

April 19, 1938.

A. KÜNZLE

2,114,716

APPARATUS FOR OPERATING UPON TEXTILE WEBS

Filed Nov. 13, 1936

5 Sheets-Sheet 1

FIG. 1.

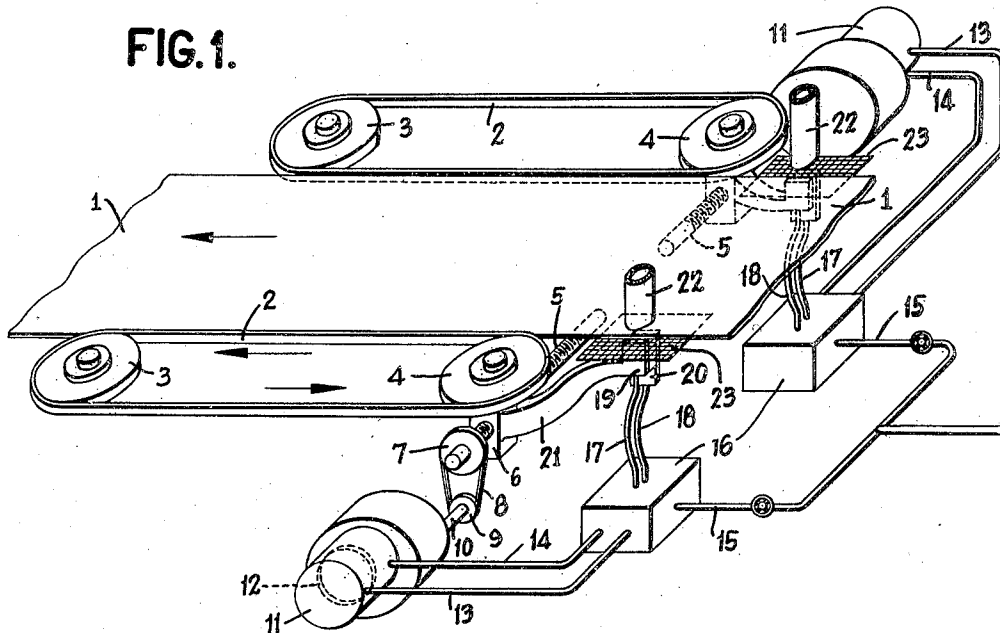


FIG. 2a.

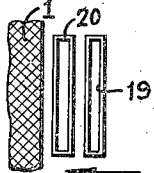


FIG. 2.

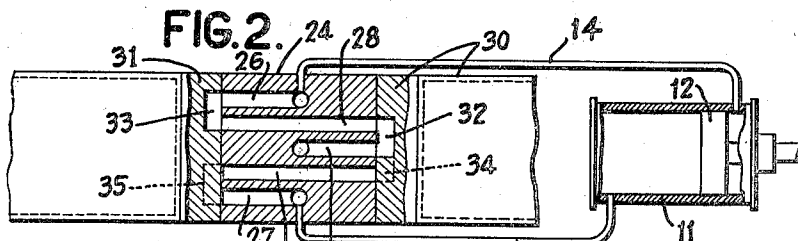


FIG. 3a.

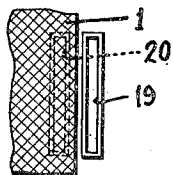


FIG. 3.

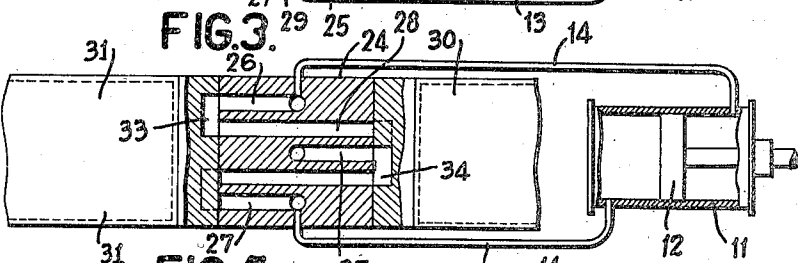


FIG. 4a.

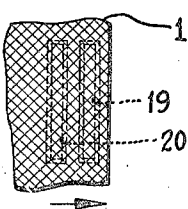
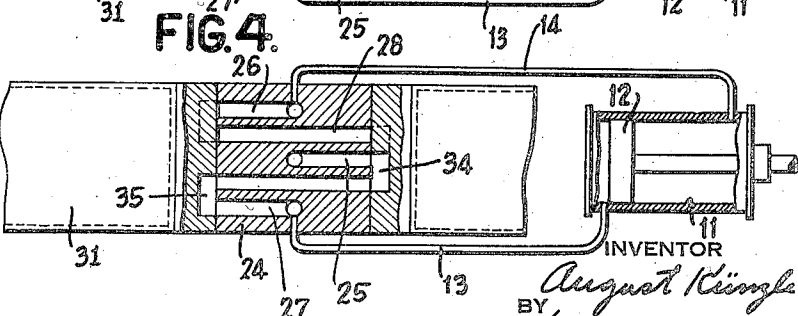


FIG. 4.



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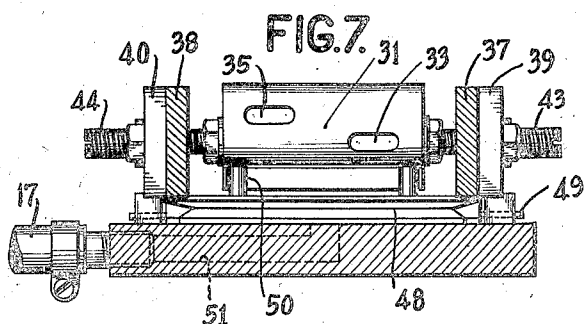
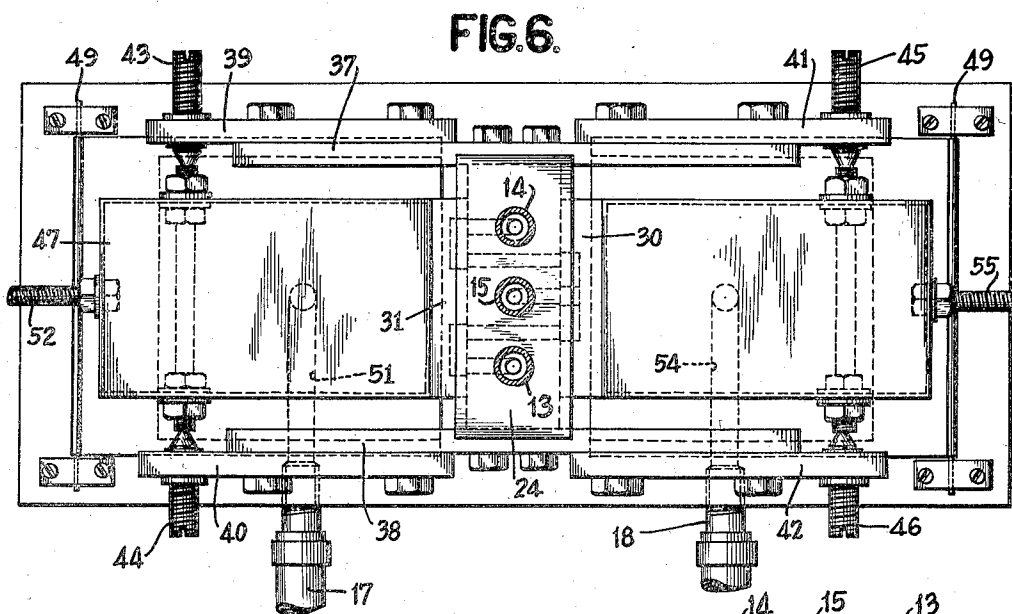
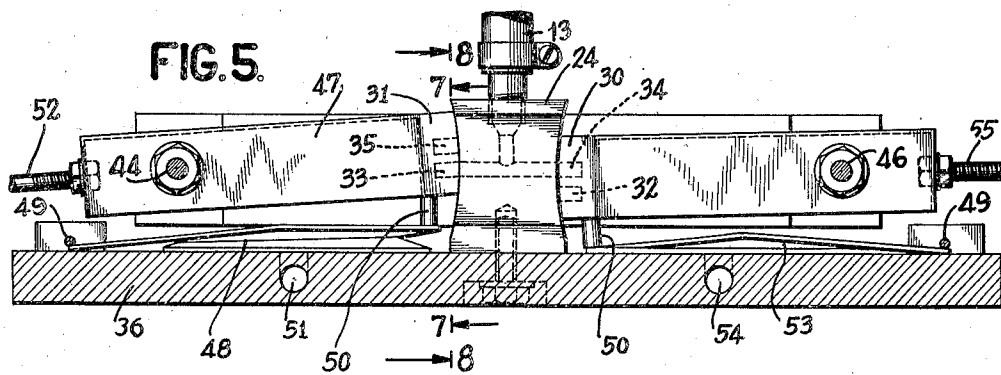
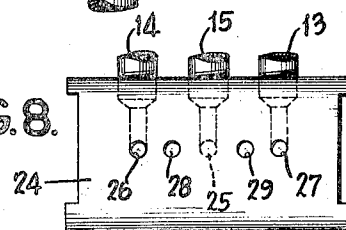


**FIG. 8.**



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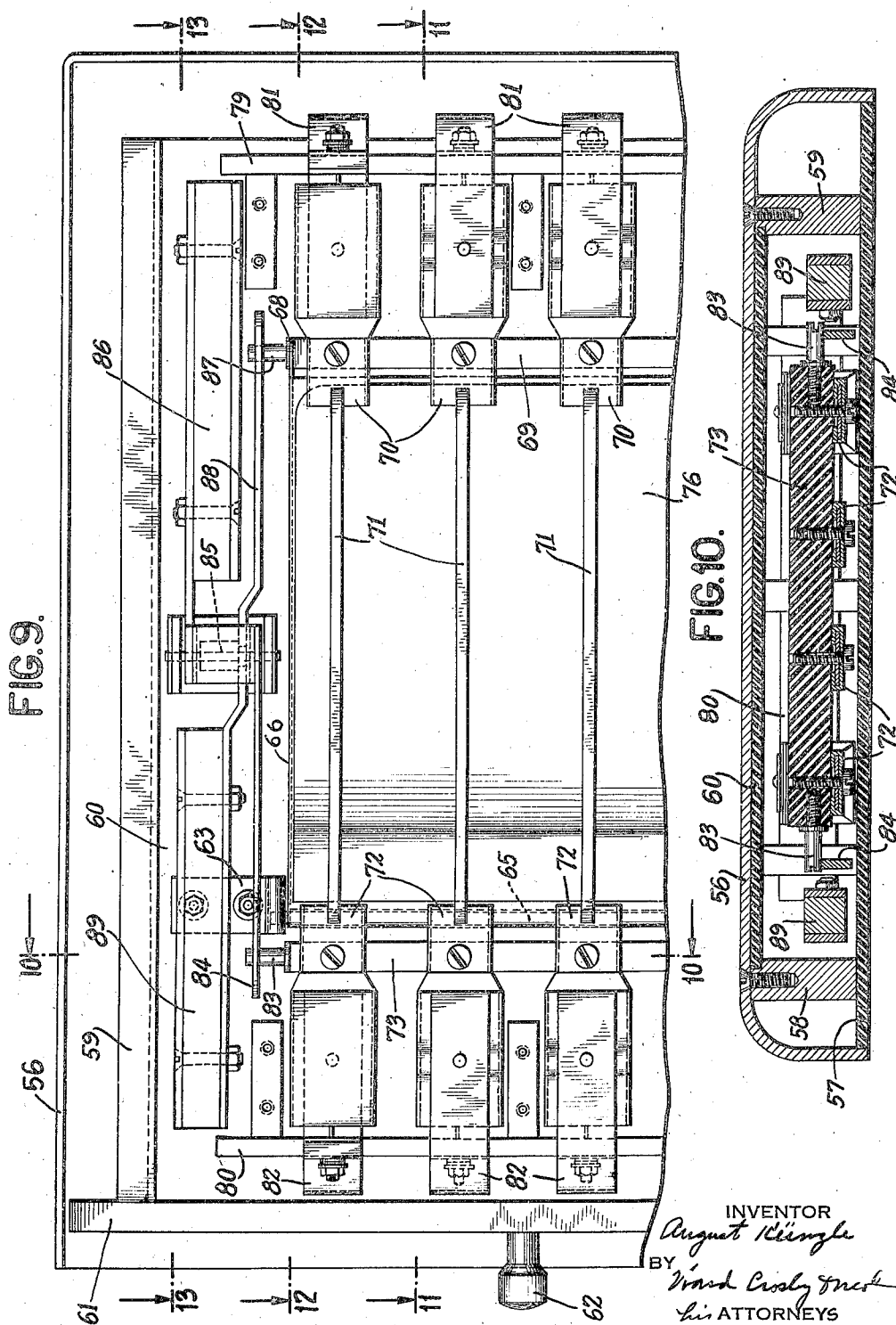
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APPARATUS FOR OPERATING UPON TEXTILE WEBS

Filed Nov. 13, 1936

5 Sheets-Sheet 3



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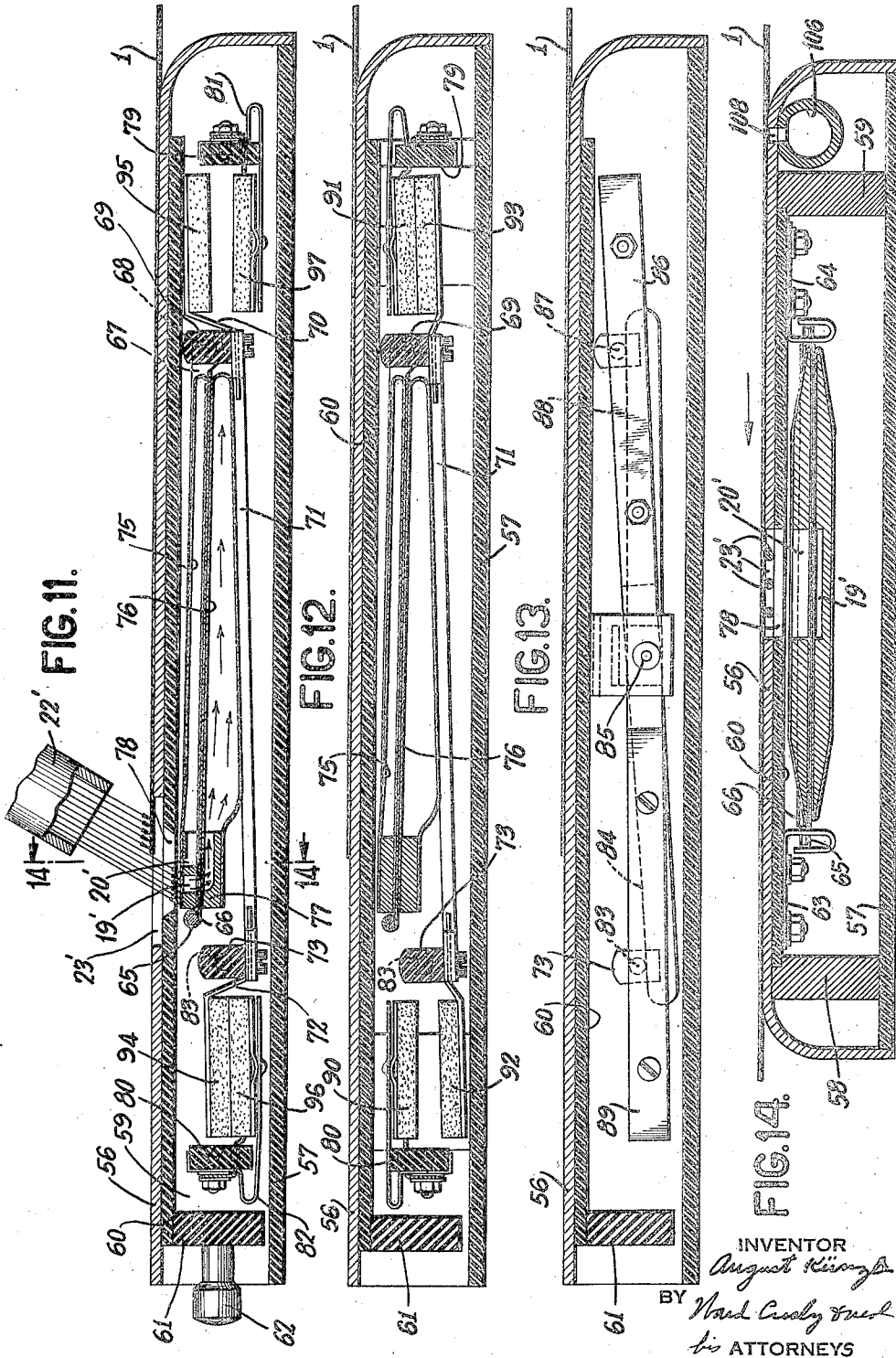
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APPARATUS FOR OPERATING UPON TEXTILE WEBS

Filed Nov. 13, 1936

5 Sheets-Sheet 4



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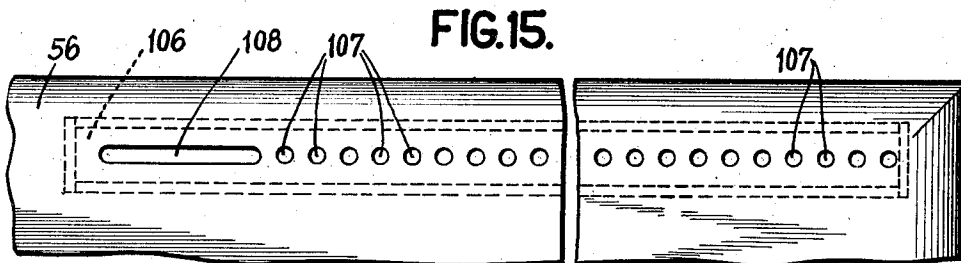


**FIG. 16a.**

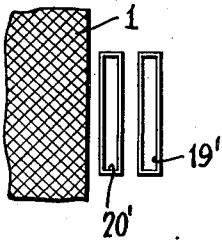


**FIG. 17a.**

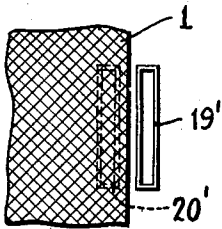
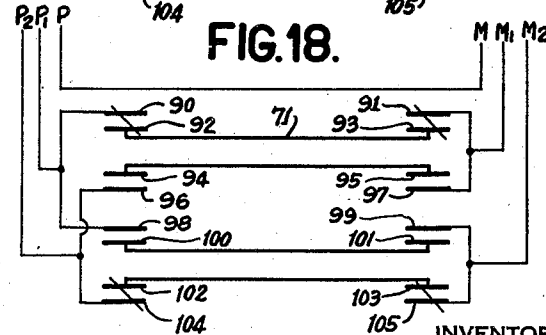
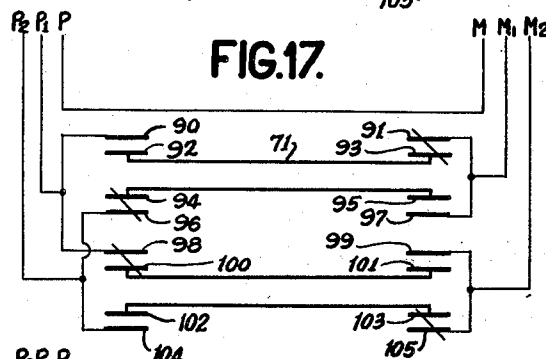
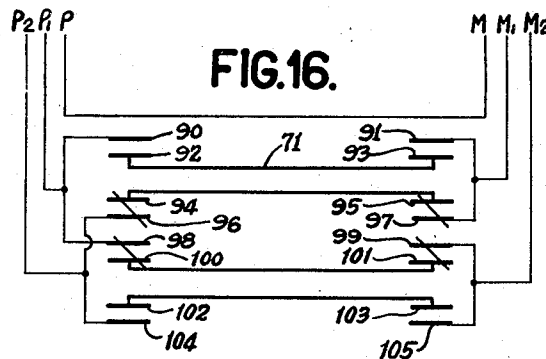
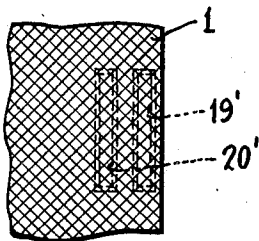


**FIG. 18a.**



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## UNITED STATES PATENT OFFICE

2,114,716

## APPARATUS FOR OPERATING UPON TEXTILE WEBS

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Application November 13, 1936, Serial No. 110,748  
In Germany November 25, 1935

12 Claims. (Cl. 26—57)

This invention relates to apparatus for operating upon textile webs and has to do more particularly with such apparatus wherein means is employed for holding a textile web adjacent its respectively opposite longitudinal edges while conducting said web in a longitudinal direction. More specifically, the invention has to do with the adjustment of such holding and conducting means in order that the web in its progressive travel may be uniformly and accurately engaged along its longitudinal edges by said holding means.

In numerous textile operations means are well known for holding textile webs and conducting them through suitable processing or finishing stages or the like, such, for example, as so-called stretching frames, which may be either tentering or non-tentering in operation, and the particular type of holding means may be either by clamp chains, needle chains or the like, well known to those skilled in this art.

In introducing the web into apparatus of this character, the necessary adjustment of the holding means with relation to the respective edges of the textile web has heretofore been attempted by means of mechanical feeler-fingers operable by the edges of the web, and in turn controlling actuating means for effecting said adjustment; but this has not satisfactorily solved the problem, especially where the textile web is a very fine fabric or where it is introduced without substantial tension. In such cases the easily yieldable nature of the web edge does not present sufficiently positive pressure to effect an accurate and timely adjustment. Numerous other proposals have also proven unsatisfactory because of a lack of sensitivity in operating upon thin fabrics, and more especially where such fabrics are either of substantially fine texture or relatively open texture.

An object of this invention is to provide greatly improved apparatus for adjusting said holding means, wherein suitable sensitivity of control and accuracy of movement is provided for all types of textile webs even when of very fine texture and of relative open weave.

Another object is to provide an effective and dependable apparatus capable of varied application and having the desired characteristics while being free from the above-mentioned shortcomings.

Further and more specific objects, features and advantages will more clearly appear from the detailed description given below taken in con-

nection with the accompanying drawings which form a part of this specification.

Referring to the drawings:

Fig. 1 is a partly diagrammatic perspective view illustrating an embodiment of the invention wherein pneumatic control units are utilized to actuate fluid pressure motive means for effecting the desired adjustment of the holding means in accordance with the position of the edges of the incoming textile web;

Fig. 2 is a somewhat diagrammatic view, partly in section, illustrating one position of the control unit and fluid motive means to cause the adjustment in one direction;

Fig. 3 is a view similar to Fig. 2 showing the control unit and fluid motive means in a neutral position;

Fig. 4 is a similar view showing the same parts in a position to cause the adjustment in a direction opposite to that in Fig. 2;

Figs. 2a, 3a, and 4a are somewhat diagrammatic views showing the positions of the web relative to parts of the apparatus in positions corresponding respectively to conditions illustrated in Figs. 2, 3, and 4;

Fig. 5 is a front elevation of the control unit illustrated somewhat diagrammatically in the preceding figures;

Fig. 6 is a plan view of the unit of Fig. 5;

Figs. 7 and 8 are sectional views taken respectively at 7—7 and 8—8 of Fig. 5;

Fig. 9 is a partial bottom plan view of a modified form of control unit for electrical motive means;

Figs. 10, 11, 12, and 13 are cross sections taken respectively at 10—10, 11—11, 12—12 and 13—13 of Fig. 9 and inverted into upright position for clarity;

Fig. 14 is a cross section taken at 14—14 of Fig. 11;

Fig. 15 is a partial plan view of the top of the unit of Figs. 9—14, inclusive, showing further details;

Figs. 16, 17, and 18 are diagrammatic views illustrating the various positions and circuit connections of the modified control unit for the three phases of adjustment corresponding to those of Figs. 2, 3, and 4; and

Figs. 16a, 17a and 18a are somewhat diagrammatic views showing the position of the web relative to parts of the apparatus in positions corresponding respectively to the phases of Figs. 16, 17, and 18.

In the figures of the drawings above designated and in the following description of the apparatus,

only such portions of previously known apparatus are included as will indicate the embodiment of the present invention in conjunction with such well-known apparatus.

Referring to Fig. 1: the textile web 1 is shown being fed in the direction indicated by the arrow and its movement is being accomplished by suitable means diagrammatically illustrated as chain units such as 2 passing around carrier wheels such as 3 and 4 and driven in the direction indicated by the arrows by suitable means not shown. The chain units 2 may be either in the form of clamp chains or needle chains or the like, and for the purposes of illustrating the invention these chain units will be assumed to be clamp chains comprising well known clamp elements actuated in a well-known manner to clamp the marginal edge of the fabric as it enters the said units. These clamp chains and cooperating parts, being well-known elements in so-called stretching frames to those skilled in the art, will not be described in further particularity and as is well understood the carrier wheels such as 4 are adapted to be individually moved toward and away from each other, and hence in a direction transverse the longitudinal direction of the web by means of adjusting screws such as 5 which are each engaged by a screw threaded portion 6 rigidly attached to and movable with the axis of each of the carrier wheels 4 so that by rotation of the screws 5 the carriers 4 and adjacent portions of the chains 2 are moved inwardly or outwardly depending upon the direction of rotation of the respective screws 5. Since these individually operating elements are identical, the following description relative to the present invention will be understood to be applicable to each of the clamp chains 2 and related adjusting mechanism and control means therefor.

In the present embodiment of the invention as illustrated in Fig. 1, the screw 5 carries at its outer end a sprocket 7 which is driven through a chain 8 by means of a sprocket 9 carried on a shaft 10 which is rotated by a suitable power train (not shown) by fluid motive means; the fluid being introduced into the cylinder 11 to actuate a piston 12 which is interconnected with said power train to cause the rotation of the shaft 10. This fluid pressure, such for example as air, is introduced into the cylinder 11 on one side or the other of said piston by means of pipes 13 and 14, which are selectively connected to a suitable source of the operating fluid, such as compressed air, by means of the pipe 15. The selective connection of the pipes 13 and 14 to the supply pipe 15 is effected by means of the control unit 16 (to be more particularly described following) and the control unit 16 is pneumatically actuated by low pressure air supplied through flexible tubular connections 17 and 18 which are in communication with orifices 19 and 20 rigidly connected together and supported by an arm 21 which is rigidly attached to the threaded portion 6 and which therefore causes the orifices 19 and 20 to move with the carrier wheel 4 and holding means associated therewith upon the rotation of the screw 5. Low pressure air for actuating the control unit 16 is supplied from a suitable source through the orifice 22, which is positioned above the orifices 19 and 20 on the opposite side of the web 1 therefrom and is preferably mounted for movement with said orifices 19 and 20. The supporting grid 23 is positioned above the nozzles 19 and 20 and is preferably spaced upwardly therefrom so as to sup-

port the marginal or selvage edge of the fabric several millimeters above the said nozzles and the lower end of the nozzle 22 is preferably positioned a greater distance above the said web of fabric 1. The grid 23, which may be in the form of an open mesh wire, serves to support the fabric in a level condition in the desired location with respect to the lower nozzles.

#### Operation

From the foregoing it will be understood that as the marginal edge of the fabric moves along over the supporting grid 23, its varying position inwardly or outwardly with respect to the nozzles 19 and 20 will uncover both nozzles, cover the innermost nozzle 20 or cover both nozzles in accordance with the degree and direction of movement of the edge of the web or fabric. This condition serves to actuate the control unit in the manner to be now more particularly pointed out with reference to Figs. 2-4, inclusive and 2a-4a, inclusive.

In the embodiment illustrated in these figures, the control unit 16 is in the form of a slide valve having a central relatively fixed member 24 provided with an intake passage 25, which is interconnected with the feed pipe 15, and with outlet passages 26 and 27, connected respectively with the pipes 14 and 13, and with additional transverse passages 28 and 29. The valve also has movable portions 30 and 31 provided with ports 32, 33, 34, and 35 serving to selectively interconnect the supply pipe 15 to either of the pipe lines 13 or 14 depending upon the setting of the valve. In Figs. 2 and 2a the edge of the web 1 is in a position where both of the nozzles 19 and 20 are uncovered, and in this position the ports and passages of the valve are set as shown in Fig. 2 so that the air coming in through supply pipe 15 passes through passage 25, port 32, passage 28, port 33, passage 26 into pipe 14, from where it is introduced into the cylinder 11 on the under or piston rod side of the piston 12 to cause a rotation of the screw 5 in a direction to move the arm 21 inwardly to thereby move the clamp chain 2 inwardly at its intake end (and simultaneously carrying along with it the nozzles 19 and 20) to thereby cause the clamping elements carried by the clamp chain 2 to move into position to accurately engage the marginal or selvage edge of the web 1. In Figs. 3 and 3a, the parts are shown in a position where this movement has been effected and the holding means have been positioned with respect to the edge of the web 1 in the desired location where the nozzle 20 is covered and the nozzle 19 is uncovered. Under this condition the movable valve elements 30 and 31 bring about a shifting of the ports so that neither the pipes 13 nor 14 are connected to the supply line 15, and hence the piston 12 is in its neutral position and is not supplied with any operating fluid on either side, this being the position diagrammatically illustrated in Fig. 1. Should the edge of the web then move so that it assumes the position illustrated in Fig. 4a, thereby covering both the nozzles 19 and 20, the movable parts of valve 16 will be so positioned that the supply line 15 will be interconnected with the pipe 13 to thereby introduce the operating fluid into the cylinder 11 on the outer or upper end of the piston 12 to thereby actuate the screw 5 in the opposite direction, and hence cause the adjustment to be the reverse of that illustrated in Fig. 2 and tending to return the parts to the neutral position illustrated in Fig. 3a; whereas

are rigidly connected to a corresponding series of four electrical connecting bars 71, whose opposite ends are rigidly secured to a similar series of four contact supporting plates 72, which in turn are rigidly attached to a cross bar 73 of insulating material (Fig. 10). The contact carrying plates 70 and 72 provide resilient mounting for carbon block contacts to be more particularly referred to hereinafter. The cross bars 69 and 73 and the interconnecting parts comprising the electrical connecting bars 71 form in effect a rigid framework, which is pivotally supported by the ends 68 from the bearing lugs 67 which in turn are carried by the plate 66 pivotally moved about the axis 65. Positioned between the supporting plate 60 and the plate 66 is an inflatable member such as the diaphragm 75, which may be in the form of a rubber bellows or the like, and which is substantially coextensive in area with the plate 66; and positioned between the plate 66 and the rods 71 is a similar inflatable member 76. The diaphragm 75 is in communication at one end with an orifice 20' and the diaphragm 76 is correspondingly in communication with an orifice 19'; said orifices being formed in the orifice block 77 which is rigidly secured to the plate 66. The said orifices 19' and 20' are in the form of long narrow slots (Figs. 11 and 14) which are positioned beneath an opening 78 in plate 60 and a registering opening in casing 56 which is provided with a coarse grid work 23' serving to support the fabric 1 and adapted to permit the passage of low pressure air therethrough. Mounted above the grid 23' and preferably attached to and adapted to be moved with the casing 56 is a low pressure air orifice 22'.

Suitably secured to the carrying plate 60 adjacent the opposite ends thereof are fixed contact supporting bars 79 and 80 of insulating material which carry in spaced relation a series of contact supporting plates such as 81 and 82 serving to flexibly support the carbon contact blocks in cooperative relationship to the blocks supported by the movable members 70 and 72. The arrangement of these blocks and the electrical circuit connections of the same may best be understood from the description of the circuit diagram to be referred to more particularly hereinafter; but at this stage it might be pointed out that these blocks are actuated by inflation of the diaphragms 75 and 76 in accordance with the introduction of low pressure air through the orifice 22' into the orifices 19' and 20' in accordance with the position of the overlying edge of the fabric web 1. When both of said orifices are covered by the fabric, the parts are returned to neutral position by means of counterweights arranged as follows (Figs. 9 and 13). The bar 73 is provided with a pair of trunnion pins 83 (see also Fig. 10) which overlie and engage a pair of counterweight arms, such as 84, which are pivoted on suitably supported axes, such as 85, and are rigidly connected to a pair of counterweights, such as 86; said counterweight mechanism serving to return the cross bar 73 and parts immediately attached thereto to an upward position when the diaphragm 76 is not supplied with air. Similarly, the bearing pins 68 carried by the cross bar 69 are provided with a pair of trunnion ends 87 similarly disposed with respect to a pair of cooperating counterweight arms 88, which are also fulcrumed on axes 85, and carry secured to the opposite ends thereof counterweights such as 89 (Figs. 9, 10, and 13), so that when the diaphragm 75 is not supplied with air the counterweights 89 serve to

return the bar 69 and the parts immediately carried thereby to an upward position.

Referring more particularly to Fig. 16 and to Figs. 9, 11, and 12: the sixteen carbon block contacts 90-105, inclusive, are arranged and interconnected as follows: the carbon blocks 93, 95, 101, and 103 being carried by the series of four movable contact plates 70 on one end of the movable frame; and the carbon contact blocks 92, 94, 100, and 102 being carried by the corresponding series of four movable plates 72 on the other end of the movable frame; the four relatively stationary carbon contact blocks 91, 97, 99, and 105 being carried on the four contact plates 81 supported on the bar 79; and the corresponding four blocks 90, 96, 98, and 104 being carried by the relatively fixed contact supporting plates 72 carried on the bar 73.

In the present preferred embodiment, a polyphase electrical motor is intended to be used, fed by the motor power lines M, M1, and M2 from a suitable three-wire power system P, P1, and P2 (Fig. 16), so that by reversing the two power lines P1 and P2 with respect to the two motor lines M1 and M2 the direction of rotation of the motor may be affected, the neutral power line P being connected directly to the motor line M. The blocks 90 and 98 are interconnected to P1, and the blocks 96 and 104 are interconnected to P2. Similarly, the blocks 91 and 97 are interconnected to M1, and 99 and 105 are interconnected to M2. The movable blocks 92-93, 94-95, 100-101 and 102-103 are interconnected in the respective pairs indicated by means of the connecting rods 71.

Referring to Figs. 14 and 15: a passageway such as pipe 106 is positioned within the casing 56 between one longitudinal edge thereof and the member 59, and is adapted to be suitably connected to a source of suction so as to suck air through the series of holes 107 (Fig. 15) and elongated slot 108 extending through the upper face of conduit 106 and adjacent portion of the casing 56. Means is thereby provided for sucking the fabric web 1 downwardly as it passes over the transversely extending openings 107 and 108 to thereby hold the edge of the web flat against the top of the control unit casing shortly prior to the position at which the incoming edge of the web is fed between the supply orifice 22' and the control orifices 19' and 20'. The elongated opening 108 is positioned in register in the direction of feed of the web with the elongated slot-like orifices 19' and 20' to provide for insuring increased action in holding the marginal edge of the fabric flatly in position just prior to the position at the orifices.

The spacing of the orifices 19'-20' and the orifice 22' relative to the plane of travel of the web 1 is preferably positioned as previously described with reference to the corresponding elements 19, 20, and 22. The control unit and associated orifice 22' is attached as by the arm 21 (Fig. 1), so as to move therewith, with the orifices 19' and 20' normally adjusted relative to the edge of the web as illustrated in Fig. 11 which corresponds to the initial setting of the position of the orifices 19 and 20, as illustrated in Fig. 1; it being, of course, understood that the corresponding unit is similarly positioned adjacent the opposite edge of the web 1 as previously stated with reference to the first embodiment illustrated in Fig. 1. With the control units in this position, the fabric will travel relative to the control units as indicated in Fig. 14 and each of the control units will operate in the manner now to be particularly pointed out.

if the relative movement between the edge of the web 1 and the nozzles 19 and 20 continues further than the position illustrated in Fig 3a to the position indicated in Fig. 2a, where both nozzles are uncovered, then the condition is as previously indicated. It will thus be seen that the adjustment of the holding means with respect to each respective edge of the fabric is under independent control so as to move the holding means adjacent each side of the web inwardly or outwardly depending upon the position of the web with respect to its predetermined neutral position at any instant.

#### *Details of control valve*

In Figs. 5-8, inclusive, details of construction are shown of a control valve which has been found to be satisfactory in operation. Referring to the said figures, 36 is the valve base on which is securely mounted the central stationary valve element 24 provided with the fluid supply and outlet passages previously described. To opposite ends of the fixed block 24 are secured bars 37 and 38, to the outer ends of which are secured pairs of arms 39, 40 and 41, 42; the first pair of said arms carrying journal pins 43, 44 and the second pair of said arms carrying corresponding journal pins 45, 46. Between each pair of said journal pins is positioned a carrying frame such as 47 which is suitably pivotally journaled on said pins so as to permit said carriers to swing upwardly and downwardly about the pivot points of said journals. One of said carriers carries at its inner end the movable valve block member 31 provided with the ports 33 and 35, and the other of said carriers similarly carries the movable block member 30 having the ports 32 and 34; said blocks 30 and 31 being provided with curved faces adapted for sliding contact with corresponding curved faces in the sides of the stationary block 24. An expansible element such as a bellows 48 is positioned beneath the movable block 31 and is preferably held in position by being pivotally secured adjacent one end as at 49 and is provided at its other end with a pair of studs 50, the upper ends of which engage the lower side of the movable block 31 serving to position the block accurately when the bellows 48 is deflated and to transmit the movement of the bellows to the block when the bellows is inflated, it being understood that the bottom face of the bellows lies against the upper face of the base 36, while the upper face of the bellows is movable about the pivotal point 49. The bellows 48 is supplied with low pressure air through a port 51 formed in the base 36 and communicating at one end with the bellows and at the other end with the pipe 17. The carrier 47 is preferably provided with a handle 52 simultaneously acting as counterweight to permit manual control of the movable port block 31 when it is desired. A second bellows 53 is positioned beneath the movable port block 30 and is constructed and arranged so as to operate in a manner identical with the bellows 48; the bellows 53 being in communication with one end of the passage 54, whose outer end is in communication with the pipe 18. The corresponding carrier is likewise provided with a handle 55 simultaneously acting as counterweight to permit its manual operation.

It will therefore be obvious that upon the low pressure air being introduced through the pipes 17 and 18 when the corresponding nozzles are uncovered by the edge of the fabric 1 so as to

permit passage therethrough of the low pressure air from nozzle 22 (Fig. 1) the bellows 48 and 53 will be correspondingly actuated with the resultant movement of the port blocks 30 and 31 so as to interconnect the supply line 15 to the feed lines 13 and 14 in accordance with the cycle of operations previously described in connection with Figs. 2-4, inclusive and 2a-4a, inclusive. In Fig. 5, where the port block 31 is raised, the port block 30 is at rest and the position of the parts corresponds to that illustrated in Figs. 3 and 3a; with both the blocks 30 and 31 raised they correspond to the position illustrated in Figs. 2 and 2a; and with both the blocks 30 and 31 at rest or in the lower position they correspond to Figs. 4 and 4a.

#### *Modifications*

Instead of employing fluid operated motive means for effecting the desired adjustment, as heretofore described, it is within the contemplation of the invention that other motive means may be employed, such for example as electrical motive means. Accordingly, where other motive means is utilized, a suitable control unit adapted to the motive means employed is used instead of the valve control means heretofore described for controlling the fluid motive means. For instance, in utilizing electrical motive means, the control unit would be provided with suitably arranged and operated electrical contacts to effect the desired operation of an electrical motor so that it may be started or stopped and operated in either direction to effect the desired adjustment; such control means, however, being similar to that previously described in that it is controlled by low pressure air introduced through suitable orifice means in general similar to that heretofore described. A suitable pneumatically operated electrical control unit for this purpose which has proven to be satisfactory in operation will now be described.

Referring to Figs. 9 and 10, the control unit is housed in a casing 56, provided with a bottom plate 57 rigidly attached thereto and which together form an enclosure open at one end (the left-hand side of Figs. 9 and 11). This casing is provided with longitudinally extending members 58 and 59 which are provided with grooved recesses extending lengthwise thereof, and in which is slidably positioned a supporting plate 60 rigidly attached to the transversely extending end piece 61, provided with a handle 62 for engagement to withdraw the plate 60 from the casing 56 and serving to entirely remove the mechanism therefrom for purposes of servicing the same or replacing it with facility when necessary; it being understood that the casing 56 is rigidly attached to and movable with the adjustable holding means, such for example as by being rigidly secured to the supporting arm 21 (Fig. 1). Bearing plates 63 and 64 (Figs. 9 and 14) are secured to the under side of plate 60 in spaced-apart relation and are provided with downwardly extending journal lugs in which is pivotally supported the shaft 65, which carries rigidly secured thereto a plate 66, one end of which surrounds the said shaft 65, and the opposite end of which carries rigidly fixed thereto a pair of spaced-apart journal lugs 67 adjacent the respectively opposite sides of said plate 66. Journaled in the lugs 67 are the ends such as 68 of a cross bar 69 formed of insulating material. Rigidly secured to the cross bar 69 in spaced relationship are a series of four movable contact supporting members 70 which

### Operation of modified structure

Referring more particularly to Figs. 16a, 16, and 11: we will assume that the edge of the fabric has moved from neutral position to that indicated in Fig. 16a, where both of the orifices 19' and 20' are uncovered. Accordingly, the low pressure air from orifice 22' (Fig. 11) will pass through the grid 23' and the opening 78 and thence through the orifices 19' and 20' into the diaphragms 75, 76, causing the same to be inflated. The inflation of the diaphragm 75 will move the plate 66 about its pivot point 65 causing the journal lugs 67 to move downwardly, carrying with them the cross bar 69 and the attached end of the frame comprising the connector rods 71, together with the movable contacts 93, 95, 101, and 103, causing the contacts 95 and 101 to make contact with the respectively corresponding fixed contacts 97 and 99, and the movable contacts 93 and 103 to break contact with their corresponding fixed contacts 91 and 105 (Fig. 16). Similarly, inflation of the diaphragm 76 (Fig. 11) will cause the bar 73 to move downwardly carrying with it the contact plates 72 and the movable contacts 92, 94, 100, and 102 so as to cause the contacts 94 and 100 to make contact with their cooperating fixed contacts 96 and 98, and causing the contacts 92 and 102 to break contact with their corresponding fixed contacts 90 and 104. Accordingly, the power lines P1 and P2 will be connected respectively to the motor lines M2 and M1, causing the motor to operate in one direction so that with the motor connected to the drive shaft 10 (Fig. 1) in place of the fluid motive means previously described, the screw 5 will be rotated in a direction to move the holding means toward the marginal edge of the fabric 1, and at the same time move the orifices 19' and 20' (Fig. 16a) toward the marginal edge of the fabric. Assuming that such movement brings the edge of the fabric 1 into a position indicated in Fig. 17a, the orifice 20' will then be blanketed by the edge of the fabric to actuate the control unit, as indicated in Fig. 11, and this will bring about a corresponding change in the position of the contacts, as illustrated in Fig. 17, and will serve to disconnect the power lines P1 and P2 from the motor lines M2 and M1 in the manner clearly illustrated in Fig. 17. Assuming the edge of the fabric to have moved to a position indicated in Fig. 18a so as to cover both orifices 19' and 20', then the diaphragm 76 will become deflated and under the influence of the counterbalance weights previously described the bar 73 and the parts carried thereby will move upwardly to position the contacts as illustrated in Fig. 18, to thereby connect the power lines P1 and P2 to the respective motor lines M1 and M2, causing the motor to reverse its direction of operation previously described in connection with Fig. 16 and thereby causing the movement of the fabric holding means outwardly and simultaneously moving the orifices 19' and 20' in the same direction.

The modified form of device has certain advantages over the embodiment first described. For example, the control units themselves in the modified form are not only in compact form but enable the actuation under the influence of the transversely shifting position of the marginal edges of the moving web to promptly and immediately control the motive means for desired adjustment and thus bringing about an extremely sensitive automatic adjustment of the parts.

In both forms of the control unit, the pair of orifices such as 19, 20, and 19', 20' have proven

to be a desirable arrangement of orifice means, because by using a pair of orifices adjacent each edge of the fabric the range of the central position within which the sidewise displacement of the adjustable mechanism remains at rest may be adjusted according to requirements by altering the space between each pair of orifices. For example, if the edge of the fabric has small irregularities in such close succession that the clamp chain would be unable to readily follow, it is advantageous to space the nozzles apart sufficiently to prevent the control mechanism from responding to such small irregularities, and thereby to prevent setting into operation the adjusting mechanism at too frequent intervals and to thus avoid undue wear on the parts. On the contrary, where a high accuracy of response is required, the spacing apart of the orifices may be suitably diminished. A plurality of orifices positioned adjacent each edge of the web thus provides a ready means by which the frequency of adjustment and accuracy of positioning the clamp chains or holding means may be readily predetermined. It is, however, within the contemplation of the invention that a single orifice may be utilized adjacent each edge of the web, and also that a series of orifices in numbers greater than two may be employed in certain cases; all of which will be readily understood by those skilled in the art after understanding the present invention. Obviously, the sizes of the orifices may be varied, the narrower orifices of course providing for greater sensitivity of the control unit. A size of two millimeters in width by thirty millimeters in length of the orifice opening has been found to be satisfactory, and in such case the movement of the edge of the fabric sidewise for a distance of two millimeters is sufficient to completely close or open an orifice and thus to bring about the operation of the adjusting means. Likewise, I have found that low pressure operating air of the order of 4 inches of water, measured in the bellows has been found satisfactory. When air under too great a pressure is used in the actuation of the control means in connection with fabrics, it has been found unsatisfactory because of the great variance in the porosity of the different pieces of fabric due to variations in the fineness of the fabric, the character of weave, etc.; whereas, with relatively low pressure air, fabrics varying over a wide range as to the degree of porosity will effect a fairly uniform control of the adjusting mechanism.

Having thus described my invention with particularity in connection with certain preferred forms thereof, it will be obvious to those skilled in the art, after understanding my invention, that other changes and modifications may be made without departing from the spirit and scope of the invention, and I aim in the appended claims to cover such changes and modifications as are within the scope of the invention.

What I claim is:

1. Apparatus for operating upon textile webs, comprising web conducting means, means for effecting relative transverse adjustment between said conducting means and said web, and control means for said adjustment means, said control means comprising means for delivering low pressure air in a direction toward one face of said web in a zone adjacent an edge of said web, intake orifice means on the opposite side of said web in the zone of influence of said low pressure air, and means actuated by said low pressure air

passing through said intake orifice means to control said adjustment means.

2. Apparatus for operating upon textile webs, comprising web conducting means, means for moving said conducting means transversely relative to said web, and control means for said motive means, said control means comprising means for delivering low pressure air in a direction toward one face of said web in a zone adjacent an edge of said web, intake orifice means on the opposite side of said web in the zone of influence of said low pressure air, and means actuated by said low pressure air passing through said intake orifice means to control said motive means, said air intake orifice means being mounted for transverse movement simultaneously with said web conducting means.

3. Apparatus for operating upon textile webs, comprising web conducting means, means for effecting relative transverse adjustment between said conducting means and said web, and control means for said adjustment means, said control means comprising means for delivering low pressure air in a direction toward one face of said web in zones respectively adjacent-opposite marginal edges of said web, air intake orifices on the opposite side of said web and respectively in the said zones of influence of said low pressure air, and means actuated by said low pressure air passing through said intake orifices to selectively control said adjustment means.

4. Apparatus for operating upon textile webs, comprising web conducting means, means for effecting relative transverse adjustment between said conducting means and said web, and control means for said adjustment means, said control means comprising means for delivering low pressure air in a direction toward one face of said web in a zone adjacent an edge of said web, a plurality of relatively long and narrow intake orifices spaced apart in a transverse direction and positioned on the opposite side of said web in the zone of influence of said low pressure air, and means actuated by said low pressure air passing through said intake orifices to selectively control said adjustment means.

5. Apparatus for operating upon textile webs, comprising web conducting means, fluid motive means for effecting relative transverse adjustment between said conducting means and said web, and control means for said adjustment means, said control means comprising means for delivering air under pressure in a direction toward one face of said web in a zone adjacent an edge of said web, intake orifices on the opposite side of said web in the zone of influence of said air, valve means for controlling the operation of said motive means, and inflatable means actuated by said air passage through said intake orifices to selectively actuate said valve means.

6. In an apparatus according to claim 5 wherein said control valve comprises two pivoted relatively movable members and an intermediate relatively fixed member, said intermediate member being provided with a plurality of fluid passages and said pivoted members with interconnecting port means for connecting said fluid passages to said motive means, said pivoted members being operable by inflatable means actuated by air passing through said respective orifices to selectively actuate said pivoted members.

7. Apparatus for operating upon textile webs, comprising web conducting means, means for effecting relative transverse adjustment between said conducting means and said web, and control

means for said adjustment means, said control means comprising means for delivering air under pressure in a direction toward one face of said web in a zone adjacent an edge of said web, intake orifice means on the opposite side of said web in the zone of influence of said air, means inflatable by said low pressure air passing through said intake orifice means and means actuated by said inflatable means to control said adjusting means.

8. Apparatus for operating upon textile webs, comprising means for holding a web adjacent its opposite edges and conducting said web in a lengthwise direction, means for adjusting the lateral spacing of said holding means in accordance with the position of the marginal edges of said web, and control means for said adjusting means, said control means comprising means for delivering air under pressure in a direction toward one face of said web in zones adjacent the respective edges of said web, intake orifice means on the opposite side of said web in the respective zones of influence of said air, and means actuated by said air passing through said intake orifice means to selectively control said adjusting means, said air intake orifice means being mounted for lateral movement simultaneously with said holding means.

9. Apparatus for operating upon textile webs, comprising web conducting means having two laterally spaced and separately laterally adjustable units for holding said web adjacent its respective marginal edges while it is being conducted, means for separately adjusting said holding units, and control means for said adjusting means, said control means comprising means for delivering air under pressure in a direction toward one face of said web in zones adjacent the respective edges of said web, intake orifice means on the opposite side of said web in the respective zones of influence of said air, and means actuated by said air passing through said intake orifice means to selectively control said adjustment means, said air intake orifice means being mounted for lateral movement simultaneously with respect to said web holding units.

10. Apparatus for operating upon textile webs, comprising web conducting means, electrical motive means for effecting relative transverse adjustment between said conducting means and said web, and control means for said adjustment means, said control means comprising means for delivering air under pressure in a direction toward one face of said web in a zone adjacent an edge of said web, intake orifice means on the opposite side of said web and in the zone of influence of said air, electrical contacts for controlling the operation of said electrical motive means, and inflatable means actuated by said air passing through said intake orifice means to selectively actuate said contacts.

11. Apparatus for operating upon textile webs, comprising web conducting means, electrical motive means for effecting relative transverse adjustment between said conducting means and said web, and control means for said adjustment means, said control means comprising means for delivering air under pressure in a direction toward one face of said web in a zone adjacent an edge of said web, intake orifice means on the opposite side of said web and in the zone of influence of said air, electrical contacts for controlling the operation of said electrical motive means, and inflatable means actuated by said air passing through said intake orifice means to

selectively actuate said contacts, said orifice means, said electrical contacts and said inflatable means being unitarily mounted for transverse movement simultaneously with said web  
5 conducting means.

12. Apparatus for operating upon textile webs, comprising web conducting means, means for effecting relative transverse adjustment between said conducting means and said web, control  
10 means for said adjustment means, said control means comprising means for delivering low pressure air in a direction toward one face of said

web in a zone adjacent an edge of said web, intake orifice means on the opposite side of said web in the zone of influence of said low pressure air, and means actuated by said low pressure air passing through said intake orifice means to control said  
5 adjustment means, and pneumatic means operable upon said web adjacent its said edge in the path of travel thereof prior to said intake orifice means for holding said edge in substantially flat  
10 position over said orifice means.

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