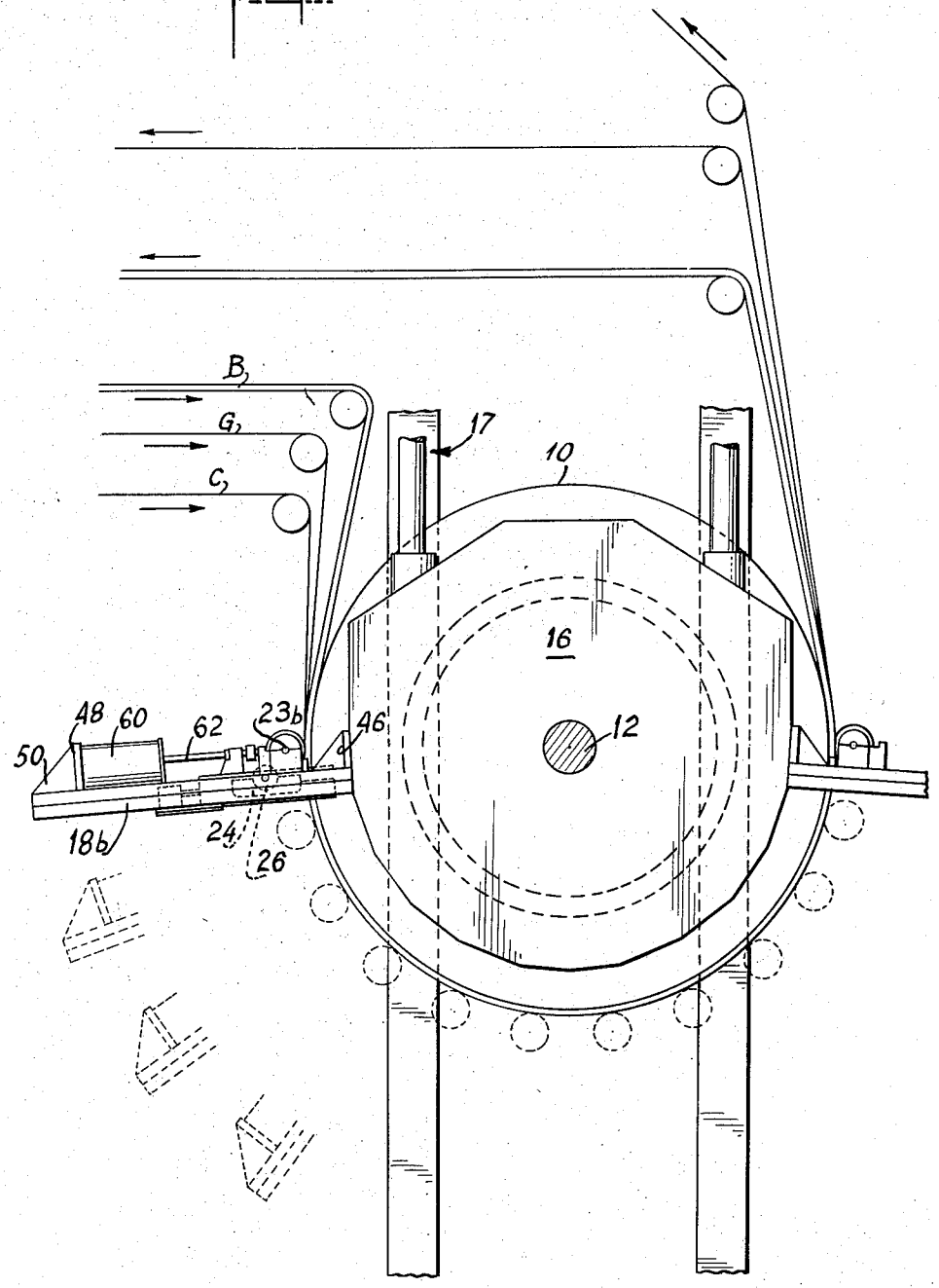
July 7, 1959 J. R. JOHNSON 2,893,310

ROLL MOVING MEANS FOR ROTARY PRINTING APPARATUS

Filed Aug. 11, 1954 8 Sheets-Sheet 1

Fig. 1.



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ROLL MOVING MEANS FOR ROTARY PRINTING APPARATUS

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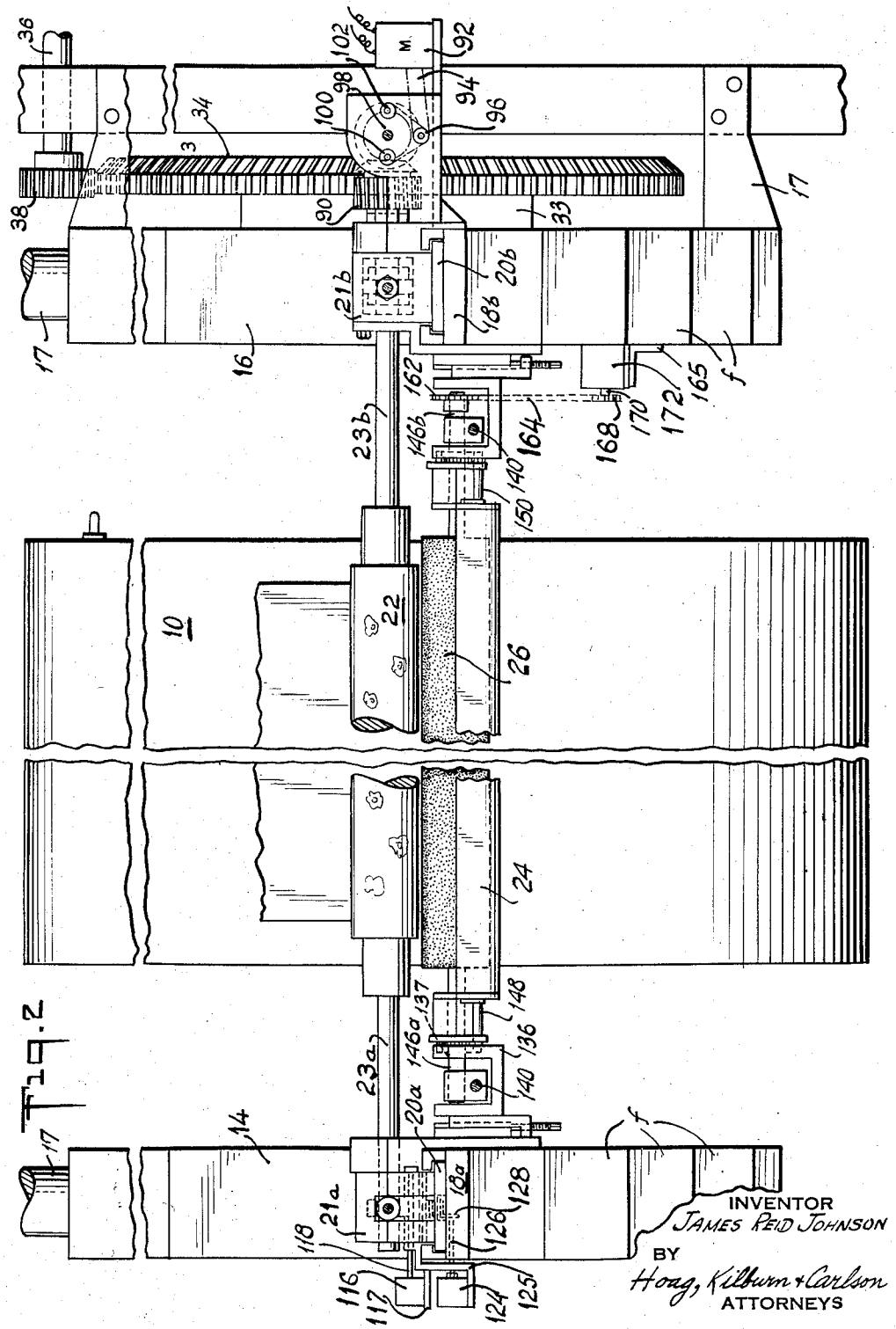


FIG. 2

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ROLL MOVING MEANS FOR ROTARY PRINTING APPARATUS

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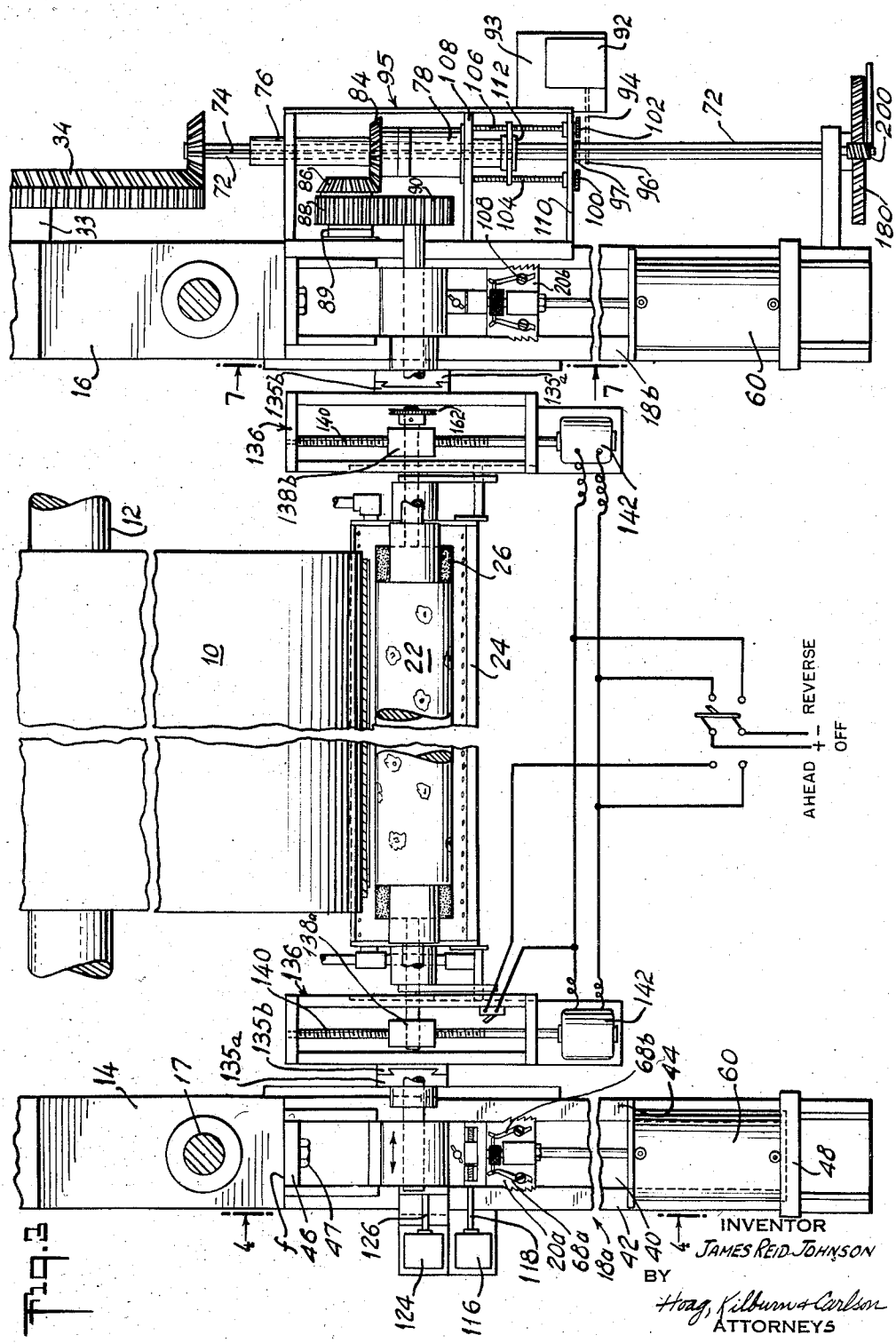


Fig. 3

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ROLL MOVING MEANS FOR ROTARY PRINTING APPARATUS

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Fig. 5.

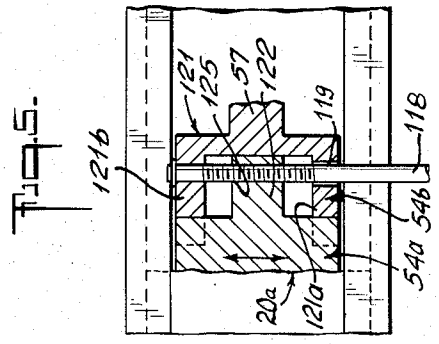


Fig. 4.

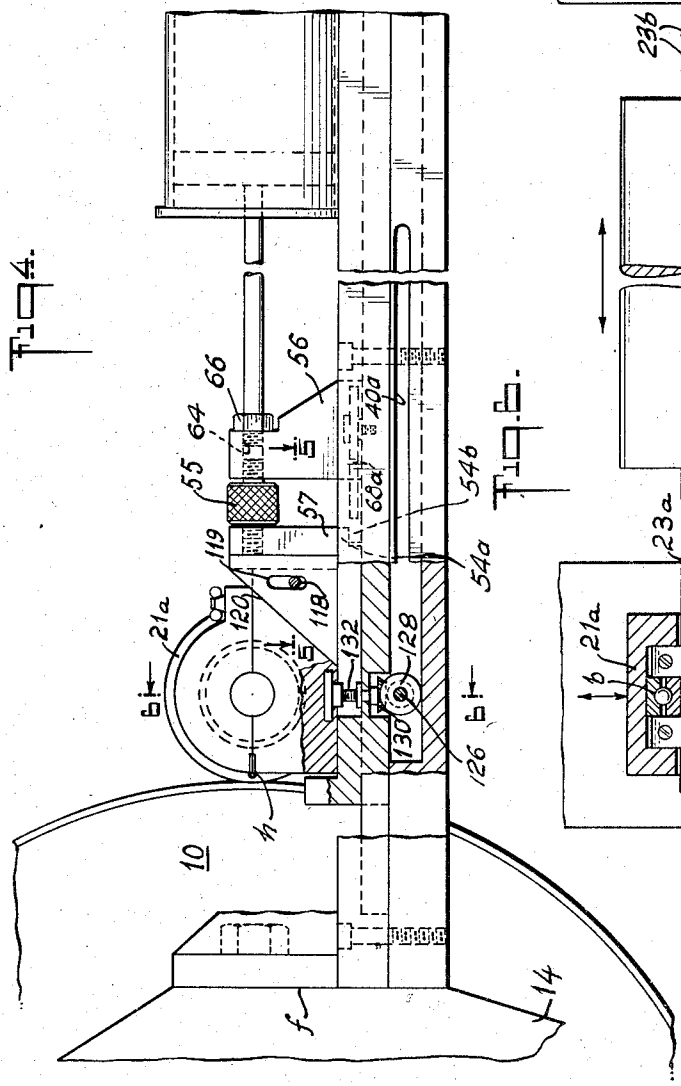
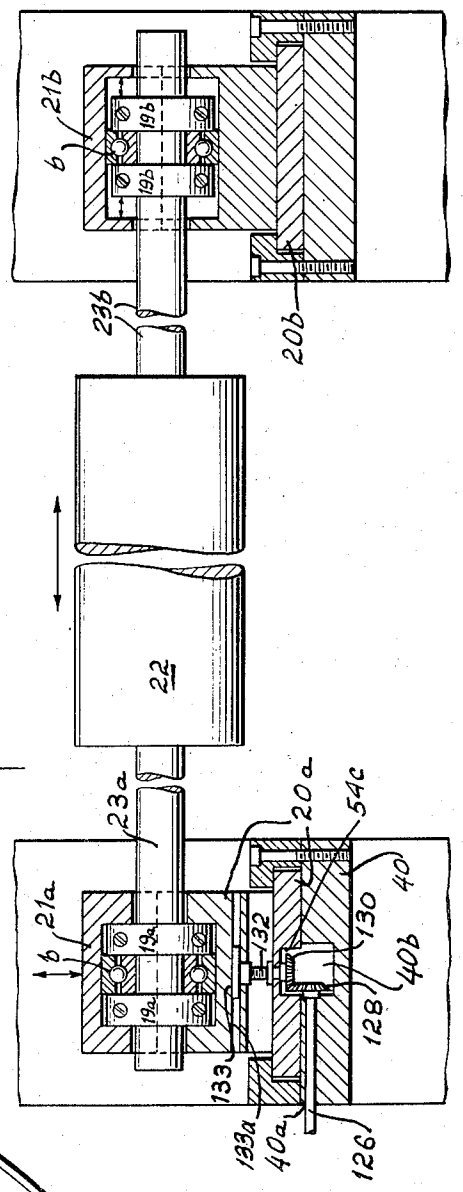


Fig. 6.



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ROLL MOVING MEANS FOR ROTARY PRINTING APPARATUS

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Fig. 7.

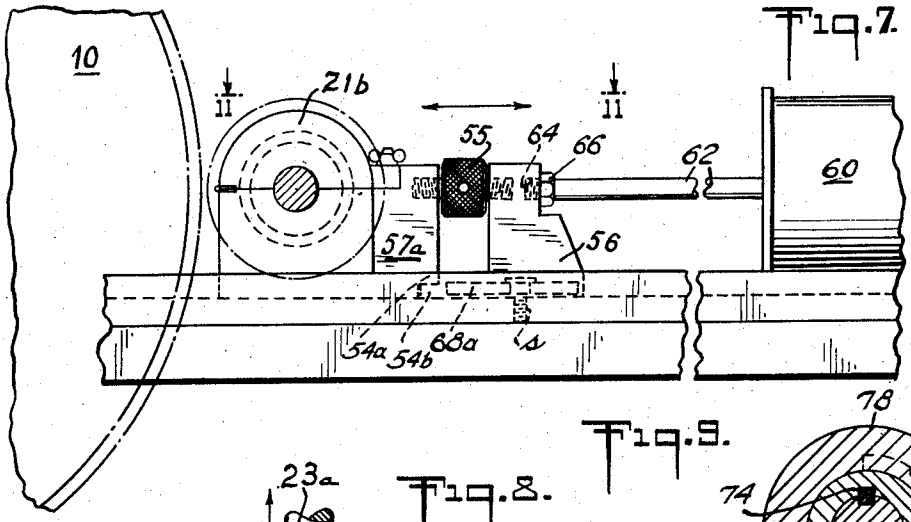


Fig. 9.

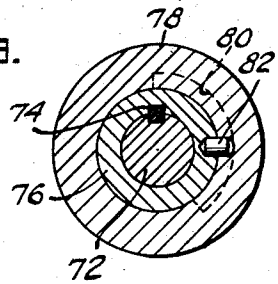


Fig. 8.

Fig. 11.

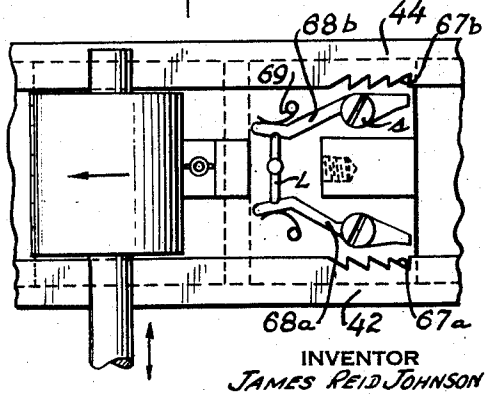
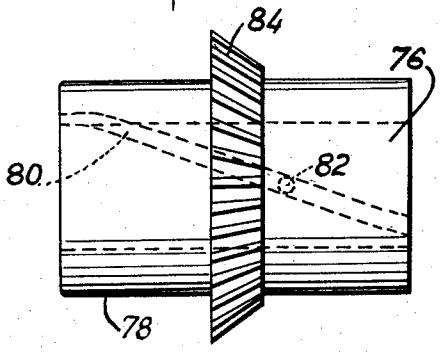


Fig. 10.



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ROLL MOVING MEANS FOR ROTARY PRINTING APPARATUS

Filed Aug. 11, 1954 8 Sheets-Sheet 6

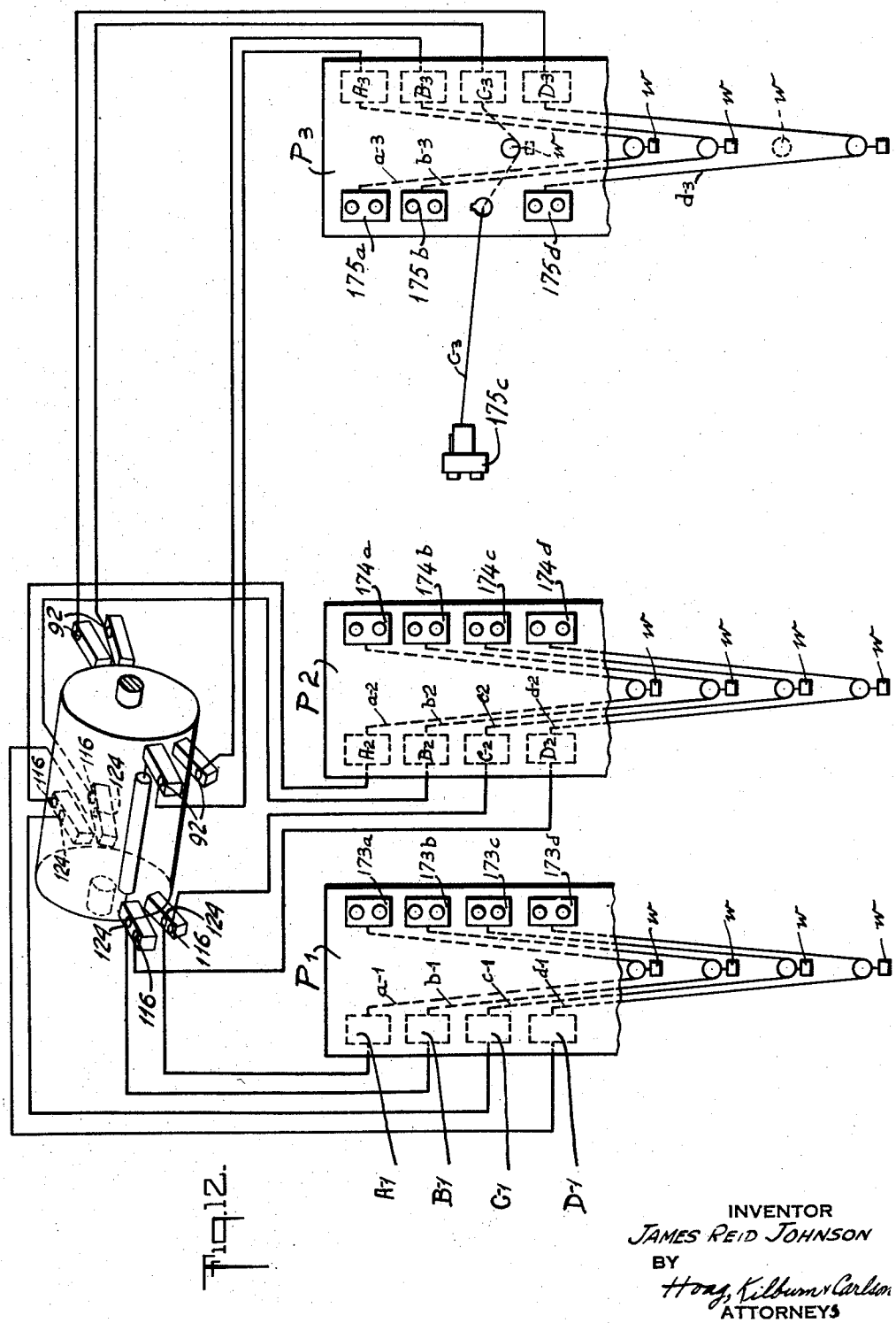


Fig. 12.

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ROLL MOVING MEANS FOR ROTARY PRINTING APPARATUS

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Fig. 13.

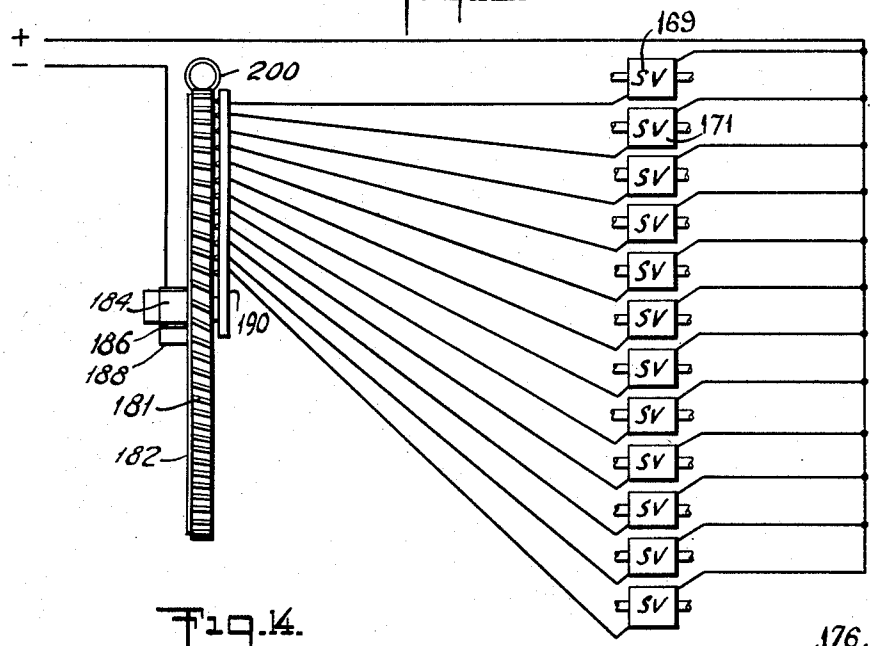
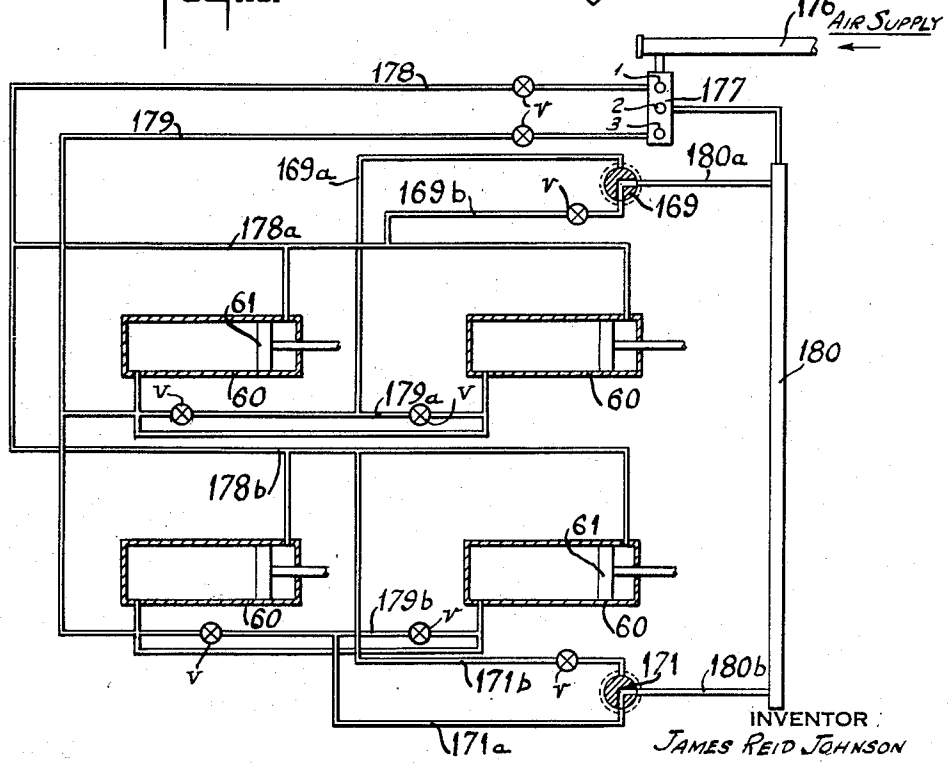


Fig. 14.



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ROLL MOVING MEANS FOR ROTARY PRINTING APPARATUS

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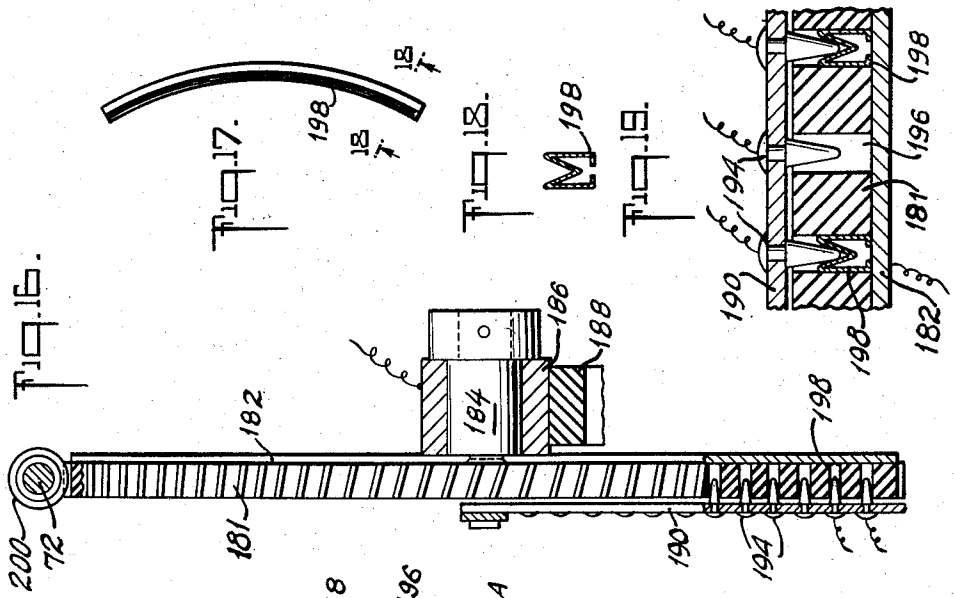


Fig. 17.

Fig. 18.

Fig. 19.

Fig. 16.

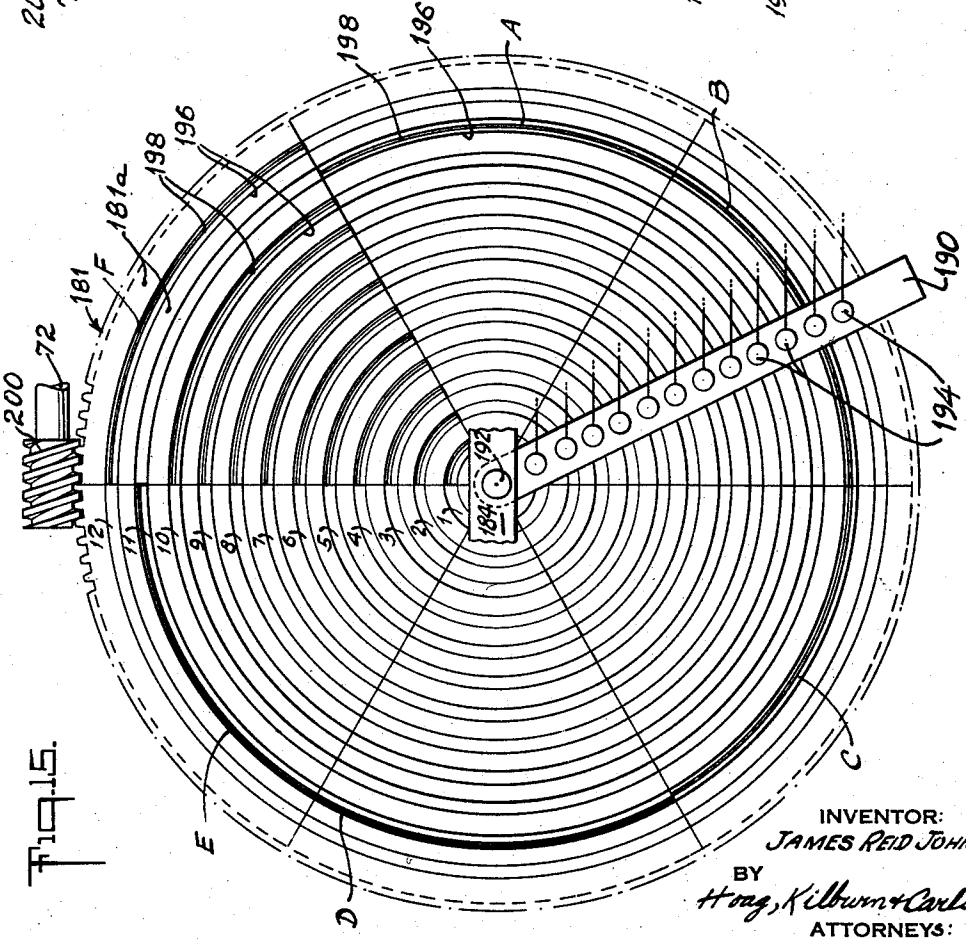


Fig. 15.

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United States Patent Office 2,893,310
Patented July 7, 1959

2,893,310

ROLL MOVING MEANS FOR ROTARY PRINTING APPARATUS

James Reid Johnson, Providence, R.I.

Application August 11, 1954, Serial No. 449,176

25 Claims. (Cl. 101—182)

This invention relates to apparatus for printing, and is described in connection with textile printing.

In the field of textile printing, one or more, usually several, print rolls are mounted for movement toward or away from backing means, and the cloth to be printed is advanced over and partly around the backing means, between said backing means and the print roll or rolls. When two or more print rolls are used, they print, one after the other within a given area, parts of a composite pattern. The size of the area is determined by the print roll surface area, all the rolls used in printing a particular pattern being of the same size. The pattern is completed when the print area has passed all the print rolls. As the cloth is advanced, the first print roll will print its part of the pattern in the first print area and then in the second print area, and while it is printing in the second print area the second print roll will be printing in the first print area, etc. Other print rolls are substituted for printing other patterns.

In order to obtain satisfactory printing, the print rolls must press upon the travelling cloth with an amount of pressure suitable for the particular material, and the rolls which cooperate in producing the pattern must be in register with one another and relative to the pattern. Many patterns require a large number of print rolls, and often ten or twelve or more rolls are employed for printing a single pattern.

At the end of a printing run of one pattern, before the start of a run for printing a different pattern, it is necessary to substitute a new set of print rolls and this has been a very time-consuming operation, involving not only the lifting out of one set of rolls from their supporting bearings and replacement by another set of printing rolls, but also the very time-consuming operation of manually and mechanically adjusting each of the new print rolls against the new cloth which is to be printed, and striving to obtain substantially the same pressure on the cloth for each of the new print rolls, in order to obtain even printing and avoid "seconds."

For each print roll there is a color receptacle known as a "color box," and a brush for transferring color from the color box to the print roll. At the end of the run of a particular pattern, and also at the end of each day's work, it has been necessary to demount all the color boxes and wash the color boxes and remount them on the machine.

In addition to controlling the movement of the print rolls toward and away from the cloth to be printed, it is necessary to maintain all the print rolls in register with one another and with the pattern to be printed. This may involve adjustment of print rolls rotatively, axially and in spacing from one another around the backing cylinder means, and it will be seen that this may be a very time-consuming operation, particularly when, as in the prior art, manual adjustment means have been located on one side of the machine, and the operator has to go around to the other side of the machine, while cloth is being continually run through the apparatus and wasted, to observe

from the pattern printed on the cloth whether one or more of the rolls is out of register, and, if so, the particular adjustment or adjustments required to obtain register, and then go back to the first mentioned side of the machine to make an adjustment, guessing how far to turn the controlling handle, and then again going to the other side of the machine to observe whether the adjustment has been enough or too much.

Accordingly, it is an object of this invention to provide textile printing apparatus in which the substitution and adjusting of print rolls may be greatly simplified, thus effecting a great saving of the operator's time, and making possible much longer continuous operation of the printing apparatus with a resulting much greater volume of output within a given length of time, per day, week, month and year.

Another object of the invention is to provide simplified and improved means for obtaining uniform pressure of the print rolls against a cloth being printed, which is much more dependable as to uniformity than prior art devices in which the print rolls were adjusted against the backing means manually, and by means of which the same pressures may be obtained on different occasions, as for example for reprinting a particular pattern on a particular kind of cloth.

Another object of the invention is to provide improved print roll mounting means.

Another object of the invention is to provide control means by which the movement of the print rolls toward or away from the backing means, and the register of the print rolls with one another and with the print pattern, both axially, rotatively and as to spacing from one another, can be controlled and greatly accelerated by remote control means, with the operator remaining in one place.

Another object of the invention is to provide fluid power means and a control system therefor by which all the print rolls may be alternatively advanced or retracted while others of the print rolls are simultaneously retracted or advanced, by remote control means.

Another object is to provide mounting and adjustment means so disposed that a maximum number of print rolls may be employed.

Other objects of the invention will be in part obvious or in part pointed out hereinafter.

The invention accordingly consists in the features of construction, combinations of elements, arrangements of parts, and in the several steps and relation and order of each of said steps to one or more of the others thereof, all as will be pointed out in the following description, and the scope of the application of which will be indicated in the following claims.

The invention will best be understood if the following description is read in connection with the drawings, in which:

Fig. 1 is a side elevational view of apparatus embodying the invention;

Fig. 2 is a front elevational view, partly broken away;

Fig. 3 is a top plan view;

Fig. 4 is a side elevational view looking from the left side of the apparatus at the slide support and slide means supporting the left-hand end of a printed roll, as viewed by the reader;

Fig. 5 is a detail view, partly in cross-section, taken on the line 5—5 of Fig. 4;

Fig. 6 is a front elevational view, partly in cross-section, showing the bearings which support the respective ends of a print roll shaft, and the means for adjusting the elevation of the left-hand bearing relative to the left-hand slide;

Fig. 7 is a side elevational view looking from the left at the slide support, slide and bearing which support the right-hand end of a print roll shaft;

Fig. 8 is a plan view showing the main drive means for each print roll, including intermeshing gears disposed radially with respect to the backing cylinder;

Fig. 9 is a detail cross-sectional view taken on the line 9—9 of Fig. 8;

Fig. 10 is a detail view of a rotatable sleeve comprising part of the main drive means illustrated in Fig. 8, and also part of the means for rotating a print roll independently of the main drive, to adjust its rotary register or "set";

Fig. 11 is a top plan view of a portion of a slide support and slide illustrating a combination of teeth on the slide support and ratchet arms on the slide which are interengageable to prevent undesired retracting of the printed rolls from the backing cylinder means;

Fig. 12 is a schematic view of electric circuit means for controlling the set or register of the print rolls individually, axially, rotatably and toward or away from one another, around the periphery of the backing cylinder, i.e., the elevation of the bearing supporting one end of the print roll shaft with respect to the slide on which the bearing is mounted;

Fig. 13 is a schematic view of electric circuit selection and control means for the solenoid valves comprised in the pneumatic system shown in Fig. 14;

Fig. 14 is a schematic view of fluid cylinder and power means for moving the slides, and therefore also the print rolls, toward and away from the backing cylinder means, in unison or selectively;

Fig. 15 is a top plan view of a selector plate comprising part of the control means shown in Fig. 13;

Fig. 16 is an end view of the selector plate assembly shown in Fig. 15;

Fig. 17 is a top plan view of a conductive strip insertable in grooves provided in the segments comprising a selector plate;

Fig. 18 is a vertical sectional view of the conductor strip shown in Fig. 17, and

Fig. 19 is a detail cross-sectional view, taken radially of the selector plate and lengthwise of a contact arm under which the selector plate revolves.

Referring first to Figures 1–3, it will be seen that the embodiment of the invention described herein comprises a large cylinder **10** mounted on the shaft **12** the ends of which are mounted for rotation in bearings provided in support members **14** and **16**, which are disposed on either side of cylinder **10**, and are narrow in relation to cylinder **10**. A support frame for members **14** and **16** is indicated generally as **17**. Any suitable frame means may be employed for supporting members **14** and **16** in elevated position but the support means, with a movable bearing for one end of the cylinder shaft, described and claimed in copending application Serial No. 449,177, now U.S. Patent No. 2,824,514, is preferred. Members **14** and **16** are generally cylindrical in form, particularly their lower halves are semi-cylindrical, although their peripheries are defined by similar series of flats *f*, from which project slide support means, as best seen in Figure 1, equal in number to the print rolls **22** which are employed, and positioned so that they extend substantially radially with respect to cylinder **10**. The slide supports which project from member **14** are each identified as **18***a* and those which project from member **16** are each identified as **18***b*. Each of said support means comprises a slideway on which is slidably mounted a slide, the slides on support means **18***a* being identified as **20***a*, and those on support means **18***b* as **20***b*. Each pair of opposed slides **20***a* and **20***b* provides the support for a print roll assembly comprising: a print roll **22**, a color box **24**, a brush **26** by which color is transferred from a color box to its associated print roll, means including reversible motor **92** for adjusting the register of a print roll rotatively with respect to other print rolls and the print pattern, means including reversible motor **92** for

adjusting the register of a print roll rotatively with respect to other print rolls and the print pattern, means including reversible motor **116** for adjusting the register of a print roll axially, means including reversible motor **124** for adjusting the register of a print roll longitudinally of the print pattern, e.g., the elevation of one end of a print roll relative to its supporting slide thereby adjusting its position relative to other print rolls around the backing cylinder; means including a pair of reversible motors **142** for moving a color box **24** and color brush **26** toward and away from the print roll to which they supply color, and means including a motor **172** for driving the brush **26** in reverse at controlled speed to remove unwanted color from the surface of the print roll, as for example occasionally when the doctor blade (not shown) conventionally used with each print roll fails to satisfactorily clean the surface of the print roll. Fluid pressure means, preferably air, including cylinders **60**, are employed for moving said print roll assembly toward and away from said backing cylinder **10**.

On the right hand end of cylinder shaft **12**, as viewed by the reader (Figure 3), is a large ring gear **34** mounted on the stub shaft **33** which projects outwardly from member **16**, parallel to shaft **12**. Ring gear **34** is driven by gear **38** on drive shaft **36** and transmits the drive to the print rolls **22** individually as will be explained, the cylinder **10** being rotated by frictional contact with one or more of the driven print rolls. The length of cloth C to be printed is passed between the backing cylinder **10** and the print rolls which are adjusted to press on the cloth with the right amount of pressure to produce the best print on that particular kind of cloth. An endless rubber blanket B extends around backing cylinder **10** and roller means (not shown), under the length of cloth C, and usually a length of cloth G, known as the "backing grey" is advanced with cloth C, between it and the blanket B. (Figure 1.)

Referring now to Figures 3, 4 and 5, it will be seen that each slide support **18***a* and **18***b* comprises a bottom plate **40** and two angle members **42** and **44**, projecting upwardly and inwardly toward one another, and extending the length of plate **40**, between the vertically extending flange and brace means **46** at the inner end of the slide support and the vertically extending stop member **48** at the outer end of the slide support. Each slide support is bolted through end member **46** onto a flat *f* of the support member **14** or **16**, as the case may be, as by bolts **47**.

The slides **20***a* and **20***b* each comprises a base member **54** which slides in the slideway defined between the slide support base **40** and the inwardly projecting portions of the angle members **42**, and supports a split bearing housing within which one end of a print roll shaft is received. In the embodiment of the invention described herein, turnbuckle means of known kind are provided, for use if desired, as an adjunct to or substitute for air cylinder means for advancing and retracting a slide. Each slide base is shown as comprising two overlapped parts **54***a* and **54***b* interconnected by thumb screw means *g*, a forward part **54***a* on which there is a bearing housing and a vertical post **57** for slide **20***a* and **57***a* for slide **20***b*, and a second part on which is a vertical post **56** which takes the thrust of an air cylinder piston rod, as will be described. Means are provided for adjusting the elevation of bearing housings **21***a* relative to their slides **20***a* respectively, and consequently bearing housings **21***b*, the elevation of which is not adjustable, and the forward portion of the slides **20***b* on which they are supported, differ somewhat from bearing housings **21***a* and the forward portion of slides **20***a* on which they are supported.

It will be noted that each bearing housing **21***a* and **21***b* is a two-part member, the parts being hinged together at *h* and provided with suitable means, indicated by the wing nuts **3**, for interengaging the parts. Within the housing **21***a* is a ball bearing *b* through which the end

23*a* of the print roll shaft extends, the shaft being held from axial movement relative to the ball bearing by means of collars 19*a* fixed on the print roll shaft on either side of said bearing. A ball bearing member *b* and collars 19*b* are similarly provided on print roll shaft end 23*b* on either side of bearing member *b*, but each bearing housing 21*b* is fixed on its slide 20*b* and there is space within the bearing housing to permit the bearing *b* and collars 19*b* to move laterally within the bearing housing. In practice, only very slight movements of a print roll axially are required for adjustment, usually on the order of 1" or less. The front portion of slides 20*a* comprises forwardly extending spaced arms the leading surfaces of which are inclined upwardly and outwardly and provide bearing surfaces facilitating movement of housings 21*a* respectively to their slides 20*a* to adjust the register of a print roll axially, as will be explained.

Adjacent the outer end of each slide support, and fixed on top of angle members 42 and 44, is an air cylinder 60, the piston rod 62 of which extends forwardly and is fixed to the post 56 which, as explained above, forms the rear portion of each slide. As illustrated in Figs. 4 and 7, the forward end of said rod is screw-threadedly engaged within a bore 64 in the outer surface of said post 56, and is further held in place by the nut 66. Since post 56 is part of each slide, actuation of piston 62 serves to move said slide on said slide support, toward and away from said backing cylinder 10. Teeth 67*a* and 67*b* are provided along the slide rails 42 and 44 respectively of the slides, and ratchet arms 68*a* and 68*b* are pivotally mounted on the slide, as by screws. The arms 68*a* and 68*b* are urged to pivot into engaged position by springs 69, and may be held out of engaging position by the locking member L pivotally mounted on the slide on pivot *p*.

By means of the air system shown in Fig. 14, air may be admitted simultaneously into opposed pairs of cylinders 60, alternatively on either side of the pistons 61 therein, for controlling movement of a pair of slides 20*a* and 20*b* toward and away from the backing cylinder 10 simultaneously with other pairs of slides, or individually, to move the print rolls into or out of printing position. Said air system coacts with the electric control means shown in Figure 15 for "jump printing," whereby one or more of the print rolls may be held out of register with the backing cylinder 10 while the other print rolls are printing for a predetermined number of revolutions, and then advanced to printing position for one or more revolutions while the said other print rolls are withdrawn from printing position, as will be fully explained.

From the above description it will be understood that pressure for pressing a print roll against fabric C while it is passing between the print roll and its locking means may be provided by air cylinder means. Such means has the advantage that the pressure of the print roll on the fabric to be printed is known and may be maintained constant, and may be exactly duplicated from time to time for printing additional lengths of the same fabric. However, if it becomes desirable to add additional pressure manually, as by turnbuckle means 55 (Fig. 7) described below, it will be necessary to fix the portion of each of the slides supporting the print roll which carries the post 56 so that the action of the turnbuckle 55 will not depend on air pressure in the cylinder.

The main drive for rotating the print rolls from ring gear 34 comprises bevel gear 70 which meshes with ring gear 34 and is fixed on the inner end of a shaft 72 which has the longitudinally extending key 74, on which is keyed the sliding sleeve or slide bearing 76, which in turn is surrounded by an outer rotatable sleeve 78 which has on its inner surface a spiral groove 80 (Figure 10), into which extends a finger 82 projecting outwardly from inner sleeve 76. On said outer sleeve 78 is a bevel gear 84 which meshes with the bevel gear 86, projecting laterally from gear 88 which is on the stub shaft 89 projecting from slide 20. Gear 88 intermeshes directly with

the gear 90 on the end of print roll shaft which is the right end 23*a* as viewed by the reader. For normal operation, the gears 88 and 90 are fully interengaged and the drive for each print roll is from ring gear 34 through gear 70 to a shaft 72, to the sliding inner sleeve 76 by reason of said key 74, and to sleeve 78 by reason of finger 82 engaging in spiral groove 80 in sleeve 78, and through bevel gear 84 on sleeve 78 to bevel gear 86 and the intermeshing gears 88 and 90, which are aligned radially with respect to the backing cylinder, and remain interengaged even during adjustment of the set of a print roll axially, i.e., laterally with respect to a slide.

As stated above, the position of each print roll may be adjusted rotatively and axially, and also raised or lowered at one end to adjust its register or "set." These movements are independent of movements with the slides. Means for adjusting rotary register will be described first.

Each print roll may be rotated individually to adjust the portion of the pattern which it prints relative to the complete print pattern, without disturbing the main drive means. This rotative adjustment, which requires less than a complete revolution of an individual print roll, is best illustrated in Figures 3 and 8.

Rotative adjustment of a print roll individually is obtained by energizing a reversible motor 92, which, as shown in Figure 3, is mounted on a bracket 93 attached to a frame 95 which projects from a slide 20*b*, and, through chain 94, drives a sprocket 96 which is supported on frame member 110. Also supported on frame member 110, and on the same shaft as sprocket 96, is a sprocket 97, the rotation of which drives the chain 98 which passes around sprocket 97 and also around sprockets 100 and 102 (Fig. 2) mounted at the outer ends of the screw-threaded rods 104 and 106 respectively (Figs. 3 and 8), which extend through, and are mounted by, the members 108 and 110 comprising part of frame 95. Rods 104 and 106 extend through interiorly threaded bores in yoke 112, which is fixed on the rear end of sliding shaft 76. When rods 104 and 106 are rotated the yoke 112 is moved on rods 104 and 106, thus causing said sliding sleeve 76 to slide axially on keyed shaft 72, and as sleeve 76 moves forwardly or rearwardly the said finger 82 thereon, which travels in the said spiral groove 80 in the outer, rotatable sleeve 78, presses against one side or the other of said groove and rotates said outer sleeve 78, thereby rotating the print roll shaft through bevel gears 84 and 86, and the gears 88 and 90, which are aligned radially with respect to support member 16 and backing cylinder 10. The radial alignment of gears 88 and 90 is important, since in this position they occupy a minimum of space circumferentially of the backing cylinder which aids in making it possible to provide a maximum number of slide supports or "nips."

It will be noted that stub shaft 89 on which gear 88 is mounted is parallel with the print roll shaft, on the end 23*b* of which gear 90 is mounted, and that gears 88 and 90 are of sufficient width to remain engaged while permitting some movement of gear 90 laterally relative to gear 88. This occurs when a print roll assembly is adjusted axially (Figs. 2, 3 and 5), which is accomplished by means which include a reversible motor 116, supported on a bracket 117 projecting from bearing housing 21*a*, on the left hand end of the assembly as seen in Figs. 2 and 3, the motor drive shaft 118 of which is screw-threaded and extends through vertical slots in the spaced arms 121*a* and 121*b* respectively of a fork-shaped member 121 which comprises part of the slide and the rear or outer portion of which is the post 57 (Fig. 4) which supports the forward end of turnbuckle means 55, the rear end of which is supported in the post 56 which forms the separate, rear portion of the slide. Member 121 is connected to the forward portion of the slide which supports the bearing housing by means of said motor shaft 118 which extends through

a threaded bore **125** in a tongue **122** which projects rearwardly from the front portion of the slide which is directly below bearing housing **21***a*. Bore **125** is aligned laterally of the slide with the said vertical slots in arms **121***a* and **121***b* As threaded rod **118** is rotated by motor **116** the tongue **122** is caused to travel on it, moving the whole bearing **21***a* with it laterally of the slide **20***a*. The faces **120** of the arms **121***a* and **121***b* toward cylinder **10** are inclined upwardly and rearwardly and the bearing housing **21***a* has a similarly inclined surface resting on the inclined faces of the arms **121***a* and **121***b* and slidable laterally on said faces.

The means for adjusting the elevation of bearing housing **21***a* and the bearing therein, toward and away from its supporting slide **20***a*, comprises a motor **124**, supported on bracket **125**, the drive shaft **126** of which has at its inner end the bevel gear **128** which meshes with the bevel gear **130** on the lower end of a screw shaft **132**, the upper end of which has on it the nut **133** which is in a slot **133***a* extending transversely through the bearing housing. As said screw shaft **132** is rotated, the nut **133** on said shaft is correspondingly raised and lowered, thus raising or lowering the bearing housing **21***a* and the end of the print roll supported therein. To accommodate the shaft **126** and to permit slide **20***a* to slide on its support means when a print roll **22** is backed away from cylinder **10**, the base **40** of the slide support is slotted with the longitudinal slot **40***a* extending from the outer face of said base to a groove **40***b* in the upper surface of base **40** in which is the bevel gear **128**. Groove **40***b* registers with a groove **54***c* in the lower surface of the base of slide **54**, in which is the gear **130** at the lower end of shaft **132**.

Referring to Figure 8, it will be noted that the gear train may be used with print rolls of different circumference, depending only on the length of shaft **72** and the length of the slide means. Accordingly, the gear train for each print roll is always rotatably in the same relationship to the gear train for each of the other print rolls which are employed.

In order to save time when mounting a set of print rolls, as for example when changing to a different print pattern, the gear trains should each be assembled with gear **88** so meshed with gear **90** that the key ways *h* in the print roll mandrels respectively are all in the same position rotatably with respect to each other. To facilitate this, two successive teeth on gear **88** are identified by the lugs *j* projecting laterally from the gear, to the left as viewed by the reader, and one tooth on gear **90**, on the print roll shaft, is identified in a similar way by a lug *k*. When the print rolls are put in the machine and the marked tooth on the gear **90** of each gear train is meshed between the two marked teeth on gear **88**, the gear trains for all the print rolls will be in proper relationship, and little or no time will be required to adjust one print roll rotatably with relation to the other print rolls, for all of the print rolls will be immediately in register or approximate register.

Associated with each print roll is a color box **24** and a brush **26** for transferring color from the color box to the print roll. Each color box and brush assembly is supported, by and between opposed slides **20***a* and **20***b*, below the print roll which is also supported by and between said slides. Projecting from the inner face of each of said slides are the rectangular frames **136**, and mounted for rotation in each of said frames is a screw-threaded rod **140**. Each rod **140** is connected at one end to a reversible motor **142** and threadedly engaged on said rods **140** respectively for travel thereon when the rods are rotated are bearings **138***a* and **138***b*. Each pair of bearings **138***a* and **138***b* receives and rotatably supports the respective ends **146***a* and **146***b* of a color brush shaft. Each color box has projecting from its ends split bearings **148** and **150**. The halves of said bearings respectively are fastened together around the said ends respectively of the color brush shaft, said shaft ends extending respectively beyond said split bearings through slots **137** in the inner side walls of frames **136**, respectively, and received in the bearings **138***a* and **138***b*, as described. By rotating an opposed pair of rods **140** the bearings **138***a* and **138***b* thereon, and the brush and color box assembly which they support, are moved forward or away from the print roll, this movement being independent of the slides, **20***a* and **20***b*, although each color box assembly also moves with the slides by and between which the assembly is supported. The means for moving a color box assembly toward and away from a print roll is described more in detail in copending application, Serial No. 449,178, now U.S. Patent No. 2,821,913 together with means for upsetting and washing the color boxes without removing them from the press.

Brush **26** is ordinarily rotated by the print roll, which is desirably an intaglio print roll the surface of which is cleaned by a doctor blade, not shown, leaving the color only in the grooves in the surface of the print roll. Occasionally, however, color stays on the surface of the print roll, which is undesirable and will mar the print unless removed. For this purpose separate means are provided for rotating the brush **26** in reverse at a slow enough speed to prevent the color for spattering, said means comprising the sprocket **162** on the end **146***b* of the brush shaft, said sprocket being connected by chain **164** (Fig. 2) to the sprocket **168** on the end of the drive shaft **170** of reversible motor **172**, which is shown mounted on a bracket **165** projecting from the inner surface of support member **16**.

In Figures 4 and 7, known manual means are shown applied to the slide means disclosed herein as a substitute or auxiliary for moving the print rolls toward and away from the backing cylinder **10**, for adjusting the pressure exerted by a print roll on a piece of fabric engaged between it and the backing cylinder **10** when and if it is desired not to print using only the controlled air cylinders to obtain the desired printing pressure. The means shown is a turnbuckle **55** interposed between posts spaced apart and projecting upwardly from a slide in front of the bearing housing which is carried by the slide. In Figure 4, which shows the bearing **21***a*, which is the one of each pair of bearings the elevation of which may be adjusted relative to its slide, the turnbuckle is between posts **56** and **57**. In Figure 7 the turnbuckle is between posts **56** and **57***a*, post **57***a* differing from the post **57** in size and shape because of the difference between bearing housings **21***a* and **21***b*. This manual means of adjusting the pressure of the print rolls against the fabric to be printed may, if desired, be employed as an adjunct to the air cylinder control system described herein. For example, the air cylinders may be employed to move the print rolls to within a distance of an inch or less of the backing cylinder **10**, and, after ratchet arms **68***a* and **68***b* have been engaged, the final adjustment may be made by means of said turnbuckle.

In Figure 12, three panels, P–**1**, P–**2** and P–**3**, are shown, each connected by suitable wiring to motors for controlling adjustment of the print rolls individually. Panel P–**1** has on it pushbuttons for controlling the circuits connected to motors **124**, for adjusting the elevation of the left-hand end of a print roll relative to its supporting slide; panel P–**2** has on it pushbuttons for controlling the circuits connected to motors **116**, for controlling the register of the individual print rolls axially, i.e., laterally of their supporting slides; and panel P–**3** has on it pushbuttons for controlling the motors **92** for adjusting the rotary register of the print rolls individually.

On panel P–**1**, a number of jacks **173***a*, **173***b*, **173***c*, and **173***d* are provided, equal in number to the number of print rolls, and each jack has two pushbuttons, for actuating motors **124** and causing them to drive their shafts clockwise or counter-clockwise. The jacks **173** are re-

movable from the panel (so that the pushbuttons for a particular print roll may be operated by the operator from various positions), and are connected by flexible leads *a*–1, *b*–1, *c*–1 and *d*–1 with solenoid switch boxes A–1, B–1, C–1 and D–1 respectively, positioned behind the panel and containing the switches that control the motor. As will be well understood, the jacks are removable from the respective panels and may be carried away by the operator and operated at a distance from the panel equal to the length of the leads respectively, each of which extends through holes in the panel and a weight *w* is hung on each lead between the jack and the switch box, so that the jack is returned to its position on the panel by force of the weight *w* at any time when it is released by the operator.

Panel P–2 similarly comprises the jacks 174*a*, 174*b*, 174*c*, 174*d*, connected by the leads *a*–2, *b*–2, *c*–2 and *d*–2 to the switch boxes A–2, B–2, C–2 and D–2 respectively, each of the leads being weighted by a weight *w*.

In like manner, panel P–3 comprises the jacks 175*a*, 175*b*, 175*c*, and 175*d*, connected by the leads *a*–3, *b*–3, *c*–3 and *d*–3, to the solenoid boxes A–3, B–3, C–3 and D–3, each of said leads being weighted by a weight *w*.

It will be understood that, by the control means illustrated in Figure 12, an operator is able to adjust the register or "set" of any print roll individually, and selectively as to rotary or lateral position, or spacing from the other print rolls around the backing cylinder, by remote control, and without the time-consuming operations of manually making each adjustment and then moving to the other side of the machine to see the effect of the adjustment by examining the pattern printed on the material.

In Fig. 14, a system of conduits is shown for supplying compressed air to the cylinders 60, which serve to advance and retract the print rolls toward and away from the backing cylinder 10 and cause the print rolls to apply controlled pressure on the fabric. Compressed air from any suitable source of supply is delivered through conduit 176 to the manually operated three-way valve 177, the three positions of which are indicated by the numerals 1, 2 and 3. From valve 177, conduit 178 leads through branches 178*a* and 178*b* to both pairs of air cylinders 60, on the side of the piston 61 which is nearer to the backing cylinder 10, and so when valve 177 is turned to position No. 1 and the pressure regulating valves *v* are set to the desired P.S.I., compressed air will be delivered to all pairs of cylinders 60 to move the pistons therein away from the backing cylinder and thereby retract the print rolls from printing position. When valve 177 is turned to position 3, compressed air will be delivered through conduit 179 and branch conduits 179*a* and 179*b* to both pairs of cylinders 60, on the side of the piston which is remote from backing cylinder 10, and will therefore serve to move the pistons toward the backing cylinder, thereby advancing the print rolls into printing position, at which time pressure regulating valves are set to the desired pressure for printing. When the valve 177 is turned to position 2, compressed air will be delivered to the manifold 180, from which it may be delivered through branch conduits 180*a* and 180*b* to each pair of cylinders 60 and selectively to either side of the pistons therein, by means of the valves 169 of which there is one for each pair of cylinders, and each has three positions, two for connecting the manifold 180 to one or the other end of the cylinders comprising a pair of cylinders, and an intermediate or "off" position. The valves SV in the electrical control circuit, see Fig. 13, are equal to the maximum number of print rolls which may be employed. The valves 169 and 171 may be operated by the electric control circuit to achieve jump printing by moving one or more print assemblies, comprising print roll, color box, color brush and doctor blade all supported by the same slides which support the print roll, out of contact with the web being printed and returning the print assembly, or assemblies to print once for a plural number of printing cycles of the other print rolls of the set.

The electric control circuit shown in Figure 13 includes a selector plate 181 for effecting jump printing, i.e., for moving one or more print rolls into printing position for a single rotation while one or more other print rolls are moved out of printing position and repeating this movement at regular intervals, such for example as once during each cycle of six printing rotations of the print rollers.

The said selector plate 181 is a flat cylindrical member the body portion 181*a* of which is made of circumferentially grooved insulating material and comprises two or more segments attached to a conductive disk 182. As illustrated in Figure 15, there are six segments which, when assembled form a complete circular surface on the backing 182. Assembly 181 is rotatably mounted on the conductive journal 184, supported by the conductive bearing 186, which bearing rests on insulating block 188. Plate 181 is rotated in synchronism with the print rolls, and, as illustrated in Fig. 3, it is positioned at the rear end of one of the shafts 72 and is rotated by the worm 200 on shaft 72. A fixed nonconducting contact arm 190 is supported at one end on support pin 192, said arm carrying a number of contact pins 194 which respectively protrude into the grooves 196 in the face of said body portion 181*a*, the grooves in each segment being equal in number and positioned in end-to-end alignment to form a series of concentric grooves.

As illustrated, there are twelve grooves in each segment. In segments A, B, C, D, and E, a conductive contact strip 198 is provided only in groove 11, so the contact pins 194, which are respectively connected to the electrical control circuits for moving the print rolls toward and away from the backing cylinder, do not complete a circuit, except in groove 11 controlling print roll No. 11. In segment F, however, all of the grooves 196 except groove 11 are filled with contact strips 198, which, as illustrated, are M-shaped, and as segment F of member 181 passes under contact arm 190, the pins 194 make contact with contact strips 198 in all the grooves respectively except in groove 11. Thus it will be seen that when the electrical circuits are completed to move the print rolls away from contact with the backing cylinder eleven out of twelve print rolls (all but roll #11) will be moved out of contact with the backing cylinder, leaving only print roll #11, which is controlled by the incompleted circuit having no contact strip in place to engage the contact pin in groove 11, in contact with the backing cylinder and therefore the only print roll in position to print.

Contact strips 198 are removable and may be placed in the corresponding grooves of any segments to cause any one or more print rollers to be withdrawn or put in printing position during the desired cycle to form any desired combinations of pattern effects.

By having different combinations of segments to form selector plates similar to 181, it will be seen that jump printing by one or more rolls may be accomplished in any desired sequence. As illustrated, member 181, which is divided into 6 segments, revolves one revolution each time the print rollers revolve six revolutions, i.e. each time a segment passes under contact arm 190, the print rollers have made one revolution. In this example, if it is desired to print a valance on a 96" drapery and the print rollers are 16" in diameter, the valance would be engraved on print roll #11. During the passage of segments A, B, C, D and E under contact arm 190, five print patterns without a valance will be printed, thus producing the body part of the drapery, and the roll #11 which is engraving to print the valance will be held out of printing position. When segment F passes under contact arm 190, print rollers 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 and 12 are backed away and print roller 11 comes into printing position, causing the valance to be printed,

thus completing the combination of patterns comprising one drapery.

If it were desired to print a border every 54", as for a table cover, and print rollers 18" in circumference were used ($3\times18"=54"$), member **181** would revolve one revolution each time the print rollers revolved three revolutions and member **180** would contain only 3 segments.

To produce other effects, selector plates **181** are emploid having two or more segments. Ratchet arm **68***a*, **68***b* engageable with teeth **67***a*, **67***b* when a slide moves back from cylinder **10** more than a predetermined amount described above, prevent a disengaged print roll from backing off more than the predetermined amount, for example, ¼ of an inch. The predetermined amount is the length of a tooth **67**. When using the jump printing circuit the ratchet members **68***a* and **68***b* (Figure 11) are placed in engaging position by turning locking member L. The slide then cannot retract more than the length of one tooth **76***a* or **76***b*.

It will thus be seen that there has been provided by this invention a method and apparatus in which the various objects hereinabove set forth, together with many thoroughly practical advantages, are successfully achieved. As various possible embodiments might be made of the mechanical features of the above invention, and as the art herein described might be varied in various parts, all without departing from the scope of the invention, it is to be understood that all matter hereinabove set forth or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

What I claim is:

1. In a textile printing machine having one or more print rolls, bearing means for a print roll shaft mounted for movement toward and away from a backing cylinder, means for rotating a print roll including, a driven shaft, a first sleeve keyed on said driven shaft, a second sleeve rotatable around said first sleeve, said second sleeve having a spiral groove in its inner surface and said first sleeve having a projection extending into said groove, a first bevel gear on said second sleeve, a pair of intermeshing gears aligned radially with respect to the backing cylinder, one of which gears is mounted on the print roll shaft, means for rotatatively supporting the other of said intermeshing gears and a second bevel gear carried by the other of said radially aligned gears meshing with the said first bevel gear.

2. The device claimed in claim 1 including means independent of the main drive means for rotating said second sleeve and thereby actuating said intermeshing gears to rotate said print roll to adjust its register.

3. In a textile printing apparatus comprising a backing cylinder and a plurality of slide support means projecting radially from said cylinder and disposed in horizontal alignment at opposite ends of said backing cylinder, with each slide support defining within itself a slideway, slide means comprising a pair of slides disposed in end to end relation in each of said slide support means, pneumatic means for advancing the slide means on the support means respectively, means for fixing the position of one slide member on each pair of slide means, and means interconnecting said slides for adjusting their position toward or away from one another to adjust the over all length of the slide means.

4. In a textile printing machine having a rotatable backing cylinder and one or more driven print roll assemblies comprising a print roll, color box, color brush and doctor blade support means for each print roll assembly movable toward and away from said backing cylinder to move a print roll into and out of frictional engagement with said backing cylinder, said print roll supporting means including bearing means movable laterally of said backing cylinder, independent means for moving said bearing means laterally with respect to said backing cylinder, drive means for each print roll assembly including a main source of power, a drive shaft, and a gear train interconnecting said drive shaft and said print roll to rotate said roll, said gear train including a pair of intermeshing gears mounted on parallel shafts, one of said gears being movable laterally with the print roll in a plane parallel with the axis of the backing cylinder, the teeth of said intermeshing gears overlapping to permit relative axial movement of one with respect to the other without disengaging.

5. In a textile printing machine having one or more print roll assemblies operated by fluid under pressure for movement toward and away from a backing cylinder, a piston connected to each end of each roll, a cylinder for each piston, a source of fluid under pressure, conduit means interconnecting said source with each cylinder on both sides of the piston therein, solenoid valve means for supplying fluid under pressure selectively to one side or the other side of the piston means for each print roll, and an electrical circuit for controlling the operation of said solenoid valve means whereby the rolls may be operated in different cycles including a selector plate divided into a plurality of segments comprising grooves and pins equal in number to the number of print roll assemblies, contact members selectively insertable in said grooves and means for rotating the plate in synchronism with the print rolls.

6. In a textile printing machine having one or more print roll assemblies operated by compressed air for movement toward and away from a backing cylinder, a piston connected to each end of each roll, a cylinder for each piston, a source of compressed air, conduit means for interconnecting said source with each cylinder on both sides of the piston therein, solenoid valve means for supplying compressed air individually to the cylinder means of each print roll assembly and selectively to one or the other side of the piston means therein, and an electrical circuit for actuation and remote control of said solenoid valve means including means connected in said electrical circuit for automatically actuating one of said circuits discontinuously to cause one of said roll assemblies to print on a different cycle than other print roll assemblies of the set.

7. In a textile printing apparatus comprising a backing cylinder and a pair of slide support means projecting radially from said cylinder and disposed in horizontal alignment at opposite ends of said backing cylinder, with each slide support defining within itself a slideway, slide means comprising a pair of rectangular slides disposed in end to end relation in each slide support means, turnbuckle means interconnecting each pair of slides, cylinder means on each slide support, piston means extending from each cylinder into contact with the rear one of a pair of slides, bearing means for a print roll shaft on the front one of each pair of slides, the front slide of one of said pair of slides having an inclined surface against which rests the bearing carried on said slide, the bearing on the other front slide of said pair of slides being enclosed in a housing having space therein to permit lateral movement of said bearing, and a fixedly mounted reversible motor having a screw shaft projecting against one of said bearings to move one of said bearings laterally on said inclined surface and to move the other of said bearings laterally within its housing.

8. In a textile printing machine comprising, a rotating backing cylinder means and a number of pairs of bearings for mounting print rolls in parallel relation to said backing means, a number of print rolls, a source of power, a number of gear trains continuously connected between said source of power and the mandrels of said print rolls respectively, each train including a shaft having a longitudinally extending key, a sleeve surrounding said shaft and slideable on said key, a rotatable sleeve surrounding the sliding sleeve and having in its inner surface a spiral groove, a finger projecting from the sliding sleeve into the groove in the rotatable sleeve, a

bevel gear on the rotatable sleeve, a stub shaft parallel to the print roll mandrel, a gear on the stub shaft having two successive teeth marked with identifying means and a gear keyed on a print roll mandrel having a single marked tooth and positioned to mesh with said gear on the stub shaft when the shaft is mounted in its bearings, a bevl gear mounted on and projecting laterally from said gear on said stub shaft and meshing with said bevel gear on the rotatable shaft to drive the said gear on said stud shaft, said gear on the stub shaft and the gear on the mandrel having axes disposed in a plane which includes the axis of the backing cylinder means.

9. The apparatus claimed in claim 8 including means for moving the sliding sleeve on the key of its shaft to adjust the distance of the said gear on said rotatable sleeve toward and away from said source of power to compensate for different diameters of the rolls of different sets of print rolls.

10. In a textile printing machine having a rotatable backing cylinder means and a number of pairs of bearings for respectively receiving the mandrels of sets of print rolls in parallel relation to said backing cylinder means, gear trains equal in number to the number of print rolls employed a common drive means for driving all of said gear trains in synchronism, said gear trains being continually in mesh with the common driving means, a gear keyed on the mandrel of each print roll and having a mark thereon, and a gear at the end of each gear train positioned to mesh with the gear on a print roll mandrel when the mandrel is placed in a pair of bearings, said gear at the end of the gear train having a mark for aligning with the print roll and marked gear thereon.

11. The device claimed in claim 10 including means for adjusting the length of each gear train to compensate for differences in diameter of the print rolls of different sets of print rolls.

12. In a textile printing machine having rotatable backing cylinder means and a number of pairs of bearings for respectively receiving the mandrels of sets of print rolls to mount them in parallel relations to said backing cylinder means, a pair of slides supporting each pair of bearings, a slideway for each slide disposed substantially radially with respect to said backing means, color boxes and brushes equal in number to the print rolls, pairs of bearings supported by pairs of slides for mounting the shaft of each brush, said color boxes having split bearings for hanging said boxes from the shafts of said brushes respectively, and means for moving each pair of slides to thereby move toward and away from its backing cylinder means, a complete printing assembly consisting of print roll, doctor blade, color box and color brush supported by said pairs of slides.

13. The apparatus claimed in claim 12 including an air cylinder on each slide support having a piston connected to the slide on said support, means for introducing pneumatic pressure selectively on either side of each piston to control the position of each slide and the bearings means thereon, and means on each slide co-acting with means on each supporting slideway for locking each slide against substantial movement away from said backing means.

14. The device claimed in claim 13 in which each slide comprises two parts interconnected by turnbuckle means, and the means on a slide for co-acting with means on the slide-way for preventing movement of the slide away from the backing cylinder means is carried by the slide part which is further from the backing cylinder means.

15. The device claimed in claim 13 including means for controlling the delivery of said pneumatic pressure to deliver it selectively to one or more pair of fluid cylinders to move a complete print assembly for engaging and disengaging it with a web being printed while said assembly continues in operation.

16. Textile printing apparatus comprising backing cylinder means and a number of printing units comprising a print roll, color box, doctor blade and color brush assembly, means for moving said units together or separately toward and away from the backing means including an air system and co-acting electrical control means, whereby any unit or group of units may be disengaged from a web passing over said backing means and returned to the web while printing according to a predetermined cycle related to the print pattern of the set of print rolls being used, bearing means for each unit, slide and slide support means for the bearing means of each unit, said slide support means being disposed substantially radially with respect to said backing cylinder means, pneumatic cylinder means mounted on said slide support means and piston means connected to said slide means, a source of pneumatic pressure to supply air under pressure to said cylinder means, said means to supply compressed air including a manually operated three-way valve controlling supply of compressed air to one or the other side of all the cylinder means and to a manifold having a branch conduit for the cylinder means for each of said printing units, each branch conduit dividing into two conduits leading respectively, to one side of the piston in each cylinder comprising the said cylinder means for a printing unit, and to the other side of the piston in each cylinder comprising the pair of cylinders, a solenoid valve in each branch conduit to control the supply of air pressure to one or the other of the conduits into which it divides, and an electrical circuit for selectively operating said solenoid valves.

17. Textile printing apparatus comprising backing cylinder means and a number of printing units comprising a print roll, color box, doctor blade and color brush assembly, said units being movable together or separately toward and away from the backing means, whereby any unit or group of units may be selectively disengaged from a web passing over said backing means and returned to the web while the web is being continuously printed according to a predetermined cycle related to the print pattern of the set of print rolls being used, bearing means for each unit, slide and slide support means for the bearing means of each unit, said slide support means being disposed substantially radially with respect to said backing cylinder means, pneumatic cylinder means mounted on said slide support means and having piston means connected to said slide means, a source of pneumatic pressure to supply air under pressure to said cylinder means, including a manifold having a plurality of branch conduits one of which connects to each side of the piston means in each cylinder, solenoid valve means in each of said branch conduits, and an electrical control circuit for selectively operating said solenoid valve means.

18. Textile printing apparatus comprising backing cylinder means and a number of printing units comprising a print roll, color box, doctor blade and color brush assembly, said units being movable, together or separately, toward and away from the backing means, whereby any unit or group of units may be selectively disengaged from a web passing over said backing means and returned to the web while the web is being continuously printed according to a predetermined cycle related to the print pattern engraved on the set of print rolls being used, bearing means for each unit, slide and slide support means for the bearing means of each unit, said slide support means being disposed substantially radially with respect to said backing cylinder means, pneumatic cylinder means mounted on said slide support means and having piston means connected to said slide means, a source of pneumatic pressure to supply air under pressure to said cylinder means, including a manifold having a plurality of branch conduits one of which connects to each side of the piston means in each cylinder, solenoid valve means in each of said branch conduits, and an electrical control system for selectively operating said solenoid valve means including individual control circuits for the sole-

noid valve means for each print roll and means for closing one or more said circuits during one printing cycle and closing one or more other of said circuits during another printing cycle, in predetermined sequence.

19. The apparatus claimed in claim 18 in which said electrical control system includes a selector plate comprising a plurality of segments, means for mounting on each segment strips equal in number to the number of print rolls, each segment providing control during one rotation of said rolls and means for closing a circuit through each contact strip on each segment in sequence.

20. In a textile printing apparatus comprising a backing cylinder and a plurality of support means projecting radially from said cylinder and disposed in horizontal alignment at opposite ends of said backing cylinder, with each slide support defining within itself a slideway and slide means disposed in each of said slideways, bearing means mounted on said slides respectively for receiving and rotatively supporting the ends of a print roll shaft, means for mounting said bearings on said slides for lateral movement on said slides respectively, drive means for rotating a print roll mounted in said bearings, means independent of said drive means for adjusting the position of said bearings laterally with respect to the said slides comprising a first reversible motor, means for fixedly mounting said motor and a screw shaft connecting said motor to one of said bearings; means independent of said means for raising and lowering one of said bearings comprising a second reversible motor, means for fixedly mounting said motor, and a screw shaft connecting said motor to one of said bearings, the slide support for one of said bearings having a vertical slot through which extends the first motor shaft for moving said bearing laterally, and one of said slides having a horizontal slot through which extends the second motor shaft which regulates the elevation of the bearing carried on said slide, means independent of the main drive means for adjusting the rotary angle of a print roll on its bearings independently of other print rolls comprising a third reversible motor, and electric circuits individual to each of the said three reversible motors, each circuit including solenoid switch means and switch control means for actuating its motor to drive it clockwise or counterclockwise, each switch control means being carried by a jack, and each jack being connected by flexible leads to the solenoid switch means controlled by its switch control means.

21. In a textile printing machine comprising a rotating backing cylinder means and a number of pairs of bearings for mounting print rolls in parallel relation to said backing means, a number of print rolls, a source of power, a number of gear trains continuously connected between said source of power and the mandrels of said print rolls respectively, each train including a shaft having a longitudinally extending key, a sleeve surrounding said shaft and slideable on said key, a rotatable sleeve surrounding the sliding sleeve and having in its inner surface a spiral groove, means projecting from the sliding sleeve into the groove in the rotatable sleeve, a bevel gear on the rotatable sleeve, a stub shaft parallel to the print roll mandrel, a gear on the stub shaft having two successive teeth marked with identifying means and each print roll mandrel having thereon a key, a gear keyed on the mandrel and having a tooth aligned with said key on the mandrel, said key being positioned in predetermined relation to the key on the mandrel of the other print roll.

22. Textile printing apparatus comprising backing cylinder means and a number of printing units comprising a print roll, color box, doctor blade and color brush assembly, means for moving said units together or separately toward and away from the backing means, whereby any unit or group of units may be disengaged from a web passing over said backing means and returned to the web while printing according to a predetermined cycle related to the print pattern of the set of print rolls being used, bearing means for each unit, slide and slide support means for the bearing means of each unit, said slide support means being disposed substantially radially with respect to said backing cylinder means, pneumatic cylinder means mounted on said slide support means and piston means connected to said slide means, a source of penumatic pressure to supply air under pressure to said cylinder means, said means to supply compressed air including a manually operated three-way valve controlling supply of compressed air to one or the other side of all the cylinder means and to a manifold having a branch conduit for the cylinder means for each of said printing units, each branch conduit dividing into two conduits leading respectively to one side of the piston in each cylinder comprising the said cylinder means for a printing unit and to the other side of the piston in each cylinder comprising the pair of cylinders, a solenoid valve in each branch circuit to control the supply of air pressure to one or the other of the conduits into which it divides, and an electrical circuit for selectively operating said solenoid valves, means for causing opening and closing of a selected solenoid valve automatically at regular intervals during a series of printing cycles to cause printing by one or more print rolls in a cycle different from the printing cycles of the other rolls.

23. A machine for printing cloth comprising a number of print rolls, backing means therefore, means for moving said print rolls toward and away from the backing means in unison, means for rotating all of said print rolls simultaneously and keeping all of the rolls in register both while the rolls are in printing contact with their backing means and while they are out of printing contact with their backing means, and means for selectively and automatically moving one of said print rolls away from its backing means without moving the other print rolls relative to their backing means and while continuing to rotate all of said rolls and keeping the non-printing roll in register relative to the other print rolls.

24. A machine for printing cloth comprising a number of printing rolls, backing means therefor, and means including a compressed air system and co-acting electrical control means for moving said print rolls together or individually toward and away from the backing means, including means for selectively and automatically moving one or more of said print rolls out of printing contact with its backing means without moving the other print rolls relative to their backing means, and for automatically returning to printing position at predetermined intervals any of said print rolls which have been selectively moved out of printing position, and means for rotating all of said print rolls and keeping them in register relative to one another while all the print rolls are in printing contact with the backing means and while all of the print rolls are out of contact with the backing means and while one or more of the print rolls are out of printing contact with the backing means and others of said print rolls are in printing contact with the backing means.

25. Textile printing apparatus comprising backing cylinder means and a number of printing units comprising, a print roll, color box, doctor blade, and color brush assembly, means for moving said units together or separately toward and away from the backing means, means for moving said units including a fluid pressure system and valve control means, selector means and means responsive to said selector means for selectively operating said valve means to cause one or more of said units to be disengaged from a web passing over said backing means or returned into contact with the web while printing according to a predetermined cycle related to the pattern on the set of print rolls being used, bearing

means for each unit, slide and slide support means for the bearing means of each unit, said slide support means being disposed substantially radially with respect to said backing cylinder, fluid cylinder means mounted on said slide support means and having piston means connected to said slide means, a source of fluid pressure to supply fluid under pressure to said cylinder means, and valve means to control the supply of fluid to said cylinders individually and to one or the other side of the piston means therein.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 2,893,310 July 7, 1959

James Reid Johnson

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 2, line 61, and column 3, line 15, for "printed", each occurrence read -- print --; column 8, line 26, for "for" read -- from --; column 9, line 47, for "P.S.I." read -- P.S.I. --; column 10, line 71, for "engraving" read -- engraved --; column 11, line 10, for "arm" read -- arms --; column 13, line 7, for "bevl" read -- bevel --.

Signed and sealed this 16th day of February 1960.

(SEAL)

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