April 26, 1932. A. F. SHAW, JR., ET AL 1,855,731

TEXTILE PRINTING MACHINE AND FRICTION DRIVEN ROLLER FOR USE THEREIN

Filed Aug. 26, 1930 2 Sheets-Sheet 1

Fig. 1.

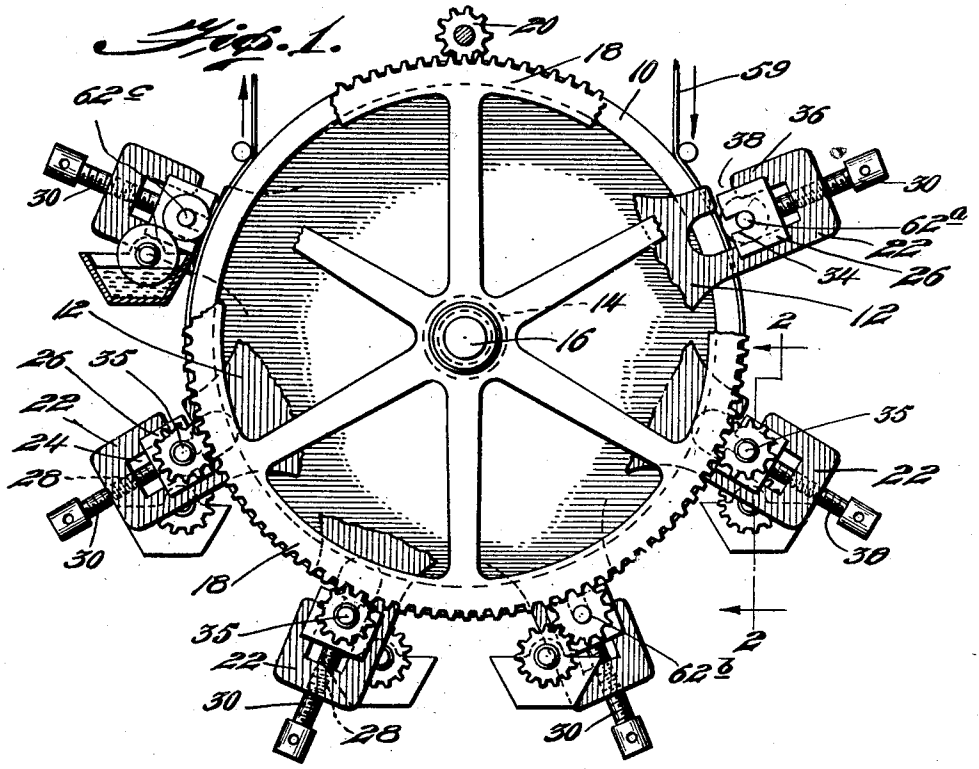
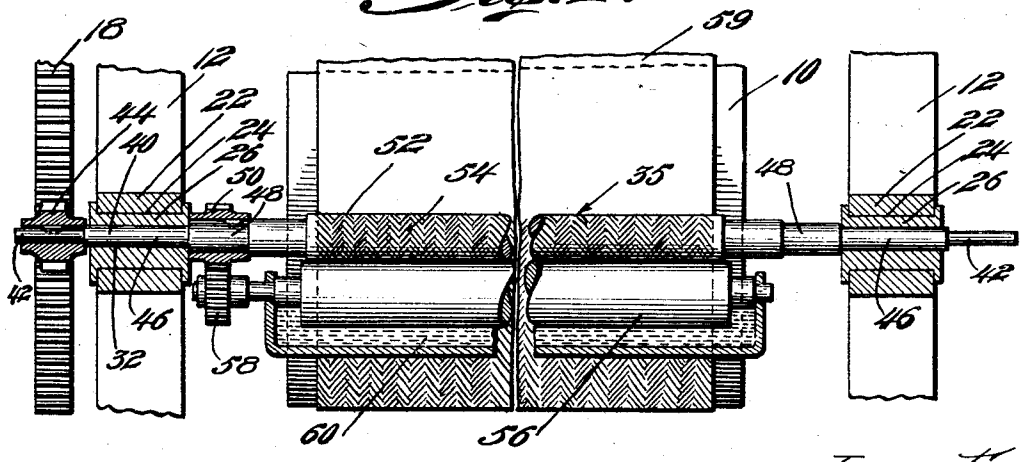


Fig. 2.



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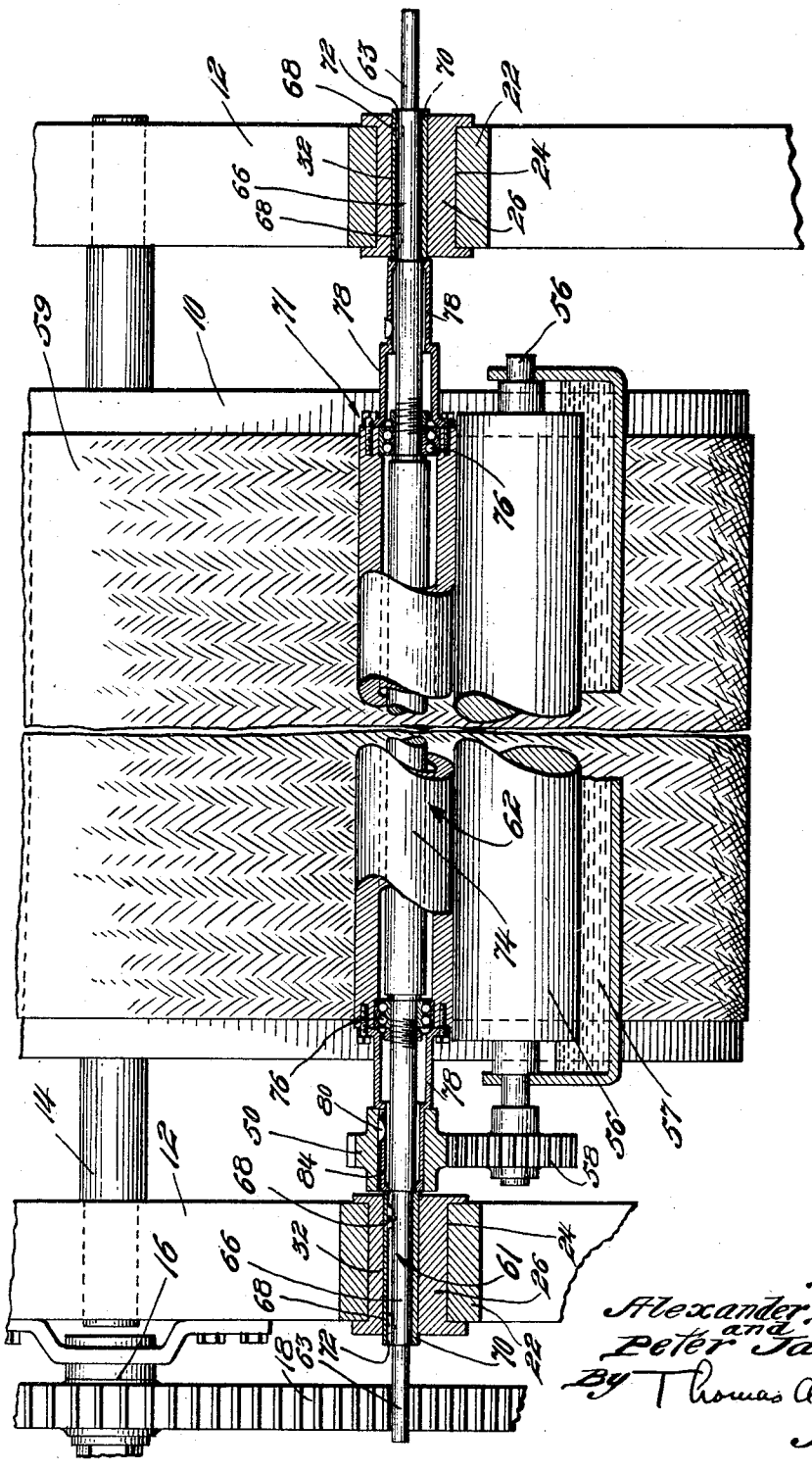


Fig. 3.

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UNITED STATES PATENT OFFICE

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TEXTILE PRINTING MACHINE AND FRICTION DRIVEN ROLLER FOR USE THEREIN

Application filed August 26, 1930. Serial No. 477,938.

Our invention relates to improvements in textile printing machines and particularly in a type of friction driven roll adapted to be used therein for various purposes.

An object of our invention is to provide a frictionally driven roll for use in textile printing machines which is interchangeable for any of the printing rolls and which may be readily substituted therefor and adjusted towards the web of fabric and cylinder in the same bearings in which the former types of printing rolls are mounted.

An object of our invention therefore is to provide a roll of this description absolutely interchangeable for any printing roll. Frictionally driven rolls of this description may be employed for various purposes in a textile printing machine. They may be either (*a*) employed as friction crushing rolls to take the creases out of the cloth after it has first come in contact with the cylinder in which case a gumming furnisher box is not employed, (*b*) as a gumming roll employed with a furnisher roll employing a solution to crush off the excessive colored gum paste from and into the printed cloth as the web of fabric leaves the printing cylinder so as to prevent the excessive amount of color from picking or marking off when aged or steamed as is particularly necessary in employing the fast indanthrenes or vat colors or (*c*) as an intermediate gumming roll which may be inserted between the printing rolls in which the color box or solution in the furnisher box thereof merely consists of gum to prevent the color inserted from the earlier printing roll from bleeding when a later heavier color is put on by a later printing roll or (*d*) as a printing roll if desired.

A further object of our invention is to provide a roll which may be readily substituted for any one of the printing rolls without substituting bearings or taking down a multiplicity of parts in the printing machine in order to make the substitution, but one which employs identically the same bearings as the printing roll and one which is also adjustable preferably radially towards said cylinder and the fabric passing around it in order to be readily driven thereby.

A further object of our invention is to provide a frictionally driven roll of this description which may be readily driven with the expenditure of a minimum amount of power. Instead of mounting a rotary mandrel or shaft in ball bearings built into the frame itself, we preferably mount a stationary shaft on the usual printing roll bearings and rotatably mount with a minimum amount of friction a roll of substantially the width of the printing cylinder on two ball bearings mounted centrally of the stationary shaft spaced apart substantially the width of the cylinder so that the only power necessary is to rotate the freely revolvable roll which is freely revolvable on the ball bearings without the necessity of revolving a mandrel or shaft on bearings in the frame.

A further object of our invention is to provide in frictionally driven rolls of this description, means thereon to readily drive a furnisher roll to furnish the gum or color or whatever solution is desired from the color box or gum box to the periphery of the driven roll in order to impregnate it on the fabric or to remove any excess of color or gum from the fabric. To this end we provide an extension projecting outwardly from the rotatable roll on which may be readily splined a standard gear for driving a furnisher roll. Hitherto, crusher rolls, or gumming rolls have been positively driven by gearing to rotate in synchronism with the printing rolls in the cylinders. Their function has been to remove all surplus dye or color and to press the previously deposited dye or color into the fabric while applying or removing the protective coating solution thereto. Where these rolls have been geared to the master gear or with the printing roll each has become a portion of the positive operating feeding mechanism for the web of fabric and it has been essential that their peripheral surfaces should rotate at an uniform speed, for otherwise the section of the fabric web between the printing rolls or between a gum roll, crushing roll or degumming roll and a printing roll

may become slack or unduly taut either of which conditions will cause a defect in the printing such as blurring, pitting, bleeding or dragging of one color into the other or into the background. It is also essential that when a printing roll has been cut down in size to put a new pattern on, that the former type of degumming or gumming rollers be similarly cut down so as to rotate at the same peripheral speed against the cloth and it is therefore apparent that formerly there must be a gumming roll for each set of printing rolls of a given size or said rolls must be cut down each time a new size of printing rolls is used.

Inasmuch, however, as we employ a frictionally driven roll which is driven by friction against the web to press or rub against it at its own speed regardless of the diameter of the printing rolls that we provide one standard gumming roll which may be used for any size of printing rolls and which is not geared to or driven by the cylinder or printing rolls and which is driven only by frictional contact with the web bearing against the cylinder with so much force as to readily drive its own furnisher roll.

These and such other objects of our invention as may hereinafter appear will be best understood from a description of an embodiment thereof such as illustrated in the accompanying drawings.

In the drawings, Fig. 1 is a diagrammatic end elevation of a standard type of six color printing machine normally employing six printing rolls and in which a roll constructed in accordance with our invention is substituted for one of the printing rolls as a crushing roll, another as an intermediate gumming roll and a third as a final gumming roll.

Fig. 2 is an enlarged fragmentary sectional view taken along the line 2—2 of Fig. 1 showing in elevation a portion of a cylinder of a printing machine with the usual type of printing roll employed.

Fig. 3 is a view approximately similar to Fig. 2 showing a slightly larger amount of the cylinder with our improved frictionally driven roll substituted for the usual printing roll shown in Fig. 2.

In the drawings, wherein like characters of reference indicate like parts throughout, 10 diagrammatically illustrates the usual cylinder of a standard textile printing machine. Said cylinder 10 is suitably mounted in the frame 12 by means of a cylinder shaft 14 so as to permit the cylinder to rotate freely on the frame. There is also mounted on the stub shaft 16 preferably axially in line with the cylinder shaft 14 but separate therefrom as shown in Fig. 3 the large master gear 18 of approximately the diameter of the cylinder and said master gear 18 is driven in any suitable manner by the gear 20 which is preferably driven by its own power motor (not shown). As shown in Figs. 1 and 2 the usual construction of printing roll is as follows: A plurality of sets of brackets 22 one set of two for each roll are provided projecting radially outwardly from the frame, beyond the edges of the cylinder, which brackets are preferably centrally slotted as at 24 to hold the bearings 26 which are radially adjustable therein. The outer end of each respective bracket is provided with a threaded hole 28 adapted to receive an adjusting screw 30 which is rigidly embedded in the outer end of the radially slidable bearing 26. Each bearing 26 is provided with the transverse hole 32 therein which serves to carry the printing roll shaft 40. The inner end of each bearing 26 is open as at 34 and one side of each bracket leg 36 is provided with a channel 38 so that each end of the printing roll shaft 40 may be inserted through the channel 38 and underneath the bearing 26 into the slot 34 after the bearing 26 has been pulled radially outwardly by unscrewing the adjusting screw 30.

The structure of the printing roll 35 is shown clearly in Fig. 2. It is provided with the printing roll shaft 40 having an end portion 42 on which the spur gear 44 is mounted which is adapted to enmesh the master gear 18 to secure a positive drive of the printing roll. The portion 46, interior of said portion 42 is slightly larger in diameter and of a size to compactly be retained within the hole 32 in the bearing 24. The portion 48 interior of said portion 46 is of still larger diameter and is interior of said bearing 26 on the frame and on which may be detachably splined, the furnisher roll driving gear 50. The central portion 52 is of substantially the width of the cylinder 10 and is provided in use with the engraved pattern 54 and is adapted to be in contact with the furnisher roll 56 having the gear 58 on one end of the shaft thereof adapted to be driven by the gear 50 on the printing roll driving shaft 40. The usual operation of the printing roll is as follows: The spur gear 20 driven in any suitable manner rotates the master gear 18 which in turn through the medium of the gears 44 rotates each respective printing roll. Each respective furnisher roll 56 is positively driven by the gear 50 on the printing roll shaft 40 in mesh with the gear 58 on the furnisher roll shaft. A suitable amount of color paste is picked up from the color box 60 and brought by peripheral contact of the furnisher roll 56 into contact with the printing roll and forced into the pattern indentations therein and rotation of the printing roll forces the paste from the pattern indentations therein into the web of fabric 59 passing between it and the cylinder and frictionally drives both the web of the fabric 59 and the cylinder 10 to impregnate the pattern on the fabric. We have endeavored so far to de-

scribe an ordinary printing machine with the usual printing roll.

As stated hitherto, crushing rolls, intermediate gumming rolls and final gumming rolls are all old in the art, but they have usually been positively driven by a positive drive from the master gear 18 and have had to be of the same peripheral size as the periphery of the printing roll or otherwise the cloth would crease or rub between them. We have shown in Fig. 3 a structure of frictionally driven roll for use as either a crushing roll 62^a, an intermediate gumming roll 62^b or final gumming roll 62^c as indicated in Fig. 1. Said frictionally driven roll 62 includes the stationary shaft 61 provided with an end portion 63 which is adapted to be used merely as a handle and which corresponds to the portion 42 of the usual printing roll 35 on which the driving gear 44 may conveniently be mounted. Said stationary shaft 61 is provided interior of said end portion 63 with a portion 66 of slightly larger diameter provided with suitable Woodruff keys 68. It often happens in practice that the bearing holes 32 of different makes of printing machines for the printing rolls are of different size and in order that our standard frictionally driven roll may be readily mounted in any size bearing hole 32, we provide the sleeves 70 having the internal key grooves 72 therein which may readily be keyed to the portions 66 by means of the Woodruff keys 68 or otherwise so that the portions 66 may be readily built up by means of different sized sleeves 70 to fit any size bearing hole 32.

In order that the rotatable portion 71 of our improved friction roll may operate with a minimum amount of friction, we suitably mount ball bearings 76 centrally of said stationary shaft 61 preferably spaced apart substantially the width of the cylinder 10 and we suitably mount a roll 74 of the desired diameter and also preferably substantially the width of the cylinder 10 on the ball bearings 76. In order that means may be readily provided to drive the furnisher roll 56 we provide an extension 78 preferably of lesser diameter than the periphery of the roll portion 74 projecting laterally towards each sleeve 70 and also provided with keys 80 thereon to which the furnisher roll driving gear 50 such as the standard gear normally used on any printing roll for this purpose may be readily keyed by means of the internal key 84 shown. It is thus obvious that the roll portion 74 and extensions 78 including the furnisher roll gear 50 will be revolved by frictional contact against the web of fabric 59 and cylinder 10 with sufficient force to drive the furnisher roll 56 to drive the desired amount of gumming or degumming solution 57 where employed onto the periphery of the frictionally driven roll 74 to either crush, gum or clean the web of fabric in the desired manner. Inasmuch as the roll is provided with the extensions 78 projecting from each side of the main roll portion 74, it is obvious that the roll is interchangeable and may be reversed end for end in the printing roll bearing 26. Where our improved frictionally driven roll is employed as a crushing roll to initially remove the creases from the fabric, as shown at 62^a in Fig. 1, it is apparent that its corresponding color box 60 and furnisher roll 56 and furnisher roll driving gear 58 may be omitted.

It is apparent that our improved frictionally driven roll 62 may be substituted in the usual bearings 26 in similar manner as one printing roll is replaced for another, namely, by unscrewing the adjusting screws 30 to bring the bearings 26 near the outer ends of the brackets 22 and removing either the shaft 40 or the shaft 61 through the slot 34 in the bottom of the bearings 26 and through the lateral openings 38 in each side wall of the bracket 22 and an inspection of Figs. 2 and 3 will readily show that the sleeve portions 70 of our improved frictionally driven roll will exactly fit into the hole 32 left vacant by the portion 40 of the printing roll shaft and a standard furnisher roll gear 50 may be interchangeably put on the portion 48 of the printing roll or the revolvable extension 78 of our improved frictionally driven roll and that the rotatable portion 74 of our improved frictionally driven roll will substantially correspond with the width of the printing portion of the printing roll 52 and that we have provided a frictionally driven roll of this description which may be readily substituted for any printing roll without redesigning the printing machine or removing any of the bearings or any part thereof and one which may be driven with a minimum amount of friction as we provide a roll of relatively light weight rotating on a standard heavy shaft and one which is frictionally driven with sufficient force to rotate its own furnisher roll and one which may be readily adjusted in the same manner as the printing roll radially relatively to the moving web 59 and cylinder 10 by mere adjustment of the screws 30 to move the bearings 26 in similar manner as the same adjustment for the standard printing roll.

It is understood that our invention is not limited to the specific embodiment shown and that various deviations may be made therefrom without departing from the spirit and scope of the appended claims.

What we claim is:

1. In a textile printing machine having a frame, a rotatable cylinder, a master gear adapted to drive a web of fabric around a portion of the periphery, of said cylinder, means to rotate said master gear, a plurality of sets of bearings mounted in said frame having holes therein of a size to hold a print-

ing roll shaft having a gear thereon exterior of one of said bearings and a furnisher roll driving gear interior of one of said bearings and adapted to be radially adjusted towards said cylinder and master gear to press said printing roll against said web and cylinder to impregnate a pattern on the web and bring the gear into positive engagement with the master gear to drive said printing roll and cylinder by peripheral contact therewith, a frictionally driven roll comprising a stationary shaft having keys near each end thereof, two ball bearings mounted centrally thereof spaced apart substantially the width of the cylinder, sleeves of substantially the diameter of the printing roll shaft of a peripheral size to non-rotatably rest in said bearing holes and having interior grooves for said keys, a roller of substantially the width of said cylinder rotatably mounted on ball bearings and thus by radial adjustment of a set of radially adjustable bearings adapted to be brought into rolling contact with said fabric web and cylinder having an extension of lesser diameter projecting laterally therefrom towards a sleeve having key means thereon adapted to detachably secure a furnisher roll gear thereon, whereby said frictionally driven roll may be detachably substituted for any printing roll and be driven by peripheral contact with said cylinder to also drive the furnisher roll.

2. In a textile printing machine having a frame, a rotatable cylinder, a master gear adapted to drive a web of fabric around a portion of the periphery of said cylinder, means to rotate said master gear, a plurality of sets of bearings mounted in said frame having holes therein of a size to hold a printing roll shaft having a gear thereon exterior of one of said bearings and adapted to be adjusted towards said cylinder and master gear to press said printing roll against said web and cylinder to impregnate a pattern on the web and bring the gear into positive engagement with the master gear to drive said printing roll and cylinder by peripheral contact therewith, a frictionally driven roll comprising a stationary shaft having ball bearings mounted thereon, a roller rotatably mounted on said ball bearings and thus by radial adjustment of a set of said radially movable bearings adapted to be brought into rolling contact with said fabric web and cylinder, whereby said roll may be detachably substituted for any printing roll and be driven by peripheral contact with said web.

3. In a textile printing machine having a frame, a rotatable cylinder, a master gear adapted to drive a web of fabric around a portion of the periphery of said cylinder, means to rotate said master gear, a plurality of sets of bearings mounted in said frame having holes therein of a size to hold a printing roll shaft having a gear thereon exterior of one of said bearings and adapted to be radially adjusted towards said cylinder and master gear to press said printing roll against said web and cylinder to impregnate a pattern on the web and bring the gear into positive engagement with the master gear to drive said printing roll and cylinder by peripheral contact therewith, a frictionally driven roll comprising a stationary shaft having keys near each end thereof, ball bearings mounted thereon, sleeves of substantially the diameter of the printing roll shaft of a peripheral size to nonrotatably rest in said bearing holes and having interior grooves for said keys, a roller rotatably mounted on said ball bearings and thus by radial adjustment of said radially movable bearings adapted to be brought into rolling contact with said fabric web and cylinder, whereby said roll may be detachably substituted for any printing roll and be driven by peripheral contact with said cylinder.

4. In a textile printing machine having a frame, a rotatable cylinder adapted to drive a web of fabric around a portion of the periphery of said cylinder, a master gear, means to rotate said master gear, a plurality of sets of bearings mounted in said frame having holes therein of a size to hold a printing roll shaft having a gear thereon exterior of one of said bearings and adapted to be radially adjusted towards said cylinder and master gear to press said printing roll against said web and cylinder to impregnate a pattern on the web and bring the gear into positive engagement with the master gear to drive said printing roll and cylinder by peripheral contact therewith, a frictionally driven roll comprising a stationary shaft having two ball bearings mounted centrally thereof spaced apart substantially the width of the cylinder, a roller of substantially the width of said cylinder rotatably mounted on said ball bearings and thus by radial adjustment of a set of said radially adjustable bearings adapted to be brought into rolling contact with said fabric web and cylinder, whereby said roll may be detachably substituted for any printing roll and be driven by peripheral contact with said cylinder.

5. In a textile printing machine having a frame, a rotatable cylinder adapted to drive a web of fabric around a portion of the periphery of said cylinder, a master gear, means to rotate said master gear, a plurality of sets of bearings mounted on said frame having holes therein of a size to hold a printing roll shaft having a gear thereon exterior of one of said bearings and a furnisher roll driving gear interior of one of said bearings and adapted to be radially adjusted towards said cylinder and master gear to press said printing roll against said web and cylinder to impregnate a pattern on the web and bring the gear into positive engagement with the master gear to drive said printing roll

and cylinder by peripheral contact therewith, a frictionally driven roll comprising a stationary shaft having ball bearings mounted thereon, a roller rotatably mounted on said ball bearings and thus by radial adjustment of a set of said radially movable bearings adapted to be brought into rolling contact with said fabric web and cylinder, having an extension projecting laterally outwards therefrom having key means thereon adapted to detachably secure a furnisher gear thereto, whereby said roll may be detachably substituted for any printing roll and be driven by peripheral contact with said cylinder to also drive the furnisher roll.

6. A frictionally driven roll for textile printing machines comprising a shaft having key means near each end thereof, spaced ball bearings mounted thereon, sleeves detachably secured to said key means, and a roller rotatably mounted on said ball bearings having extensions projecting laterally thereon each having key means thereon adapted to detachably receive a furnisher gear thereon.

7. A frictionally driven roll for textile printing machines comprising a shaft having spaced ball bearings mounted thereon, and a roller rotatably mounted on said ball bearings having an extension projecting laterally therefrom having key means thereon adapted to detachably receive a furnisher gear thereon.

8. A frictionally driven roll for textile printing machines comprising a shaft having key means near each end thereof, spaced ball bearings mounted thereon, sleeves detachably secured to said key means and a roller rotatably mounted on said ball bearings.

9. In a textile printing machine having a frame, a rotatable cylinder adapted to drive a web of fabric around a portion of the periphery thereof, a master gear, means to rotate said master gear, a set of bearings mounted in said frame having holes therein of a size to hold a printing roll shaft having a gear thereon exterior of one of said bearings and adapted to be adjusted towards said cylinder and master gear to press said printing roll against said web and cylinder to impregnate a pattern on the web and bring the gear into positive engagement with the master gear, and a treating roller adapted to be driven by frictional contact with the web of fabric against the cylinder alone interchangeable in said bearings for a printing roll.

In testimony whereof we affix our signatures.

ALEXANDER F. SHAW, JR.
PETER JASWELL.