, comprising a measuring device, a stuff-box and means for supplying the stuff thereto, a measuring-receptacle, communicating with said box, and means for measuring a given quantity of the stuff fed into the measuring-receptacle, a flow-box, communicating with the stuff-box, and means intermediate the said flow-box and measuring apparatus for automatically regulating the feeding of the stuff, as set forth.

2. An automatic stock-feeding apparatus for paper-machines, comprising a stuff-box with overflow, a supply-pipe leading to said box, a measuring-receptacle opening into said box, provided with a suitable discharge-opening, a rotatable shaft mounted within said measuring-receptacle and wings upon said shaft, a counterbalanced flow-box communicating with said stuff-box, connections intermediate said flow-box and shaft, whereby the stock being fed into the flow-box regulates the rotary speed of said winged shaft and means for driving the shaft, as set forth.

3. An automatic stock-feeding apparatus for paper-machines, comprising a stuff-box with overflow, a supply-pipe leading to said box, a measuring-receptacle opening into said box, provided with a suitable discharge-opening, a rotatable shaft mounted within said measuring-receptacle and wings upon said shaft, a counterbalanced flow-box communicating with said stuff-box, a friction-disk mounted to rotate with said shaft, a driving-shaft, an antifriction-pulley splined to said driving-shaft, and adapted to bear against said friction-disk, and means intermediate said counterbalanced flow-box and friction-pulley for moving the latter toward the center or circumference of said friction-disk, as set forth.

4. An automatic stock-feeding apparatus for paper-machines, comprising a stuff-box with overflow, a supply-pipe leading to said box, a measuring-receptacle opening into said box, provided with a suitable discharge-opening, a rotatable shaft mounted within said measuring-receptacle and wings upon said shaft, a counterbalanced flow-box communicating with said stuff-box, a friction-disk mounted to rotate with said shaft, a driving-shaft, an antifriction-pulley splined to said driving-shaft, and adapted to bear against said friction-disk, a pivotal lever, having arms engaging said friction-pulley, and means intermediate said lever and counterbalanced flow-box for actuating said lever, whereby the friction-pulley may be moved nearer toward the center or circumference of said friction-disk, as set forth.

5. An automatic stock-feeding apparatus

for paper-machines, comprising a stuff-box, a measuring-cylinder communicating therewith, a winged shaft rotating within said cylinder, a friction-disk fixed to said shaft and rotating horizontally, a driving-shaft and friction-pulley splined thereon, a lever engaging said friction-pulley, a flow-box communicating with said stuff-box, a pivotally-mounted angled lever supporting said flow-box, an adjustable weight upon said lever, connections between said lever and friction-pulley, whereby the weight of the stock, being fed to the flow-box, may regulate the rotary movement of said winged shaft, as set forth.

6. An automatic stock-feeding apparatus for paper-machines, comprising a stuff-box, a measuring-cylinder communicating therewith, a winged shaft rotating within said cylinder, a friction-disk fixed to said shaft and rotating horizontally, a driving-shaft and friction-pulley splined thereon, a lever engaging said friction-pulley, a flow-box communicating with said stuff-box, a pivotally-mounted angled lever supporting said flow-box, an adjustable weight upon said lever, a rock-shaft upon which said angled lever is mounted, a post rising from said shaft, an adjustable sleeve upon said post and connection between the latter and said antifriction-disk, as set forth.

7. An automatic stock-feeding apparatus for paper-machines, comprising a stuff-box, a supply-pipe leading thereto, a measuring-cylinder opening into said stuff-box, a rotary winged shaft in said cylinder, a friction-disk fixed to rotate with said shaft, a driving-shaft and a friction-pulley splined thereon and in contact with said friction-disk, a lever engaging said friction-pulley, a flow-box having a weir at one edge thereof, a pipe leading from said stuff-box and opening into the flow-box, rods supporting said flow-box, an angled lever with counterbalanced weight thereon, a shaft upon which said angled lever is fulcrumed, the arms of said lever having hooked ends in which the flow-box-supporting rods have bearings, a post rising from the fulcrumed shaft of the angled lever, an adjustable sleeve mounted upon said post and a rod connecting said post with said pivotal lever engaging said friction-pulley, as set forth.

8. An automatic stock-feeding apparatus for paper-machines, comprising a stuff-box, a supply-pipe leading thereto, a measuring-cylinder opening into said stuff-box, a rotary winged shaft in said cylinder, a friction-disk fixed to rotate with said shaft, a driving-shaft and a friction-pulley splined thereon and in contact with said friction-disk, a lever engaging said friction-pulley, a flow-box, a weir upon one side of said flow-box, pins therein, rods secured to said flow-box, a pipe leading from the stuff-box into the flow-box, a shield at the end of said pipe, a counterbalanced angled lever and a shaft upon which it is fulcrumed, a cross-piece connecting said rods and provided with a knife-edge resting in the hooked arms of said angled lever, a post rising from said fulcrumed shaft, an adjustable sleeve upon said post and a rod connecting said sleeve with said pivotal lever which actuates the friction-pulley, as set forth.

In testimony whereof we hereunto affix our signatures in presence of two witnesses.

EDWIN F. STEWART.
FREDERICK W. McNAMARA.

Witnesses:
F. L. SMITH,
W. R. CHAPMAN.