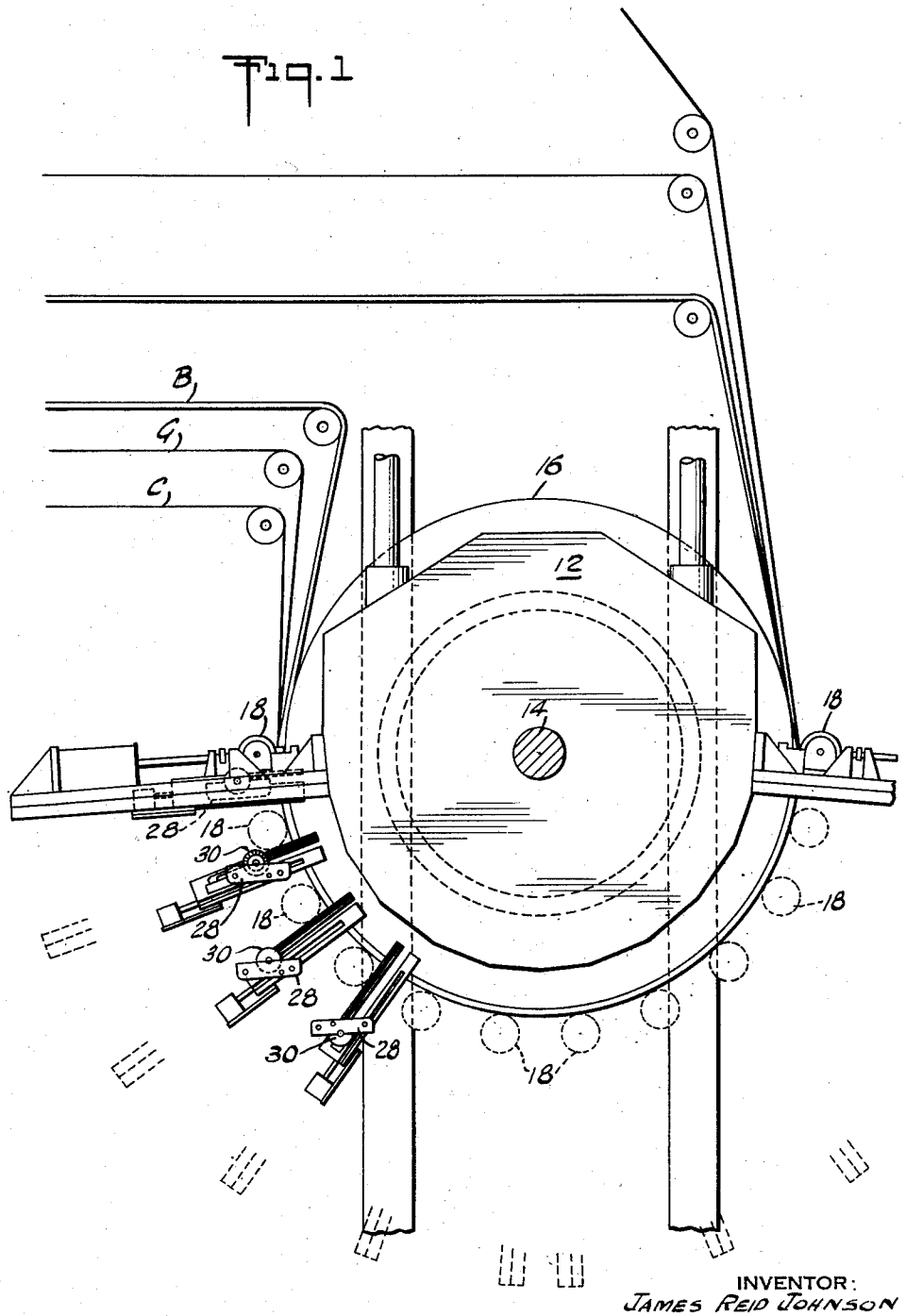
Feb. 4, 1958 J. R. JOHNSON 2,821,913

SUPPORT AND CONTROL OF A COLOR BOX ASSEMBLY IN PRINTING APPARATUS

Filed Aug. 11, 1954 4 Sheets-Sheet 1

Fig. 1



INVENTOR:
JAMES REID JOHNSON
BY
Foag, Kilburn & Carlson
ATTORNEYS:

Feb. 4, 1958 J. R. JOHNSON 2,821,913

SUPPORT AND CONTROL OF A COLOR BOX ASSEMBLY IN PRINTING APPARATUS

Filed Aug. 11, 1954 4 Sheets-Sheet 2

Fig. 2

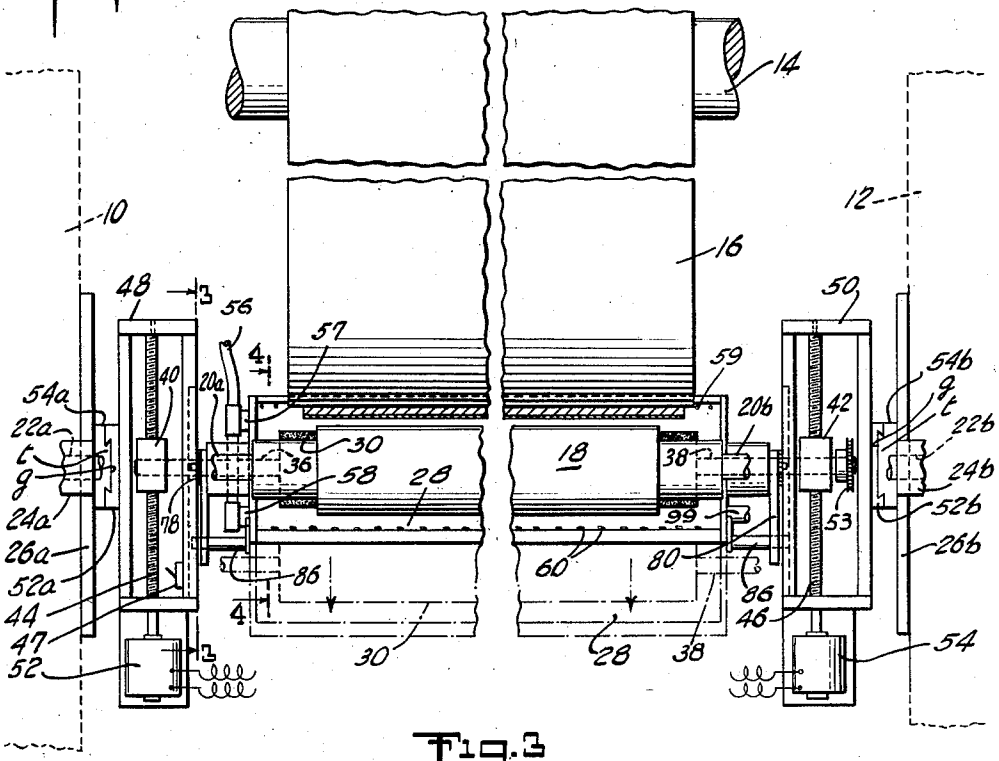
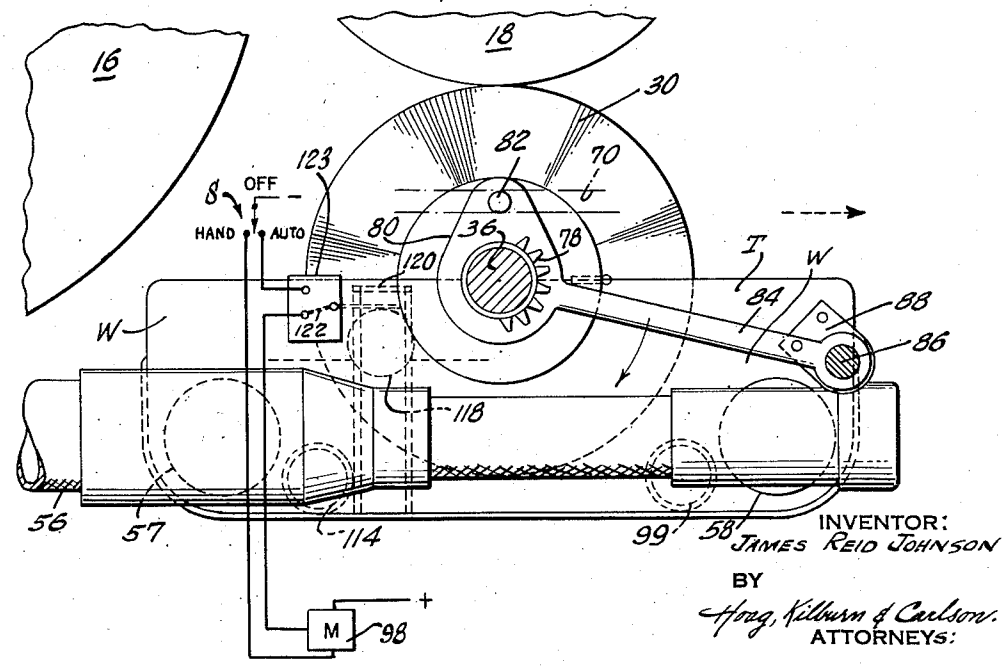


Fig. 3



INVENTOR:
JAMES REID JOHNSON

BY

Hoag, Kilburn & Carlson.
ATTORNEYS:

Feb. 4, 1958 J. R. JOHNSON 2,821,913

SUPPORT AND CONTROL OF A COLOR BOX ASSEMBLY IN PRINTING APPARATUS

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Fig. 4

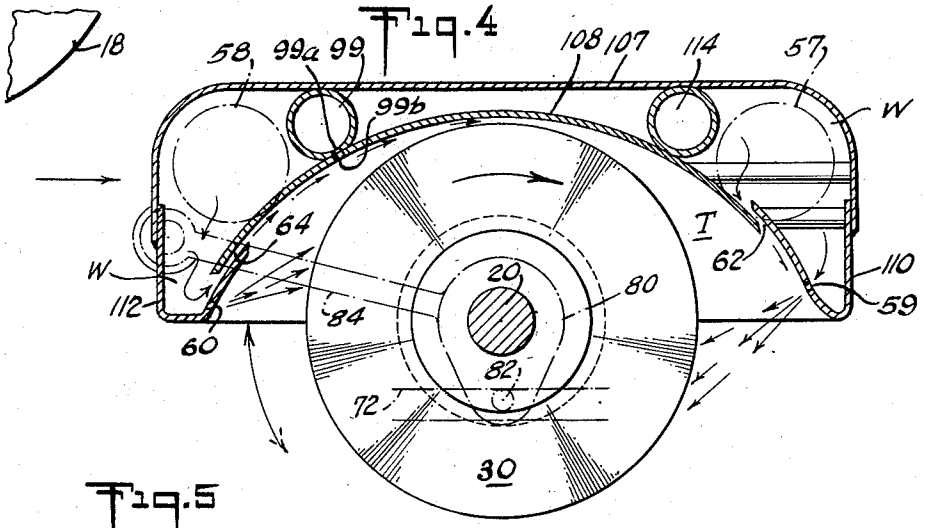


Fig. 5

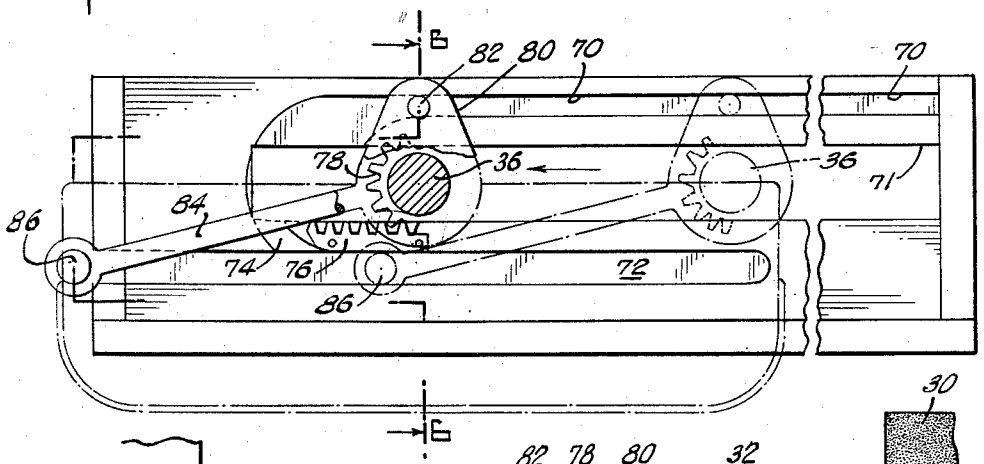
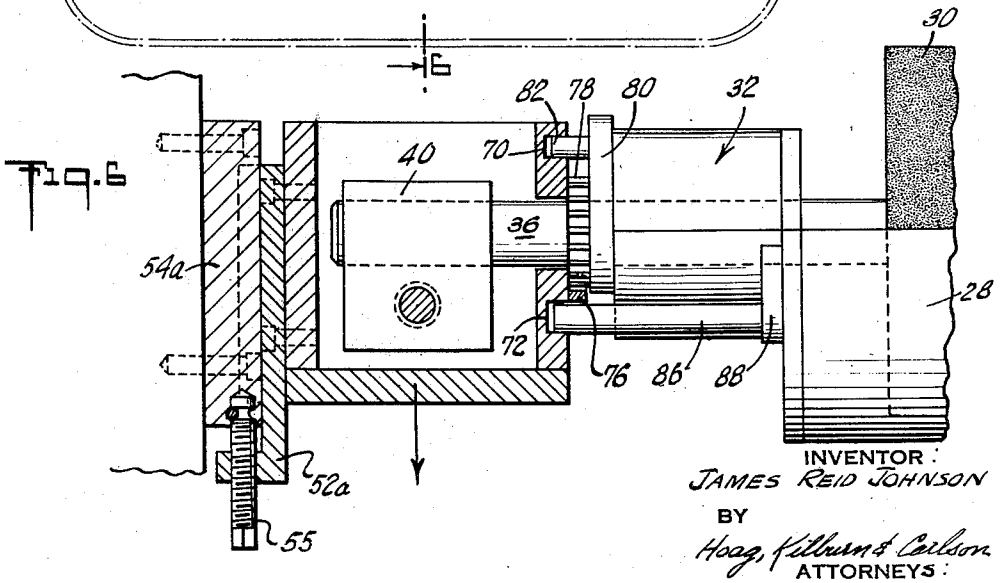


Fig. 6



INVENTOR:
JAMES REID JOHNSON
BY
Hoag, Killburn & Carlson
ATTORNEYS.

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SUPPORT AND CONTROL OF A COLOR BOX ASSEMBLY IN PRINTING APPARATUS

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Fig. 7

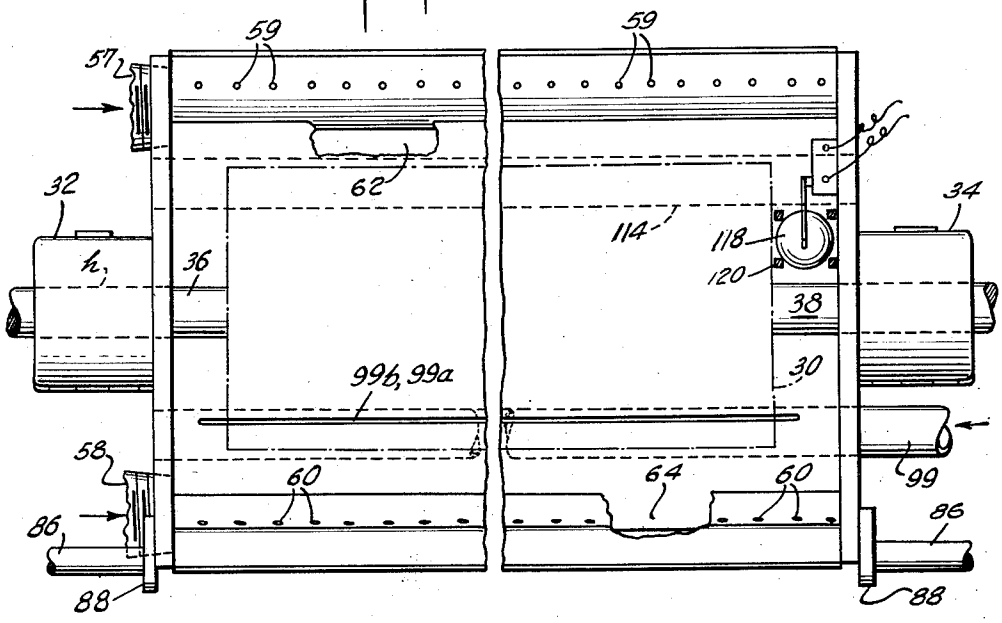


Fig. 8

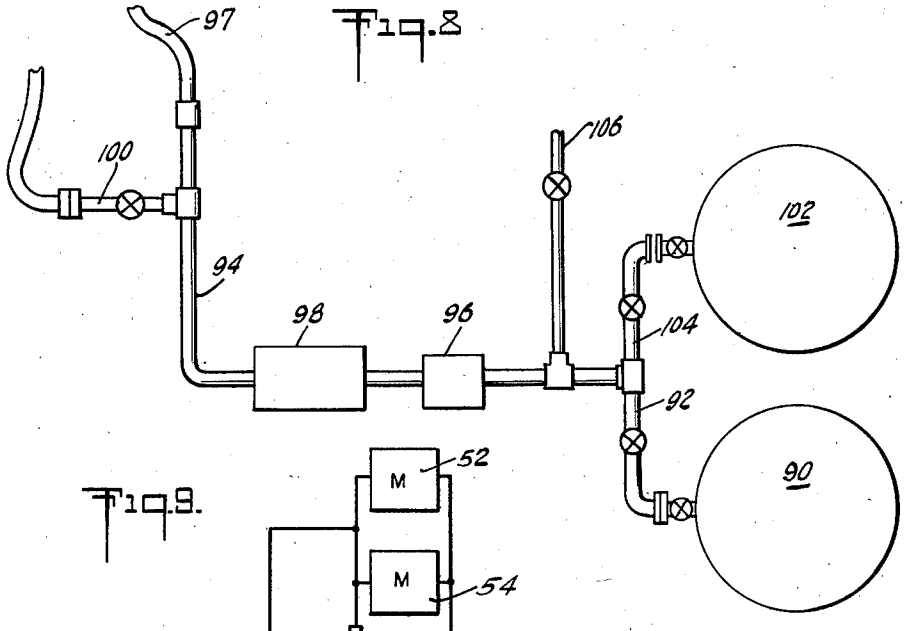
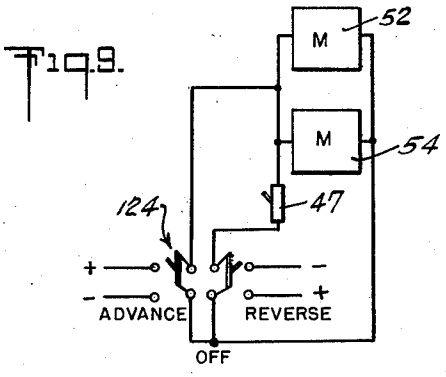


Fig. 9.



INVENTOR
JAMES REID JOHNSON

BY
Hoag, Killburn & Carlson
ATTORNEY

United States Patent Office 2,821,913 Patented Feb. 4, 1958

2,821,913

SUPPORT AND CONTROL OF A COLOR BOX ASSEMBLY IN PRINTING APPARATUS

James Reid Johnson, Providence, R. I.

Application August 11, 1954, Serial No. 449,178

21 Claims. (Cl. 101—178)

This invention relates to apparatus for printing textile fabrics, wall paper and the like, and particularly to the construction, support and control of a color box and brush unit used with each print roll.

In the operation of textile printing apparatus a wide variety of colors are employed. The colors are supplied in semi-liquid form, in tubs which are placed under the printing apparatus and in the past have been supplied to the color boxes as needed by the operator using a dipper, and transferred from a color box to its associated print roll by a brush or other furnisher roll mounted in the apparatus between the color box and print roll. If several colors are used in the pattern the operator will of course fill different color boxes with the different colors.

At the end of the run of a particular pattern, before refilling the color boxes with different colors, and at the end of a day's operation, the color boxes and brushes must be washed and it has been customary to physically detach the color boxes and the brushes from the apparatus and to carry them to a sing and wash them, thereafter returning them to the machine and remounting them. This very time consuming operation of removing the color boxes and brushes, washing them, and returning them to the machine and refilling them with color, has to be repeated each time the pattern is changed and a different color or combination of colors is required, and at the end of each day, for the color in a color box would harden and become encrusted on the walls of the color box and on the brush if allowed to stand over night.

It is an object of this invention to greatly simplify the operation of washing color boxes and brushes and to substantially reduce the amount of time required for these non-productive operations.

Another object of the invention is to provide support and operating means such that the color boxes and brushes may be washed and refilled without being removed from the apparatus of which they are a part.

Another object of the invention is to simplify the operation of washing color boxes and trays and provide means whereby both the washing of the trays and brushes and the refilling of them with a desired color may be accomplished automatically and controlled by remote control.

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,

Figure 1 is an end elevation of textile printing apparatus employing color box and brush construction, support, and control means embodying the invention;

Figure 2 is a top plan view showing a print roll, color box and brush assembly, and means for moving the color box and brush assembly, toward and away from the print roll and independently of the slides which support the print roll;

Figure 3 is an end view of one end of a color box or tray and means for turning the color box upside down to clean it;

Figure 4 is a view similar to Figure 3 showing the color box after it has been rotated to an upside down position around its bearings on the brush shaft;

Figure 5 is a view looking outwardly from one end of a color box and showing the track means provided on the sides of the frame members respectively within which the color brush bearings are supported;

Figure 6 is a view, partly in cross section, taken on the line 6—6 of Figure 5;

Figure 7 is a top plan view of a color box embodying the invention showing in dotted lines a color brush and shaft on which the color box is supported;

Figure 8 is a detail schematic view of piping through which color may be supplied to a color box including valves and connections for washing out the piping, and

Figure 9 is a schematic wiring diagram for operation and control of the reversible motors shown in Fig. 2, which control movement of the color box and brush assembly toward and away from a print roll.

Referring first to Figure 2 the numerals 10 and 12 indicate support means in which there are bearings (not shown) to receive the ends of a shaft 14 for rotatably supporting a backing cylinder 16 having around its periphery one or more print rolls 18 mounted for movement toward and away from said backing cylinder 16, the ends 20*a* and 20*b* of each print roll shaft being received in bearings 22*a* and 22*b* of slides 24*a* and 24*b* respectively slidable on the slide support means 26*a* and 26*b* respectively, as is fully described and claimed in my co-pending application Serial No. 449,176. Apparatus of the kind described in said co-pending application is illustrated in Fig. 1 and shows part of an endless rubber blanket B, a length of "backing grey" G, and a length of cloth C to be printed, passing around the backing cylinder 16 between it and a series of print rolls 18.

Associated with each print roll 18 is a color box 28 and a brush 30 for transferring color from the color box to the print roll. This application is directed to the structure of a color box and to the means for supporting a color box and brush for movement toward and away from a print roll, and means for rotating the color box independently, the means for upsetting and washing the brush and color box assembly, and means for automatically filling and controlling the level of color within a color box.

Each color box 28 has projecting from its ends split bearings 32 and 34 (Figure 7) the semi-circular halves of which are hinged together along the hinge lines *h* respectively, and the unhinged opposed surfaces of which may be provided with any suitable means for interengagement, not shown. Each color box is mounted, by means of said split bearings, on the brush shaft ends 36 and 38 respectively, said ends being continued outwardly beyond said split bearings through slots 71 (Fig. 5) in the inner walls of frame members 48 and 50 respectively, and received in the bearings 40 and 42 respectively which are mounted for movement toward and away from said cylinder 16 on the threaded shafts 44 and 46 respectively, which are mounted for rotation within the rectangular frame members 48 and 50 respectively. The rods 44 and 46 are connected at one end to the reversible motors 52 and 54 respectively by which said threaded rods 44 and 46 may be rotated in either direction to cause the bearings 40 and 42 to travel on said rods toward and away

from said print roll 18. A limit switch 47, shown positioned on the inside of left-hand frame member 48 (Fig. 2), is included in the electrical circuit controlling the reversible motors 52 and 54 respectively to automatically limit the travel of said motors in a direction away from print roll 18 (Fig. 9).

The rectangular frame members 48 and 50 have on their outer surfaces the members 52*a* and 52*b* respectively each of which has in its outer surface a vertically extending groove *g*, extending from its lower end but terminating short of its upper end, and adapted to be slipped onto and engage a tongue *t* projecting inwardly from members 54*a* and 54*b* respectively. Thus by engaging the members 52*a* and 52*b* on the members 54*a* and 54*b* the assembly of color box and its supporting color brush, together with the frame means 48 and 50 and the means which they support and which control independent movement of the color box and color brush relative to a print roll, may be mounted on, and supported between, two opposed slides 24*a* and 24*b*, beneath the print roll, and with the brush 30 extending into the color box 28 and also into contact with the surface of the print roll. By means of manually operable screw means 55, see Fig. 6, on which the laterally projecting lower end of each member 52*a* is threadedly engaged for travel on said screw means as said screw means is rotated, the elevation of the assembly, comprising the frames 48 and 50 and the color brush and color box supported between them, may be adjusted relative to said slides 24*a* and 24*b*. It will be understood that when the slides 24*a* and 24*b* are moved, by means not shown herein, but which are preferably of a kind shown, described and claimed in my co-pending application Serial No. 449,176, the color box and brush assembly will be moved with said slides and the print roll supported between said slides, and, in addition to this movement with the print roll, the color box and brush assembly may be moved independently of said slides toward and away from the print roll, in a plane parallel to a plane extending radially through the print roll axis.

On the end 38 of the brush shaft is a gear 53 (Figure 2). When gear 53 is rotated, by any means, brush 30 is rotated within bearings 40 and 42, this motion being independent of movement of said bearings along threaded rods 44 and 46 respectively. Such rotation of the brush is sometimes desired, as for example when the brush is in contact with the print roll, to remove from the print roll, by rotating in reverse, color left on the print roll surface due to imperfect functioning of a doctor blade provided for that purpose.

Each color box 28 comprises a trough-like portion T which serves as a color receptacle which is open at the top and into which extends the brush member 30, and a space W through which water or other cleaning fluid may be transmitted to wash the receptacle T and the brush 30. As best seen in Figures 3 and 4 water is introduced into the space W through a flexible hose line 56 through openings 57 and 58 in one end of a color box, the left-hand end as seen in Figure 2. Preferably the hose line 56 remains connected to the water compartment W of the color box, the water supply being controlled by any suitable valve means. Hose line 56 and color box openings 57 and 58 are provided with means of any suitable kind for making a good coupling attachment to said openings 57 and 58. The wall separating space W from the color receptacle T is perforated by the spaced jet openings 59 along one lateral margin, the spaced jet openings 60 along the other lateral margin, and by the slots 62 and 64 respectively which function as will be described. However, before the start of washing the color receptacle, the brush and the piping through which color is passed to and from a color box, the color box and brush assembly are first moved outwardly from the print roll with which they are associated and turned up-

side down. A means for moving a color box and brush combination toward and away from a print roll has been described and the means for turning the tray and brush upside down will now be described.

The upsetting movement begins near the end of the outward travel on threaded rods 44 and 46 of the bearings 40 and 42 respectively which support the respective ends 36 and 38 of a brush shaft. As best seen in Figures 2, 5 and 6, the inner faces of rectangular frames 48 and 50 are each grooved to provide upper and lower slots 70 and 72 disposed respectively above and below the toothed rack 76. (See Figure 5.) Aligned with each rack 76 is a gear 78 which engages said rack 76 just before the color box and brush assembly reach the end of its travel outwardly on said threaded rods 44 and 46. A cam pin carrier 80 is mounted on each brush shaft end and attached to each carrier 80 is a gear 78. Each member 80 has a laterally projecting pin 82, which extends into slot 70 and travels in it during most of the travel of a color box assembly away from a print roll, and an arm 84 which at its other end has a cross pin 86 one end of which extends into and travels in slot 72 during most of said travel, and the other end of which is pivotally connected to the color box by the bearing bracket 88. (Fig. 3.)

When the bearings 40 and 42 of a color box unit are moved outwardly away from a print roll by rotation of screw rods 44 and 46, gear 78 meshes with rack 76 just before the said movement is completed; pin 82 clears the open end of slot 70; pin 86 clears the open end of slot 72, and the arm 84 is swung causing the color box to rotate around the ends 36 and 38 of the brush shaft, on said split bearings 32 and 34. During this movement pin 82 moves into and through the curved slot 74 into slot 72. Pin 86, after moving out of slot 72, is free to swing with the color box, which, at the end of the swinging movement assumes the position shown in Figure 4. When a color box has swung from the working position shown in Figure 3 to the position shown in Figure 4 it is in readiness to be washed.

When the color box is turned upside down the supply of water to hose 56 is turned on and flows into space W through the openings 57 and 58 in the color box, and the water thus introduced under high pressure is forced out of the jets 59 and 60. Jets 59 direct water downwardly against the brush 30, while water forced from the jets 60 is directed upwardly against brush 30, and the combined action of the streams of water from jets 59 and 60 is to cause rotation of said brush in a clockwise direction as viewed in Figure 4. At the same time water ejected from slot 64 is directed over the bottom of color reservoir T and this action is increased and completed by water issuing from slot 62. After brush 30 and the color receptacle T have been thoroughly washed and are clean the supply of water through hose 56 is turned off. Due to inertia, brush 30 continues to rotate for some time and this motion serves to dry it.

In Figure 8 a system of piping is shown for pumping color, as for example from a color supply receptacle 90 through branch conduit 92 and conduit 94, through strainer 96 and motor-pump 98 to a flexible hose 97 which is connected in any suitable way to the open end of tube 99 which extends from end to end of the color box through the water space W therein and is closed at its far end but communicates with the color receptacle through the weeper openings 99*a*, and, optionally, from conduit 94 through branch conduit 100 to weeper outlets for initially wetting the print roll with color as is sometimes desired. A second or reserve color reservoir 102 is shown from which color may be drawn through branch conduit 104 and supplied to the main conduit 94, as for example if the supply from reservoir 90 becomes exhausted. A color line is detached at the end of a printing operation and while it and its associated color box and brush are being

washed and is connected before the start of another printing operation. Any known quick coupling means may be employed for connecting the color line to tube 99 in a color box and for making connection between the color line and a color reservoir.

The above described piping may be flushed out, as for example at the end of the day's work or before using the piping to feed a different color, by introducing water under high pressure through conduit 106 to conduit 94 from which it may be forced through branch conduits 92 and 104, after they have been detached from the color reservoirs 90 and 102 respectively, and also forced through main conduit 94, strainer 96 and motor-pump 98 to the tube 99 within the color box from which it is discharged through the weeper openings 99*a* in tube 99 and the openings 99*b* in the color receptacle T.

As shown herein the color box is a trough-like structure with a false bottom and is constructed essentially of four sheet metal pieces in addition to end members and strengthening members. These four sheet pieces are the trough-shaped bottom member 107, the curved false bottom or partition member 108, and the bent over members 110 and 112 the opposite margins of which overlap the upper extremities of said members 107 and 108 respectively. The overlapped margins of member 107 may be welded or otherwise joined to the opposed margins of members 110 and 112 respectively, but the overlapped margins of member 108 and members 110 and 112 are spaced apart to leave spaces forming the slots 62 and 64 through which water is forced in the direction indicated by arows in Figure 4. The jet openings 59 and 60 are provided in the inwardly bent portions of members 110 and 112 respectively and the openings 99*b* are provided in partition member 108, in register with the openings 99*a* in said tubular member 99 into which color is introduced from conduit 94 of the piping illustrated in Figure 8.

Extending from end to end of the color box and symmetrically disposed with relation to tube 99 is a tubular member 114, both ends of which may be closed and which merely serves the function of a cross support between the ends of the color box, coacting with tubular member 99 to strengthen the color box structure longitudinally.

In Figures 3, 7 and 8 means are shown for automatically controlling the level of color in the color box including an electric circuit comprising said motor-pump 98 and a switch S having three positions marked "Hand," "Off" and "Auto.". When the switch S is thrown to "Automatic" motor-pump 98 is actuated and color will be fed to the color box, as described above and illustrated in Fig. 8, until the float 118 therein rises within its guides or cage 120 to a predetermined level when it moves switch arm 122, shown in switch box 123 on outside wall of the color box, thus opening the circuit and stopping the supply of color. This switch is turned to "Off" position while the color boxes are moved away from the print rolls respectively and turned upside down for washing by operation of said motors 52 and 54 which are part of the separate circuit shown in Fig. 9. When the color boxes have been turned upside down and are ready for washing the switch S is turned to "Hand" and the motor-pump 98 is actuated to pump out any color remaining in the color line, and thereafter to pump water under high pressure from conduit 106 through the tubing to flush it out. This washing is preferably done at the same time that water is supplied to the color box through the hose 56. When the flushing water runs clear motor-pump 98 is turned off, conduit 106 is closed, and, by operation of the electric circuit shown in Figure 9 the color boxes and brushes are returned to upright position and moved back into operative relation to the print rolls respectively. The color line is then coupled to a color reservoir containing the color desired for the next operation, and the switch S (Figure 3) is turned to "Automatic," whereupon the circuit will operate in response to the position of the said float 118 as described.

The circuit shown in Figure 9 connects said motors 52 and 54 in parallel with said limit switch 47 and the three position switch 124 marked "Advance," "Off" and "Reverse." For backing the color box away from its print roll and upsetting it the switch arm is moved to "Reverse." Movement away from the print roll is limited by the limit switch means 47 which breaks the circuit through the contacts marked "Reverse" (Figure 9). After washing, the switch arm 124 is moved to "Advance" when it is desired to move the color box assembly back to operative position.

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 printing apparatus employing a print roll, a color receptacle, and means for transferring color from the receptacle to said print roll, the combination of a brush, a brush shaft, a color receptacle hung on said shaft with said brush in parallel relation to the print roll, means for moving the brush and receptacle assembly toward and away from said print roll, and means interconnected between said brush shaft and the receptacle operative near the end of the assembly's movement away from the print roll and at the beginning of its movement toward the print roll to rotate said receptacle around the brush shaft substantially 180°.

2. In apparatus for printing cloth comprising a backing cylinder, a print roll movable toward and away from the backing cylinder, the combination with the print roll of a color box, means for supporting the color box for movement with the print roll toward and away from the backing cylinder, means for moving the color box toward and away from the print roll and for tipping it over to drain it, without removing it from the machine, and afterward returning it to its operative position, and means for directing fluid over the inner surface of the color box to clean it while in its tipped over position.

3. In apparatus for printing cloth comprising a backing cylinder and a print roll movable toward and away from the backing cylinder the combination with the print roll of a color box, means for supporting the color box for movement with the print roll toward and away from the backing cylinder, means for moving the color box toward and away from the print roll, and means extending between the color box supporting means and the color box for upsetting the color box in response to movement of the color box away from its print roll, and for righting the color box upon movement of the color box toward its print roll.

4. In apparatus for printing cloth comprising a backing cylinder and a print roll movable toward and away from the backing cylinder the combination with the print roll of a color box, means for supporting the color box for movement with the print roll toward and away from the backing cylinder, means for moving the color box toward and away from the print roll, and means extending between the color box supporting means and the color box for upsetting the color box in response to movement of the color box away from its print roll, and for righting the color box upon movement of the color box toward its print roll, flexible conduit means movable with the color box during its movement toward and away from its print roll and during the upsetting and righting movement of the color box, and pump means for supplying color into the receptacle while it is in righted position.

5. In apparatus for printing cloth comprising a backing cylinder and a print roll movable toward and away

from the backing cylinder the combination with the print roll of a color box, means for supporting the color box for movement with the print roll toward and away from the backing cylinder, means for moving the color box toward and away from the print roll, and means extending between the color box supporting means and the color box for upsetting the color box in response to movement of the color box away from its print roll, and for righting the color box in response to movement of the color box toward its print roll, means carried by the color box for attachment to conduit means, and means for transmitting color from the conduit means into the color box.

6. In apparatus for printing cloth comprising a backing cylinder and a print roll movable toward and away from the backing cylinder the combination with the print roll of a color box, means for supporting the color box for movement with the print roll toward and away from the backing cylinder, means for moving the color box toward away from the print roll, and means extending between the color box supporting means and the color box for upsetting the color box in response to movement of the color box away from its print roll, and for righting the color box upon movement of the color box toward its print roll, a plurality of flexible conduit means movable with the color box during its movement toward and away from its print roll and during the upsetting and righting movements of the color box, means in said color box through which color may be supplied into the color box while it is in righted position from at least one of said flexible conduit means and means in said color box through which cleaning fluid may be supplied from at least one of said flexible conduits and directed over the color receiving surface of the color box while the color box is in upset position.

7. In apparatus for printing cloth comprising a backing cylinder and a print roll movable toward and away from the backing cylinder the combination with the print roll of a color box, means for supporting the color box for movement with the print roll toward and away from the backing cylinder, means for moving the color box toward and away from the print roll, means extending between the color box supporting means and the color box for upsetting the color box upon movement of the color box away from its print roll, and for righting the color box upon movement of the color box toward its print roll and flexible conduit means movable with the color box during its movement toward and away from its print roll and during the upsetting and righting movements of the color box, including jet means and pump means for supplying cleaning fluid under pressure and directing it across the color receiving surface of the color box while said color box is upset to clean said surface.

8. In apparatus for printing cloth comprising a backing cylinder and a print roll movable toward and away from the backing cylinder the combination with the print roll of a color box, means for supporting the color box for movement with the print roll toward and away from the backing cylinder, means for moving the color box toward and away from the print roll, means extending between the color box supporting means and the color box for upsetting the color box upon movement of the color box away from its print roll, and for righting the color box upon movement of the color box toward its print roll, and means carried by the color box for attachment to conduit means and for transmitting cleaning fluid from the conduit means to and over the color receiving surface of the color box.

9. The apparatus claimed in claim 3 in which the means for supporting the color box is the shaft of a brush, the brush portion of which extends into the color box when the color box and brush are assembled, to transfer color from the color box to its print roll when the combination of a color box and brush are in operative position relative to said print roll.

10. The device claimed in claim 3 in which the means for supporting the color box is the shaft of a brush, the brush portion of which extends into the color box when the color box and the brush are assembled, to transfer color from the color box to its print roll when the combination of a color box and brush are in operative position relative to said print roll, and jet means for directing cleaning fluid under pressure against the brush to clean it while the color box is upset.

11. A color box containing bottom, end, and side wall, and false bottom means defining a color receptacle and a space between the color receptacle and its true bottom, said color box comprising bearings to receive the shaft of a brush with the brush extending into the said color receptacle to pick up color from the color box and transfer it to a print roll, conduit means and pump means for supplying color into the receptacle, means for passing cleaning fluid through said conduit means to clean it, and separate conduit means and jet means for supplying and directing cleaning fluid over the inner surface of said receptacle and against said brush.

12. The apparatus claimed in claim 11 including means interconnecting the shaft of the brush and the color receptacle for upsetting the color receptacle to drain it, said color box comprising means actuable in the upset position of the color box to direct liquid substantially tangentially against the brush to clean the brush and rotate it.

13. The apparatus claimed in claim 11 in which the conduit means for supplying color into the receptacle comprises, a fixed conduit portion located in the space between the true and false bottoms of said receptacle, and a flexible conduit insertable into an open end of said fixed conduit.

14. The apparatus claimed in claim 11 in which the conduit means for supplying cleaning fluid to the receptacle comprises fixed conduit means located between the true and false bottoms of said receptacle and flexible conduit means adapted for connection to an open end of said fixed conduit means.

15. The device claimed in claim 11 including means for supplying cleaning fluid into the said space between the false and true bottoms, and jet openings in said false bottom disposed on opposite sides of said brush and disposed to direct streams of cleaning fluid tangentially against the top and bottom portions respectively of the brush surface whereby said brush is rotated and cleaned while the flow of cleaning fluid through said jets is continued and whereby the brush is substantially self-drying due to its inertial rotation after the supply of the streams of cleaning fluid is stopped.

16. Printing apparatus comprising a print roll, a color box movable toward and away from the print roll, and means for moving the color box toward and away from the print roll, said color box comprising a receptacle for color, means pivotally mounted on one end and slideably related to the color box on the other end for overturning the color box upon movement of the color box away from said print roll and returning it to operative position upon movement of the color box toward the print roll, means for supplying cleaning fluid to said color box, operative when the color box is overturned, and means for directing the cleaning fluid over the surface of the color box while it is in overturned position.

17. Printing apparatus comprising, a print roll, a color box and a rotatable furnisher brush, and support means on which this assembly is disposed in parallel relation to a backing roll and on which the color box and brush are movable toward and away from the print roll in a straight line, means for overturning said color box as it is moved away from said print roll and for returning it to operative position as it is returned toward the print roll and separate means operative while said color box is upside down to direct jets of cleaning fluid against the periphery of the brush and to give it rotational energy

whereby the brush continues to rotate for a time and tends to dry itself after its wetting by the cleaning fluid ceases.

18. Printing apparatus comprising a print roll, a color box and a rotatable furnisher brush, and support means on which this assembly is disposed in parallel relation to a backing roll, and on which the color box and brush are movable toward and away from the print roll in a straight line, means for moving the color box and brush toward and away from the print roll, bearing means projecting from the color box for supporting said color box on the shaft of said brush, and means actuated by movement of the color box and brush toward and away from said print roll for rotating the color box around said brush shaft, thereby overturning the color box and providing a guard over the brush to control splashing when the brush is cleaned.

19. Printing apparatus comprising a print roll, a color box and a furnisher brush, support means on which this assembly is disposed in parallel relation to a backing roll and on which the color box and brush are movable toward and away from the print roll in a straight line, and means for moving the color box and brush toward and away from the print roll including, means for supporting the color box on the brush shaft for rotation around said brush shaft, and means for rotating the color box around the brush shaft comprising, a cam pin carrier mounted on the brush shaft, groove means in said support means, an arm connected to said color box and interconnecting said cam pin carrier and the color box, and a pin projecting from said arm into said groove means, a rack on said support means, and a pinion carried by said cam pin carrier, said groove means and said rack and pinion being disposed to cause the pin projecting from said arm to move out of said cam groove means as said pinion engages said rack, whereby the color box is rotated around the brush shaft by swing of said arm as further travel of said rack over said pinion causes rotation of said cam pin carrier.

20. Printing apparatus comprising a print roll, a color box and a furnisher brush, support means on which this assembly is disposed in parallel relation to a backing cylinder, and on which the color box and brush are movable toward and away from the print roll, and means for moving the color box and roll toward and away from the print roll including a rack, cam grooves disposed above and below said rack, a cam pin carrier mounted on said brush shaft, a cam pin extending from said carrier into the upper of said grooves, a gear on said carrier adapted to mesh with said rack after a predetermined extent of movement of the color box and brush toward or away from the print roll, an arm interconnecting said carrier and the said color box and having a pivot connection to the color box, a cam pin extending from said arm into the lower of said cam grooves, said cam grooves being of a length and shape to cause the cam pin carried by said arm to move out of the lower cam groove, and the cam pin projecting from said carrier to move from the upper cam groove into the lower cam groove around a semi-circular path during meshing of said pinion and rack, thereby causing said carrier and said color box to rotate around said brush shaft.

21. Printing apparatus comprising a print roll, a color box and brush assembly, support means on which said assembly is disposed in parallel relation to said print roll and is movable toward and away from the print roll in a straight line, and power driven means for moving the assembly toward and away from the print roll including an arm rotatable around said brush shaft and having a pivot connection to said color box, cam groove means, and cam follower means on said arm whereby said assembly is rotated around said shaft by action of said cam follower in said cam groove means during a portion of the movement of said assembly toward and away from said print roll.

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