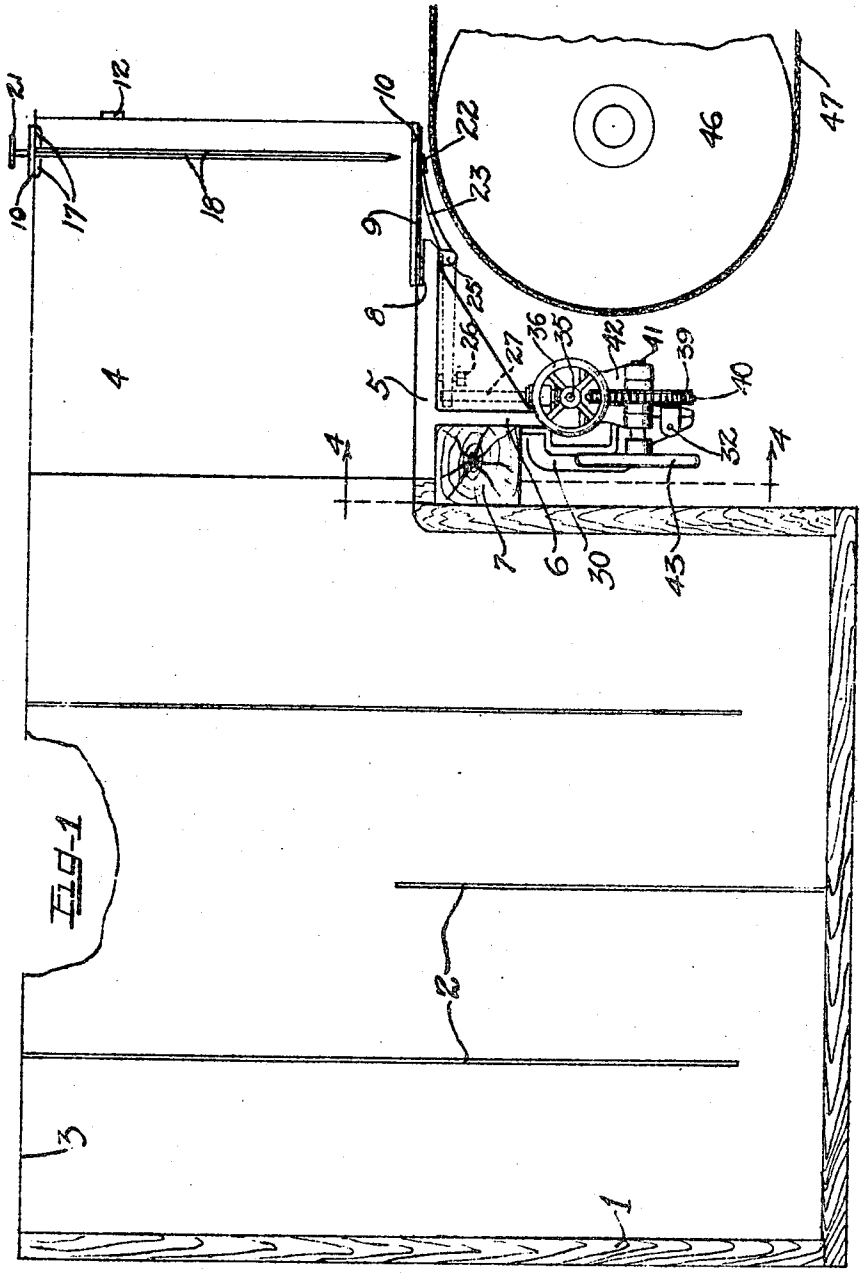
April 6, 1926. 1,579,204

E. E. BERRY

ADJUSTABLE APRON BOARD

Filed Dec. 15, 1923 4 Sheets-Sheet 1



Inventor
Earl E. Berry
by Charles W. Miller
Attys

April 6, 1926. 1,579,204

E. E. BERRY

ADJUSTABLE APRON BOARD

Filed Dec. 15, 1923 4 Sheets-Sheet 2

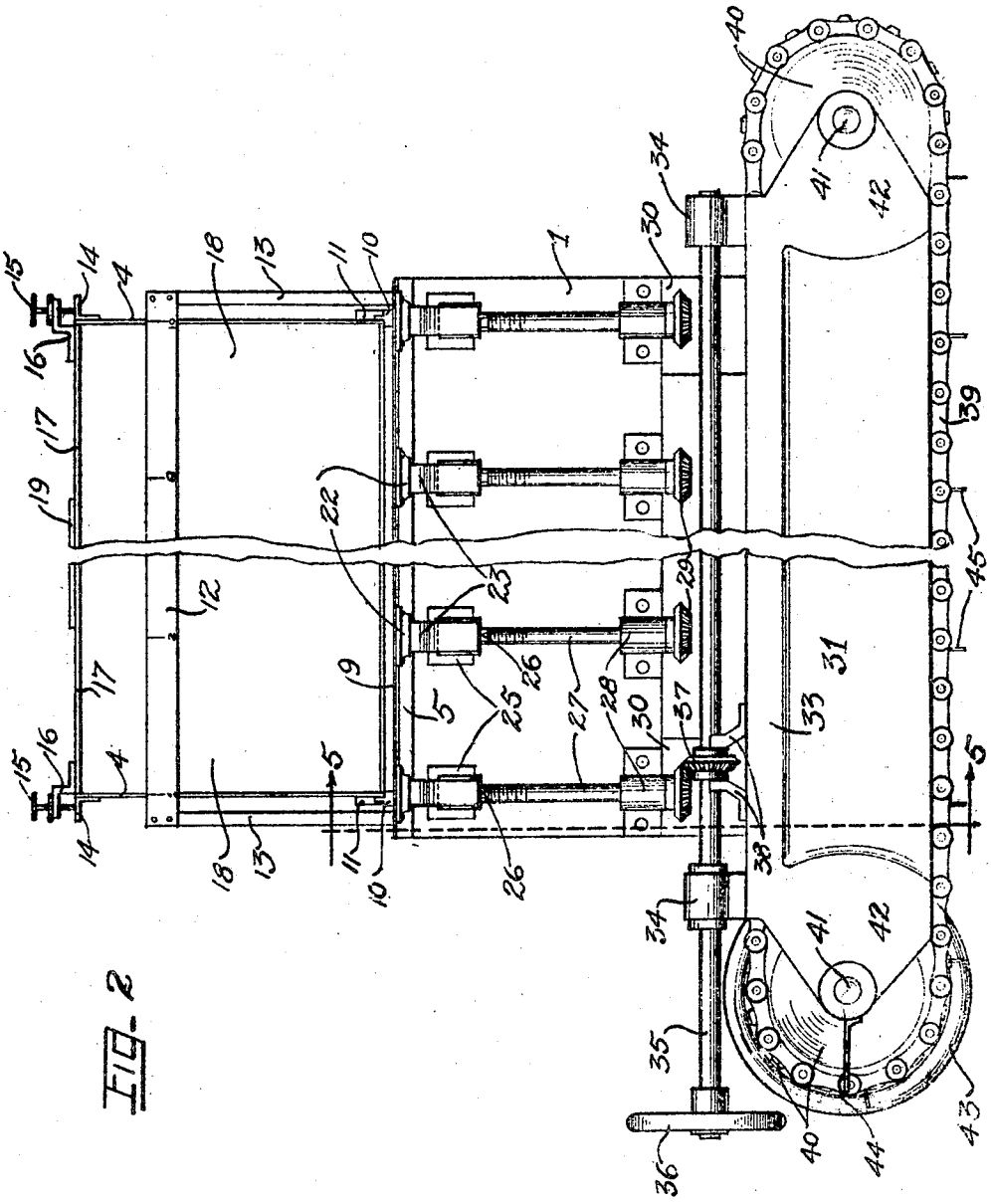


FIG. 2

Inventor
Earl E. Berry.
By Charles C. Wright
Attys

April 6, 1926. 1,579,204

E. E. BERRY

ADJUSTABLE APRON BOARD

Filed Dec. 15, 1923 4 Sheets-Sheet 3

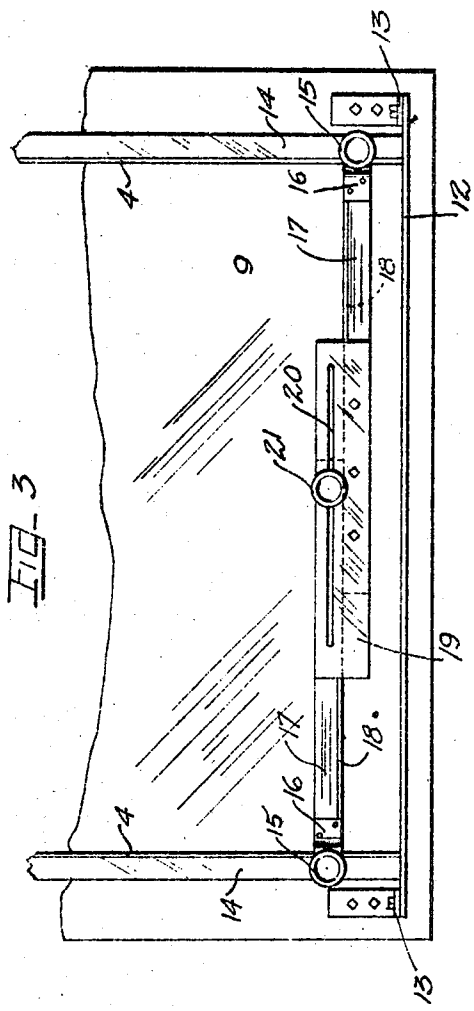


FIG. 3

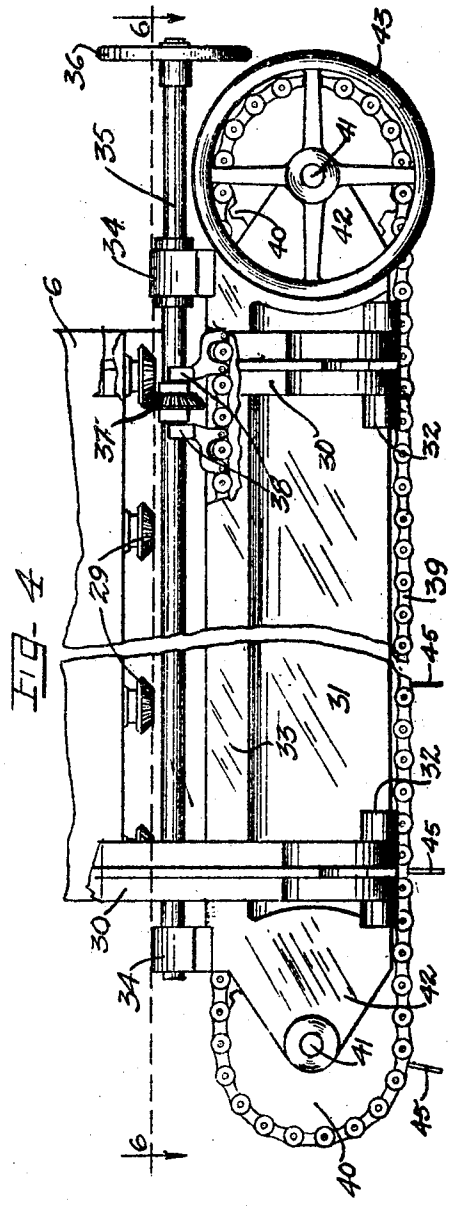


FIG. 4

Inventor
Earl E. Berry.
By Charles W. Kills
Attys

April 6, 1926. 1,579,204

E. E. BERRY

ADJUSTABLE APRON BOARD

Filed Dec. 15, 1923 4 Sheets-Sheet 4

Fig. 5

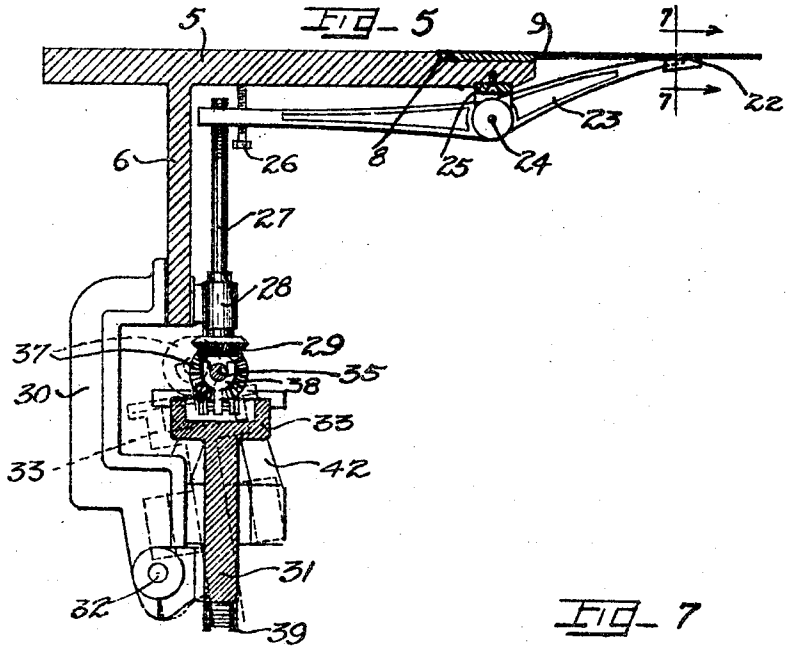


Fig. 7

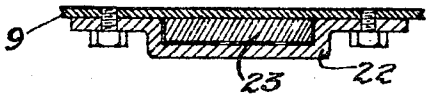
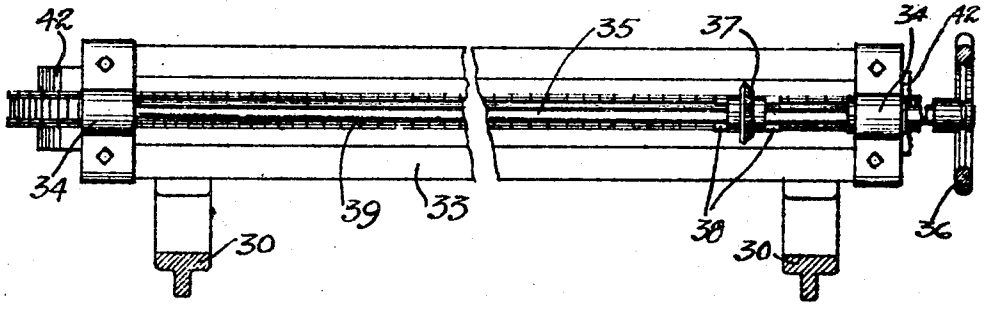


Fig. 6



Inventor
Earl E. Berry

by Charles W. Wells
Attys

Patented Apr. 6, 1926. 1,579,204

UNITED STATES PATENT OFFICE.

EARL ELWIN BERRY, OF BELOIT, WISCONSIN, ASSIGNOR TO BELOIT IRON WORKS, OF BELOIT, WISCONSIN.

ADJUSTABLE APRON BOARD.

Application filed December 15, 1923. Serial No. 680,824.

To all whom it may concern:

Be it known that I, EARL E. BERRY, a citizen of the United States, and a resident of the city of Beloit, in the county of Rock and State of Wisconsin, have invented certain new and useful Improvements in an Adjustable Apron Board; and I hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, and to the numerals of reference marked thereon, which form a part of this specification.

This invention relates to paper making machines and more particularly to a container comprising a sluice and flow box forming a part of the wet end of the machine.

In the manufacture of paper the prepared pulp is delivered from a beating or refining engine and is diluted with water. The diluted pulp is then permitted to flow through a set of screens before entering a flow box from which the quantity of pulp flowing and the thickness of the paper to be made, is regulated before flowing on to an endless travelling band of wire cloth from which the water is permitted to drain. In the paper making machines now in use difficulty is encountered in obtaining a uniform thickness of paper due to the fact that the bottom board of the apron often warps or becomes distorted so that the thickness of the sheet of the diluted pulp flowing over the apron varies, thereby tending to produce a sheet of paper of uneven thickness.

Experience has shown that due to irregularities and imperfections in the design of the head box, counter or eddy currents are set up in the flow of the diluted pulp passing through the head box on its way to the slices and apron. These eddy currents have a tendency to cause the fibres of the pulp to bunch up or clot, thereby producing a stock of unequal density in different parts of the flow box. For a given flow box these streaks of different density occur in substantially the same place for a given adjustment of a machine and thus cause a sheet of paper to be formed of varying thickness. Each individual paper machine has its own peculiarities in producting the counter or eddy currents referred to, said currents occurring in practically the same location in the same head box under the same conditions, but sometimes changing to new positions when parts of the machine are adjusted for a change in weight or thickness of a paper being made. To compensate for the unequal density of the flow of pulp resulting from the formation of eddy currents in the head box an adjusting mechanism is provided for the apron so that a paper of uniform thickness will be produced.

It is an object of this invention to provide a flow box with an adjustable apron lip which may be adjusted to so regulate the flow of diluted pulp onto the wire that a sheet of paper of uniform thickness will be formed across the entire width of the machine by causing a layer of lesser volume of pulp to pass onto the wire from the apron at the points of greater density caused by the formation of eddy currents in the head box.

It is also an object of the invention to provide an apron which is so constructed that the thickness of the sheet may be regulated as well as the width thereof.

It is a further object of this invention to provide an adjustable lip for the apron of a paper making machine in order that said lip may be adjusted transversely to permit a sheet of diluted pulp of uniform density or thickness to flow over the lip and beneath the slices on to an endless wire cloth.

It is also an object of the invention to provide a paper making machine apron with a lip having an adjusting mechanism connected therewith whereby different portions of the lip may be adjusted to insure a uniform thickness of a flow of pulp over the lip and beneath a controlling slice.

It is an important object of the invention to provide an apron and a flexible lip therefor, said apron having a manually adjustable adjusting device mounted thereon for independently adjusting different portions of the lip to insure a pulp flow of uniform thickness from beneath the slices.

Other and further important objects of this invention will be apparent from the disclosures in the specification and accompanying drawings.

This invention (in a preferred form) is

illustrated in the drawings and hereinafter more fully described.

On the drawings:

Figure 1 is a longitudinal side elevation of a paper making machine head box and apron with the side removed and illustrating an adjustable lip and adjusting means embodying the principles of this invention.

Figure 2 is an enlarged fragmentary front elevation of the apron and adjustable lip adjusting mechanism.

Figure 3 is a fragmentary top plan view of the apron and slices.

Figure 4 is a fragmentary view taken on line 4—4 of Figure 1.

Figure 5 is a detail section taken on line 5—5 of Figure 2 with parts omitted.

Figure 6 is a detail plan view taken on line 6—6 of Figure 4.

Figure 7 is an enlarged fragmentary detail section taken on line 7—7 of Figure 5.

As shown on the drawings:—

The reference numeral 1 indicates a head box provided with a plurality of alternately arranged downwardly and upwardly directed transverse baffles or partitions 2 arranged so that diluted pulp entering the head box at 3 will flow through a circuitous path below one baffle and over the next and then flow into an apron formed on one end of the head box 1 and of a depth approximately half that of the head box.

The apron comprises adjustable side walls 4 which rest upon an apron board 5 having a downwardly directed integral flange 6 formed thereon and secured to a supporting block or beam 7. The apron board 5 is shorter than the side walls 4 and is recessed along the front edge at 8 to receive one edge of a projecting flexible metal lip 9. The lower front portions of the apron side walls 4 are cut away and rest upon rubber strips 10 which movably rest upon the top of the lip 9. Retaining strips 11 are secured to the outer sides of the side walls 4 and clamp against flanges formed on said rubber strips 10 (Figure 2.).

A graduated scale 12 projects across the front edges of the side walls 4 and has the ends thereof secured to upright bars 13 the lower ends of which are bent at right angles and secured to the lip 9 to the outside of the side walls 4. Secured to the outer side of the upper edge of each side wall 4 is an angle bar 14 against which an adjusting screw 15 engages. The adjusting screws 15 are threaded through a pair of Z-brackets 16 secured upon the flanges 17 formed on the upper ends of a pair of adjustable plates 18 forming slices. Bolted to the flange 17 of one of the plates 18 is a plate 19 having a longitudinal slot 20 therein through which a set screw 21 projects and engages the flange 17 of the other plate to hold the plates 18 and the side walls 4 in an adjusted position for producing a predetermined width of paper.

Secured to the bottom of the lip 9 are a plurality of straps 22 in the pocket of each of which one end of a fulcrumed lever 23 is engaged. Each lever 23 is pivoted intermediate its ends on a pin 24 supported by a bracket 25 fastened to the bottom of the apron board 5 (Figure 5). The inner end of each lever 23 is provided with a set screw 26 adapted to contact the bottom of the apron board 5. Also threaded through a threaded aperture in the inner end of each fulcrumed lever 23 is the upper end of an adjusting screw 27 the lower plain portion of which is journalled in a bearing sleeve 28 secured to the flange 6. A beveled gear 29 is fixed on the lower projecting end of each adjusting screw 27.

Rigidly secured to the flange 6 are a pair of channel brackets 30 on which a plate 31 is pivotally supported at 32. Integrally formed along the upper edge of the plate 31 is a channel 33 having bearing members 34 fixed near the ends thereof. Journalled in the bearing members 34 is a slotted shaft 35 having a hand wheel 36 fixed on one end thereof. Slidably feathered on the shaft 35 is a beveled gear 37 for coaction with the beveled gears 29. The beveled gear 37 is adapted to be slidably moved to different positions on the shaft 35 by means of forks 38 which are connected to the upper lap of an endless chain 39 trained around sprockets 40. The sprockets 40 are supported on stub shafts 41 engaged in forked brackets 42 integrally formed on the ends of the pivoted plate 31. Fixed on the projecting end of one of the stub shafts 41 is a hand wheel 43. An indicating finger or pointer 44 is formed on one of the plate brackets 42 (Figure 2) with which indicating pins 45 on the lower lap of the chain 39 are adapted to register to indicate that the gear 37 is in mesh with a selected one of the beveled gears 29.

The reference numeral 46 (Figure 1) indicates a breast roll around which an endless travelling band of wire cloth 47 is trained to receive the pulp from the lip 9.

The operation is as follows:—

In the manufacture of paper the pulp delivered from the beating or refining engine is diluted and is sometimes first permitted to flow through a sand trap, then to the screens and next into the head box 1 at the point 3. The pulp passes through the head box alternately below and above the baffles 2 and then flows out over the apron board 5 and the adjustable lip 9. The side walls 4 of the apron are adapted to be moved toward or away from each other when the set screw 21 is loosened to determine the width of the flow of the sheet of pulp passing over the apron board 5 and the lip 9. The adjustment of the side walls

4 determines the width of the paper being formed. By tightening the set screw 21 the side walls are held in their adjusted positions. The slices 18 are slidable transversely one upon the other when the side walls are being adjusted.

To determine the thickness of the flow of pulp over the lip 9 on to the endless wire cloth band 47 the slices 18 are adapted to be raised or lowered by adjusting the screws 15. The space between the lip and the lower edge of the slice is thus adjusted to vary the weight of the paper being formed.

To insure a uniform thickness of stock the lip is flexible and adjustable transversely by means of the improved adjusting mechanism of this invention. By means of the scale 12 the particular portion of the lip needing adjustment may be selected and the corresponding adjusting screw requiring adjustment selected. The plate 31 is then swung about its pivots 32 into the dotted line position of Figure 5. The hand wheel 43 is then manually rotated thereby rotating the chain 39 causing the forks 38 thereon to slide the beveled gear 37 on the shaft 35 into a position nearly in register with the particular beveled gear 29 selected. This position may be easily determined by means of the pins 45 and the indicating finger 44 on the bracket 42 (Figure 2). The plate 31 is now swung back into normal vertical position and the hand wheel 43 is again turned slightly to bring the gear 37 into mesh with the respective gear 29. By turning the hand wheel 36 the gear 37 rotates the respective gear 29 and the corresponding adjusting screw 27. Rotation of the adjusting screw 27 tends to swing the respective lever 23 about its pivot 24 whereby the outer end of the lever is either raised or lowered a predetermined amount to adjust the desired portion of the flexible lip 9 that needs adjustment to insure a flow of stock of uniform thickness or density to produce a paper of uniform weight across the sheet. The set screw 26 may be set to act as a stop to limit the upward movement of the inner end of the respective lever 23. It will thus be noted that any portion of the lip 9 may be adjusted so that the thickness or density of the flow of pulp over the lip and beneath the slices will be uniform.

The width and thickness of the stream of stock flowing over the lip 9 onto the wire 47 is thus readily controlled to determine the proper weight of the paper while the width of the paper is further governed by means of deckle straps which travel with the conveyor 47.

I am aware that many changes may be made. and numerous details of construction may be varied through a wide range without departing from the principles of this invention, and I therefore do not purpose limiting the patent granted hereon, otherwise than necessitated by the prior art.

I claim as my invention:—

1. The combination with an apron of a paper making machine, of a lip forming a part thereof and mechanisms connected therewith for independently adjusting the different portions of said lip.

2. The combination with an apron of a paper making machine, of a lip forming a part of the bottom of said apron, a plurality of pivotally mounted members connected with said lip and means for independently adjusting said members to cause adjustment of different portions of said lip.

3. In a paper making machine the combination with an apron, of a flexible lip forming a part thereof, and means for independently adjusting different portions of the lip to insure a flow of stock of uniform depth thereover.

4. In a paper making machine the combination with a head box, of an apron formed thereon comprising an apron board, a lip supported thereon, adjustable side walls for said apron, a plurality of adjusting mechanisms connected with said lip and means for selectively operating any one of said adjusting mechanisms to cause adjustment of selected portions of the lip.

5. In a paper making machine the combination with a head box, of an apron formed thereon comprising an apron board, a lip supported thereon and projecting therefrom, adjustable side walls for said flow box, slidable slice plates between said side walls, means thereon to permit adjustment of the side walls with respect to one another, mechanisms for adjusting said slice plates with respect to the lip, and mechanisms connected with the lip for adjusting different portions thereof to insure a uniform thickness of stock thereover.

6. In a paper making machine an apron comprising an apron board, a lip supported thereon and projecting therefrom, a plurality of levers pivoted intermediate their ends beneath the apron board, means connecting the outer ends of said lever to said lip, adjusting screws connected with the inner ends of said levers, gears on said adjusting screws, a pivoted frame, a shaft thereon, a gear slidably keyed on said shaft, means on said pivoted frame for moving said shaft gear into engagement with a selected one of said adjusting screw gears, and a hand wheel on said shaft for rotating the same to cause rotation of the selected adjusting screw and movement of the corresponding lever to adjust a selected portion of the lip.

7. In a paper making machine an apron comprising an apron board, a lip projecting therefrom, a plurality of levers fulcrumed beneath the bottom apron board and con-

nected to said lip, a plurality of adjusting screws connected with said levers, set screws on said levers adapted to engage against said apron board, beveled gears on said adjusting screws, a pivoted frame, a shaft journalled thereon, a beveled gear slidably keyed on said shaft, sprockets on said frame, a chain trained around said sprockets, forks on said chain engaging said shaft gear, means for operating said chain to cause said shaft gear to be shifted into mesh with a selected one of said screw gears, and means on said shaft for rotating the same to cause the selected adjusting screw to actuate its respective lever to adjust a selected portion of the lip.

8. In a paper making machine an apron and an independently adjustable member associated with the bottom thereof at the outer edge of said apron.

9. In a paper making machine an apron comprising an apron board, adjustable side walls, an adjustable slice supported thereon, a lip on said apron board, a plurality of members fulcrumed on said apron board and connected to said lip, and means for selectively operating said fulcrumed members to adjust selected portions of said lip.

10. The combination with a paper making machine apron, of an apron board and a lip associated therewith, a plurality of pivotally mounted members connected with said lip, screws for adjusting said members, gears on said screws, a pivoted frame, sprockets supported thereon, a chain engaging said sprockets, a shaft journalled over said frame, a gear slidable on said shaft and rotatable therewith, means for rotating the shaft, a hand wheel for rotating one of said sprockets to cause rotation of the chain, an indicator on said pivoted frame to position the gear on said shaft in a selected position to mesh with a gear on a selected one of said adjusting screws.

11. In a paper making machine including the apron, slices and breast roll thereof, a flexible member extending from said apron over said breast roll and means for independently adjusting said member with respect to said slices.

12. In a paper making machine including the apron, slices and breast roll thereof, a flexible member extending from said apron over said breast roll and means for independently adjusting said member at different points along its width with respect to said slices.

13. In a paper making machine an apron having an independently adjustable lip.

In testimony whereof I have hereunto subscribed my name.

EARL ELWIN BERRY.