March 21, 1967 E. C. GREMBECKI ETAL 3,309,993

PRINTING CYLINDER CLEANER

Filed Jan. 26, 1965 3 Sheets-Sheet 1

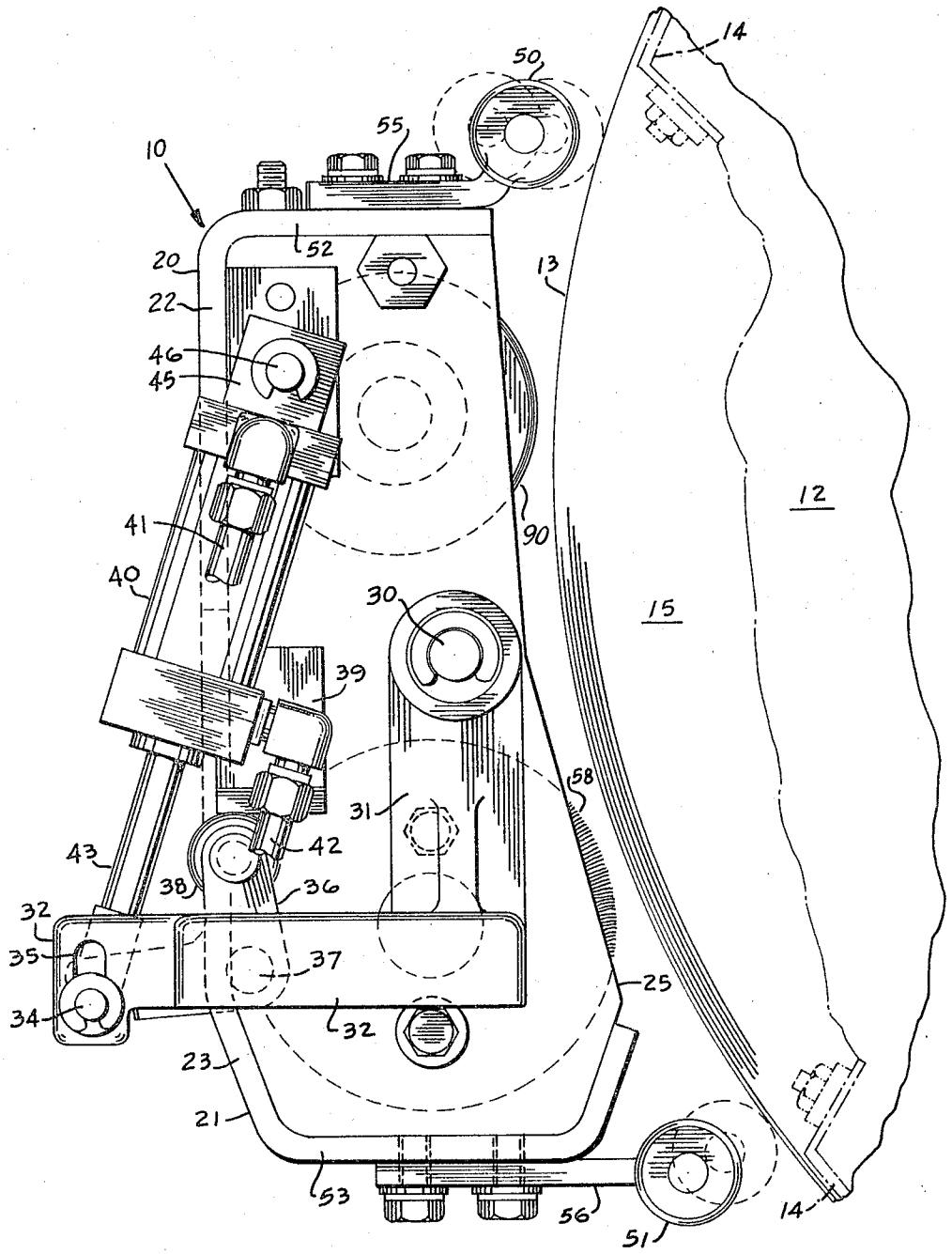

FIG.-1

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PRINTING CYLINDER CLEANER

Filed Jan. 26, 1965 3 Sheets-Sheet 2

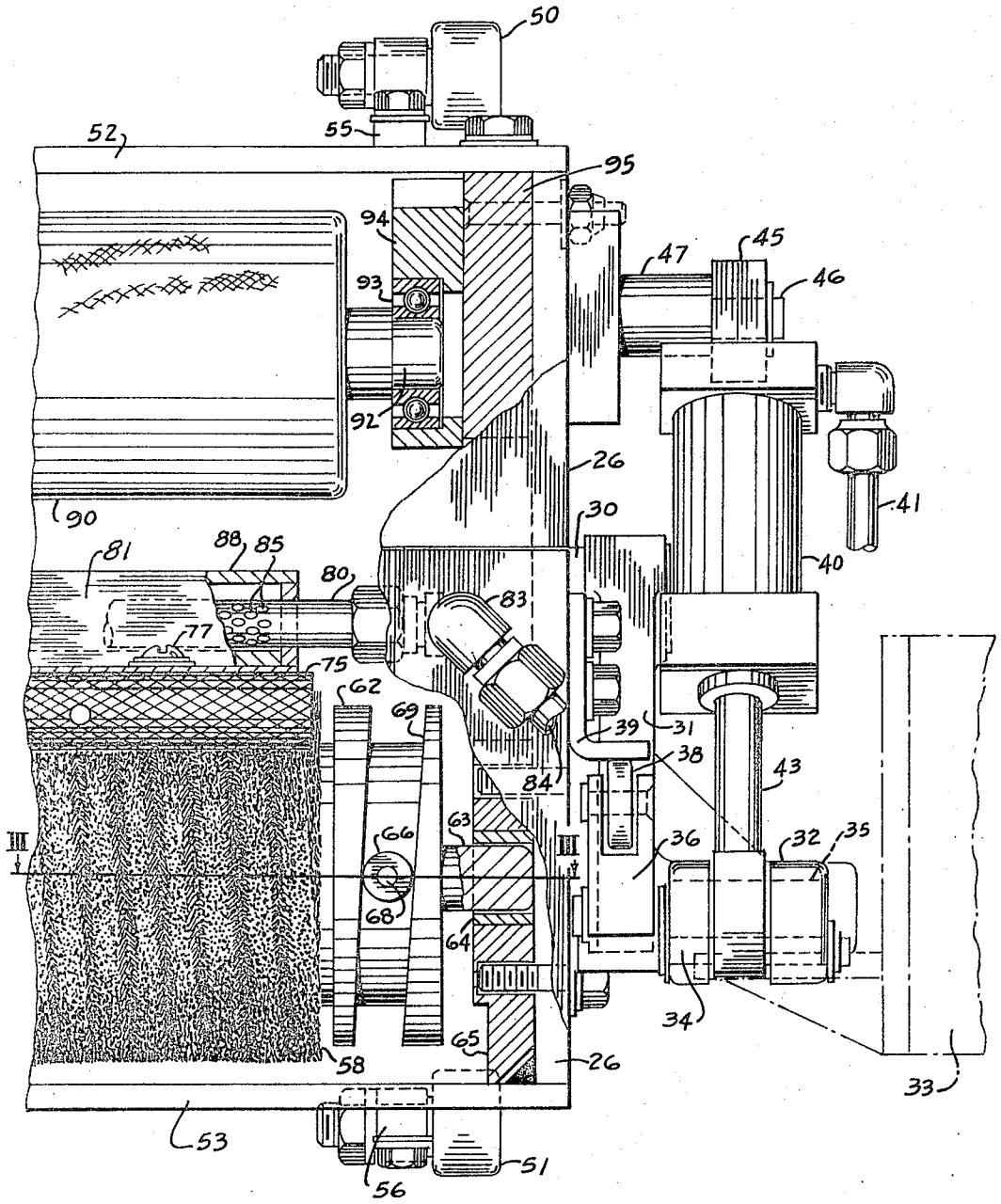

FIG.-2

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Filed Jan. 26, 1965 3 Sheets-Sheet 3

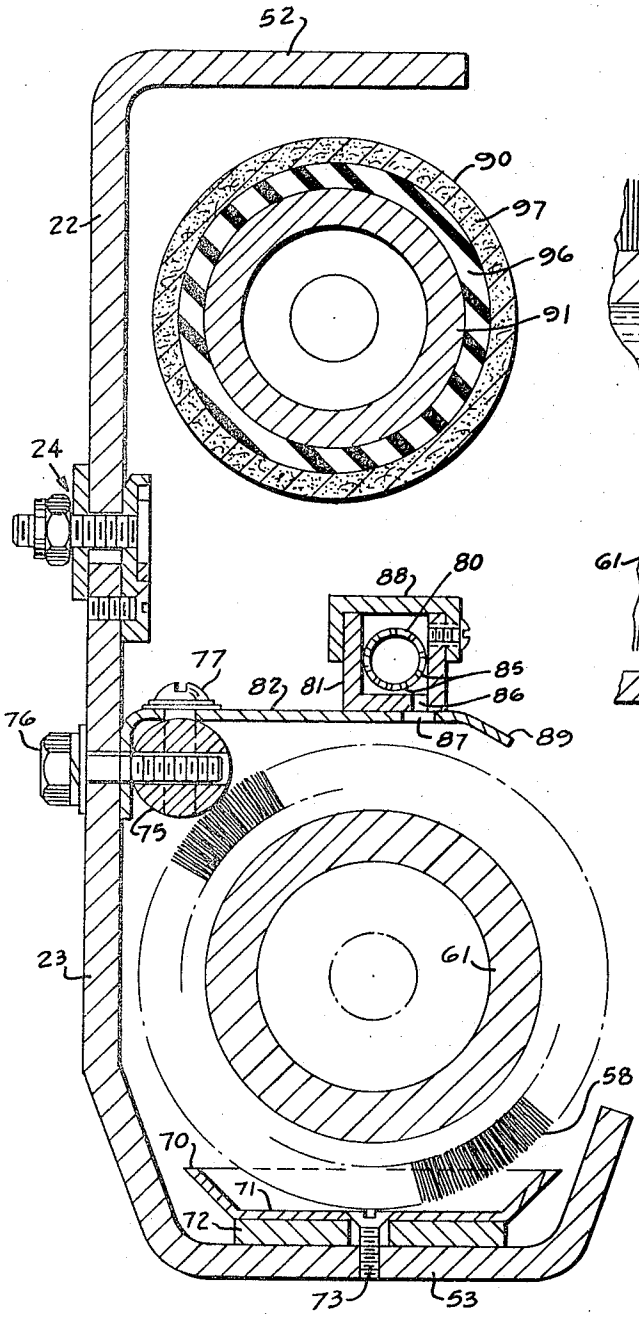

FIG.-4

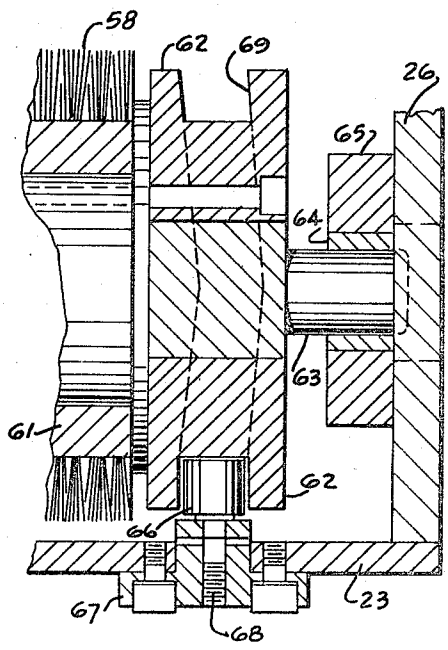

FIG.-3

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3,309,993

PRINTING CYLINDER CLEANER

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8 Claims. (Cl. 101—425)

This invention relates generally to means for cleaning the cylinders of printing machines, and relates more particularly to new and useful improvements in a cleaning device especially adaptable for use in removing ink, lint and foreign matter from the printing surface of a printing press cylinder.

At the present time, offset presses have a gap in the blanket cylinder. In a sheet-fed press, this gap is important in obtaining the sheet gripper action and can constitute as much as 25% of the circumferential surface of the cylinder. In a web-fed press, a gap or interruption in the surface of the printing impression also exists, although it is reduced to a minimum, usually being less than one inch in length. Additionally, in both sheet- and web-fed presses, the mounting of the blanket cylinder journal is generally by means of an eccentric supported in the press frames which comprises the cylinder "throw-off" for the presses. Both of these factors—i.e., the cylinder gap and the eccentric mounting, whereby the cylinder surface assumes more than one position—result in an interruption or change of position in the surface of the blanket cylinder as it rotates during the printing operation.

Heretofore, it has been customary to utilize the rotating blanket cylinder surface itself as a locating point in positioning the cleaning elements during the cleaning of the surface. Alternatively, locating stops may be provided on the cleaner assembly itself or on the press frames. Since the cleaning mechanism must be held rigidly in position during the cleaning action, when the position of the cleaning elements is located by means of the blanket cylinder surface, the brushing or wiping action is affected by the release of pressure in the gap areas. Likewise, it is not satisfactory to provide locating stops on the cleaner assembly or the press frames since the blanket cylinder moves in an eccentric mounting.

Heretofore, it has also been customary to transfer from a trough, or the like, cleaning fluid to the surface of the blanket cylinder by means of a rotating brush which picks up the cleaning fluid from the trough and applies it to the surface of the blanket cylinder. This has been found objectionable in that it is difficult to control the amount of cleaning fluid applied to the blanket cylinder and the bristles of the brush soon become clogged with foreign matter, resulting in unsatisfactory or substantially ineffective cleaning of the blanket cylinder. These objections have been alleviated by our Patent No. 3,089,415, granted May 14, 1963, which provides a knurled applicator roller in the fluid trough for transferring the cleaning fluid to the brush and cleaning the bristles of the brush. However, in the construction of the patent which is common to the state of the art in the field, the lint and foreign matter is deposited in the fluid trough and thereby soon contaminates the cleaning fluid, which often causes a deterioration in the cleaning ability of the fluid and requires intermittent draining of the trough and replenishing the fluid supply. Further, although the provision of the applicator roller in our prior patent more evenly applies the cleaning fluid to the blanket surface, there is still required an excess of fluid in the trough, which is generally undesirable.

It is therefore an object of this invention to provide a

new and improved printing cylinder cleaner device, substantially avoiding the defects of the prior art.

Another object of this invention is to provide a new and improved blanket cylinder cleaner which may be used in both sheet-fed and web-fed offset printing press machines.

Another object of this invention is to provide a new an improved printing cylinder cleaner assembly wherein the assembly is held rigidly in position during the cleaning action unaffected by the gap in a blanket cylinder or the eccentric mounting of a blanket cylinder.

Another object of this invention is to provide a new and improved printing cylinder cleaner assembly wherein the assembly is held rigidly in position for cleaning by bearing against a fixed, uninterrupted locating surface.

Another object of this invention is to provide a new and improved printing cylinder cleaner which applies the cleaning fluid to the cylinder without contamination from the materials previously removed from the cylinder surface.

Another object of this invention is to provide a new and improved printing cylinder cleaner assembly wherein a predetermined measurable quantity of cleaning fluid is applied to the cylinder surface.

Another object of this invention is to provide a new and improved printing cylinder cleaner assembly having improved distribution of the cleaning fluid on the printing surface.

Another object of this invention is to provide a new and improved printing cylinder cleaner assembly which provides a self-cleaning action for the cleaning element.

Other objects and advantages of the invention are set forth in part herein and in part will be obvious herefrom, or may be learned by practice with the invention, the same being realized and attained by means of the instrumentalities and combinations pointed out in the appended claims.

The invention consists in the novel parts, constructions, arrangements, combinations and improvements herein shown and described.

Briefly described, the present invention is characterized by a novel and improved printing cylinder cleaner construction wherein the cleaning elements, preferably including both brush and wiper rollers, supported and enclosed in a pivotal housing assembly, are located in their respective operative positions by positive positioning or stop means engaging the bearer of the printing cylinder. The stop means may preferably comprise roller assemblies mounted on the top and bottom walls of the cleaner housing assembly by adjustable bracket means. The rotary brush vibrates as it rotates, and is mounted so as to rotate with its bristles in peripheral contact with a cleaning shaft, open-end trough and, when in operative position for brushing action, the cylindrical surface of the printing cylinder. Means are provided for supplying a predetermined, measurable quantity of cleaning fluid directly onto the upper surface area of the brush.

In an alternate embodiment of the invention, of especial utility for web-fed printing machines, the cleaning action is performed solely by the brush element. The brush is mounted in a pivotal enclosure and located in operative position as previously described and is supplied with cleaning fluid also in the manner previously described. By permitting the brush to continue rotating after closing off the supply of cleaning fluid, the fluid and foreign matter is substantially fully removed from the bristles of the brush and, consequently, from the surface of the printing cylinder, by the cleaner shaft and the bottom of the trough in contact with the peripheral edges of the brush bristles.

It will be understood that the foregoing general de-

scription and the following detailed description as well are exemplary and explanatory of the invention but are not restrictive thereof. Thus, while the cleaner construction of this invention is particularly adapted for cleaning the cylindrical surface of a blanket cylinder, the principles underlying the operation of the invention are not limited to such usage, and the cleaner may be used with extremely satisfactory results to clean any printing surface, whether that surface be an offset blanket or a printing plate. However, since the invention is particularly adaptable for cleaning blanket cylinders, reference will be made hereinafter thereto in describing an application and operation of the invention.

The accompanying drawings, referred to herein and constituting a part hereof, illustrate a preferred embodiment of the invention and, together with the description, serve to explain the principles of the invention.

Of the drawings:

FIGURE 1 is a side elevation of a cleaner assembly embodying the present invention, shown in the inoperative position, in relation to a fragmentary portion of the blanket cylinder of a sheet-fed offset printing press machine;

FIGURE 2 is a fragmentary view in end elevation, partly diagrammatic and partly in section, of the cleaner assembly of FIGURE 1, the assembly housing broken away to illustrate the cleaning elements;

FIGURE 3 is a sectional view taken along line III—III of FIGURE 2 showing details of the cam mounting of the brush roller providing reciprocative rotation for the brush; and

FIGURE 4 is a sectional view taken through the longitudinal central portion of the cleaner assembly of FIGURE 1, illustrating the relationship of the cleaner elements and showing details of the cleaning fluid injection tube and positioning of the open-end trough beneath, and in contact with, the cleaner brush.

With respect to the drawings and the following detailed description of an embodiment of our invention, for ease of description and understanding of the invention, only one end of a blanket cylinder and only one side of the blanket cleaner mechanism is described. It will be understood to those of ordinary skill in the art that the cleaning elements extend substantially the entire width of the blanket cylinder surface, that the blanket cylinder has a bearer at each end thereof, and that, therefore, the mounting and pivotal assemblies described are provided at each end of the cleaner assembly, unless otherwise specifically indicated.

Referring now more particularly to the embodiment of the invention shown in the accompanying drawings, there is illustrated in FIGURE 1 a novel printing cylinder cleaner assembly, designated generally by reference numeral **10**, facing a blanket cylinder **12**, only a fragment of which is shown, of a sheet-fed offset printing press machine. Cylinder **12** includes a bearer **13** and a blanket **14** suitably secured thereto, leaving the conventional gap area **15** in the circumference of the cylinder surface.

As previously stated, it will be understood that the cleaner of the present invention is equally suitable for cleaning the printing surface of any printing cylinder, which may be, for example, an offset blanket or a printing plate, and the illustration in FIGURE 1 of a sheet-fed blanket cylinder is intended to be explanatory of the invention and not restrictive thereof.

Cleaner assembly **10** includes a housing having upper and lower frames **20**, **21** whose respective end plates **22**, **23** may be securely locked together by several locating bracket-and-nut assemblies **24** to form a rigid enclosure having an open front **25** facing the peripheral surface of the blanket cylinder **12**.

Cleaner assembly **10** at its side wall **26** is provided with a trunnion **30** which is journaled in the upper end portion **31** of support bracket assembly **32**, supported by bracket **33** mounted to the press frame, illustrated diagrammatically. Bracket assembly **32** includes a pivot pin **34** mounted in slot **35** and a bell crank bearing shaft **36** pivotally mounted to pin **34** and bracket **32** at **37**, bell crank **36** having a roller assembly **38** bearing against the underside of angle bracket **39** mounted to side wall **26**.

The cleaner assembly is pivoted about trunnion **30** by pneumatic cylinder **40**, which may be of conventional construction and operable through flexible pneumatic fluid lines **41**, **42** in a manner well known to those of ordinary skill in the art. The piston rod **43** of cylinder **40** is pivoted on pin **34** of bracket assembly **32** and the cylinder casing **45** of cylinder **40** is pivoted at **46** to stud shaft **47** extending from side wall **26** of the cleaner assembly housing.

In accordance with the invention, stop means are provided for engaging the bearer **13** of the blanket cylinder **12** so as to provide a fixed, uninterrupted locating surface for rigidly positioning the cleaner assembly in operative position for cleaning the blanket cylinder surface. As here preferably embodied, this means comprises roller assemblies **50**, **51** provided on the forward ends of adjustable bracket arms **55**, **56** mounted on the top wall **52** at both ends of upper housing frame **20** and on the bottom wall **53** at both ends of lower housing frame **21**, respectively.

The respective pivotal connections **46** and **34** between casing **45** and piston rod **43** are arranged in such manner that the pneumatic cylinder **40** positions the cleaner assembly **10** either in an inoperative position, in position for a brushing action or in position for a wiping action. When the cylinder **40** is not charged, the assembly assumes the inoperative position illustrated in FIGURE 1. To bring the cleaner in position for brushing action, cylinder **40** is charged through fluid hose line **42** whereby casing **45** pivots the assembly about trunnion **30** until rotary stop **51** engages bearer **13** thereby bringing brush **58** into brushing engagement with the cylindrical surface of blanket cylinder **12**. Piston rod **43** is of sufficient length such that an excess charge is maintained in the cylinder **40** after stop **51** has contacted the bearer whereby the stop is at all times maintained in firm contact with the bearer. It will thus be seen that bearer **13** provides a fixed, uninterrupted, locating surface for firmly holding cleaner assembly **10** in rigid position for the brushing action. In a similar manner, upon charging cylinder **40** through fluid hose line **41**, the assembly is pivoted in the opposite direction until rotary stop **50** engages bearer **13**, thereby bringing wiper roller **90** into engagement with blanket **14** and holding the assembly in rigid position for the wiping action.

Brush **58** is carried by shaft **61** having a cylindrical cam **62** on one end thereof, illustrated in FIGURES 2 and 3, shaft **61** terminating in a trunnion **63** journaled in bearings **64** of bearing block **65** suitably rigidly mounted to side wall **26**. A cam follower **66** is mounted to end plate **23** by means of a support bracket **67** suitably secured thereto and having a threaded borehole to receive adjustment screw **68** from which follower **66** extends. Cam follower **66** may thereby be adjustably located to ride in the channelled cam profile surface **69** of cam **62**.

The opposite end of shaft **61** is provided with suitable gear means (not shown) in meshed relationship with a suitable drive assembly, such as that shown and described in our Patent 3,049,997, granted Aug. 21, 1962, for rotating the brush in a direction opposite to the direction of rotation of the blanket cylinder. Upon rotation of the brush by the drive assembly, the cam follower **66** riding on the cam profile **69** causes the brush to simultaneously reciprocate, imparting a vibratory motion to the brush.

The bristles of brush **58** are preferably wound on the shaft in a helix pattern illustrated in FIGURE 2, presenting a helical brushing action to the blanket cylinder surface which combines with the reciprocative vibratory mo-

tion to provide a scrubbing action, effectively cleaning the blanket surface.

Brush 58 is journaled in bearing block 65 such that the bristles of the brush peripherally engage the bottom 71 of trough 70 adjustably mounted to the bottom wall 53 of cleaner assembly 10 by means of shims 72 and suitably secured thereto, for example, by screws 73. Trough 70 is open-ended, extending substantially the full length of the cleaner housing though terminating short of side walls 26.

The bristles of brush 58 also peripherally engage near their upper surface a cleaner shaft 75 which is preferably a stationary rod having a knurled surface, mounted to end plate 23 and cleaning fluid channel bracket 82, more fully described hereinbelow, by means of locknut 76 and screw 77, respectively, or by any other suitable means.

In accordance with the invention, means are provided for supplying a predetermined, measurable quantity of cleaning fluid from a position above brush 58 directly onto the upper surface area thereof. As here preferably embodied, this means comprises a fluid tube 80 located in an applicator channel 81 mounted on a bracket 82 extending from end plate 23 substantially over brush 58 and in close, spaced relationship thereto. Tube 80 is connected through suitable fittings 83 and connecting line 84 to a pump (not shown) capable of delivering a measurable quantity of cleaning fluid with a timed cycle of operation. The pump is preferably of a mechanically actuated fluid injector type, although any simple motorized rotary pump may be suitable.

Cleaning fluid is injected into applicator tube and distributed through holes 85 therein to fill the applicator channel 81, whereupon the fluid is fed by gravity feed through registering apertures 86, 87 in the channel 81 and channel bracket 82, respectively, onto the upper surface of brush 58. Applicator channel 81 is provided with a cover 88 to prevent foreign matter from clogging the distributing apertures in the applicator tube, and to prevent overflow of the cleaning fluid. A downwardly extending lip 89 provided on the forward end of channel bracket 82 serves to spread the cleaning fluid evenly over the brush.

In the preferred embodiment of our invention there is provided a wiper roller 90 carried by shaft 91 terminating in a trunnion 92 journaled in suitable bearings 93 of bearing block 94 supported by supporting block 95 suitably fixed to side wall 26 and end plate 22. Since wiper roller 90 is frictionally driven upon contact with the surface of the blanket cylinder, identical mountings are provided at each end of the roller shaft. A layer of rubber 96 or other suitable shock absorbent material is preferably provided on shaft 91 beneath the outer absorbent layer 97, preferably an absorbent cotton material.

With the foregoing description in mind, the operation of the cleaner of our invention is as follows:

A predetermined quantity of cleaning fluid is injected into the fluid applicator tube from where it is distributed throughout the applicator channel. As the fluid emerges by gravity feed from the channel bracket apertures and is applied to the upper surface of the brush, the pneumatic cylinders are charged so as to pivot the housing assembly until rotary stops 51 are brought into engagement with the bearer surface of the blanket cylinder to thereby bring brush 58 into engagement with the cylindrical surface of the blanket cylinder. The pneumatic cylinders exert pressure through the rotary stops against the bearer surfaces to rigidly position the cleaner assembly during the brushing action, the position of the assembly thereby not being affected by the release of pressure in the gap areas or the eccentric mounting of the blanket cylinder journal as the blanket cylinder revolves. The brush cleans and scrubs the blanket surface as the appropriate quantity of cleaning fluid continues to be applied to the bristles of the brush, the helical pattern of the brush

bristles and the combined reciprocative rotating motion of the brush against the blanket providing an effective cleaning action. The open-ended trough beneath the brush, shimmed so that the bottom of the trough engages the periphery of the brush, combines with the lip of the channel bracket to evenly distribute the cleaning fluid to the brush, and continues to do so even when the gap area of the blanket cylinder is exposed to the brush during each revolution of the cylinder during the cleaning cycle.

Also, the combination of the bottom of the trough and the knurled cleaning shaft in peripheral contact with the surface of the brush serves to remove foreign matter from the bristles of the brush which has in turn been removed from the surface of the blanket. In addition, each time the gap in the surface of the blanket cylinder is exposed to the brush, the cleaning of the blanket surface momentarily stops and a brush self-cleaning function takes place by the combination of the cleaner shaft and trough bottom engaging the brush bristles.

It will thus be seen that by providing the cleaning fluid from a position above the brush, a fresh supply of fluid is continually applied to the blanket surface without contamination by ink and foreign matter removed therefrom.

After a suitable time period for the brushing action, the pneumatic cylinders are thereafter charged so as to pivot the housing assembly in the opposite direction until rotary stops 50 are brought into engagement with the bearer of the blanket cylinder thereby bringing the wiper roller into contact with the cleaned blanket cylinder surface. In like manner to that previously described, the assembly is held in rigid position during the wiping action.

In an alternate form of our invention, where space is not available for both a rotary brush and wiper roller, as is the case in certain web-fed printing presses, the wiper roller may be eliminated and the cleaner comprised of a rotary brush only, mounted as illustrated in our preferred embodiment. In the alternate embodiment, the brush would continue to revolve for a suitable period of time after the application of the cleaning fluid is stopped. The cleaning shaft and the bottom of the open-ended trough combine to remove substantially all of the cleaning fluid and foreign matter dissolved therein from the bristles of the brush, thereby removing substantially all of the cleaning fluid from the surface of the blanket cylinder. The fluid-free brush then serves as a wiper roller, not only to wipe off the cleaning fluid but also as a means to evaporate the fluid in addition to the wiping action. Any remaining traces of cleaning fluid on the blanket cylinder would be removed by the initial paper, web-fed through the printing machine.

The invention in its broader aspects is not limited to the specific embodiments herein shown and described but departures may be made therefrom within the scope of the accompanying claims, without departing from the principles of the invention and without sacrificing its chief advantages.

What is claimed is:

1. A cleaner for cleaning the cylindrical surface of a printing cylinder having bearer surfaces at the ends thereof comprising: a pivotal housing assembly; means mounting cleaning means in said assembly, said cleaning means including a rotatable brush and a wiper roller; means for supplying cleaning liquid to said brush including liquid pump means and applicator means, said pump means adapted to deliver a predetermined, measurable quantity of cleaning liquid to said applicator means, said applicator means adapted to apply said liquid to the upper surface of said brush; means normally locating said housing assembly in an inoperative position, said means adapted to pivot said housing assembly into a first operative position wherein said brush engages the surface of said printing cylinder and into a second operative position wherein said wiper roller engages the surface of said printing cylinder; roller stop means provided on said housing assem-

bly cooperating with the bearer surfaces of said printing cylinder to locate said housing assembly in each of said operative positions; said pivoting means holding said stop means in cooperative relationship with said bearer surfaces under pressure, whereby said cleaner is held in rigid operative position during each of the brushing and wiping actions.

2. A cleaner as claimed in claim 1 wherein said liquid pump means delivers said cleaning liquid on a timed cycle of operation.

3. A cleaner for cleaning the cylindrical surface of a printing cylinder having bearer surfaces at the ends thereof comprising: a pivotal housing assembly; means mounting cleaning means in said assembly, said cleaning means including a rotatable brush and a wiper roller; means for supplying a predetermined measurable quantity of cleaning liquid to said brush; means normally locating said housing essembly in an inoperative position, said means adapted to pivot said housing assembly into a first operative position wherein said brush engages the surface of said printing cylinder and into a second operative position wherein said wiper roller engages the surface of said printing cylinder; said housing assembly including means for removing foreign matter and used cleaning liquid from said brush without contaminating the supply of fresh cleaning liquid supplied to said brush including a cleaning shaft and a trough, said shaft and said trough each being adjustably mounted in bearing engagement with said brush; roller stop means provided on said housing assembly cooperating with the bearer surfaces of said printing cylinder to locate said housing assembly in each of said operative positions; said pivoting means holding said stop means in cooperative relationship with said bearer surfaces under pressure, whereby said cleaner is held in rigid operative position during each of the brushing and wiping actions.

4. A cleaner as claimed in claim 3 wherein said cleaning shaft comprises a staionary knurled rod and said trough is open-ended.

5. A cleaner for cleaning the cylindrical surface of a printing cylinder having bearer surfaces at the ends thereof comprising: a pivotal housing assembly; means mounting cleaning means in said assembly, said cleaning means comprising a rotatable brush; means for supplying cleaning liquid to said brush including liquid pump means and applicator means, said pump means adapted to deliver a predetermined, measurable quantity of cleaning liquid to said applicator means, said applicator means adapted to apply said liquid to the upper surface of said brush; means normally locating said housing assembly in an inoperative position, said means adapted to pivot said housing assembly into an operative position wherein said brush engages the surface of said printing cylinder to clean the printing surface thereof; said housing assembly including means for removing foreign matter and used cleaning liquid from said brush without contaminating the supply of fresh cleaning liquid applied to said brush; and means cooperating with the bearer surfaces of said printing cylinder locating said housing assembly in said operative position, whereby said cleaner is held in rigid operative position during the brushing action.

6. A cleaner as claimed in claim 5 wherein said liquid pump means delivers said cleaning liquid on a timed cycle of operation.

7. A cleaner as claimed in claim 5, said means for removing foreign matter and used cleaning liquid from said brush including a cleaning shaft and a trough, said shaft and said trough each being adjustably mounted in bearing engagement with said brush.

8. A cleaner as claimed in claim 6 wherein said cleaning shaft comprises a stationary knurled rod and said trough is open-ended.

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