June 26, 1923. 1,460,206

C. H. MASLAND, 2D

FABRIC PRINTING MACHINE

Filed Dec. 11, 1920 3 Sheets-Sheet 1

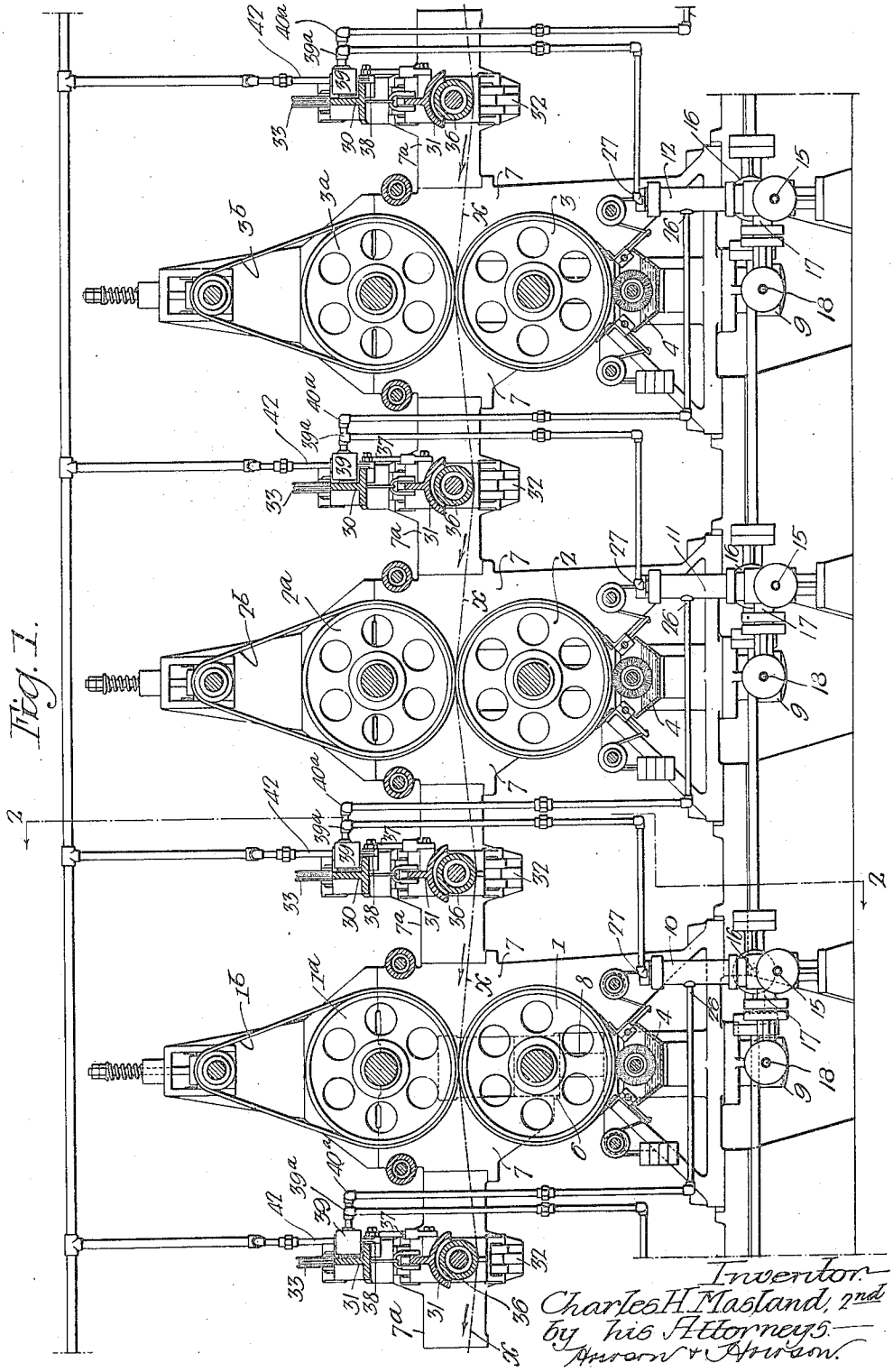


Fig. 1.

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Filed Dec. 11, 1920 3 Sheets-Sheet 2

Fig. 2.

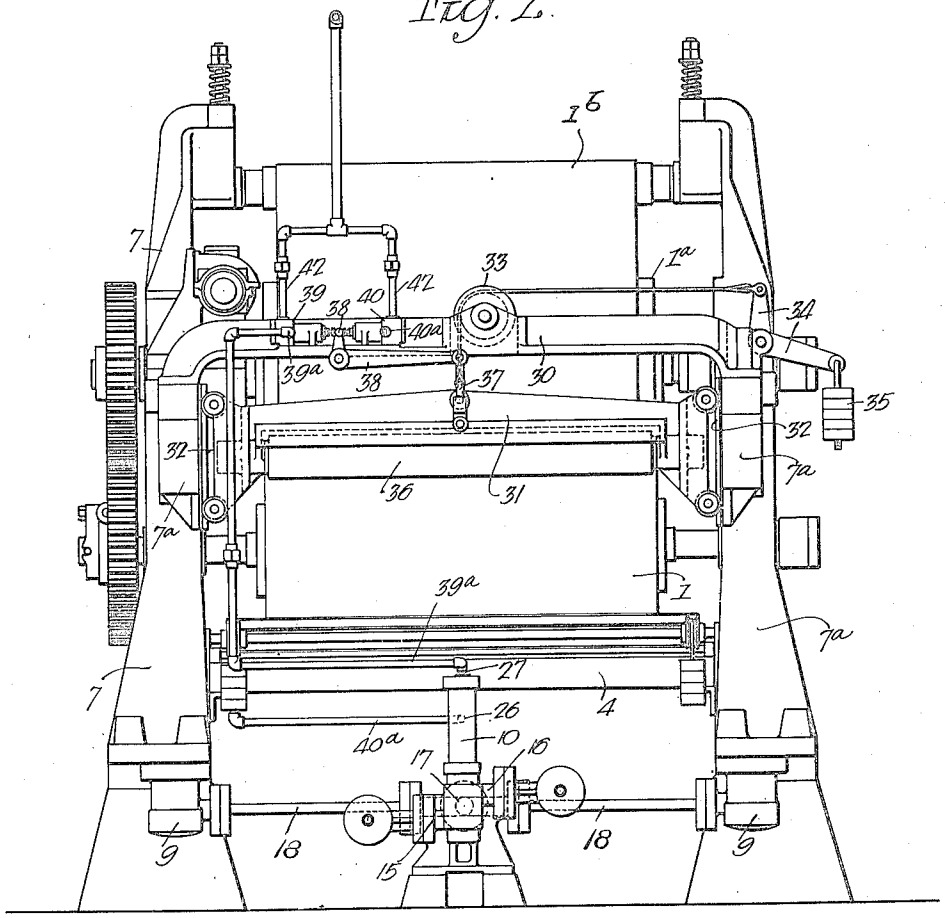
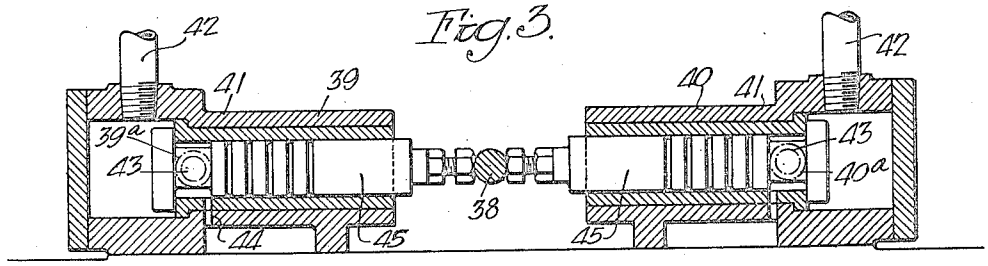


Fig. 3.



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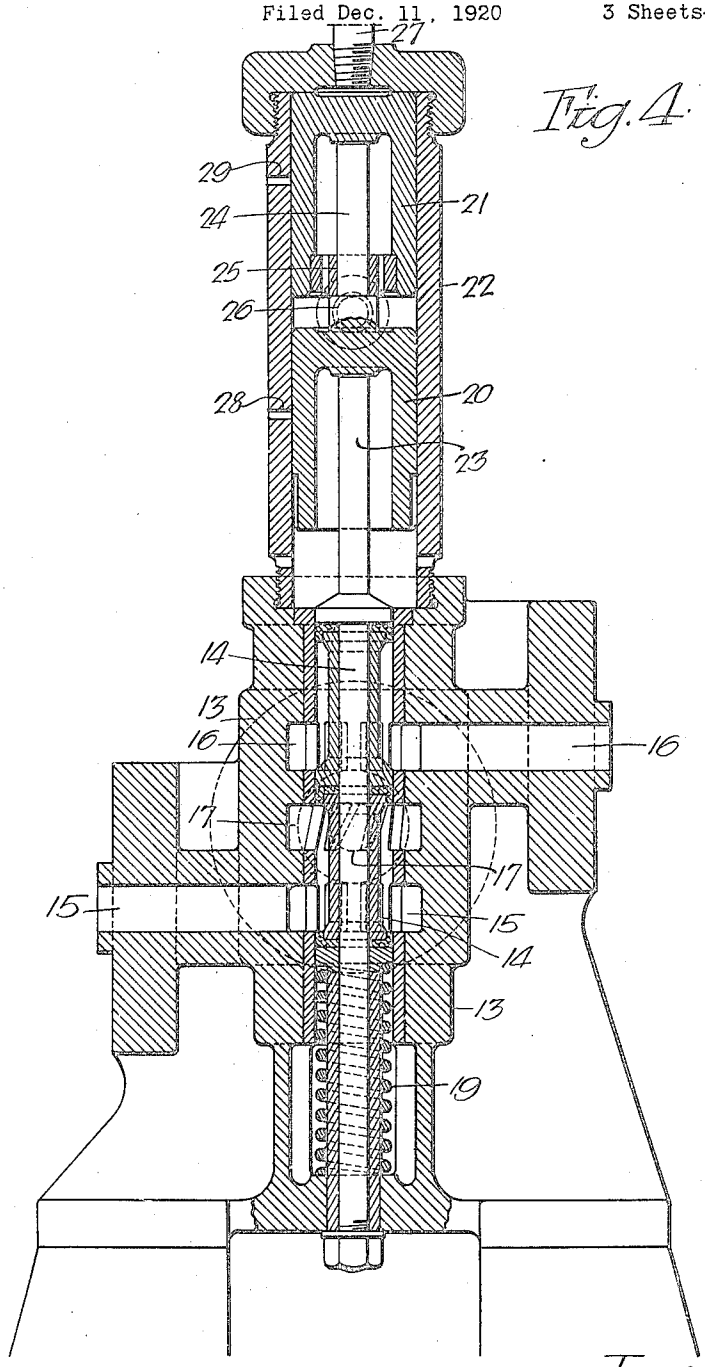
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FABRIC PRINTING MACHINE

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Fig. 4.



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Patented June 26, 1923. 1,460,206

UNITED STATES PATENT OFFICE.

CHARLES H. MASLAND, 2D, OF MELROSE, PENNSYLVANIA, ASSIGNOR TO C. H. MASLAND & SONS, INC., OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

FABRIC-PRINTING MACHINE.

Application filed December 11, 1920. Serial No. 428,834.

To all whom it may concern:

Be it known that I, CHARLES H. MASLAND, 2d, a citizen of the United States, residing in Melrose, Montgomery County, Pennsylvania, have invented certain Improvements in Fabric-Printing Machines, of which the following is a specification.

My invention relates to fabric printing machines, and more particularly to machines for printing carpets, rugs and the like, the principal object of my invention being to provide means for coordinating the various printing rolls and the fabric so that the markings placed by the rolls upon the fabric will conform with accuracy to give the desired design.

In fabric printing machines of the type comprising a series of pattern rolls to which the fabric is successively fed to receive thereon a number of different colored markings which together constitute the pattern, it is essential in order to obtain a clear cut and well defined pattern that the rolls and fabric be absolutely coordinated, so that the markings may be applied to the fabric at exactly the proper points. There is, however, the liability of considerable error in this respect due to shrinkage or stretching of the fabric at various points along its length, such variations resulting in imperfect registration and poorly defined designs. It has been the custom heretofore to retain the markings in registry by angular adjustment of the rolls manually.

One object of the present invention is to provide means for causing the various markings to conform, the operation of which is controlled by the fabric itself, the device being such that shrinkage of the fabric and the consequent tautening thereof between the rolls causes an adjustment of certain of the rolls resulting in the development of the necessary slack to compensate the said shrinkage, and vice versa when an excess of slack develops due to a stretching of the fabric between the rolls, the device acts automatically to take up this excess slack, thereby insuring absolute conformity in the markings of the individual rolls.

In the attached drawings:

Figure 1, is a vertical longitudinal section of a portion of a printing machine made in accordance with my invention;

Fig. 2, is a vertical section of the machine on the line 2—2, Fig. 1;

Fig. 3, is a vertical section of one pair of the pilot valves, and

Fig. 4, is a vertical section of one of the operating valves controlling the flow of the actuating fluid to the plunger cylinders controlling the pattern rolls.

With reference to the drawings, the machine comprises a series of pattern rolls 1, 2 and 3, each of which rolls operates in conjunction with a second or blanket roll, respectively 1^a, 2^a and 3^a, supported in the present instance directly above the said pattern rolls. Each of the pattern rolls carries upon its surface some portion of the design which it is desired to impart to the fabric, and each roll is provided with means whereby a dye or ink or other coloring matter is applied thereto so that the particular portion of the design carried thereby is marked on the fabric in a given color. In the present instance there is shown established below each of the rolls 1, 2 and 3, a receptacle 4 for the reception of the said coloring matter, each receptacle being provided with a rotary brush which takes the coloring matter from the receptacle and spreads it upon the face of the roll.

The opposite ends of said rolls 1, 2 and 3, are mounted in bearings 6 movable vertically in the frame 7 of the machine, said bearings each being supported by a plunger 8 mounted respectively in cylinders 9, established one under each end of each of the said rolls. Each pair of cylinders associated with the respective rolls is connected through a single control valve with a suitable source of actuating fluid, said control valves being indicated by the numerals 10, 11 and 12.

The details of the control valves are shown in Fig. 4, and comprise in each case a casing 13 in which is mounted a piston valve 14, said piston valve being such as to alternately connect an intake port 15 and an exhaust port 16 with the port 17, which communicates by means of pipes 18 with one or other of the pairs of cylinders which underlie the bearings in which are mounted the respective pattern rolls.

Located in the bottom of the valve casing is a spring 19 which exerts an upward pressure against the piston valve and tends to elevate and retain it in its normal position in which the port 17 is connected with the supply port 15. The piston valve is de-

pressed against the pressure of the spring to connect the port 17 with the exhaust port 16 by means of a pair of pistons 20 and 21 located in the auxiliary casing 22 at the top of the main casing 13, the said piston 20 normally resting upon the upper end of the valve spindle 23 and having itself a spindle 24 which extends upwardly through a suitable aperture 25 in the bottom of the piston 21 and abuts the under face of the top of said piston, the arrangement being such that while the piston 20 may be depressed independently of the piston 21, depression of the latter piston entails also depression of the piston 20.

A port 26 in the side of the casing 22 admits air or other suitable actuating fluid to the casing above the piston 20 for actuating the said piston, while a second port 27 in the casing head is adapted to introduce the actuating fluid at the top of the piston 21 to force the latter piston downwardly. Suitable vents 28 and 29 are provided in the sides of the cylinder so that when the pistons have been forced downwardly sufficiently to clear the said vents, the actuating fluid may escape therethrough and will not act further to force the pistons downwardly in the cylinder.

Extending between the sides 7^a of the main frame of the machine intermediate each of the sets of rolls 1, 1^a; 2, 2^a; and 3, 3^a; is a bridge 30, said bridges each supporting a carriage 31, adapted to travel vertically in slideways or tracks 32 formed in the opposite sides of the frame or of said bridge portion. The said carriage is supported by means of a suitable cord which extends over a pulley 33 mounted at the top of said bridge member and which is attached at the opposite end, in the present instance, to one arm of a bell crank lever 34, the other arm of which carries counterbalance weights 35. A roller 36 is mounted in suitable bearings in the carriage, and the weights 35 under operating conditions are such as not quite to balance the weight of the carriage and roller. An arm 37 extends upwardly from the top of said carriage and is pivotally attached to one end of a bell crank lever 38 mounted upon the said bridge member, the other arm of said bell crank lever extending upwardly and having its end disposed between the opposing spindles of a pair of pilot valves 39 and 40, carried by said bridge member.

The construction of the pilot valves is shown in Fig. 3, said valves each comprising a casing 41 having a port 42 for the admission of air or other actuating fluid to the interior of the casing, a port 43 for the discharge of air from the casing, and an exhaust port 44. A slide valve 45 mounted in the casing is adapted when closed, which is the normal position, to connect the discharge port 43 with the exhaust port 44. while when in the open position, the said valves are adapted to close the said exhaust port and connect the admission port 42 with the discharge port. The admission ports of both valves are connected to any suitable source of fluid supply, while the discharge ports are connected respectively to the operating valves associated with the rolls on either side of the bridge by which the pilot valves are carried.

In the present instance, the discharge ports of the valves 39 are respectively connected by means of suitable pipe lines 39^a with the port 27 of that one of the valves 10, 11 or 12, which is associated with the roll directly in the rear of the bridge by which the particular valve is carried, while the discharge ports of the valves 40 are respectively connected by means of suitable pipe lines 40^a with the port 26 of that one of the valves 10, 11 or 12, associated with the roll directly in front of the said bridge which carries the particular valve. This arrangement will be more readily understood by reference to Figs. 1 and 2, which show the discharge ports of the valves 39 and 40 which lie between the rolls 1 and 2 respectively connected to the port 27 of the valve 10 and to the port 26 of the valve 11.

The operation of the device is as follows: The strip of fabric x is fed through the respective sets of printing rolls in the direction indicated by the arrows in Fig. 1, and as it passes through receives from the said rolls a number of different colored markings which go to make up the desired pattern. The rollers 36 are adapted to rest upon the strip of fabric intermediate the said printing rolls, and when the fabric is at the proper tension and the lengths thereof between the respective rolls remain constant, the rollers 36 and the carriages 31 are supported in such a position that the pilot valves are unaffected by the levers 38 and are left in the normal closed condition, whereby the pistons 14 of the valves 10, 11 and 12, which control the flow of the actuating fluid to the cylinders 9 are in the normal elevated position throwing the said cylinders 9 open to the actuating fluid, the rolls 1, 2 and 3, consequently being held tightly against the blankets 1^b, 2^b and 3^b upon the respective opposing rolls 1^a, 2^a and 3^a. We will suppose now that a shrinkage of the fabric occurs between the rolls 1 and 2. This shrinkage causes a tautening and shortening of the fabric which elevates the roller 36 supported by that section of the fabric, and thereby operates the associated pilot valve 39, whereby actuating fluid is thrown through the port 27 of the valve 10, forcing the pistons 21 and 20 downwardly, together with the piston valve 14 so that the fluid in the cylinders 9 which are associated

with the roll 1 is exhausted and the said roll 1 permitted to fall sufficiently to relieve the pressure exerted upon the fabric by the rolls 1 and 1^a, and to permit the slippage of the fabric therebetween. The fabric being released by the rolls 1 and 1^a, there follows a readjustment which relieves the tension at the point where it developed which carries the roller 36 again to its normal position, whereupon the port 27 is thrown open to exhaust, the spring 19 operates to move the piston valve to its normal elevated position, and the roll 1 again raised against the roll 1^a.

Should slack develop between the said rolls 1 and 2, the roller 36 is lowered with a consequent operation of the valve 40, which throws a supply of actuating fluid to the port 26 of the valve 11. The valve 11 then operates in the manner previously described to throw the cylinders 9 associated with the roll 2 open to exhaust whereby the said roll 2 is lowered away from its companion roll 2^a, releasing the fabric and thereby permitting the roll 1 to take up the excess slack, whereupon the roller 36 being again raised to normal, throws the port 26 open to exhaust, and thereby permits the spring to elevate the valve 14 to the normal elevated position and effects the elevation of the roll 2.

It will be clear that the action for any one adjustment will not be confined to a single roller or to the rolls immediately adjacent thereto as above described, since the movement of any one roll will almost invariably effect the next adjacent roller which in turn will effect a movement of the rolls with which it is associated. The adjusting action is therefore progressive, there being a continuous adjustment and readjustment back and forth between the various rolls giving the desired result.

I claim:

1. In a fabric printing machine, the combination of a plurality of pairs of normally opposed and revolving rolls between which the said fabric is consecutively fed in a continuous strip, with means controlled by the tension of the fabric for separating the rolls of the respective pairs, substantially as and for the purpose set forth.

2. In a fabric printing machine, the combination with a plurality of pairs of normally opposed and revolving rolls between which the said fabric is consecutively fed in a continuous strip, of means controlled by the tension of the fabric for shifting one of the rolls of each pair with respect to the other, substantially as and for the purpose set forth.

3. In a fabric printing machine, the combination of a plurality of pairs of normally opposed and revolving rolls between which the said fabric is consecutively fed in a continuous strip, of means controlled by the tension of the fabric for interrupting the feeding action of the respective pairs of rolls upon the fabric.

4. In a fabric printing machine, the combination of a plurality of pairs of normally opposed and revolving rolls between which the said fabric is consecutively fed in a continuous strip, of means operatively associated with and controlled by the tension of the said fabric for interrupting the feeding action of the respective pairs of rolls upon the fabric.

5. In a fabric printing machine, the combination of a plurality of pairs of normally opposed and revolving rolls between which the said fabric is consecutively fed in a continuous strip, and mechanism operatively associated with and controlled by the tension of the fabric between each of said pairs of rolls and adapted to interrupt the feeding action of the respective pairs of rolls to retain the fabric at a uniform tension.

6. In a fabric printing machine, the combination of a plurality of pairs of normally opposed and revolving rolls between which the said fabric is consecutively fed in a continuous strip, of means established between each pair of rolls and operatively associated with the said fabric whereby the rolls of the respective pairs on either side thereof may be separated for relieving the tension upon the fabric.

7. In a fabric printing machine, the combination of a plurality of pairs of normally opposed and revolving rolls between which the said fabric is consecutively fed in a continuous strip, one of the rolls of each pair being mounted in fixed bearings and the others of said rolls being mounted in bearings movable with respect to the fixed roll, independent mechanism normally operating upon said movable roll of each pair to force it against its companion fixed roll, and means operatively associated with the fabric for actuating said mechanism for effecting movement of said movable roll away from the fixed roll to relieve the tension upon the fabric at that point.

8. In a fabric printing machine, the combination of a plurality of pairs of normally opposed and revolving rolls between which the said fabric is consecutively fed in a continuous strip, one roll of each pair being mounted in fixed bearings and the other roll of each pair being mounted in movable bearings, means supporting said movable bearings and normally retaining the movable roll against the fixed roll, and independent means associated with the fabric intermediate each pair of rolls for actuating the mechanism supporting the movable roll of the pairs on either side thereof to lower said movable rolls away from their

respective fixed rolls and for elevating them again into contact therewith.

9. In a fabric printing machine, the combination of a plurality of pairs of normally opposed and revolving rolls between which the said fabric is consecutively fed in a continuous strip, one of the rolls of each pair being mounted in fixed bearings and the other roll of each pair being mounted in movable bearings, a cylinder under each of said movable bearings, pistons in the cylinders adapted to support the said bearings, an independent valve controlling the flow of an actuating fluid to each of the sets of cylinders associated with the respective rolls, means normally retaining said valve in position admitting an actuating fluid to the said cylinders whereby said movable rolls are supported in a position bearing against their respective companion fixed rolls, pilot valves controlling the operation of said operating valve, and means associated with the fabric for actuating said pilot valves to effect actuating of said operating valve permitting exhaust of the actuating fluid from the cylinders.

10. In a fabric printing machine, the combination of a plurality of pairs of normally opposed and revolving rolls between which the said fabric is consecutively fed in a continuous strip, mechanism for separating the rolls of each pair, and means supported by the fabric intermediate each pair of rolls whereby the said mechanism of one of the adjacent rolls is actuated by the development of undue slack in the fabric and the said mechanism of the other of the adjacent rolls is actuated by the development in the fabric of undue tension.

11. In a fabric printing machine, the combination with a plurality of pairs of normally opposed and revolving rolls between which the said fabric is consecutively fed in a continuous strip, the upper of said rolls being carried in fixed bearings and the lower of said rolls in movable bearings, a cylinder under each of said movable bearings, plungers in the cylinders adapted to support said bearings, means for admitting an actuating fluid to the said cylinder underneath the plungers to force the latter upwardly in the cylinders whereby the lower roll is forced against the upper, an independent operating valve controlling the admission and exhaust of an actuating fluid from the cylinders associated with each roll, said valves each comprising a casing, a sliding valve element, means for normally elevating the said element in the casing so that an actuating fluid is admitted to the cylinders, a pair of independent pistons, and pilot valves operatively associated with the fabric between each pair of rollers for controlling the flow of an actuating fluid to the valve for forcing the respective pistons downwardly to open the cylinders to the exhaust.

12. In a fabric printing machine, the combination with a plurality of pairs of normally opposed and revolving rolls between which the said fabric is consecutively fed in a continuous strip, of mechanism supporting the lower of said rolls and adapted to shift the lower roll toward and away from the upper, said lower roll being mounted in movable bearings, an operating valve controlling the operation of said mechanism, a roller supported by the fabric between each pair of rolls, a pair of pilot valves operatively associated with said roller and adapted respectively to control the flow of an actuating fluid to the said operating valves controlling the cylinder mechanism on each side of the said roller whereby when the roller is allowed to drop from the normal position due to the development of slack in the fabric the operating valve on one side is actuated, and when the roller is elevated above the normal position due to the development of a tension in the fabric the operating valve on the other side of said roller is actuated.

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