L. S. McCURDY.

FLOW REGULATOR FOR PAPER MAKING MACHINES.

APPLICATION FILED JUNE 19, 1914.

1,154,788.

Patented Sept. 28, 1915.

2 SHEETS—SHEET 1.

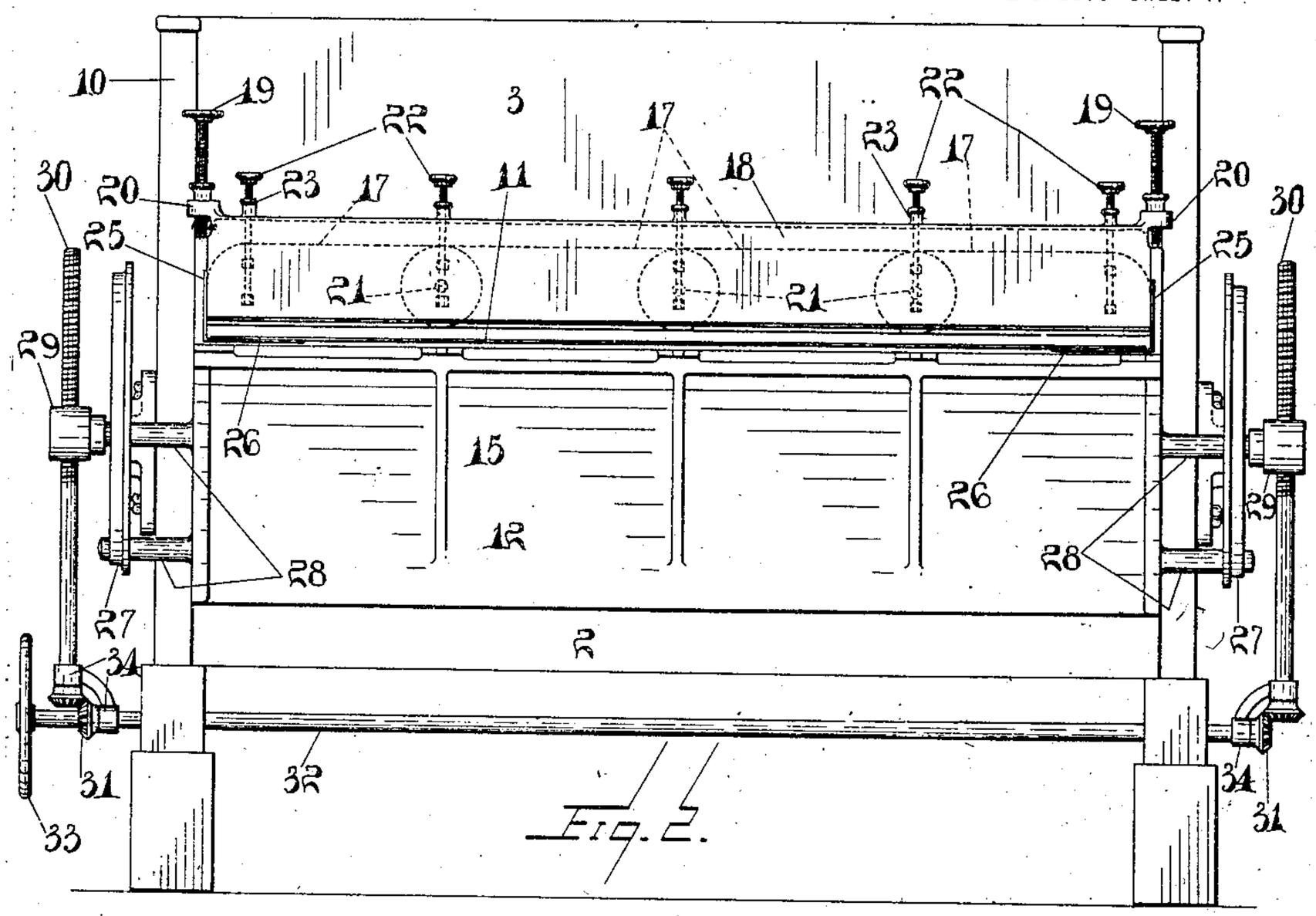

Fig. 2.

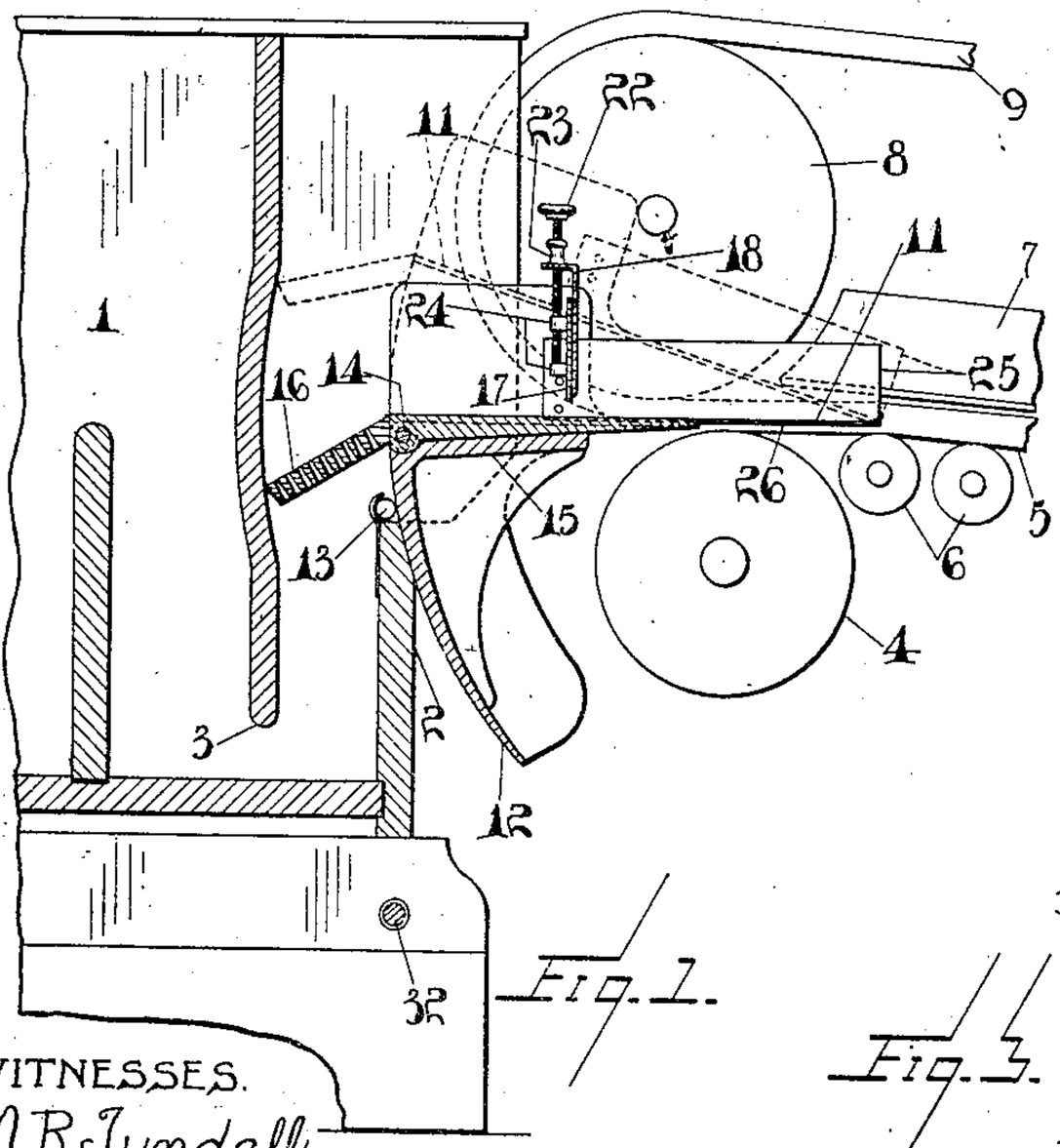

Fig. 1.

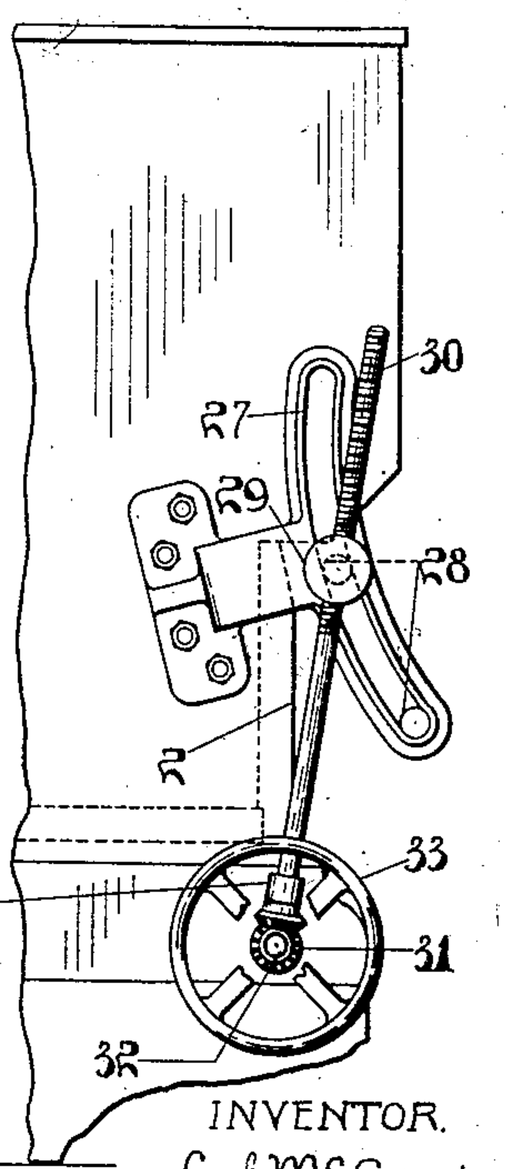

Fig. 3.

WITNESSES.

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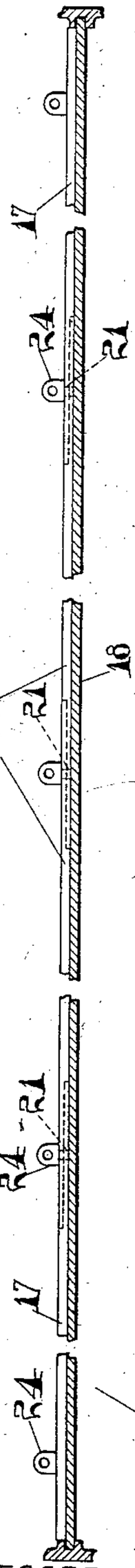

FIG. 5.

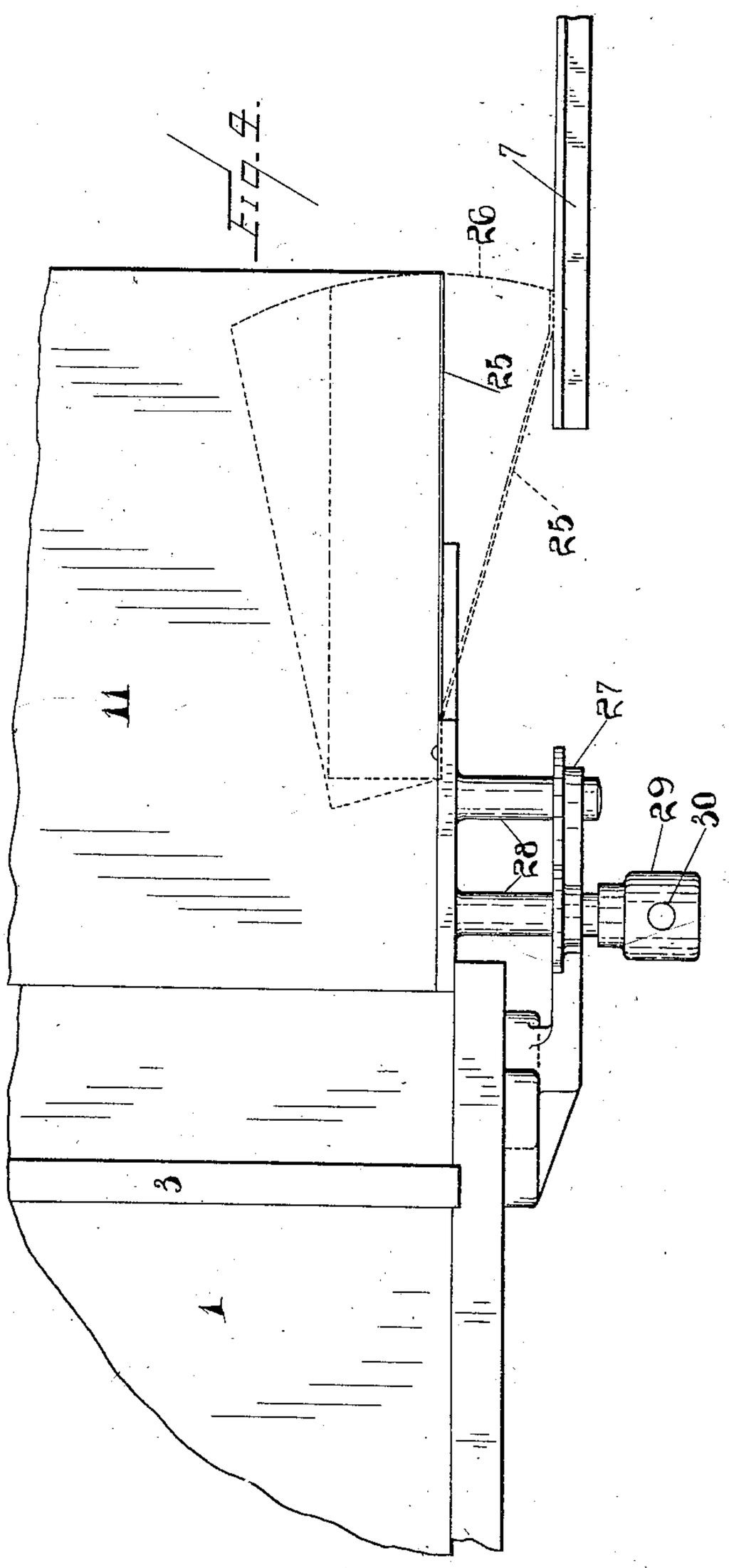

FIG. 4.

WITNESSES.

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UNITED STATES PATENT OFFICE.

LESTER S. McCURDY, OF THOROLD, ONTARIO, CANADA.

FLOW-REGULATOR FOR PAPER-MAKING MACHINES.

1,154,788. Specification of Letters Patent. Patented Sept. 28, 1915.

Application filed June 19, 1914. Serial No. 846,108.

To all whom it may concern:

Be it known that I, LESTER S. McCURDY, a citizen of the United States of America, residing at the town of Thorold, in the county of Welland, Province of Ontario, Canada, have invented certain new and useful Improvements in Flow-Regulators for Paper-Making Machines, of which the following is a specification.

My object is to devise means for accurately and quickly regulating the flow of paper stock to the endless wire cloth mold of the paper machine, for the following purposes: 1. To obtain perfect uniformity of thickness of paper in any desired width or thickness. 2. To obtain any desired width of flow within predetermined limits, and 3. To obtain any desired speed of flow without the use of feed aprons and without the necessity of varying the proportion of water in the stock.

I attain my object by means of the constructions hereinafter described and illustrated in the accompanying drawings in which—

Figure 1 is a longitudinal section of part of the paper-making machine provided with my flow regulator; Fig. 2 a front elevation of the parts shown in Fig. 1; Fig. 3 a side elevation of the adjusting means for the sluice way; Fig. 4 a plan view of part of the apparatus showing the means for adjusting the sluice way at its forward end; and Fig. 5 a detail showing the method of hinging the sections of the slice bar.

In the drawings like numerals of reference indicate corresponding parts in the different figures.

1 is the flow box of which 2 is the forward end, and 3 a cross partition below which the stock must flow to reach the exit to the sluice way.

4 is the breast roll which carries the endless wire mold 5.

6 are two of the table rolls which support the mold.

7 is part of the deckle frame, 8 a deckle wheel and 9 part of one of the deckle straps.

10 is part of the frame of the machine suitably shaped to support the different parts.

In ordinary machines an apron is provided to carry the stock on to the wire mold. I dispense entirely with this apron and use instead a sluice way 11 provided with a bottom and suitable sides. This sluice way extends from the forward end of the flow box to a point close to and above the endless mold. This sluice way is arranged as hereinafter described to receive stock from the flow box and to discharge it at any desired velocity within predetermined limits, the velocity being determined by tilting the sluice way to a suitable angle to give the velocity of flow desired. Means for tilting the sluice way will be hereafter described.

The following means are provided to discharge the stock into the sluice way. The rearward end of the sluice way is secured to a curved breast piece 12. The rearward surface of this breast piece forms part of the surface of a cylinder, of which the axis is located at the forward edge of the bottom of the sluice way, the latter being arranged to tilt on this edge as an axis. The breast piece 12 is fitted closely to the forward end 2 of the flow box so as to maintain close contact therewith as the breast piece be raised or lowered. Packings are preferably employed to keep the joint tight, such for example as the strip of packing hose 13 shown in Fig. 1. While the sluice way may be permanently connected with the breast piece, it is preferably hinged thereto at 14 so that the sluice way may be thrown up if it is desired to obtain access to parts underneath. When the sluice way is in working position, it rests on the forward extension 15 of the breast piece so that in effect when the apparatus is in use the sluice way and breast piece have a fixed relationship to one another. The upper edge of the breast piece forms an overfall for the stock flowing from the box, and as the breast piece is raised the height of the overfall is also raised, and consequently the head through which the stock falls from the upper edge of the breast plate to the endless mold. Thus, within the limits of adjustment any desired head and consequent velocity of flow may be given to the stock flowing through the sluice way. Preferably a strainer 16 is secured to the breast piece, the rear edge of which fits close to the partition 3. Where this partition contacts with the strainer as the latter rises and falls with the breast piece, the surface of the partition is curved on a curve concentric with the curve of the rearward

surface of the breast piece. This, of course, is necessary to prevent any jamming of the strainer as it rises and falls.

In paper-making machinery a slice bar is usually employed to regulate the depth of the flow of stock to the mold, and consequently the thickness of the paper formed. In my construction this slice bar is carried by the sluiceway 11. The slice bar is formed of a number of sections 17 carried by the support 18. This support is suitably guided on the sides of the sluice way so as to be vertically movable and is adjusted by means of the adjusting screws 19, which screw through the lugs 20 formed at the ends of the support 18 and engage the sides of the sluice way, as shown particularly in Fig. 2. By adjusting these screws the slice bar support and with it the sections of the slice bar are vertically adjusted as a whole. The sections 17 of this slice bar are hinged together on the hinge pins 21. The ends of the sections are overlapped and halved so that the total thickness at the hinge is no greater than at other points in the length of a section. A slice bar is thus formed which may be flexed or bent so that at different parts of its length it may be adjusted at different distances from the bottom of the sluice way. The division of the slice bar might, of course, be carried to infinity, thus producing a perfectly flexible slice bar, but for practical purposes it is sufficient to divide it into about four or five sections. These sections are vertically adjusted by means of the adjusting screws 22, which are screwed through the lugs 23 formed on the support 18, and are journaled in the lugs 24 formed on or secured to the sections 17. Preferably, alternate sections underlie sections at either side, and the lugs are formed on the hinged portions of these sections showing at the rear side of the slice bar. The underlying sections preferably have the holes through which the hinge pins 21 pass slightly elongated to allow for the slight elongation of the bar as a whole which takes place when its lower edge does not form a straight line parallel with the bottom of the sluice way. It is evident that by adjusting the screws 22 that the sections of the slice bar may be adjusted independently of the general adjustment so as to correct any irregularities in the flow and thus produce a sheet of paper of even thickness from side to side.

In order that the machine may be quickly adapted to produce paper of different widths, I make the forward end of the sluice way adjustable in width. This is preferably accomplished in the following manner: The forward ends of the sides of the sluice way are formed as wings 25 secured to the rearward portions of the sides. Preferably these wings adjacent the fixed portions of the sides are formed of spring material, having such a set that the wings tend to spring outwardly. Their outward swing is limited by their contact with the deckle frame as shown particularly in Fig. 4. To each wing is secured a bottom piece 26 overlapping the sluice way bottom and preferably underlying the same. With this arrangement the forward end of the sluice way automatically adjusts itself in width to suit the spacing of the sides of the deckle frame, which frame is always adjusted according to the width of the web of paper being produced. Owing to the overlapping of the bottom pieces of the wings and the main bottom of the sluice way, the tendency exists to produce a difference in the thickness of the flow at the sides of the forward end of the sluice way and the middle of the same. This tendency is, however, easily corrected by adjusting the end sections of the slice bar to give a greater flow toward the sides of the sluice way. This also compensates for the thinning out due to the spreading of the width of the stock as it flows from the slice bar to the widened forward end of the sluice way.

While any desired means might be employed to tilt the sluice way, I prefer to employ means which would avoid the necessity of actually placing a shaft at the forward end of the sluice way. Therefore, for purposes of adjustment, I provide at each side of the frame of the apparatus an arc-shaped guide 27, the arc being struck from a center located at the forward edge of the bottom of the sluice way. A pair of pins 28 are secured to each side of the breast plate 12 and project into the guides 27. By suitably moving these pins up the guides, it is evident that the breast plate and the sluice way carried thereby will be tilted on an imaginary axis located at the forward edge of the bottom of the sluice way.

For the purpose of simultaneously raising the breast plate at each end I provide the following mechanism. A nut 29 is journaled on each of the upper pins 28. Through each nut is threaded a screw 30. The lower end of each screw is connected by means of bevel gearing 31 with the shaft 32 provided at one end with a hand wheel 33, by means of which it may be rotated. The screws 30 are at their lower ends journaled in bearings 34 on which the shaft 32 is also journaled, the bearings thus being rotatable on the shaft to accommodate themselves to the varying angles of the screws 30 as the upper pins 28 move up and down the arc-shaped guides 27.

From the above description it will be seen that I have constructed a machine which will satisfactorily attain the objects of my invention as set out in the preamble to this specification.

What I claim as my invention is:

1. In paper making machinery the combination of a flow box; a traveling mold; deckle straps coöperating with said mold; a sluice way having the forward edge of its bottom reaching to a point close to and above the upper surface of the mold and between the deckle straps and its rear end adapted to receive stock from the flow box; and means for supporting said sluice way so that it may be tilted to varying angles to the horizontal on an imaginary axis located substantially at the aforesaid forward edge.

2. In paper making machinery the combination of a flow box; a traveling mold; a curved breast piece forming an overfall for the stock flowing from the box; a sluice way secured to said breast piece in fixed relationship thereto and having the forward edge of its bottom reaching to a point close to and above the mold; and means for supporting said sluice way and breast piece so that they may be adjusted to raise the breast piece and tilt the sluice way on a stationary imaginary axis located substantially at the aforesaid forward edge, the said breast piece being suitably fitted to the front of the flow box to prevent leakage.

3. In paper making machinery the combination of a flow box; a traveling mold; deckle straps coöperating with said mold; a breast piece vertically adjustable to vary the overfall for the stock; and a sluice way adapted to discharge on to the mold between the deckle straps movable to follow the breast plate and tiltable to vary its angle to the aforesaid mold on an imaginary axis at its forward edge.

4. In paper making machinery the combination of a flow box; a traveling mold; a breast piece vertically adjustable to vary the overfall for the stock; a sluice way movable to follow the breast plate and tiltable to vary its angle to the aforesaid mold; a strainer board secured to the breast piece; and a partition with which the rear edge of said strainer board contacts as the breast piece rises and falls.

5. In paper making machinery the combination of a flow box; a traveling mold; a curved breast piece forming an overfall for the stock flowing from the box; a sluice way secured to said breast piece in fixed relationship thereto and having the forward edge of its bottom reaching to a point close to and above the mold; means for supporting said sluice way and breast piece so that they may be adjusted to raise the breast piece and tilt the sluice way on an axis located substantially at the aforesaid forward edge, the said breast piece being suitably fitted to the front of the flow box to prevent leakage; a strainer board secured to the breast piece; and a partition with which the rear edge of said strainer board contacts as the breast piece rises and falls, said partition being curved to correspond with the curved path followed by the rear edge of the strainer board.

6. In paper making machinery the combination of a flow box; a traveling mold; a sluice way having the forward edge of its bottom reaching to a point close to and above the upper surface of the mold and its rear end adapted to receive stock from the flow box; means for supporting said sluice box so that it may be tilted to varying angles to the horizontal on an axis located substantially at the aforesaid forward edge; a sectional slice bar controlling the flow through the sluice way; means for adjusting the slice bar as a whole to and from the bottom of the sluice way; and means for adjusting the sections to and from the bottom of the sluice way independent of the general adjustment.

7. In paper making machinery the combination of a flow box; a traveling mold; a sluice way adapted to convey stock from the flow box to the mold; a sectional slice bar controlling the flow through the sluice way and comprising a plurality of sections hinged together; means for adjusting the slice bar as a whole to and from the bottom of the sluice way; and means for adjusting the sections to and from the bottom of the sluice way independent of the general adjustment.

8. In paper making machinery the combination of a flow box; a traveling mold; a sluice way adapted to convey stock from the flow box to the mold; a sectional slice bar controlling the flow through the sluice way and comprising a plurality of sections hinged together; means for adjusting the slice bar as a whole to and from the bottom of the sluice way; and means engaging the hinges for adjusting the sections to and from the bottom of the sluice way independent of the general adjustment.

9. In paper making machinery the combination of a flow box; a traveling mold; a sluice way having the forward edge of its bottom reaching to a point close to and above the upper surface of the mold and its rear end adapted to receive stock from the flow box; means for supporting said sluice box so that it may be tilted to varying angles to the horizontal on an axis located substantially at the aforesaid forward edge; a slice bar controlling the flow through the sluice way adapted to bend to permit of the gap for the passage of stock to be set of different depths at different points along the length of the bar; and means for bending said bar to adjust the gap.

10. In paper making machinery the combination of a flow box; a traveling mold; a sluice way adapted to convey stock from the flow box to the mold; said sluice way

having the forward ends of its sides formed as wings flexibly connected to the rearward portions of the sides; and bottom pieces on said wings overlapping the sluice box bottom.

11. In paper making machinery the combination of a flow box; a traveling mold; a sluice way adapted to convey stock from the flow box to the mold, said sluice way having the forward ends of its sides formed as wings flexibly connected to the rearward portions of the sides; bottom pieces on said wings overlapping the sluice box bottom; a slice bar controlling the flow through the sluice way adapted to bend to permit of the gap for the passage of stock to be set of different depths at different points along the length of the bar; and means for bending said bar to adjust the gap.

12. In paper making machinery the combination of a flow box; a traveling mold; a sluice way adapted to convey stock from the flow box to the mold, said sluice way having the forward ends of its sides formed as wings flexibly connected to the rearward portions of the sides; bottom pieces on said wings overlapping the sluice box bottom; spring means tending to press the wings outwardly; and a deckle frame with which said wings contact to limit their outward movement.

Niagara Falls, Ont., this eighth day of June A. D. 1914.

LESTER S. McCURDY.

Signed in the presence of—
EDW. S. THEISEN,
HERBERT WIDEMAN.