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PAPER MAKING MACHINERY

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3 Sheets-Sheet 2

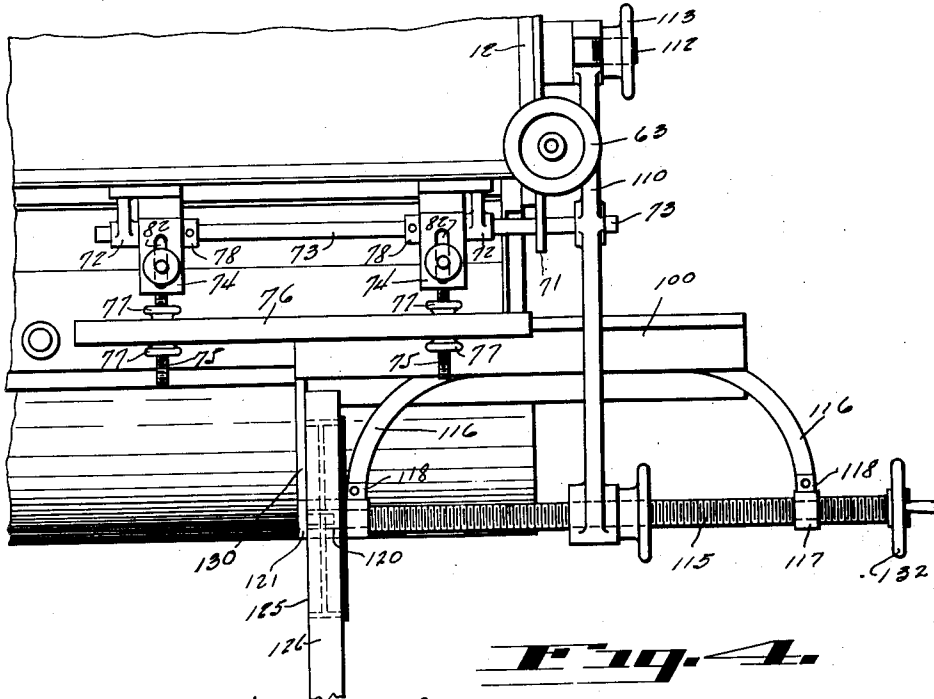


Fig. 4.

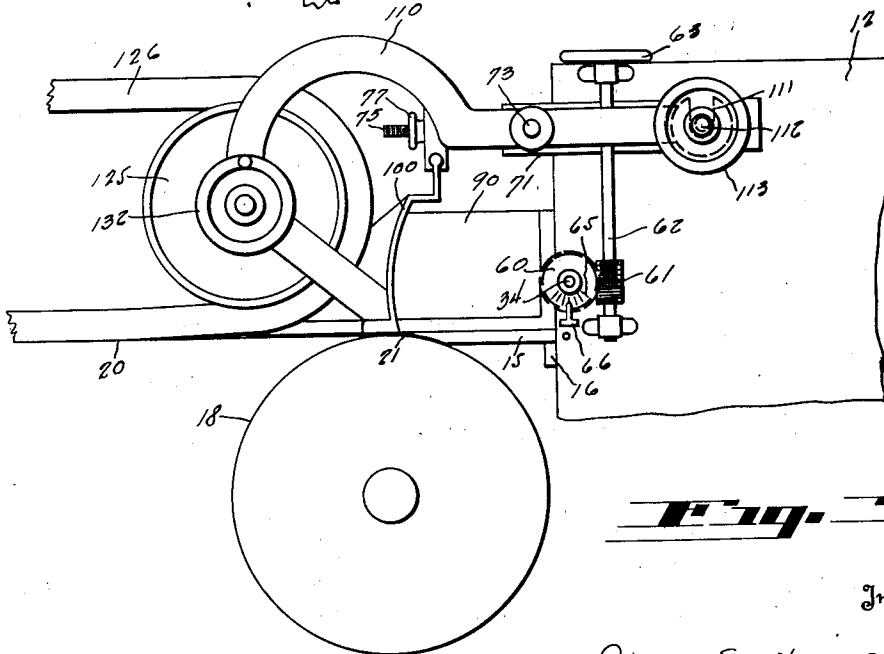


Fig. 5.

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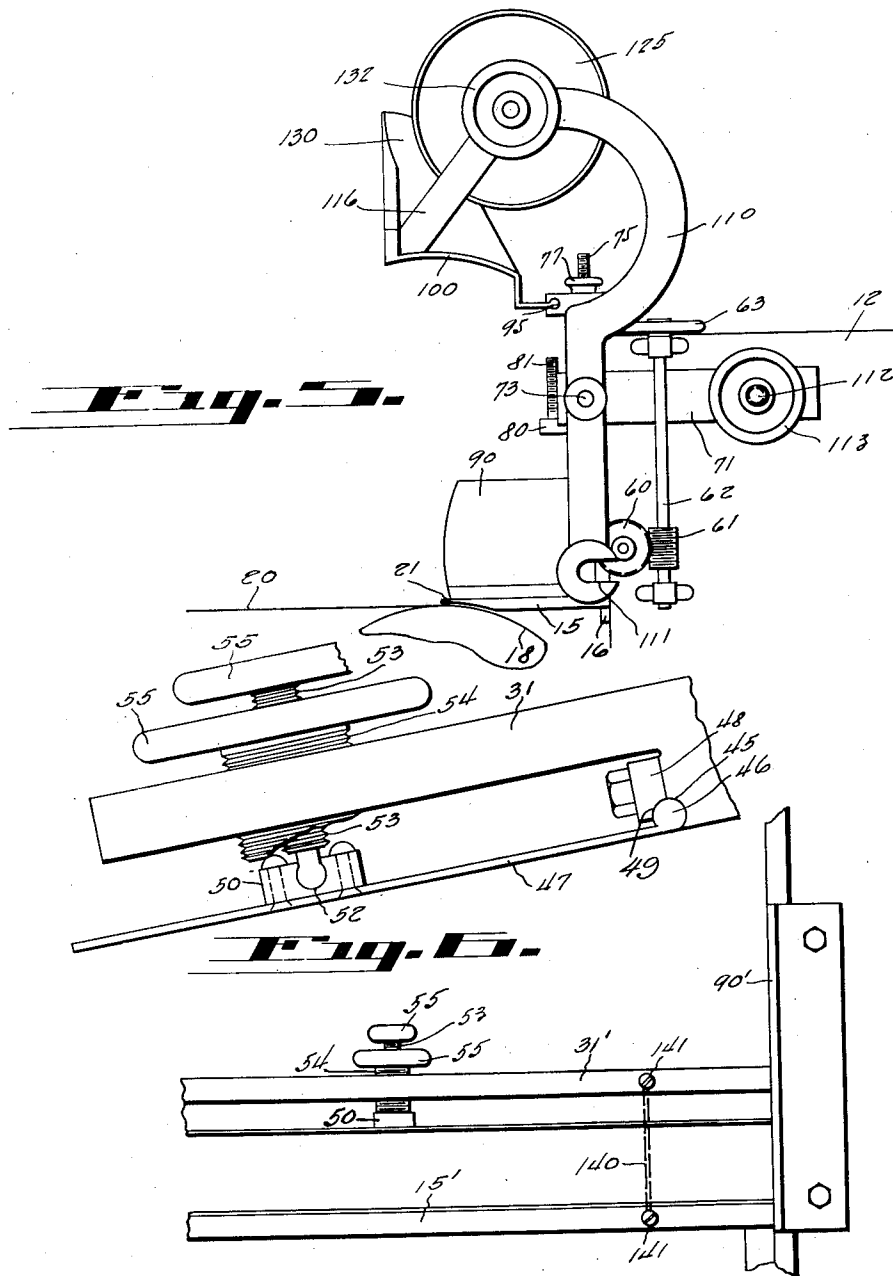
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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE.

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PAPER-MAKING MACHINERY.

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This invention relates to paper making machinery and more particularly to that portion of paper making machines which has to do with the feeding of the paper making stock upon the forming part of the machine.

One of the principal objects of the invention is to provide mechanism for controlling the flow of the stock from the flow box to the forming wire, which is constructed for ready adjustment to vary the width of the flowing stream of stock to vary the width of the sheet of paper to be formed.

Another object of the invention is to provide a device of this character, comprising a support for a deckle strap, which is so constructed that the deckle strap may be readily positioned as desired, without affecting the adjustment of the associated parts of the apparatus.

Other objects and advantages of the invention will be apparent from the description set out below when taken in connection with the accompanying drawings.

In the drawing in which like characters of reference designate like parts throughout the several views thereof;

Fig. 1 is a front elevation of one side of the flow box and of a paper making machine, showing a deckle strap supporting mechanism embodying this invention;

Fig. 2 is a vertical section of the device, along the line 2—2 of Fig. 1, looking in the direction of the arrows;

Fig. 3 is an end elevation of the device shown in Fig. 1;

Fig. 4 is a plan view of the same device;

Fig. 5 is an end elevational view of the device of the deckle strap supporting mechanism in elevated position to permit of changing the wire;

Fig. 6 is a detail view of one feature of the device; and

Fig. 7 is a fragmentary view of a slightly modified form of the invention.

As showing a preferred embodiment the invention is illustrated in connection with a Fourdrinier type of paper making machine. In a machine of this type the pulp, or other fibrous material, suspended in water, is supplied to a flow box whence it is fed through a suitable opening, at the desired rate, across a flow directing apron onto the traveling wire, which may or may not be given a transverse

oscillatory motion, this wire being endless and suspended upon two rotatable rolls. The roll at the flow box or inlet end is called a breast roll and the roll at the other or outlet end of the wire is called the couch roll. The thickness or weight of the paper sheet being formed is controlled by varying the rate at which the stock is flowed upon the wire. Ordinarily this is accomplished by varying the effective area of the opening through which the stock flows from the flow box. In addition to varying the weight of the paper, the width of the sheet of paper being formed is varied to meet different conditions. In order to control the lateral spread of the stock after it is flowed upon the wire two deckle straps are used, these straps being endless rubber belts, which ride over supporting pulleys positioned at opposite ends of the forming wire, the lower half of the belt riding upon the wire and serving as a fence or dam to limit the spread of the stock. When it is desired to vary the width of the sheet of paper it is necessary to vary the positioning of the deckle straps; and at the same time control the flow of the stock so that the proper amount will be fed between the deckle straps. This invention has particularly to do with mechanism constructed for readily varying the positioning of the deckle straps, and concomitantly controlling the flow of the stock, without the necessity of disturbing the setting or adjustment of any associated parts of the apparatus.

In the drawing the flow box is designated generally by the numeral 10, and this box has an outlet opening 11 through which the stock is fed to the paper forming part of the machine. Associated with this outlet opening is an apron 15, which is preferably pivotally mounted upon some fixed part of the flow box or its frame work, so that it may be swung upwardly about its pivots as desired. Downward movement of the apron is limited by a stop 16. This apron is extended a sufficient distance to overlie the breast roll 18, which is rotatably mounted and constructed in any suitable conventional manner. This breast roll carries a wire 20, and it will be noted that the apron overhangs the breast roll such a distance that its free edge lies substantially in a perpendicular plane passing through the axis of the breast roll. The apron is cut away at its forward or inlet edge as shown

at 21 to correspond to the curvature of the breast roll and the wire carried thereby.

In order to vary the thickness or weight of the paper, as desired, the quantity of stock which is flowed, per unit of time, upon the wire is ordinarily varied. In order to control the rate of flow of the stock upon the wire means is provided for varying the effective vertical opening through which the stock flow from the floor box to the wire. This means is in the trade usually referred to as an "inlet", and wherever the word inlet is used herein it is meant to designate that mechanism associated with the flow box, and the outlet opening 11 thereof, which controls the rate of flow of the stock, per unit of width of the wire, from the flow box to the wire, and includes among other elements the apron 15 and a lip member designated generally by the numeral 30, which lip member is adjustable with respect to the apron so that the effective vertical opening between the lip member and the apron may be varied as desired.

As shown the lip member 30 comprises an upper plate 31. This plate 31 is provided along its rear edge with an enlargement which is substantially circular in cross section this enlarged portion at each of its opposite ends being provided with an extension in the nature of a stub shaft which is journaled in the frame 12. Mounted within the outlet opening of the flow box is a curved plate member 40 the front edge of which is recessed to receive the enlargement 33. This construction is such that the lip member may be swung up or down upon the supporting shaft portions 34, the recessed front edge of the member 40 serving to support the enlargement 33 throughout its length. Preferably the enlargement 33 and the recessed edge of the member 40 are constructed to give a sliding fit as the members rotate relative to each other. In order to assist in retaining the enlargement in place within the recessed edge of the plate 40 a retaining plate 41 is preferably bolted upon the upper face of the plate 40 this retaining plate being extended to overhang the enlargement 33 and thus retain it in position during operation.

The plate member 31 is provided intermediate its width with a shoulder having a circular recess 45, which extends across the face thereof. Mounted in this recess is a cylindrical enlargement 46, carried by the rear edge of the flexible plate 47. A retaining plate 48 is bolted to the front face of the plate or supporting member 31, this plate having a recess 49 therein adapted to register with, and be complementary to, the recess 45, the plate 31 and the retaining plate 48 thus functioning together to provide a recess receiving the enlargement 46. Adjacent its front edge, the retaining plate 47 has attached thereto, at suitable intervals, socket members which are attached thereto in any suitable way. These

members are shown in the drawing as being riveted to the plate 47 it being of course obvious that after attachment the ends of the rivets extending through the plate 47 would be dressed down to provide a smooth surface, as the existence of irregularities or projections upon the lower face of the flexible plate 47 would result in the accumulation of stock, or impurities, during operation of the device and such accumulation would in turn tend to make irregular the effective vertical opening through the inlet. If desired these socket members 50 may be brazed or soldered or attached in any other desired manner to the flexible plate. This flexible plate may be of any suitable flexible material, but brass constitutes a very satisfactory material, since it is sufficiently flexible, and may be readily deformed, and at the same time is not subject to corrosion in the presence of water which is inevitably present in paper making machines. Each of the socket members has positioned therein, when the device is assembled, the head 52 of an adjusting bolt 53, which bolt is threadedly mounted within a bushing 54, this bushing being in turn threadedly mounted within a suitable passage in the plate 31. The adjusting bolt 53 and the bushing 54 are each provided with suitable hand wheels or the like, 55, for use in manipulation thereof. After the adjusting bolts are positioned to give desired warping or local adjustment of the flexible plate, the bushings 54 are manipulated to bring the lower end into frictional engagement with the upper face of the socket member to lock the device in desired adjusted position.

During the paper making operation impurities tend to collect within the inlet, especially where hard water,—that is water having considerable quantities of chemicals in solution therein,—are used. And such collected impurities will often materially vary the effective opening through the inlet. In order that the paper produced may be uniform throughout, it is necessary that substantially even distribution of the stock over the wire shall be secured. For if a greater quantity of stock is flowed to one portion of the wire than to another the paper will be thicker where this greater quantity of stock is flowed than it will be at the place where a lesser quantity of stock flowed. Any material variation in the effective opening through the inlet, therefore, will result in uneven distribution and non-uniformity in the paper. By means of the apparatus herein described this non-uniformity of flow may be prevented. For by properly manipulating the adjusting bolts 53 the edge of the flexible plate 47 may be locally adjusted or warped to give a vertical opening that will give a uniform rate of flow across the entire inlet.

It is to be understood, of course, that in addition to this local adjustment or warping of

the flexible plate 47 the entire lip member may be swung as a whole about the pivot shafts 34. The effective opening through the inlet for producing a given weight or
 5 grade of paper, is secured by swinging the lip member about its pivots. Then local adjustment, or fine adjustment or warping, of the flexible member 47 may be secured through suitable manipulation of the adjusting bolts 53.

It is to be noted that the joint between the enlargement 33 and the plate 40 is such that whatever may be the positioning of the lip member the lower surface of the members 40
 15 and the supporting member 31, which surfaces are in contact with the flowing stock, will be unbroken and thus present no irregularities tending to cause the accumulation of impurities or the like. And the same thing
 20 is true with respect to the joint between the flexible plate 47 and the supporting member 31.

For effecting adjustment of the lip member as a whole one of the pivot shafts 34, extends entirely through the frame 12 and is
 25 provided at its outer end with a gear 60, preferably a worm gear of brass or the like. Co-operating with this worm gear 60 is a worm pinion 61, mounted upon a suitable shaft 62, which is rotatably supported by the frame
 30 12, this shaft having a hand wheel 63 upon the upper end thereof. By proper manipulation of the hand wheels rotary motion may be imparted to the pivot shaft 34 to swing the
 35 lip member up or down as desired. In order to assist in operation of the machine, in the changing of the effective opening through the inlet, the gear 60 is provided on its outer face with suitable indicating marks 65, a
 40 pointer 66 being attached adjacent the gear so that by means of suitable indicating characteristics, any desired positioning of the lip member to secure a given rate of flow of the stock may be secured.

45 Attached to the end of the flow box, or the frame work supporting it, is a bar 71, the front end of which extends beyond the front face of the flow box.

Rigidly secured to the front of the flow box
 50 are supporting standards 72. These standards 72, and the forwardly extending end of the bar 71, are provided with aligned passages within which is journaled the shaft 73. Pivotaly mounted upon the shaft 73 are sup-
 55 porting arms 74, the free end of each arm being threaded, and preferably reduced in cross section, as indicated by the numeral 75. Slidably supported upon the threaded portion 75 of these arms is a channel bar 76, having
 60 transverse passages therein of such size as to receive the threaded portions 75 in freely slidable relation. Threadedly mounted upon each of the portions 75 on each side of the channel bar 76 are two adjusting nuts 77, by
 65 manipulation of which the channel bar 76

may be moved back and forth along the threaded portions 75, toward or away from, the flow box. The supporting bars 74 are held against movement lengthwise of the shaft 73 by means of suitable collars or
 70 spacers 78.

Rigidly supported upon the front of the flow box and located respectively beneath the supporting members 74, are a plurality of
 75 lugs or projections 80. Each of the projecting members 80 is provided with an upstanding threaded extension 81, and each of the supporting members 74 is provided with an elongated passage 82 adapted to receive the
 80 upstanding projection 81. This projection 81 is threaded, and adapted to receive an adjusting nut 83 thereon.

Rigidly but removably secured to the apron, and to the front of the flow box or the supporting frame for the flow box is an end
 85 plate 90, which is positioned to fit snugly against the end of the lip member and to thus act as a dam to prevent the outflow of the stock through the end of the inlet mechanism.

The channel bar 76 is provided with a channel 95, the inner end of which is enlarged and substantially circular in cross section, as clearly shown in Fig. 2. Slidably mounted
 95 within this channel is a plate 100, the upper edge of which is shaped to fit snugly but slidably in the channel 95. This plate 100 extends downwardly into contact with the apron 15, and throughout the greater portion of its height is curved, the curved portion being
 100 so arranged as to contact with the free edge of the lip member throughout the normal range of adjustment of said lip member. This arrangement is such that as the lip member is swung up or down, as it is adjusted,
 105 its free edge will at all times contact with the cooperating face of the curved portion of the plate 100 to prevent leakage of stock. Pivotaly mounted upon the outer free end of the shaft 73 is a supporting arm 110, the rear
 110 end of which is provided with an upwardly opening slot 111, adapted to receive an out-standing stop member 112, preferably carried by the bar 71. This stop member is provided with a lock nut 113 which when tight-
 115 ened will hold the supporting arm 110 against pivotal movement, but when loosened will permit of swinging that arm upon the shaft 73.

The forward portion of the bar is arched,
 120 as shown in Fig. 2, to clear the associated mechanism, and is provided with a threaded passage in its forward end within which is threadedly positioned the shaft 115. This shaft is also rotatably mounted in aligned
 125 passages within the supporting extensions 116, carried by the plate 100. These extensions extend upwardly and terminate in enlargements 117 having bearing passages therein, each of the enlargements being pref-
 130

erably provided with a removable cover 118 which permit of ready assembling of the device.

The threaded shaft 115 is provided at its inner end with a flange 120 and with an axially arranged threaded socket adapted to have threaded therein an extension 121, having an enlarged head, this extension serving to support, in freely rotatable relation, the deckle pulley 125. This deckle pulley is shown as flanged, to carry the deckle strap 126, but the construction of the pulley shown is not meant to be in any way a limitation as any suitable form of deckle pulley may be used. Carried by the plate 100 and extending forwardly from the lower inner corner thereof is a V-shaped plate 130, which is tightly connected to the plate 100, and serves, with the deckle strap, to prevent the lateral spread of the stock flowed through the inlet onto the paper forming part.

The threaded shaft 115 is provided with an operating wheel 132 upon its outer end by means of which the shaft may be rotated. As the shaft rotates it moves with reference to the supporting bar 110, which bar is during operation fixed with relation to the inlet and flow box with respect to transverse movement, and as a consequence the plate 100, with its associated parts, including the deckle pulley, is moved transversely of the inlet, in one direction or the other depending on the direction of rotation of the shaft. By proper manipulation of the shaft 115, therefore, the deckle strap may be moved to increase or decrease the width of the formed sheet of paper, as desired. And at the same time the plate 100 is correspondingly moved, this plate cooperating with the apron, the front end of the lip member, and the front face of the plate 90, to limit the effective width of the inlet and to prevent the escape of stock through the inlet throughout the extent of the plate. As a consequence the effective width of the inlet is varied as the plate 100 and supported deckle strap are moved in one direction or the other.

Inasmuch as there is a substantial head in the flow box which tends to cause leakage of the stock through any openings, it is desirable to maintain the plate 100 in close contact with the apron, the front of the lip member, and the front end of the plate 90. By proper manipulation of the adjusting nuts 77 the channel bar 76, together with the plate may be moved backwardly or forwardly in order to hold the plate snugly against the front edge of the lip member and the front ends of the plate 90. By screwing down upon the adjusting nuts 83 the pivoted supporting member 74 may be swung downwardly around the shaft 73 to hold the lower face of the plate 100 closed against the apron. As a result leakage through the device is substantially prevented while adjustment to give the desired width may be

readily accomplished. Of course, during transverse movement of the plate 100 the various adjusting nuts may be loosened as needed to permit free movement of the parts.

As is well known the length of life of the wires which are used in paper making machines is limited, and in actual practice these wires must be changed about every ten days to two weeks. In changing the wire, which is endless, it is of course necessary to so move the breast roll and the couch roll relative to each other that the wire may be readily removed and a new wire slipped in place after which the breast roll is replaced in its normal operating position. In many paper making machines the breast roll is arranged so that it may be moved to effect changing of the wire without disturbing the setting of the inlet, the deckle strap apparatus, and associated parts. And with such a machine the apparatus as thus far described is entirely satisfactory. With many paper making machines, however, the breast roll is so mounted that in changing the wire it must be lifted bodily upwardly. Where it is desired to thus remove the breast roll the plate 100 and supporting deckle mechanism are swung upwardly upon their mountings into inoperative position and out of the path of the breast roll. The end plate 90 is then removed after which the apron may be swung upwardly upon its pivot mountings thus moving the elements of the inlet from position overhanging the breast roll. In Fig. 7 is shown a slightly modified form of construction which is adapted to permit of moving the breast roll upwardly, in such a form of paper making machine, without the necessity of disturbing the mounting of the inlet and deckle parts. In this arrangement the plate 90' is not mounted on top of the apron, as in the form of device described above, but is carried by the flow box or the frame work supporting the flow box, and held snugly positioned against the end of the apron 15', as well as against the end of the lip member. And also in this construction, as will be evident from the drawing, the plate 100 overhangs the apron, so that it is in contact with the front edge of the apron, just as it is in contact with the front edge of the lip member.

In this modified form of construction the lip member and the apron are interconnected so that by proper manipulation of the hand wheel 63 the lip member may be swung upwardly into inoperative position at the same time carrying the apron along with it. This connecting means is preferably detachable so that it may be disconnected when the inlet is in operative position to permit of free adjustment of the lip member. A very satisfactory form of attaching means is that shown in the drawing which consists of a chain 140, the end links of which are connected to the top plate

31' and the apron 15' respectively, by means of bolts or screws, or in any other suitable way. If desired the end links may be formed so that they may be readily slipped on or off the screws 141, or the device may be so arranged that the chain and the screws are entirely removed from the inlet by unscrewing the screws. By means of this construction, when it is desired to move the breast roll upwardly so as to change the wire, the adjusting nuts 83 are first removed. Then the adjusting nuts 77 and 113 are loosened. The plate 100, and its associated mechanism, then, along with the deckle pulley, is swung upwardly about the shaft 73. Proper manipulation of the hand wheel 63 will then cause the apron and the lip member to swing upwardly so that the breast roll may be readily moved to slacken the wire so as to effect the changing of the wire.

While the forms of apparatus herein described constitute preferred embodiments of the invention, it is to be understood that the invention is not limited to these precise forms of apparatus, and that changes may be made therein without departing from the scope of the invention which is defined in the appended claims.

What is claimed is:

1. In apparatus of the character described comprising a paper forming part and a source of supply of paper making stock; inlet means for flowing a stream of the paper making stock of controlled thickness upon the paper forming part, and means for varying the effective width of the stream of flowing stock without movement of the parts of said inlet means which effect such thickness control.

2. In apparatus of the character described comprising a paper forming part and a source of supply of paper forming stock; an inlet for directing a stream of said paper forming stock from the source of supply onto the paper forming part, and means separate from said inlet for varying the effective width of the said inlet without affecting any other adjustment of said inlet.

3. In apparatus of the character described comprising a paper forming part and a source of supply of paper making stock; an inlet associated with said source of supply for flowing a stream of the paper making stock upon the paper forming part, and means for varying the thickness of the stream of stock flowing through the said inlet, said means comprising a locally adjustable plate, and means for independently varying the effective width of the said inlet without movement of said locally adjustable plate.

4. In apparatus of the character described comprising a paper forming part and a flow box having an outlet opening therein; an inlet for flowing a stream of paper making stock upon the paper forming part, and means for varying the effective width of the stream of

flowing stock, independently of other control of the stream of stock, said means being constructed to be moved to inoperative position without disturbing the setting of the said inlet.

5. In apparatus of the character described comprising a paper forming part and a flow box having an outlet therein; an inlet associated with said outlet opening for flowing a stream of the paper making stock upon the paper forming part, said inlet being adjustable to vary the thickness of the stream of stock flowing therefrom, and means for varying the effective width of the inlet independently of other setting of the said inlet, said means being constructed to be moved to inoperative position without disturbing the setting of the said inlet.

6. In apparatus of the character described comprising a forming part and a flow box having an outlet opening therein; an inlet associated with said outlet opening comprising an adjustable plate, means for warping the front edge of said plate to locally vary the thickness of the stream of stock flowing through the said inlet, and means for varying the effective width of the said inlet opening and constructed to be swung upwardly to inoperative position without disturbing the setting of the said inlet parts.

7. In apparatus of the character described comprising a paper forming part and a source of supply of paper making stock; an inlet associated with said source of supply for flowing a stream of the paper making stock upon the paper forming part, means for varying the thickness of the stream of stock flowing through the said inlet, said means comprising a locally adjustable plate, means for varying the effective width of the said inlet without disturbing the said thickness-varying means, and a deckle strap pulley carried by the width varying means.

8. In apparatus of the character described comprising a paper forming part and a source of supply of paper making stock; an inlet associated with said source of supply for flowing a stream of the paper making stock upon the paper forming part, means for varying the thickness of the stream of stock flowing through the said inlet, said means comprising a locally adjustable plate, means for varying the effective width of the said inlet independently of other flow controlling setting thereof, and a deckle strap pulley carried by the width varying means, the construction being such that the width varying means and deckle pulley may be moved together into inoperative position.

9. In apparatus of the character described comprising a paper forming part and a source of supply of paper making stock; means for flowing a stream of the paper making stock upon the paper forming part, means for varying the effective width of the stream of flow-

ing stock independently of other control of the stream of stock, a deckle strap pulley carried by the width varying means, and means for swinging the deckle strap pulley 5 and the width varying means upon the regular mounting of the said width varying means to inoperative position.

10. In a machine for making paper, comprising a paper forming part and a flow 10 box having an outlet opening therein; a movably mounted inlet associated with the said outlet for flowing a stream of the paper making stock upon the said paper forming part, and means associated with said inlet for 15 varying the effective width thereof, said width varying means being movable to inoperative position without affecting other setting of the inlet.

11. In a paper making machine comprising a paper forming part and a flow 20 box having an outlet therein; an inlet pivotally mounted in association with the said outlet opening for flowing a stream of the paper making stock upon the paper forming part, 25 width varying means pivotally mounted adjacent said inlet, means for adjusting the said width varying means for controlling the effective width of the said inlet, and means for moving the varying means upon its 30 mountings without disturbing the setting of the inlet.

12. In apparatus of the character described comprising a paper forming part and a source of supply of paper making stock; an inlet 35 associated with said source of supply for flowing a stream of the paper making stock upon the paper forming part, means for varying the thickness of the stream of stock flowing through the said inlet, said means comprising a locally adjustable plate, and means for 40 varying the effective width of the said inlet independently of other flow controlling setting thereof, and means for holding the adjustable plate in substantially tight contact 45 with respect to the inlet to prevent leakage of the paper making stock.

13. In a paper making machine comprising a paper forming part and a flow box having an outlet opening therein; an inlet 50 associated with said outlet opening for flowing a stream of the paper making stock upon the paper forming part, said inlet comprising an apron, and an adjustable lip associated therewith; and width varying means co- 55 operating with the said inlet for varying the effective width of the said inlet independently of other adjustment of the inlet, said width varying means comprising an adjustable plate, means for adjusting the plate down-

wardly against the apron, and means for ad- 60 justing the plate horizontally against the front edge of the said lip.

14. In apparatus of the character described comprising a paper forming part and a source of supply of paper making stock; means for 65 flowing a stream of paper making stock upon the paper forming part, means for independently varying the effective width of the stream of flowing stock without disturbing the setting of said means for flowing the 70 stream of stock, and means carried by the width-varying means for limiting the lateral spread of the stock on the wire.

15. In apparatus of the character described comprising a paper forming part and a source of supply of paper making stock; an inlet 75 associated with said source of supply for flowing a stream of the paper making stock upon the paper forming part, means for varying the thickness of the stream of stock flow- 80 ing through the said inlet, said means comprising a locally adjustable plate, means for varying the effective width of the said inlet without disturbing the said thickness-varying means, and means carried by said width- 85 varying means for limiting the lateral spread of the stock on the wire.

16. In apparatus of the character described comprising a paper forming part and a source of supply of paper making stock; an inlet 90 associated with said source of supply for flowing a stream of the paper making stock upon the paper forming part, means for varying the thickness of the stream of stock flowing through said inlet, and a separate 95 means for varying the effective width of the stream of flowing stock, said latter means comprising an adjustable plate horizontally slidable against the front edge of said inlet.

17. In apparatus of the character described 100 comprising a paper forming part and a source of supply of paper making stock; an inlet associated with said source of supply for flowing a stream of the paper making stock upon the paper forming part, said inlet including 105 an adjustable lip member, and a separate means for varying the effective width of said inlet independently of other adjustment of the inlet, said width varying means comprising an adjustable plate horizontally slidable 110 against the front edge of said lip member, said plate being shaped to contact with the front edge of said lip member in all operative positions of adjustment of both said plate and said lip member. 115

In testimony whereof I hereunto affix my signature.

RALPH E. HEISEL.