United States Patent [19]

Kossak

[11] 3,735,702

[45] May 29, 1973

[54] APPARATUS AND METHOD FOR CLEANING ROTATING CYLINDRICAL SURFACES

[75] Inventor: **Joseph J. Kossak,** Roselle, N.J.

[73] Assignee: **Oxy-Dry Sprayer Corporation,** Chicago, Ill.

[22] Filed: **May 12, 1971**

[21] Appl. No.: **142,585**

[52] **U.S. Cl.**.....**101/425,** 101/426, 15/21 C, 15/256.62

[51] **Int. Cl.**.....**B41f 35/00,** B41l 41/00

[58] **Field of Search**.....101/425, 426; 15/256.5, 256.51, 256.52, 256.53, 256.6, 21, 38, 21 R, 21 C, 21 D, 49 RB, 51, 114, 117

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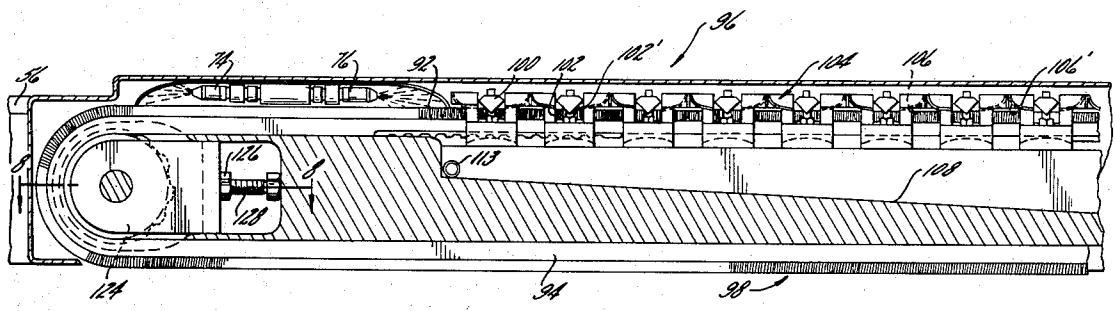
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Primary Examiner—Robert E. Pulfrey
Assistant Examiner—Eugene H. Eickholt
Attorney—Wolfe, Hubbard, Leydig, Voit & Osann

[57] **ABSTRACT**

A means, and a corresponding method therefore, for removing undesired foreign matter from rotating cylindrical surfaces, such as, for example, the blanket of a blanket cylinder on an offset press, comprises a scrub means including an endless belt having upstanding bristles thereon which presents a scrubbing course for tangentially contacting the transverse dimension of the surface to be cleaned and a preparation course in which excess solvent and foreign matter is removed from the bristles and solvent applied thereto and a means for drying the scrubbed surface which includes an absorbent wiper roller. In the preparation course, a plurality of flicker bars are interposed to intercept the bristles as they proceed through the preparation course to cause the bristles to flex and to remove the solvent and foreign matter therefrom. Transfer means are provided to receive the solvent and foreign matter and move the same away from the bristles.

28 Claims, 13 Drawing Figures



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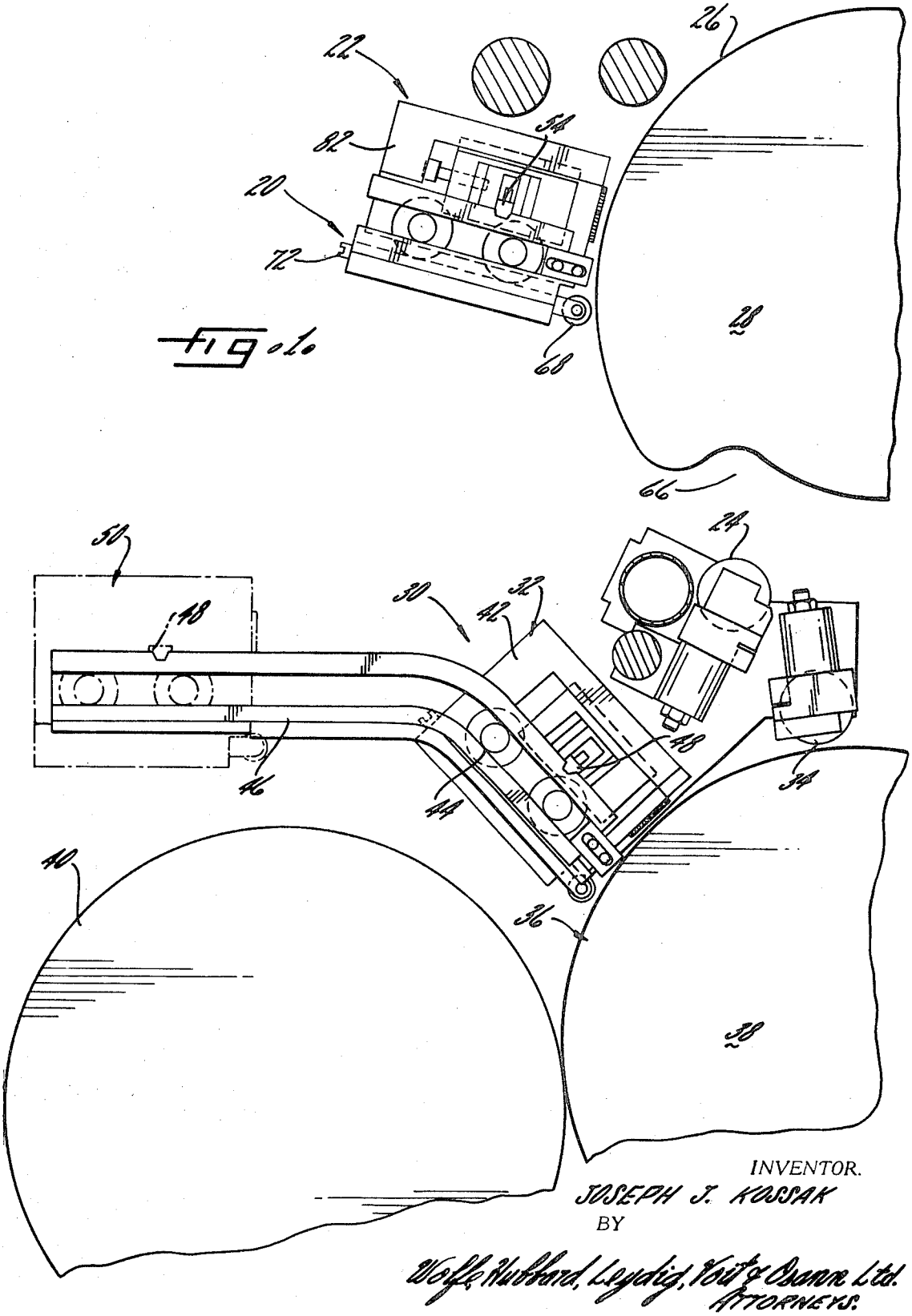


Fig. 1

INVENTOR.
JOSEPH J. KOSSAK
BY
Wolfe, Hubbard, Leydig, Voit & Osann Ltd.
ATTORNEYS.

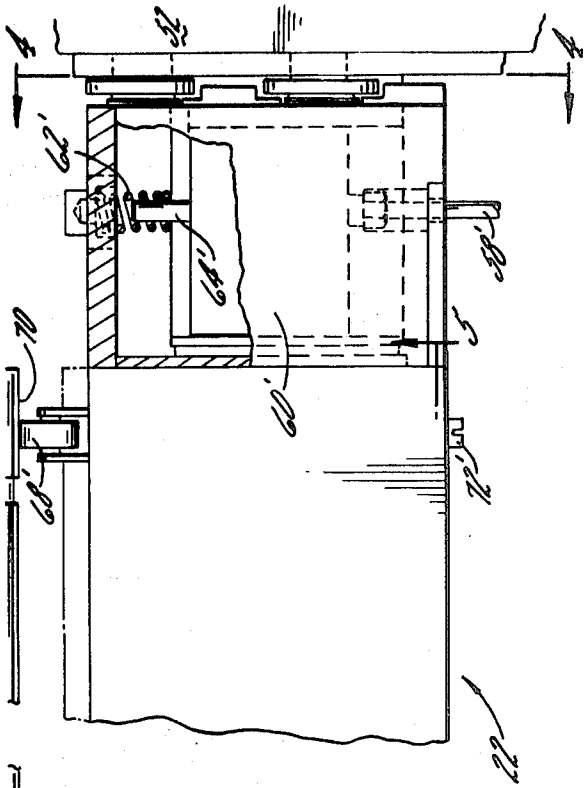


Fig. 1

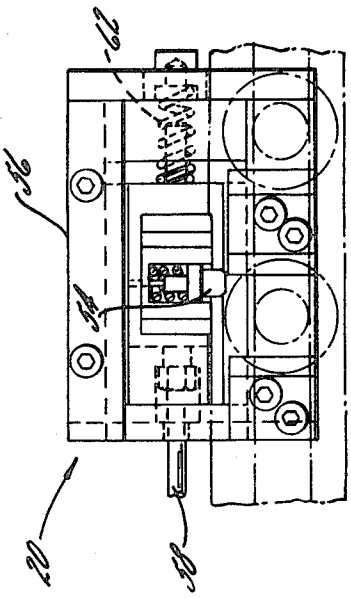


Fig. 4

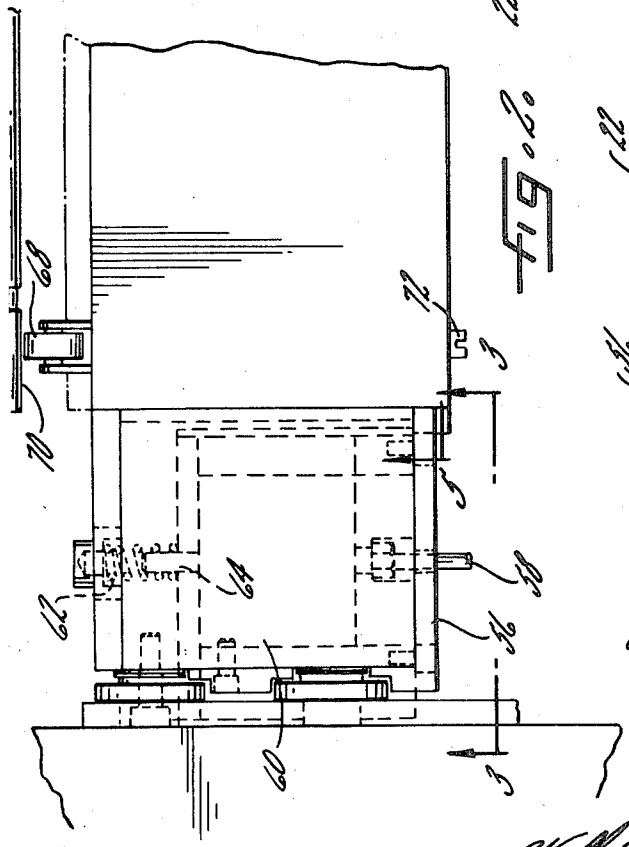


Fig. 2

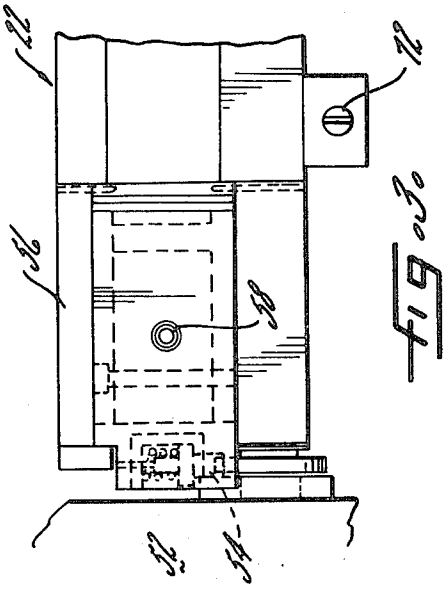


Fig. 3

INVENTOR.
JOSEPH J. KOSSAK
BY
Wolfe, Hubbard, Leydig, Voit & Osann Ltd.
ATTORNEYS.

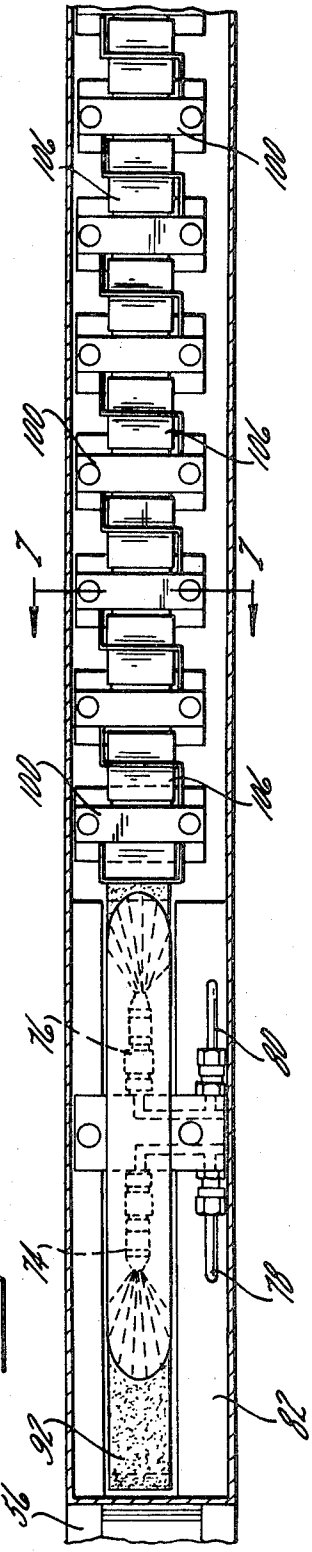


Fig. 5a.

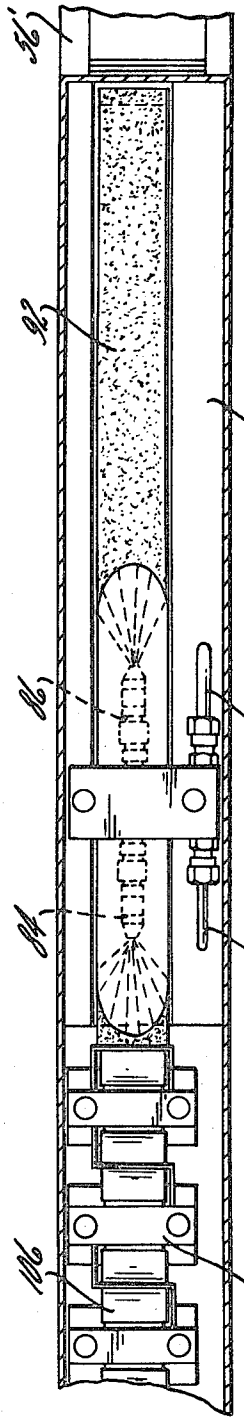


Fig. 5b.

INVENTOR.
JOSEPH J. KOSSAK
BY
Wolfe, Hubbard, Leydig, Voit & Osann, Ltd.
ATTORNEYS.

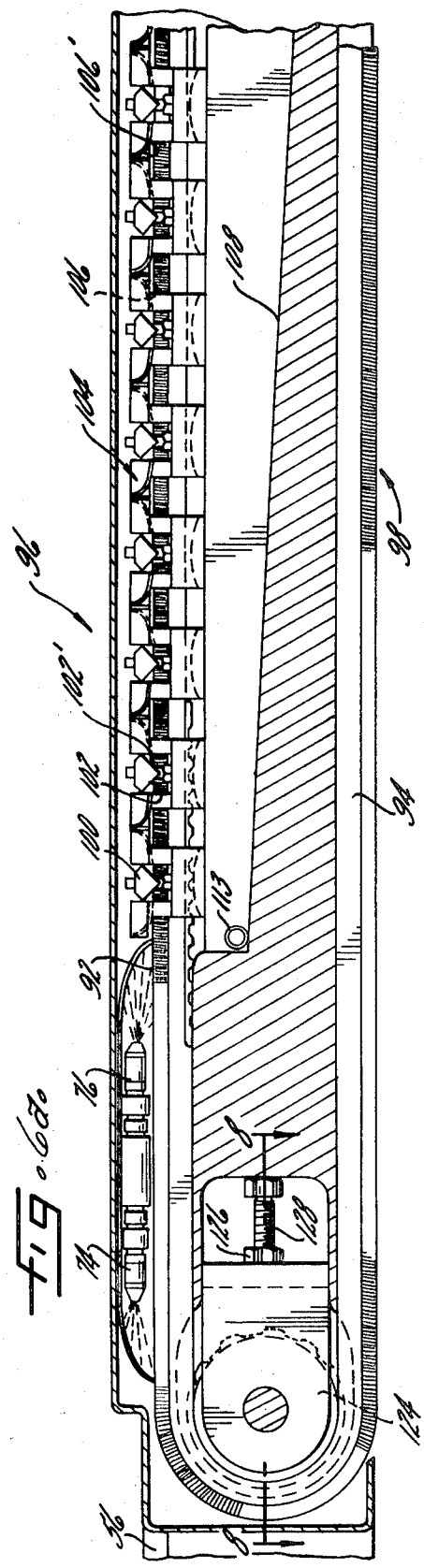


FIG. 6a

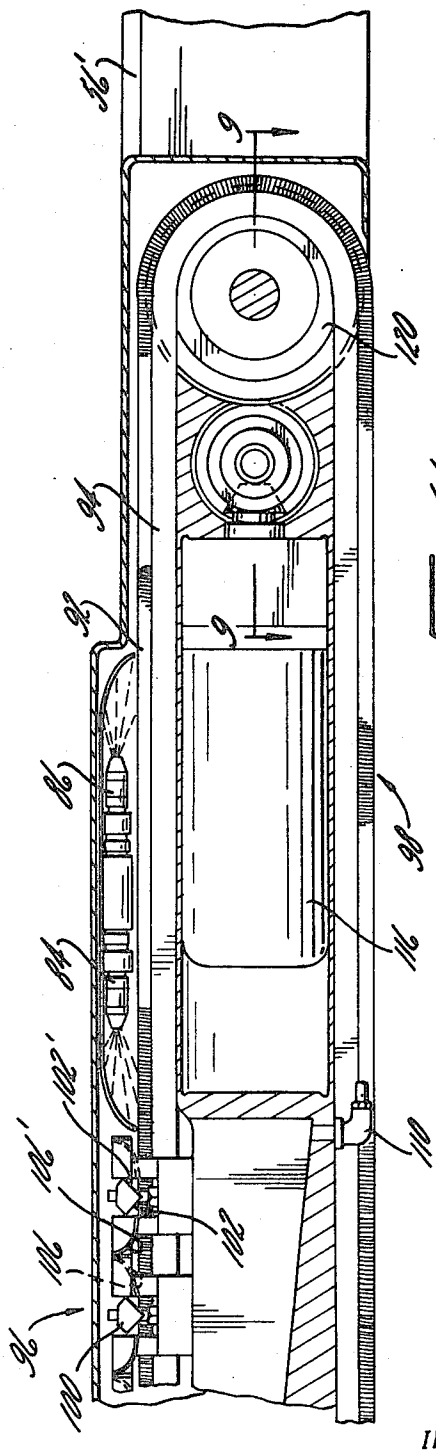


FIG. 6b

INVENTOR.
JOSEPH J. KOSSAK
BY
Wolfe, Hubbard, Leydig, Voit & Osann Ltd.
ATTORNEYS.

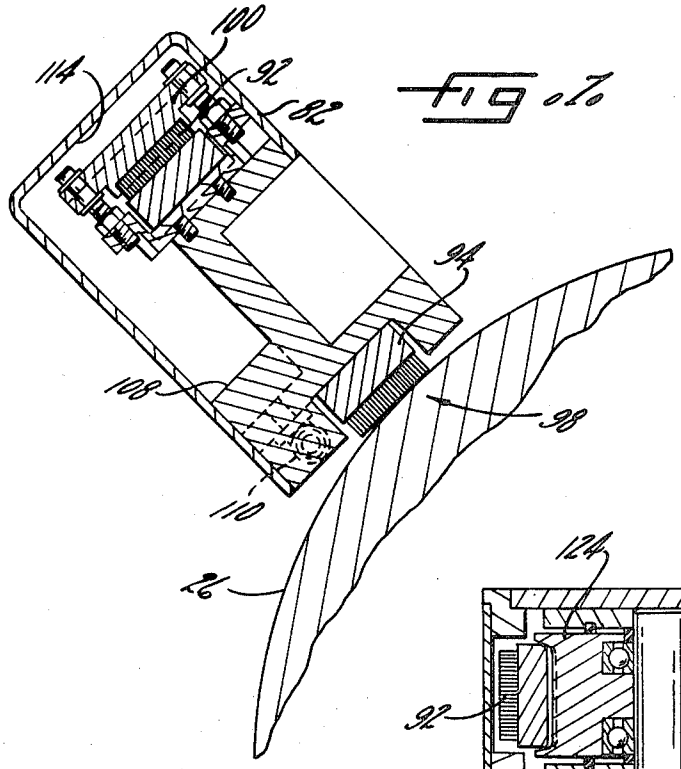


Fig. 7.

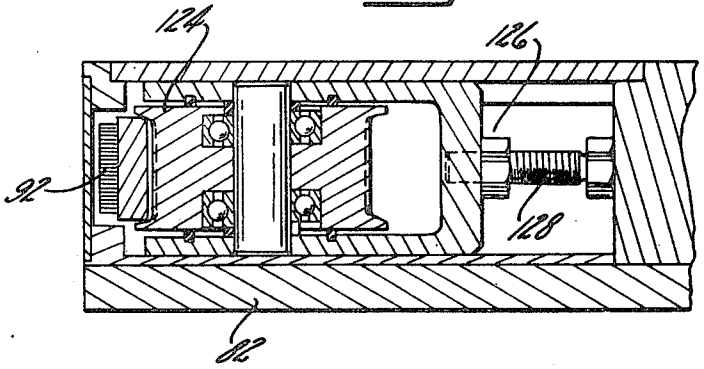


Fig. 8.

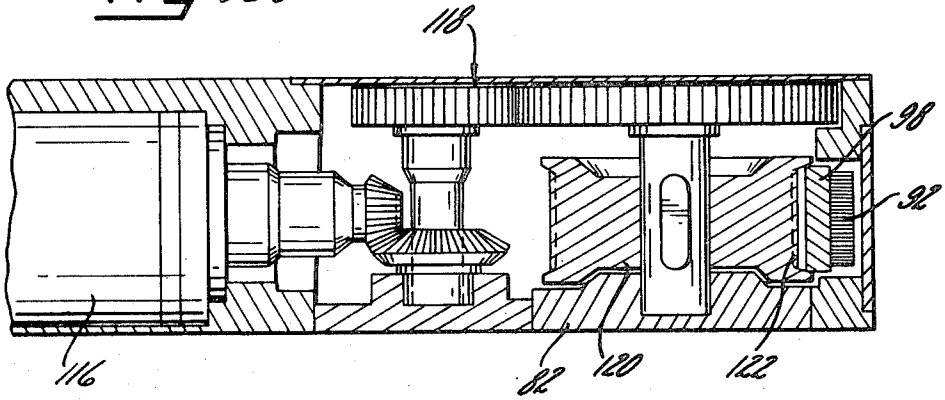


Fig. 9.

INVENTOR.
JOSEPH J. KOSSAK
BY
Wolfe, Hubbard, Leydig, Voit & Osann, Ltd.
ATTORNEYS.

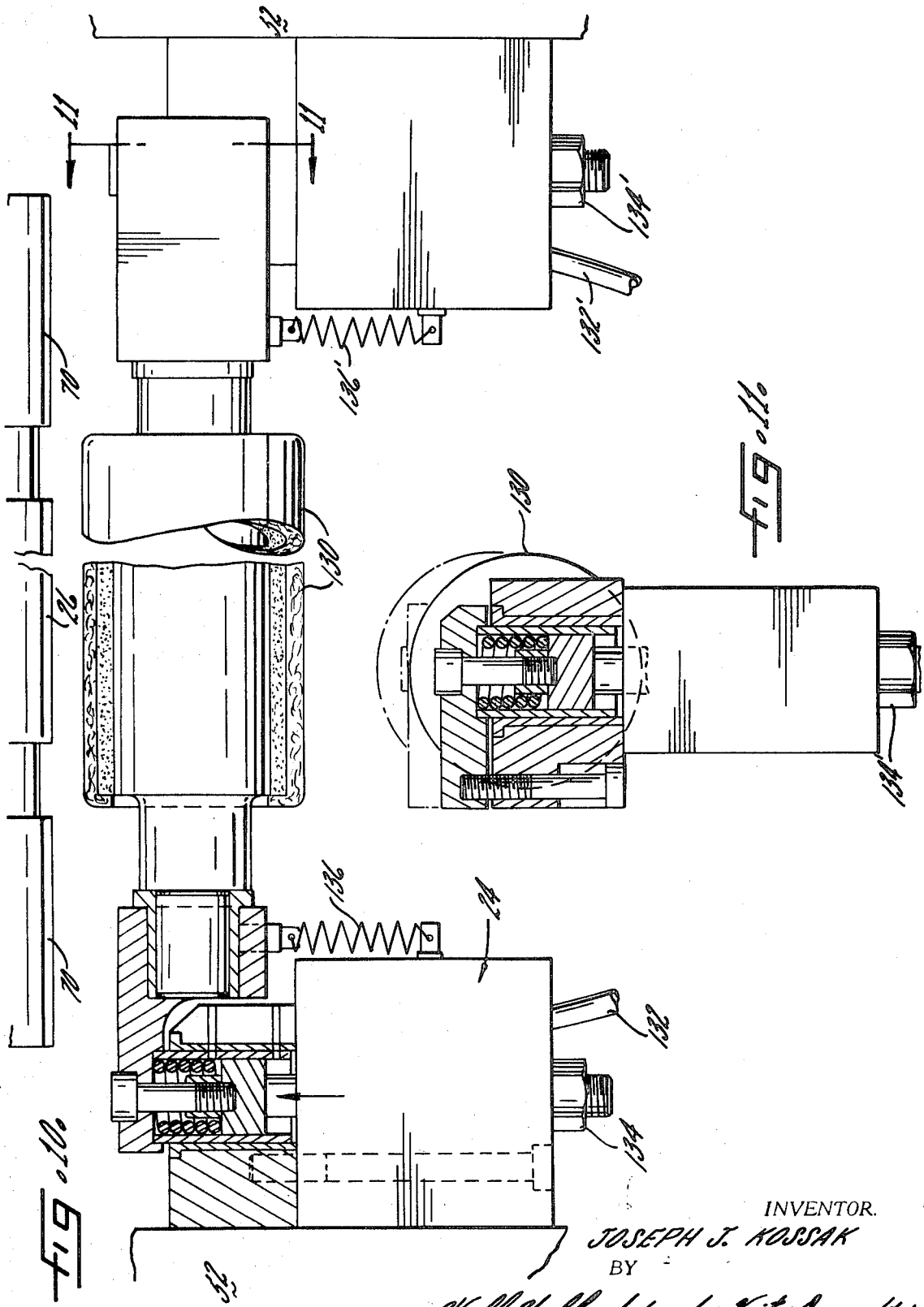


Fig. 10.

Fig. 11.

INVENTOR.
JOSEPH J. KOSSAK
BY
Wolfe, Hubbard, Leydig, Voit & Osann Ltd.
ATTORNEYS.

APPARATUS AND METHOD FOR CLEANING ROTATING CYLINDRICAL SURFACES

This invention relates to cleaning devices and, more particularly, to a method and means for cleaning rotating cylindrical surfaces such as, for example, the blankets of blanket cylinders on offset presses.

DUring printing on an offset press, the blankets on the blanket cylinders accumulate foreign matter such as dried ink and/or ink build-up, paper lint, clay coating, dirt and the like which must be removed to maintain the quality of printing. Obtaining register for printing during "make-ready" operations often requires the blankets to be washed a number of times. Also, during a specific run or job, these blankets must be washed at various times during the running of the job. Still further, the blankets must also be washed to remove the image when the job is complete.

Typically, this cleaning operation is carried out by hand. The pressman will generally apply any of several well-known conventional solvents by means of a cloth saturated with solvent to remove the ink and other foreign matter. This practice involves possible health hazards due to, among other things, possible physical contact with solvent which may be toxic. The resulting messy cloths, of course, have to be discarded; and this is a problem. In addition, on some types of presses the pressman in cleaning the blankets on the cylinders when the press is at a standstill must jog the press periodically so that the complete circumference of the cylinder can be washed. Other types of presses include a "creep speed," and the pressman typically cleans the blankets while the press is running at this speed. Both types of presses represent potential hazards to the pressman in cleaning the blankets.

A thorough cleaning operation of this type may take up to 10 minutes or more; and, depending upon the type of printing operation and the length of the run, an average of anywhere from about 5 to 10 and even more washes may be required per 8-hour operating shift. Because of the length of time involved in manually washing the blankets, the printing plates must be gummed to prevent oxidation from taking place. This loss of presstime constitutes a significant economic loss; consequently, it is not unusual for pressman to delay this cleaning operation until the quality is actually below an acceptable standard as opposed to when quality actually requires it.

However, to develop a satisfactory cleaning device, several substantial hurdles must be overcome. One significant problem is one of space. Several types of presses have only a minimal amount of space in and around the blanket cylinders so that any unit utilized must be compact. Further, because the pressman must carry out such functions as removing and replacing the blanket or offset plate or making other cylinder repairs or adjustments, the unit must either be sufficiently compact so that the pressman can have adequate access by working around the unit or the unit must be capable of being easily moved into and out of position. The problem is particularly acute in smaller offset presses such as two-color presses in which the blanket cylinders are often disposed above the other and in sufficiently close proximity that the spatial considerations must take into account the units for both blanket cylinders.

In addition to the spatial problem, any blanket washer apparatus must be capable of overcoming the fouling of the apparatus by the foreign matter that is being removed. Basically, the apparatus must be essentially self-cleaning so that it is capable of operating in a trouble-free manner for a long period of time.

Several types of blanket washers have been proposed in the past. Among these are the following: U.S. Pat. Nos. 3,049,997 to Grembecki et al., 3,089,415 to Grembecki et al., 3,309,993 to Grembecki et al. and 3,411,444 to Boneschi. While the blanket washers illustrated in these patents do provide certain desirable attributes, the structures disclosed do not provide desirable solutions to the spatial and other problems associated with developing a blanket washer for smaller presses.

It is accordingly an object of the present invention to provide a method and means for automatically cleaning rotating cylindrical surfaces to remove undesired foreign matter which is characterized by their compact construction.

Another object of the present invention is to provide an apparatus that is essentially self-cleaning. A related and more specific object is to provide a means for preventing the foreign matter removed from the surface from fouling the apparatus.

A still further object lies in the provision of apparatus of the above-described type wherein the flow of solvent for the cleaning operation may be variably controlled to achieve uniform cleaning.

Yet another object provides an apparatus which is highly reliable and capable of carrying out the cleaning cycle in minimum amount of time so as to allow increased machine production time.

Another object is to provide an apparatus for cleaning blanket surfaces which minimizes paper spoilage, achieves longer blanket life, obviates plate gumming and other operations.

A still further object provides a versatile apparatus that may be located at numerous different positions about the circumference of the surface being cleaned so as to maximize a pressman's working area.

Another object lies in the provision of a safe, reliable apparatus for automatically cleaning rotating cylindrical surfaces.

Other objects and advantages will become apparent as the following description proceeds, taken in conjunction with the accompanying drawings in which:

FIG. 1 is a side elevation view of one embodiment of the cleaning device of the present invention and showing, in the inoperative position, a tandem unit for cleaning the blankets of a two-color, sheet-fed offset printing press;

FIG. 2 is an end elevation view, partly broken away, and illustrating the means for moving the scrub means into and out of its operative position for cleaning the blanket cylinder (the operative position being shown in phantom);

FIGS. 3 and 4 are, respectively, cross-section views taken substantially along lines 3—3 and 4—4 of FIG. 2 and further illustrating the means for moving the scrub means into and out of its operative position;

FIGS. 5*a* and 5*b*, together, are a cross-section view taken substantially along lines 5—5 of FIG. 2 and showing the spray nozzles for applying water and solvent to the belt and the flicker bars for cleaning the bristles of the scrub means and the transfer surfaces which remove the foreign matter and prevent it from falling back on to the bristles;

FIGS. 6*a* and 6*b*, together, are a cross-sectional view taken substantially along lines 6—6 of FIGS. 5*a* and 5*b* and further showing the spray means, flicker bars and transfer surfaces as well as the drain for removing the foreign matter;

FIG. 7 is a cross-sectional view taken substantially along lines 7—7 of FIG. 5*a* and showing the scrub means in operative position;

FIG. 8 is a cross-sectional view taken substantially along lines 8—8 of FIG. 6*a* and illustrating the adjustable means for tensioning the endless belt of the scrub means;

FIG. 9 is a cross-sectional view taken substantially along lines 9—9 of FIG. 6*b* and showing the drive means for the endless belt;

FIG. 10 is a top plan view, partly broken away, of the means for drying the blanket surface; and

FIG. 11 is a cross-sectional view taken substantially along line 11—11 of FIG. 10 and further showing the means for moving the wiping roll into its operative position, which is shown in phantom.

While the invention is susceptible of various modifications and alternative constructions, there is shown in the drawings and will herein be described in detail the preferred embodiments. It is to be understood, however, that it is not intended to limit the invention to the specific forms disclosed, but, on the contrary, it is intended to cover all modifications and alternative constructions falling within the spirit and scope of the invention as expressed in the appended claims. For example, while the present invention may be advantageously used in connection with cleaning the blanket cylinders on sheet-fed offset presses and this will be the specific use described herein, it should be appreciated that the present invention is readily applicable to the cleaning of other rotating cylindrical surfaces. Further, while the present invention is desirably suited for use in a tandem relationship to clean the adjacent blanket cylinders in a two-color press, it should be readily appreciated that a single unit is also highly advantageous.

Briefly, the present invention provides a method and means for automatically removing undesired foreign matter from rotating cylindrical surfaces such as the blanket of a blanket cylinder by a scrubbing and wiping cycle involving only a minimum time. The surface is first cleaned by contacting with an endless belt having bristles thereon wet with solvent and/or water for the foreign matter. The solvent and/or water is added as desired during the scrubbing to accomplish the desired cleaning action. The direction of rotation of the endless belt may be reversed during the scrubbing operation to minimize the scrub cycle time. Means are provided to clean the bristles during each revolution and to carry away the foreign matter and solvent removed from the bristles. After the scrubbing has been completed, a wiper roller is moved into position; and the cycle is completed by wiping the surface dry.

Turning now to the drawings, there is shown one exemplary embodiment of the device of the present invention for cleaning the adjacent blanket surfaces of the blanket cylinders of a two-color, sheet-fed offset press. Thus, as is shown in FIG. 1, the cleaning device or assembly comprises a first unit **20** including a scrubbing unit **22** and drying unit **24** for cleaning the blanket surface, indicated at **26** of blanket cylinder **28.** A second unit **30** includes a scrubbing unit **32** and a drying unit **34** for cleaning the blanket surface, indicated at **36,** of the lower blanket cylinder **38.** Plate cylinder **40,** associated with the blanket cylinder **38,** is shown in fragmentary form. The construction and operation of the two units are identical, except for the withdrawal of the scrubbing unit for the bottom blanket which is described hereinafter. Accordingly, with this exception, only the structure of the first unit **20** will be described herein.

As can be seen from FIG. **1,** the blanket washer units are compact in construction and, restricted only by the press design, may be positioned adjacent the blanket and along its circumference at the point at which the pressman has the maximum room in which to service or replace the blanket of the top unit as required. In addition, and in accordance with one aspect of the present invention, the scrub unit for the lower unit is movably mounted so that it can be withdrawn to expose an area of the lower blanket cylinder adequate to allow the pressman to service the blanket and blanket cylinder as required. Thus, as is shown in FIG. **1,** scrub unit **32** for the lower blanket is mounted in a housing generally indicated at **42** and movably mounted on rolls **44,** set in track **46.** Stop lock **48** maintains the housing in its normal position; however, when it is desired to service the lower blanket **36,** stop lock **48** may be manually raised; and the scrub unit **32** withdrawn along the track **46** to the position shown in phantom and indicated at **50.**

FIGS. **2** through **4** illustrate the means for moving the scrubbing unit from its inoperative position shown in FIG. **1** into position in contact with the blanket of the blanket cylinder for cleaning the surface thereof. As shown, the scrubbing unit **22** is mounted to the press frame **52;** and, with stop locks **54** (one on each end) in position, the housing **56** is fixed in position. Each end of the scrub unit is provided with an inlet **58, 58'** for hydraulic fluid and includes a slidable member **60, 60'.** Springs **62, 62'** are positioned about extremities **64, 64'** of slidable members **60, 60',** respectively, and are partially compressed to maintain the slidable members in the inoperative position. Application of hydraulic fluid through lines **58, 58'** serves to cause slidable members **60, 60'** to function as hydraulic cylinders; and, when sufficient hydraulic pressure builds up, the effect of springs **62, 62'** is overcome and the slidable members **60, 60'** move toward the blanket cylinder; and the bristles on the endless belt (not shown) contact the blanket surface. Upon removal of the hydraulic pressure, the springs force the slidable members, the belt and bristles away and out of contact from the blanket surface and into the inoperative position.

The inward travel of the scrub unit must be restricted to prevent the unit from falling into the gap (shown at **66** in FIG. **1**) in the blanket cylinder and to provide the pressure of the bristles on the blanket surface to effect the desired scrubbing action. This may be accomplished, as seen in FIGS. **1** through **3,** by providing limit rolls **68** (one on each side and only one side being shown) that ride in contact with bearer surfaces **70.** Adjustable screw **72** allows variance of the extent of travel of the scrub unit as desired.

The endless belt in the scrub unit presents a scrubbing course which tangentially contacts the transverse dimension of the blanket and a return of preparation course. In the preparation course, a plurality of flicker bars are interposed to intercept the bristles as they proceed through the preparation course to cause the bris-

tles to flex and to remove the solvent and the foreign matter therefrom. Transfer surfaces are provided to receive the solvent and foreign matter and transport such away from the bristles. Desirably, the unit is symmetrically designed so that the endless belt may be moved in either direction. Thus, in accordance with the present invention, it has been found desirable to carry out the scrubbing action by moving the belt through the preparation course and then the scrubbing course in one direction for about half of the scrubbing cycle time, allowing the belt and bristles to momentarily recede to the inoperative position, reversing the direction of movement of the belt and thereafter moving the belt and bristles back into operative position to complete the last half of the scrubbing cycle. In this fashion, it has been found that a uniformity of cleaning across the width of the blanket surface is effected in a minimum amount of time.

As is shown in FIGS. 5*a* through 6*b*, spray nozzles **74, 76,** (FIG. 5*a*) fed through lines **78, 80** are located adjacent one end of housing **82,** and spray nozzles **84, 86** (FIG. 5*b*) fed through lines **88, 90,** respectively, are located at the other end of the housing. Desirably, one of the nozzles at each end will spray water while the other supplies a solvent. For example, for cleaning blanket surfaces, the solvent may suitably comprise a mixture of aliphatic hydrocarbons, napthas and ethylene glycol monoether. A variety of such solvents are commercially available.

In the illustrative embodiment, the spray of each of the nozzles is directed against a baffle to restrict the area of spray. Alternatively, nozzles with suitably restricted spray patterns are commercially available; and these could be used to spray directly on the bristles. Regardless of whether direct or indirect spray is used, bristles **92** of the endless belt **94** should be uniformly wetted as they proceed through the preparation course, indicated at **96,** and into the scrubbing course, indicated at **98.** Desirably, the endless belt comprises a one-piece molded construction and should be formed from a material that is chemically resistant to the solvents being used. The bristles may be attached to the belt by conventional tufting techniques. The bristle height (measured from the belt) may be, for example, from about three-eighths inch to one-half inch with medium full bristle density (as that term is used in the art). The bristles should also be, of course, chemically resistant to the solvents used, sufficiently pliable so that the surface being cleaned is not significantly damaged and yet should be sufficiently rigid so that, as will be hereinafter discussed in detail, they may be cleaned by flexing. The belt itself may have a width of about one to five-sixteenths inch.

Interposed between the nozzle pairs are a plurality of flicker bars and transfer means which clean the foreign matter and excess solvent from the bristles and remove the same from the area so there is little opportunity for the bristles to become fouled by the foreign matter. As shown, and in keeping with the present invention, the flicker bars and transfer means are symmetrically designed so that the bristles will be cleaned regardless of the direction in which the belt is moving. To this end, a plurality of flicker bars **100** are interposed to contact the bristles **92** of the endless belt and each includes two substantially flat inclined surfaces **102, 102'.** The flicker bars are positioned so that one of the surfaces **102, 102'** intercepts the bristles during passage of the belt through the preparation course in sequential fashion at angles and for distances sufficient to allow the individual bristles to flex so as to remove the foreign matter therefrom as the belt passes through the preparation course. Generally, the flicker bars should be positioned so that the bristles are in contact with the surfaces **102** or **102'** for about one-eighth inch. The flicker bars are desirably adjustable so that this contact distance can be increased or decreased as required. The included angle between the bristle as it first contacts the flicker bar surface and the surface itself can be varied with certain limits. While an angle of 45° has been found to be suitable, this may be varied from about 30° to 60°. As the angle decreases below 45°, it may be necessary to increase the contact distance to achieve the necessary flexing of the bristles.

A plurality of transfer means **104** are positioned between adjacent flicker bars to receive the foreign matter and solvent which is flicked off the bristles and to remove the same in such a fashion that the cleaned bristles do not become again contaminated or fouled by the removed foreign matter. In the exemplary embodiment, each transfer means includes surfaces **106, 106',** one of which, depending upon the direction of the movement of the belt, collects the excess solvent and foreign matter; and, in connection with the tilted position of the scrubbing unit **22** (FIG. 7) causes the matter to move across the width of the transfer surface and fall into a trough **108,** tapered to move the foreign matter towards a drain **110.** Fluid (from a source not shown) may enter through line **113** to aid in moving the foreign matter out through drain **110.** Also, it may be desirable to provide a water flow across the transfer surface to assist in transporting the foreign matter to the trough.

It should be appreciated that, while the means for effecting removal of the foreign matter comprises positioning the scrubbing unit such that the transfer surface is tilted towards the drain, this could be carried out by other means. Thus, the transfer surfaces themselves could be tilted to provide the same benefit.

It should be similarly appreciated that the back wall **114** (FIG. 7) of the housing **82** could serve as the transfer surface. In this event, the flicker bars are desirably contoured to assist in collecting the foreign matter and moving the same to the trough. It may be necessary to move the flicker bars closer together in this embodiment.

In the exemplary embodiment, a series of ten flicker bars and associated transfer means have been provided. However, it should be understood that, while this construction has been found desirable, a greater or lesser number may be used. The particular number selected will depend upon the width of the blanket cylinder (i.e., — the side of the press). Whether an adequate number of flicker bars are being used can be visually determined by inspecting the bristles to see if they are substantially free from foreign matter residue. Adjustability in the number of flicker bars can be achieved by replacing a transfer surface with a flicker bar or vice versa.

In accordance with a further aspect of the present invention, the drive means for the endless belt is positioned within the housing and the belt which significantly contributes to the compactness of the unit. Thus, as can be seen in FIGS. 6*a*, 6*b*, 8 and 9, the endless belt **98** is driven by a motor **116** through suitable gearing, shown generally at **118** which powers drive wheel **120.**

To achieve the necessary scrubbing action, the belt should be positively driven to avoid slippage. As shown, the endless belt **98** (FIG. **9**) has its surface provided with a series of cogs **122** so as to be positively driven by drive wheel **120.** A tension roll **124** is also provided, and the tightness of the belt may be suitably adjusted by changing the position of stop **126,** located on threaded member **128.**

Following removal of the ink and foreign matter by the cleaning action of the scrubbing unit, the surface is wiped dry. The wiping action may be achieved by maintaining an absorbent wiper roll against the blanket surface following completion of the scrubbing cycle. As shown in FIGS. **10** and **11,** a wiper roll **130** has adjacent each end hydraulic cylinders supplied through lines **132, 132'.** Introduction of hydraulic fluid moves the wiper roll from its inoperative position into contact with the blanket surface, the position being shown in phantom in FIG. **11.** Limit of travel is adjustably determined by stops **134,134'.** The wiper roll is frictionally driven upon contact with the surface of the blanket cylinder and may suitably comprise a layer of flannel beneath an outer absorbent layer, preferably an absorbent cotton material. After completion of the drying cycle, springs **136, 136'** function to withdraw the roll from the blanket surface to the inoperative position when the hydraulic pressure has been relieved.

It should be appreciated that the amount and frequency and type of solvents that are employed may differ depending upon the type of printing which has been done and the particular sequence of the blanket being cleaned. For example, the initial blanket cylinder in a typical paper printing job may have considerably more clay and anti-offset powder build-up so as to require more water than subsequent blankets. Also, the ink build-up on later blankets may be greater than the earlier blankets. Further, while it is generally desirable to employ separate nozzles so that water and an organic solvent can be separately sprayed, it should be appreciated that only a single nozzle need be used if a solvent is employed which will satisfactorily remove all types of the foreign matter which is being removed from the surface. With this background in mind, a typical cleaning cycle involves actuation of the hydraulic cylinders **60, 60'** to position the scrubbing unit **22** of the belt **94** in contact with the blanket surface with the positioning being effected by employing stops **68** (only one being shown). Typically, the solvent application is initiated so that the bristles will be wet before the blanket surface is contacted. Generally, when the blanket contains gum, clay or other water-soluble impurities, water will be initially applied prior to contact of the brush belt with the surface of the blanket, the exact amount of water employed being dependent upon the extent of the presence of water-soluble impurities.

Following the initial application of water, predetermined amounts of solvent are periodically applied until the blanket is cleaned. The amount of each application or "shot" should, at a minimum, be adequate to cover the normally dull surface of the blanket so as to give the surface a "wet" appearance (i.e., — a shiny appearance) yet not be so excessive as to cause any significant amount to run into the cylinder gap. Subsequent shots should be added at least before any significant amount of drying has occurred on the blanket. This can be visually determined since the shiny appearance begins to fade as drying occurs. To simplify operation, it is preferred to have the amount of solvent in subsequent shots be the same as the original application. However, if desired, the amount of the subsequent shot can be varied so long as significant amounts of solvent are not allowed to run into the gap.

After about half of the scrubbing cycle has been carried out, the hydraulic pressure is momentarily relieved; and springs **62, 62'** function to move the bristles and belt to the inoperative position. The drive motor is then reversed and solvent and water is again applied to the bristles so that they will be wet prior to contact with the blanket surface. It should be appreciated that if nozzles **74, 76** were being used during the first half of the cycle, nozzles **84, 86** would be employed for the last half. Hydraulic cylinders **60, 60'** are then again actuated to move the brush belt into position for completing the scrubbing cycle. Shots are continued until the completion of the cleaning of the surface which can be readily visually determined as by viewing the blanket. For most applications, it has been found generally suitable to apply from about four to 12 shots of solvents in amounts ranging from 1-½ to 5 ounces per shot over a period of from about 75 to 105 seconds. The specific amount of solvent applied, the number of applications, the spacings of the applications and the total scrubbing time will depend upon such factors as the size of the press and the type of printing job involved.

The wiper roll is then moved into its operative position by supplying hydraulic fluid to the cylinders through lines **132, 132',** and the blanket dried. The whole cleaning cycle can be carried out in about 2 to 2½ minutes.

Thus, as has been seen, the present invention provides a method and means for cleaning surfaces such as the blankets on offset presses in a quick, efficient and reliable manner. Easy accessibility for servicing the blanket cylinders is also provided, and the cleaning unit is essentially self-cleaning through the use of a plurality of flicker bars and transfer surfaces which allow the bristles to flex and remove the foreign matter with the transfer surfaces collecting and removing the foreign matter.

I claim as my invention:

1. An apparatus for cleaning a rotating cylindrical surface containing undesired foreign matter thereon comprising a scrub means including an endless belt having upstanding bristles across at least a portion of the belt width and presenting a scrubbing course for tangentially contacting the cylindrical surface across its transverse dimension and a preparation course for removing the foreign matter from, and applying solvent to, the bristles, said scrub means being mounted for movement relative to the cylindrical surface to be cleaned, drive means connected to said endless belt for moving the belt through the two courses in either direction, means connected to said scrub means for moving the scrub means into and out of a position operative to clean the cylindrical surface, means for supplying solvent for the foreign matter to the bristles adjacent each end of the preparation course, a plurality of flicker bars for cleaning the bristles located adjacent the preparation course and interposed between the areas at which solvent can be supplied to the bristles, each flicker bar presenting two substantially flat inclined surfaces and positioned such that one surface of each intercepts the bristles during passage of the belt through the preparation course in sequential fashion at angles and for dis-

tances sufficient to allow the individual bristles to flex so as to remove the foreign matter and solvent therefrom as the belt passes through the preparation course, transfer means located between the flicker bars for intercepting the foreign matter and solvent removed from the bristles and substantially preventing such matter from falling back onto the bristles, and drying means mounted adjacent said cylindrical surface for drying the surface which has been scrubbed.

2. The apparatus of claim 1 wherein said drying means includes a wiper roll having an absorbent surface mounted for movement relative to the cylindrical surface being cleaned, and means connected to said wiper roll for moving the roll into and out of contact with the surface being cleaned.

3. The apparatus of claim 2 wherein the wiper roll and the means for moving the roll are spatially disposed from the scrub means to allow access to the cylindrical surface therebetween.

4. The apparatus of claim 1 which includes stop means operatively associated with said scrub means for positioning the scrub means in operative contact with the surface being cleaned.

5. The apparatus of claim 1 which includes a drain trough positioned adjacent said transfer means to receive the foreign matter and solvent from the transfer means.

6. The apparatus of claim 5 wherein the scrub means is disposed relative to the surface being cleaned so that the foreign matter and solvent run transversely across the transfer means and drain into the drain trough.

7. The apparatus of claim 1 wherein the drive means positively drives the endless belt.

8. The apparatus of claim 1 which includes means for supplying water to the bristles adjacent each end of the preparation course.

9. The apparatus of claim 1 wherein the means for moving the scrub means into and out of the operative position includes spring means maintaining the scrub means out of the operative position and hydraulic means capable of moving the scrub means into its operative position.

10. The apparatus of claim 1 wherein the drive means for the endless belt is positioned between the belt courses.

11. An apparatus for cleaning a rotating cylindrical surface containing undesired foreign matter thereon, a scrub means including an endless belt having upstanding bristles across at least a portion of the belt width and the belt presenting a scrubbing course for tangentially contacting the cylindrical surface across its transverse dimension and a preparation course for removing the foreign matter from the bristles and applying solvent to the bristles, said scrub means being mounted for movement relative to the cylindrical surface to be cleaned, drive means connected to said endless belt for moving the belt through the two courses in either direction, means connected to said scrub means for moving the scrub means into and out of position to clean the surface, means for supplying solvent for the foreign matter to the bristles at the preparation course, a plurality of flicker bars for cleaning the bristles, each flicker bar presenting two substantially flat inclined surfaces and positioned such that movement of the belt through the preparation course sequentially contacts said bristles with one surface of each flicker bar at an angle and for a distance sufficient to allow the individual bristles to flex so as to remove foreign matter therefrom, and transfer means located between the flicker bars for intercepting the foreign matter removed from the bristles and preventing such matter from falling back on to the bristles.

12. In an offset press having a first blanket cylinder and a second blanket cylinder with the first being spatially disposed above the second, an apparatus for cleaning the blankets of the cylinders comprising a first unit for the first blanket cylinder including a scrub means comprising an endless belt having upstanding bristles across at least a portion of the belt width and the belt presenting a scrubbing course for tangentially contacting the blanket surface across its transverse dimension and a preparation course for removing the foreign matter from the bristles and applying solvent thereto, said scrub means being mounted for movement relative to said first blanket cylinder, drive means connected to said endless belt for moving the belt through the two courses in either direction, means connected to said scrub means for moving the scrub means into and out of a position operative to clean the blanket, means operatively associated with said endless belt for supplying solvent for the foreign matter to the bristles adjacent each end of the preparation course, a plurality of flicker bars for cleaning the bristles located at the preparation course and interposed between the areas at which solvent can be supplied to the bristles, each flicker bar presenting two substantially flat inclined surfaces and positioned such that one surface of each intercepts the bristles during passage of the belt through the preparation course in sequential fashion at angles and for distances sufficient to allow the individual bristles to flex so as to remove the foreign matter and solvent therefrom as the belt passes through the preparation course, transfer means located between the flicker bars for intercepting the foreign matter and solvent removed from the bristles and preventing such matter from falling back on to the bristles and means for drying the surface which has been scrubbed, the scrub means being adjacent the upper portion of the blanket cylinder and the means for drying the blanket being adjacent the bottom portion of the blanket cylinder and a second unit for the second blanket including a scrub means positioned adjacent the upper portion of the blanket and located below the scrub means for the first unit, said scrub means comprising an endless belt having upstanding bristles across at least a portion of the belt width and the belt presenting a scrubbing course for tangentially contacting the cylindrical surface across its transverse dimension and a preparation course for removing the foreign matter from the bristles and applying solvent to the bristles, said scrub means being mounted for movement relative to said second blanket cylinder, drive means connected to said endless belt for moving the belt through the two courses in either direction, means connected to said scrub means for moving the scrub means into and out of a position operative to clean the blanket, means operatively associated with said endless belt for supplying solvent for the foreign matter to the bristles adjacent each end of the preparation course, a plurality of flicker bars for cleaning the bristles located at the preparation course and interposed between the areas at which solvent can be supplied to the bristles, each flicker bar presenting two substantially flat inclined surfaces and positioned such that one surface of each

intercepts the bristles during passage of the belt through the preparation course in sequential fashion at angles and for distances sufficient to allow the individual bristles to flex so as to remove the foreign matter and solvent therefrom as the belt passes through the preparation course, transfer means located between the flicker bars for intercepting the foreign matter and solvent removed from the bristles and preventing such matter from falling back on to the bristles, and means for drying the blanket which has been scrubbed, the means being positioned adjacent the top of the second blanket and also adjacent the means for drying the first blanket.

13. The apparatus of claim **12** wherein the scrub means, drive means, means for moving the scrub means into and out of a position operative to clean the surface, means for supplying solvent to the bristles, the flicker bars and transfer means for the second unit are mounted in a common housing and which includes means connected to said common housing for guiding the housing away from the blanket a distance sufficient to allow access to the blanket.

14. A method for cleaning a rotating cylindrical surface containing undesired foreign matter thereon which comprises providing an endless belt with upstanding bristles across at least a portion of the belt width and presenting a scrubbing course for tangentially contacting the cylindrical surface across its transverse dimension and a preparation course for removing the foreign matter from the bristles and applying solvent thereto, moving the belt through its two courses, wetting the bristles with a predetermined amount of solvent for the foreign matter as the belt exits from its preparation course, moving the wetted bristles into contact with the surface to be cleaned as the bristles enter the scrubbing course for a predetermined time while applying additional amounts of solvent to the bristles, presenting a series of substantially flat inclined surfaces to contact the bristles as they enter into the preparation course at angles and for distances sufficient to allow the individual bristles to flex so as to remove the foreign matter and solvent therefrom, intercepting the foreign matter and solvent removed from the bristles so as to prevent the foreign matter from falling back on to the bristles, moving the bristles out of contact with the surface to be cleaned, reversing the direction of movement of the belt, wetting the bristles with predetermined amount of solvent as the bristles pass through the new exit of the preparation course, moving the wetted bristles into contact with the surface to be cleaned for a predetermined period of time while applying additional solvent at predetermined time intervals, presenting a second series of substantially flat inclined surfaces to contact the bristles at angles and for distances sufficient to allow the individual bristles to flex so as to remove the foreign matter and excess solvent therefrom, intercepting the foreign matter and solvent removed from the bristles so as to prevent the foreign matter from falling back on to the bristles, moving the bristles out of contact with the surface and drying the surface cleaned by the brush.

15. A method for cleaning a rotating cylindrical surface containing undesired foreign matter thereon, said method comprising the steps of

providing an endless belt having upstanding bristles across at least a portion of the belt width and presenting a scrubbing course for tangentially contacting the cylindrical surface and a preparation course for removing foreign matter from said bristles and applying solvent thereto;

moving the belt in a first direction through its two courses while flexing said bristles to remove foreign matter therefrom and wetting the bristles with a solvent for said foreign matter as the belt moves through its preparation course, and contacting the wetted bristles with the surface to be cleaned as the belt moves through its scrubbing course;

withdrawing said belt from contact with the surface to be cleaned;

moving the belt in the reverse direction while flexing said bristles to remove foreign matter therefrom and wetting the bristles with a solvent for said foreign matter as the belt moves through its preparation course, and contacting the wetted bristles with the surface to be cleaned as the belt moves through its scrubbing course;

withdrawing said belt from contact with the surface to be cleaned;

and drying the cleaned surface.

16. The method of claim **15** wherein the said belt is maintained in contact with the surface to be cleaned for about the same length of time both before and after the direction of movement of said belt is reversed.

17. The method of claim **15** wherein said belt is always wetted with said solvent after the flexing of said bristles to remove foreign matter therefrom, regardless of the direction of movement of said belt.

18. A method for cleaning a rotating cylindrical surface containing undesired foreign matter thereon, said method comprising the steps of

providing an endless belt having upstanding bristles across at least a portion of the belt width and presenting a scrubbing course for tangentially contacting the cylindrical surface and a preparation course for removing foreign matter from said bristles and applying solvent thereto;

moving the belt in a first direction through its two courses while presenting a series of substantially flat inclined surfaces to contact the bristles as they enter the preparation course at angles and for distances sufficient to allow the individual bristles to flex so as to remove foreign matter therefrom, wetting the bristles with a solvent for said foreign matter as the belt moves through its preparation course, and contacting the wetted bristles with the surface to be cleaned as the belt moves through its scrubbing course;

withdrawing said belt from contact with the surface to be cleaned,

and drying the cleaned surface.

19. The method of claim **18** which includes the step of intercepting the foreign matter removed from the bristles so as to prevent the foreign matter from falling back onto the bristles.

20. Apparatus for cleaning a rotating cylindrical surface containing undesired foreign matter thereon, said apparatus comprising the combination of an endless belt having upstanding bristles across at least a portion of the belt width and presenting a scrubbing course for tangentially contacting the cylindrical surface and a preparation course for removing foreign matter from said bristles and applying solvent thereto; reversible drive means connected to said belt for driving said belt in opposite directions through its two courses, flexing

means mounted adjacent the preparation course of said belt for flexing said bristles to remove foreign matter therefrom while said belt is moving in either direction through its preparation course; wetting means mounted adjacent the preparation course of said belt for wetting said bristles with a solvent for said foreign matter while said belt is moving in either direction through its preparation course; means connected to said belt for contacting the wetted bristles with the surface to be cleaned as said belt moves through its scrubbing course in a first direction; means connected to said belt for withdrawing said belt from contact with the surface to be cleaned, reversing the direction of said drive means to move said belt in the reverse direction past said flexing means and said wetting means, and then again contacting the wetted bristles with the surface to be cleaned as said belt moves through its scrubbing course in said reverse direction; and means mounted adjacent said cylindrical surface for drying the cleaned surface.

21. The apparatus of claim **20** wherein said wetting means includes solvent dispensing means located at both ends of said flexing means adjacent the preparation course of said belt for wetting the bristles of said belt after said bristles are flexed to remove foreign matter therefrom, regardless of the direction of movement of said belt.

22. The apparatus of claim **20** wherein said drying means includes a wiper roll having an absorbent surface mounted for movement relative to the cylindrical surface being cleaned, and means connected to said wiper roll for moving the roll into and out of contact with the surface being cleaned.

23. The apparatus of claim **20** wherein the means for contacting the wetted bristles with the surface to be cleaned includes stop means operatively associated with said belt for positioning said belt with said bristles in operative contact with the surface being cleaned.

24. The apparatus of claim **20** wherein said reversible drive means is mounted between the two courses of said belt.

25. The apparatus of claim **20** wherein said flexing means comprises a plurality of flicker bars each of which presents two substantially flat surfaces positioned such that movement of said belt through the preparation course in either direction sequentially contacts said bristles with one surface of each flicker bar at an angle and for a distance sufficient to allow the individual bristles to flex so as to remove foreign matter and solvent therefrom.

26. The apparatus of claim **25** which includes transfer means located between said flicker bars for intercepting the foreign matter and solvent removed from said bristles and substantially preventing said foreign matter and solvent from falling back onto said bristles.

27. Apparatus for cleaning a rotating cylindrical surface containing undesired foreign matter thereon, said apparatus comprising the combination of

an endless belt having upstanding bristles across at least a portion of the belt width and presenting a scrubbing course for tangentially contacting the cylindrical surface and a preparation course for removing foreign matter from said bristles and applying solvent thereto;

drive means connected to said belt for driving said belt through its two courses;

flexing means presenting a series of substantially flat inclined surfaces to contact the bristles as they enter the preparation course at angles and for distances sufficient to allow the individual bristles to flex so as to remove foreign matter therefrom;

wetting means mounted adjacent the preparation course of said belt for wetting said bristles with a solvent for said foreign matter while said belt is moving through its preparation course;

means connected to said belt for contacting the wetted bristles with the surface to be cleaned as said belt moves through its scrubbing course;

means connected to said belt for withdrawing said belt from contact with the surface to be cleaned; and

means mounted adjacent said cylindrical surface for drying the cleaned surface.

28. The apparatus of claim **27** which includes transfer means for intercepting the foreign matter removed from said bristles and substantially preventing such matter from falling back onto said bristles.

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