United States Patent

Johnson

[15] **3,658,003**

[45] **Apr. 25, 1972**

[54] METHOD FOR WASHING ELEMENTS OF FABRIC PRINTING MACHINES

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[22] Filed: **May 29, 1969**

[21] Appl. No.: **829,055**

[52] **U.S. Cl.**.....**101/426,** 101/425, 101/157, 101/366

[51] **Int. Cl.**.....**B41f 35/02,** B41f 35/04

[58] **Field of Search**.....101/425, 157, 169, 366, 426; 118/104, 203

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Primary Examiner—J. Reed Fisher

Attorney—John W. Hoag

[57] **ABSTRACT**

A print roll doctor blade in a cloth printing machine has a spray header selectively connectable to sources of wash water and solvent; a color box extending under the doctor blade has a spray header selectively connectable to sources of color, wash water and drying air; wash water draining from the doctor blade is collected in the color box and spilled from it, together with wash water introduced directly into the color box for preliminarily washing it and its associate color transfer brush and the print roll, into a washer-receptacle initially spaced below the color box and then raised to form with the inverted color box a closure within which washing of the color box and brush is completed.

1 Claim, 5 Drawing Figures

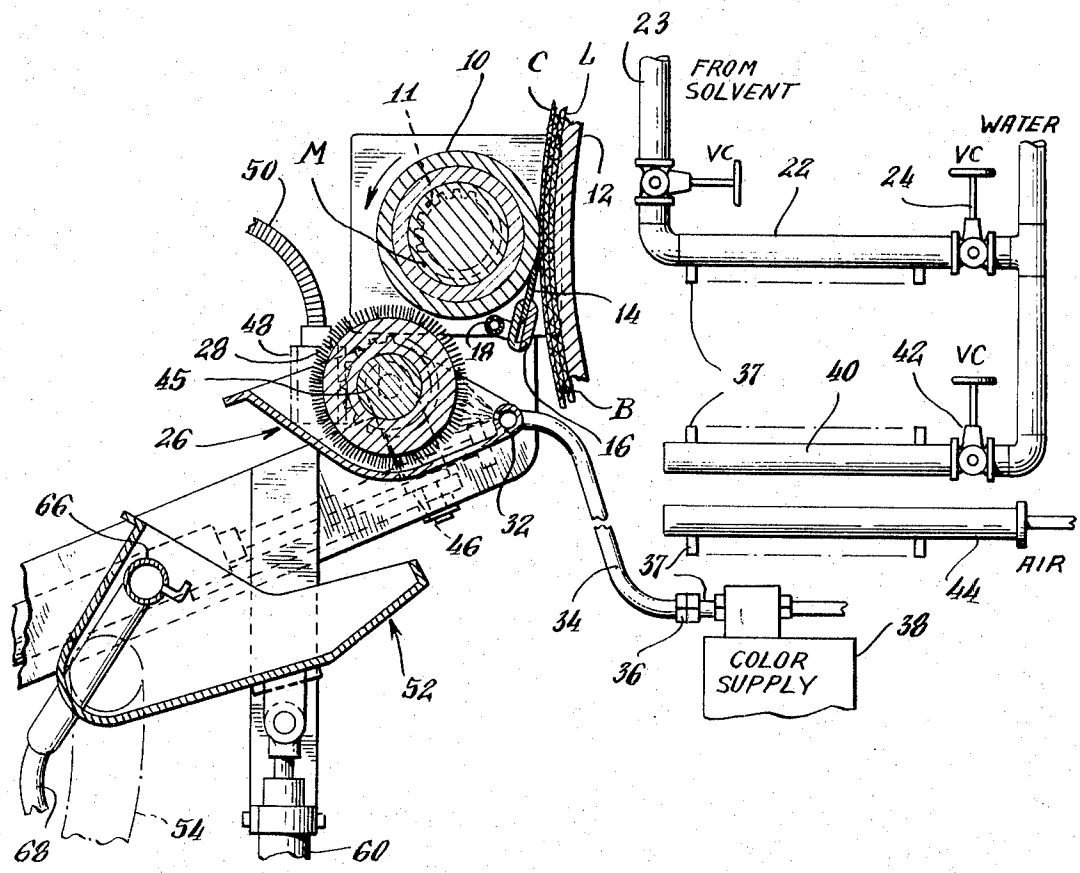


Fig. 4.

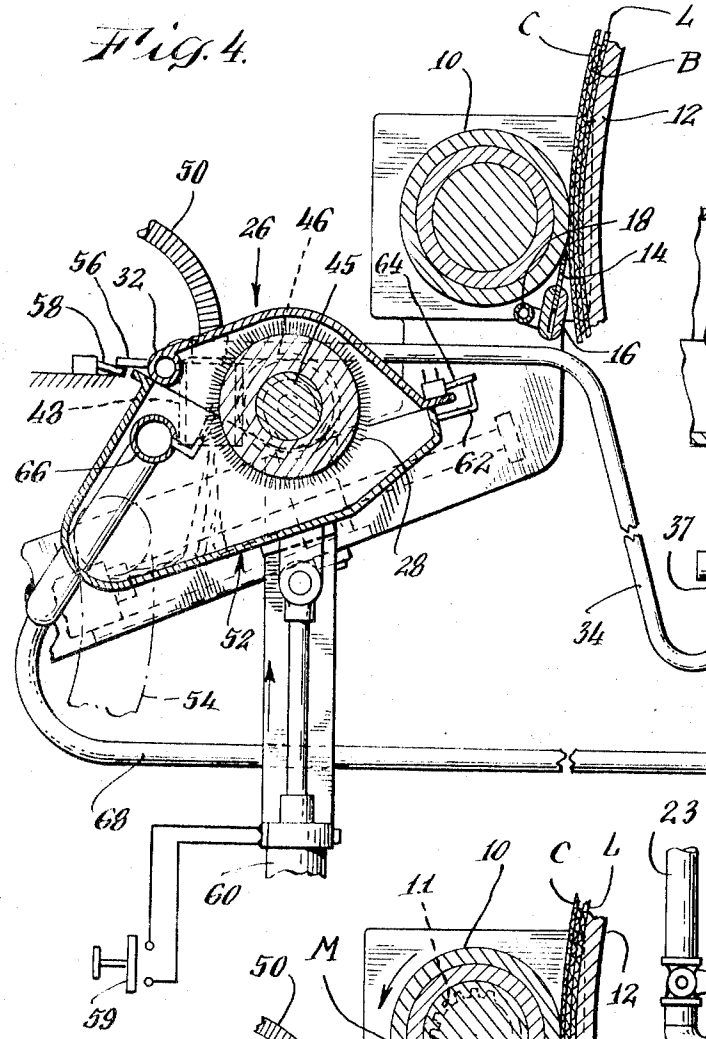


Fig. 5.

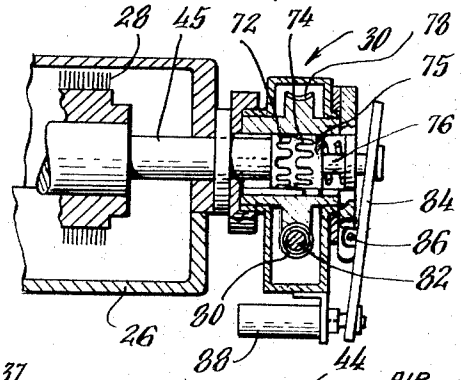
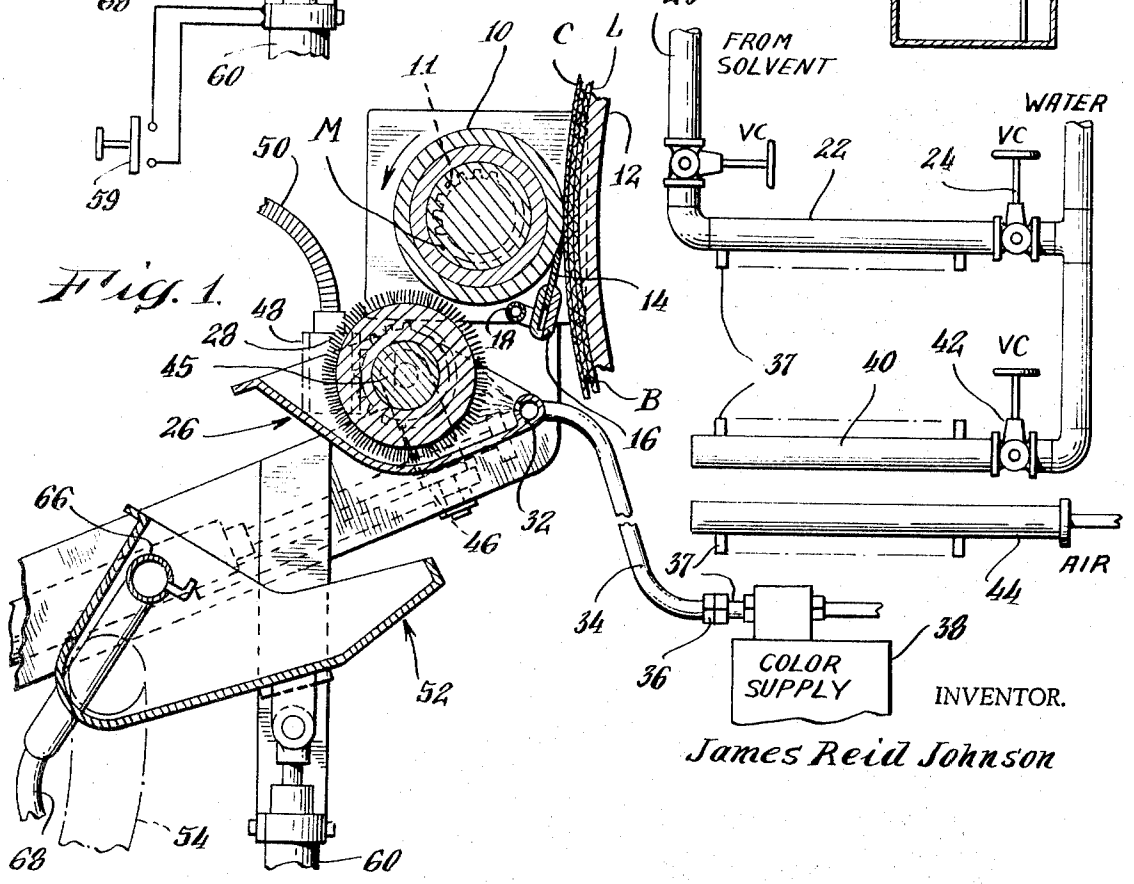


Fig. 1.



INVENTOR.

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Fig. 2.

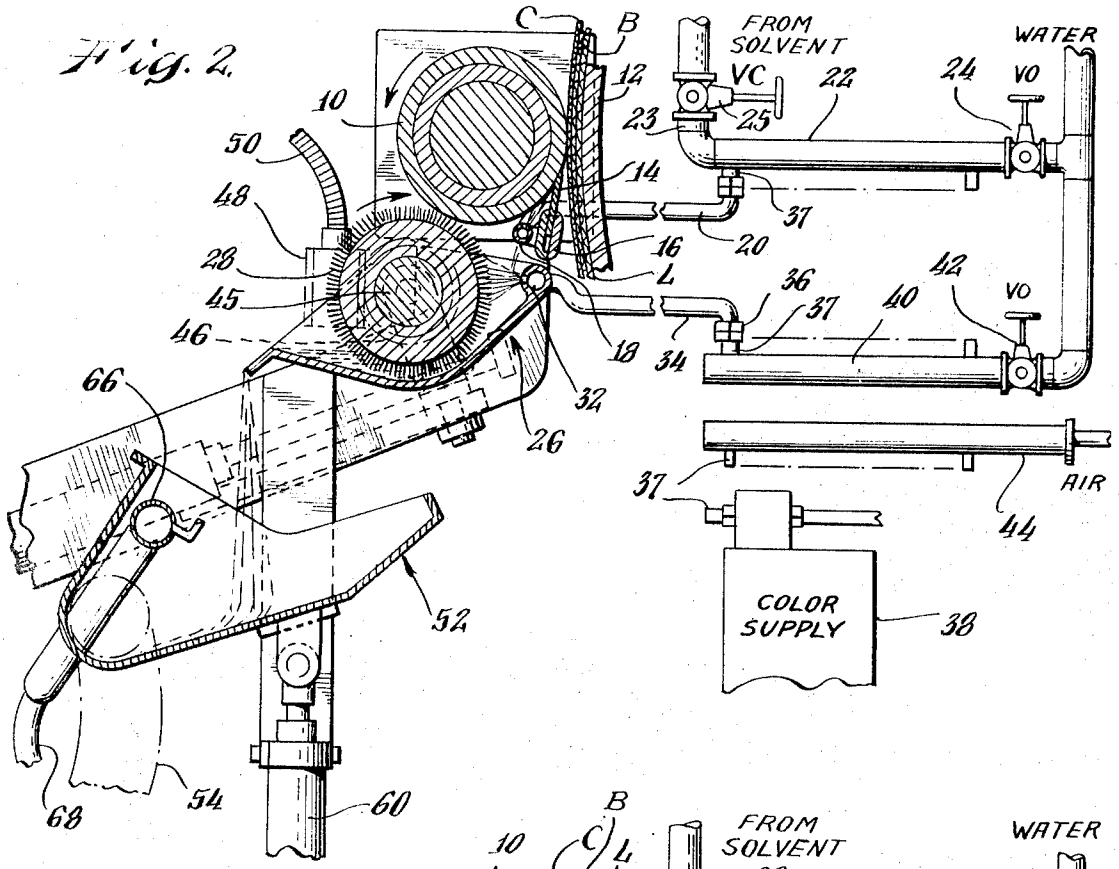
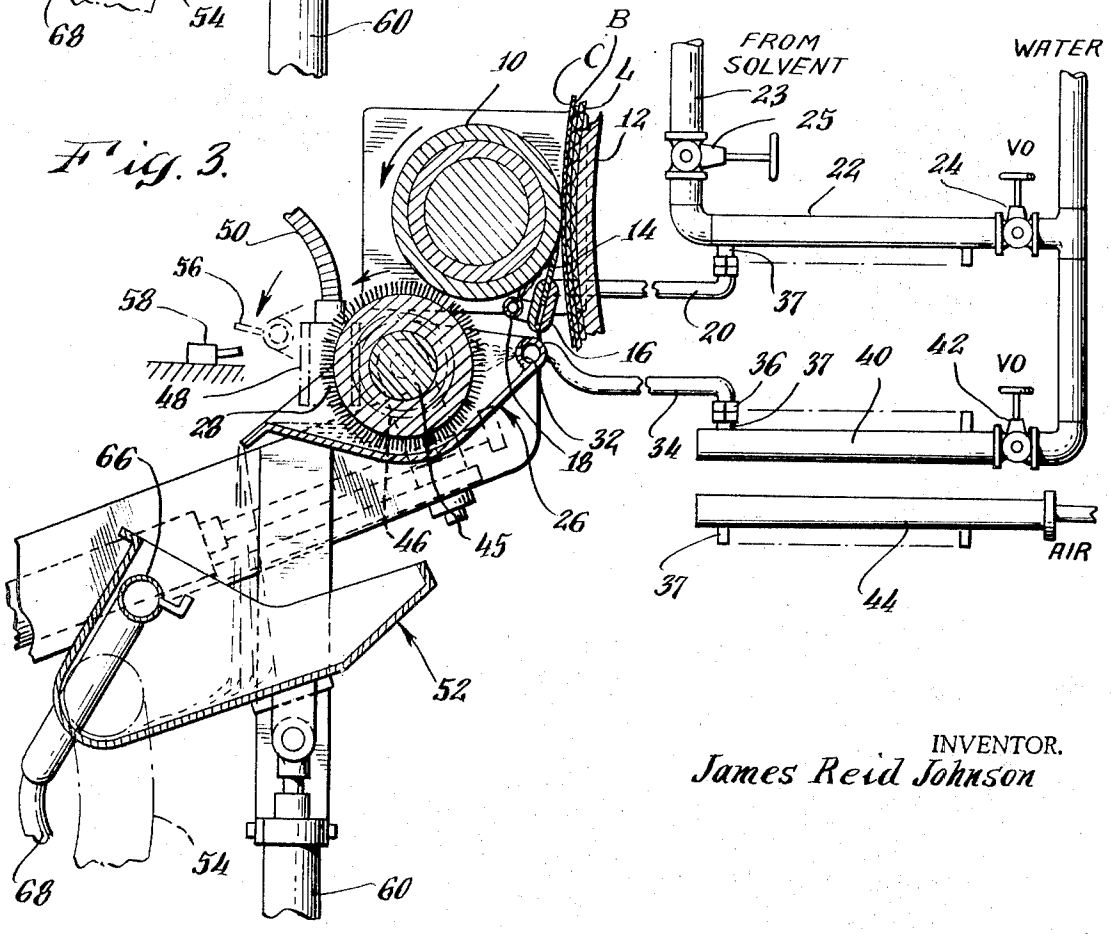


Fig. 3.



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METHOD FOR WASHING ELEMENTS OF FABRIC PRINTING MACHINES

This invention relates to method and means for washing color from elements of printing apparatus.

In the printing of cloth by passing it between one or more print rolls and a backing cylinder color is transferred to a print roll by a rotatable transfer medium such for example as a brush, or roller with cloth, and excess color is scraped from the surface of the print roll by a doctor blade. These color boxes and related elements of the printing apparatus have to be cleaned at the end of each work day and also each time the days work requires a change in the color employed. Since most runs of cloth to be printed are short each printing machine ordinarily prints several different runs every day with a different design and a different color.

The cleaning of the color boxes and related elements has always been very time consuming. It was long customary to remove each subassembly of color box and brush or other color transfer medium separately from the machine and carry it to a sink and wash both elements using a hose and return them to the machine by hand. Excess color was wiped off each doctor blade by hand and then it, together with its support means, was taken out of the machine by hand, washed with a hose, and remounted in the machine. Since eight or more print rolls are commonly employed in a single printing machine it will be readily understood that a great deal of time was required to manually remove the doctor blade and color box subassemblies from a machine, wash them over a sink and remount them in the machine. It was in fact common for the unproductive, "down" time required for washing the color boxes and related elements to exceed the productive operating time of a machine.

The terms "water" and "wash water" are used herein broadly to include any cleaning liquid. The term "color box" is well known in the art. It is sometimes used interchangeably with the term "color tray."

In my U. S. Pat. No. 2,821,913, February 4, 1958 for SUPPORT AND CONTROL OF A COLOR BOX ASSEMBLY IN PRINTING APPARATUS there is disclosed means for supplying color to a color box through a flexible conduit, means for moving the color box and its related transfer medium a short distance away from a backing cylinder and overturning the color box to spill out its contents without removing it from the machine, and means for supplying washing liquid into the color box to clean it and the brush and the conduit through which the color is supplied.

In my U.S. Pat. No. 3,227,078, Jan. 4, 1966 for STRUCTURE AND OPERATION OF COLOR BOXES OF PRINTING APPARATUS the automatic filling, emptying and washing of color boxes and their transfer mediums was improved by the provision of a washer-receptacle shaped to coact with a color box turned upside down and placed upon it to form a closure within which the color transfer medium and the inner surface of the color box is cleaned by jets of water from a header disposed within the washer-receptacle.

In pending U.S. Pat. Application, Ser. No. 595,453, filed Nov. 18, 1966, now U.S. Pat. No. 3,462,300 method and means are disclosed for supplying washing liquid under constant high pressure to the nozzles in the washer-receptacle disclosed in said U.S. Pat. No. 2,821,913 and cutting it off abruptly without "water hammer," thus enabling the color transfer medium to continue to rotate at high speed to dry.

In a copending U.S. Pat. application Ser. No. 829,049, filed May 29th, 1969 means are disclosed for mounting the washer-receptacle for swinging movement to give access to machine elements located behind it, for raising the washer-receptacle into closure forming contact with an overturned color box, and for guiding the washer-receptacle as it moves up and down toward and away from the color box.

This application is directed to improvements in washing methods and means including the provision of individual means for washing each doctor blade without moving it away from its related print roll and for independently performing a preliminary washing of the related color box and its transfer

medium, which may be done simultaneously with washing of the doctor blade, for draining the wash liquid from the doctor blade into the color box, and draining wash liquid from the color box into a washer-receptacle while they remain spaced apart, and for moving the color box and the washer-receptacle together in a new and improved way to form a closure within which the washing of the color box and its transfer medium is completed.

A spray header is provided along each doctor blade and is supplied with washing water or solvent through a conduit which may be selectively connected to a source of water, such as a municipal supply line, or to a source of color solvent. Each sub-assembly of a color box and color transfer medium is disposed beneath its related print roll and doctor blade, and for the preliminary washing step is given a few degrees of overturning movement to bring one end of the color box close to the base of the doctor blade support to intercept water splashing from the doctor blade as well as wash water draining from the doctor blade, and to tip the color box enough to cause its contents to be discharged over its lowered side into a washer-receptacle one of which is supported beneath each color box and is spaced below it during washing of the doctor blade and preliminary washing of the color box and transfer medium.

After the preliminary washing step the overturning of the color box is completed and the washer-receptacle is raised to meet the fully inverted color box to form with it a closure in which the washing of the color box and transfer medium is completed. A fluid supply hose leading to the color box is provided with quick connect and disconnect means for attachment alternatively to sources of color, washing liquid and drying air. During the preliminary washing step water is supplied through the supply hose and during the second washing step drying air may be passed through the supply hose.

The invention will best be understood by reading the following description in connection with the drawings in which

FIG. 1 is a side view partly in section showing a print roll and color box in operative, printing position, with the print roll being driven to print on a length of cloth which, together with a backing comprising an endless blanket, is being advanced between the print roll and a backing cylinder which is wrapped with a layer of lapping, and showing a doctor blade positioned to scrape from the surface of the print roll and return any excess of color being transferred to the print roll by a rotating brush transfer medium from a horizontally disposed color box or tray having therein a spray header which is being supplied with color from a color supply source through a flexible conduit. A washer receptacle which is inactive during printing is shown disposed below the color box.

FIG. 2 shows the doctor blade being washed with sprays of water supplied to a spray header through a hose connected to a source of water supply, and shows the color box hose disconnected from the color supply and connected to a water supply, with the color box and rotated transfer brush being given a preliminary washing by sprays of water from the spray header which is located in the color box and supplied with water by said color box hose, with the color box tilted enough to raise one side to a position adjacent the lower end of the doctor blade and its holder to intercept water splashing from the doctor blade, and with its other end lowered enough to permit wash water, including wash water draining from the doctor blade, to be spilled out and received in the downwardly spaced washer-receptacle which is connected to a drain.

FIG. 3 is similar to FIG. 2 but shows the transfer brush being rotated in the opposite direction to that shown in FIG. 2, so that at the line of contact with the print roll the brush will be moving opposite to the surface of the print roll, to clean it,

FIG. 4 shows the color box assembly after it has been moved away from its print roll and the color box has been moved from its tilted position to a fully overturned position, with its flexible hose connected to a source of air for drying the inside of the hose, and with the washer-receptacle moved up against the overturned color box and coacting with it to form a closure, and with a spray header within the washer-receptacle

supplied with high pressure fluid from a source adapted to cut off abruptly and without "water hammer," and

FIG. 5 is a side elevation partly in section showing a clutch for connecting and disconnecting the transfer brush and driving means for rotating it.

In the embodiment of the invention shown and described herein a print roll **10** which may be rotated by any power means acting for example through gear **11** on print roll mandrel M, is shown in operating position for printing on a length of cloth C which, together with a printers blanket B, is passed between the print roll and a backing cylinder **12** which is covered with a layer of lapping L. A doctor blade **14** is mounted in a holder support **16** with its free edge extending into contact with the surface of the print roll to remove excess color, and a spray header pipe **18** is disposed parallel with the doctor blade in position to direct sprays of wash water or solvent over the inner surface of the doctor blade. A hose **20** is connected at one end to the spray header pipe **18** (Fig. 2) and at its other end has a coupling adapted to be alternatively connected to a source of wash water or a source of solvent. As shown hose **20** is connected to a pipe **22** which may be connected to a municipal water line and controlled by valve **24** as shown in FIGS. **2** and **3**. A branch pipe **23** controlled by valve **25** is shown communicating between a source of color sovent and pipe **22** to supply solvent to the doctor blade header when valve **24** is closed and valve **25** is opened.

Beneath the subassembly of print roll **10** and doctor blade **14** is another subassembly comprising the open top color box or tray **26** and the brush **28** which extends into the color box **26** and is rotatable, as by a drive applied through the clutch **30**, shown in FIG. **5**, to transfer color from the color box to the surface of the print roll **10**. Within the color box is a spray header pipe **32**, extending substantially the length of the color box, and connected to the header pipe **32** is a flexible conduit **34** having at its free end a coupling member **36** adapted to be quickly and easily and selectively connected to and disconnected from coupling members carried respectively by a color container **38**, a source of wash water which may be a pipe **40** connected to a municipal water line and controlled by valve **42**, and a source of drying air which may be a pipe **44** supplied with air in any suitable way as from a shop air line. During printing the header **32** is connected to the source of color as shown in FIG. **1**. During the preliminary washing step the header **32** is connected to a source of water **40** as shown in FIGS. **2** and **3** and the brush may be rotated in one direction to help empty the color box or in the reverse direction to clean the surface of the print roll.

The color box and brush may be rotatably supported on the shaft or axle **45**. On axle **45** is a gear **46** meshing with a worm gear **48**, which may be driven through shaft **50** by any suitable source of power, to first tip the color box from its operative position shown in FIG. **1** to the position shown in FIG. **2** to bring one end of the color box close to the lower end of doctor blade, and for discharging wash water, including wash water and solvent draining from the doctor blade, and water introduced directly into the color box, for a preliminary washing of the color box and brush, and secondly to complete the overturning of the color box preparatory to a second washing of the brush and the inside of the color box within a closure formed by coaction of the color box **26** and a washer-receptacle **52**, as shown in FIG. **4**.

Washer receptacle **52**, which has the flexible discharge conduit **54**, is disposed below the color box and transfer brush subassembly in position to receive wash water spilled from the tipped color box during washing of the doctor blade and the preliminary washing of the color box and brush, and also during the second washing step after it has moved up against the overturned color box.

Mounting means for the color box, brush and washer-receptacle is shown and described in copending U.S. Pat. application Ser. No. 829,056. The color box may carry an abutment **56** which, as the overturning of the color box is completed in preparation for the second washing step, serves to trigger a contact switch **58** (FIG. **4**) in an electric circuit which stops the overturning motion of the color box and conditions the circuit so that by operating a control button **59** when desired the fluid pressure cylinder **60** is actuated to raise the washer-receptacle until its rim contacts the rim of the overturned color box thus forming a closure enclosing the transfer brush and the inner surface of the color box. When the upward movement of the washer-receptacle is completed an abutment **62** triggers a contact switch **64** to start a flow of high pressure liquid into the closure. As is more fully described in copending application Ser. No. 595,453 a spray header pipe, identified herein by the numeral **66**, extends along a side wall of the washer-receptacle as well as across both ends, and wash water under high pressure is supplied to the header through conduit **68** from a container indicated in FIG. **4**, by numeral **70**, and is directed tangentially against the brush which is caused to revolve at very high speed and throw off wash water against the interior of the color box. As is explained in said copending application the supply of high pressure wash water is cut off abruptly, and without strain on valves or "water hammer," leaving the brush rotating at such a high speed that it throws off any remaining water and dries itself in a matter of a few seconds.

It will be understood that clutch **30**, referred to above, will be closed during printing, and also during the preliminary washing step when the brush is used to push water out of the tipped color box, or, by reverse rotation to clean the surface of the print roll, and will be open while the brush is being turned at high speed by jets of washing liquid. The clutch **30** illustrated in FIG. **5** comprises a housing having therein, a worm wheel **78** which as a sleeve defining hub **75**, a worm **80** on drive shaft **82**, and the clutch members **72** and **74** disposed within the hub. Clutch member **74** is at one end of stub shaft **76** the other end of which is slidingly engaged by one end of operating arm **84** which is pivoted at **86**. Clutch member **74** is urged into engagement with clutch member **72** by spring means and the clutch members are disengaged by actuating power cylinder **88** the piston of which is attached to the other end of arm **84**.

While the second washing step is being performed, the interior of conduit **34**, from which color has been washed during the preliminary washing of the color box, may be dried by connecting it to the air line **44**, as is shown in FIG. **4**. By the method and apparatus disclosed herein the above identified elements of a machine for printing on a length of fabric may be washed and dried in a dependable way and with a great saving in time.

LIST OF PARTS

M Mandrel
10 print roll
11 gear on M
C length of cloth
B blanket
12 backing cylinder
L lapping on **12**
14 doctor blade
16 doctor blade holder
18 spray pipe along d - b
20 hose connected between **18** and
22 a pipe source of wash water
24 valve in **22**
26 color box
28 brush
30 clutch for **28**
32 header pipe in **36** color box
34 flexible conduit connected to **32**
36 coupling on 3nd of **34**
37 coupling on **38**, **40** and **42**
38 color container
40 pipe- source of wash water
42 valve in **40**
44 source of drying air

45 shaft or axle supporting color box and brush
46 gear on 44
48 worm gear meshing with 46
50 shaft rotating 48
52 washer-receptacle
54 discharge conduit of 52
56 abutment on color box
58 contact switch triggered by 56
60 power fluid cylinder
62 abutment on washer receptacle
64 contact switch
66 spray header in washer-receptacle
68 conduit to 66
70 container of h p. wash water.
72 clutch member
74 movable clutch member
75 hub of 74
76 stub shaft
78 worm wheel
80 worm
82 drive shaft
84 operating arm
86 pivot for 84
88 power cylinder

I claim

1. A method of washing color from elements of a printing machine comprising the following steps:

providing a print roll, a backing cylinder, a doctor blade extending into contact with the print roll between the print roll and the backing cylinder, a color box disposed below the print roll and the doctor blade, a color transfer medium extending partially into the color box for transferring color from the color box to the print roll, means for selectively supplying washing fluid or color to the color box from a source of supply, a spray header disposed along the length of the doctor blade and connected to a source of washing liquid, means for mounting the color box for movement from a horizontal position below the transfer medium to a tilted position, means for moving the color box from a horizontal position to a tilted position with one end raised and disposed under the doctor blade in position to receive fluid draining from the doctor blade and with its other end lowered and disposed to discharge fluid, and means for turning the color box upside down;

providing an open top washer receptacle with a drain conduit and with means for spraying a washing liquid, means for raising the washer receptacle into contact with said color box when the latter is in an overturned position to thus form an enclosure, and means for introducing wash liquid under high pressure into said enclosure and for directing it against the transfer medium and the inner surface of the color box;

tilting the color box,

supplying wash fluid into the color box and simultaneously directing sprays of wash liquid through said spray header against said doctor blade,

collecting the wash liquid from said doctor blade within the color box and discharging the wash liquid from the color box into said washer receptacle,

thereafter turning the said color box upside down,

raising said open top receptacle until it forms with said upside down color box an enclosure, and

directing jets of cleaning fluid against said color transfer medium and the inner surface of said color box while they are within said enclosure.

* * * * *