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BLANKET CLEANER FOR ROTARY DUPLICATING MACHINE

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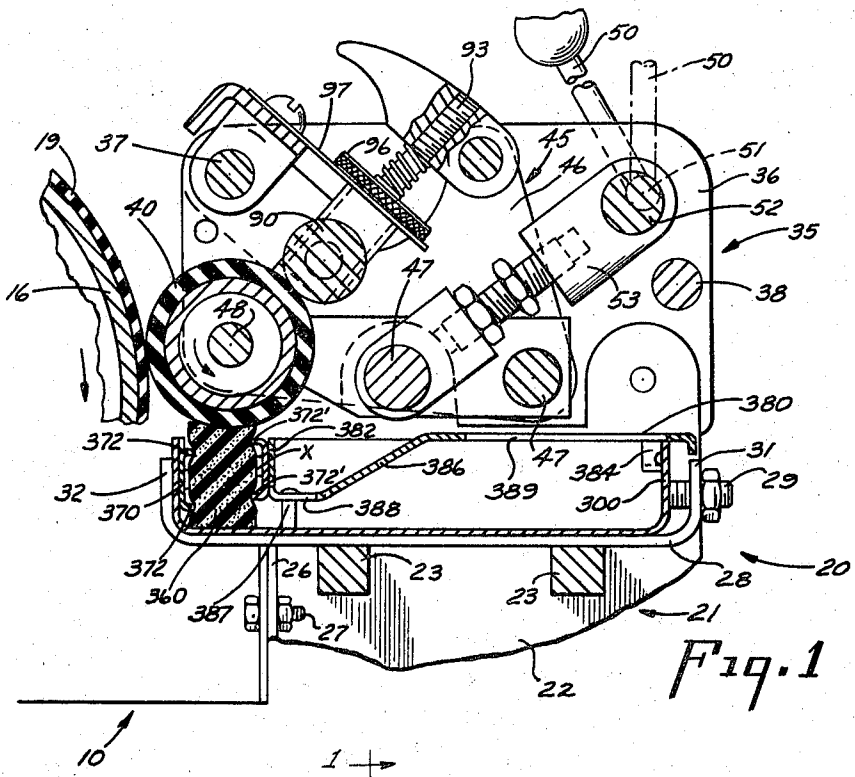


Fig. 1

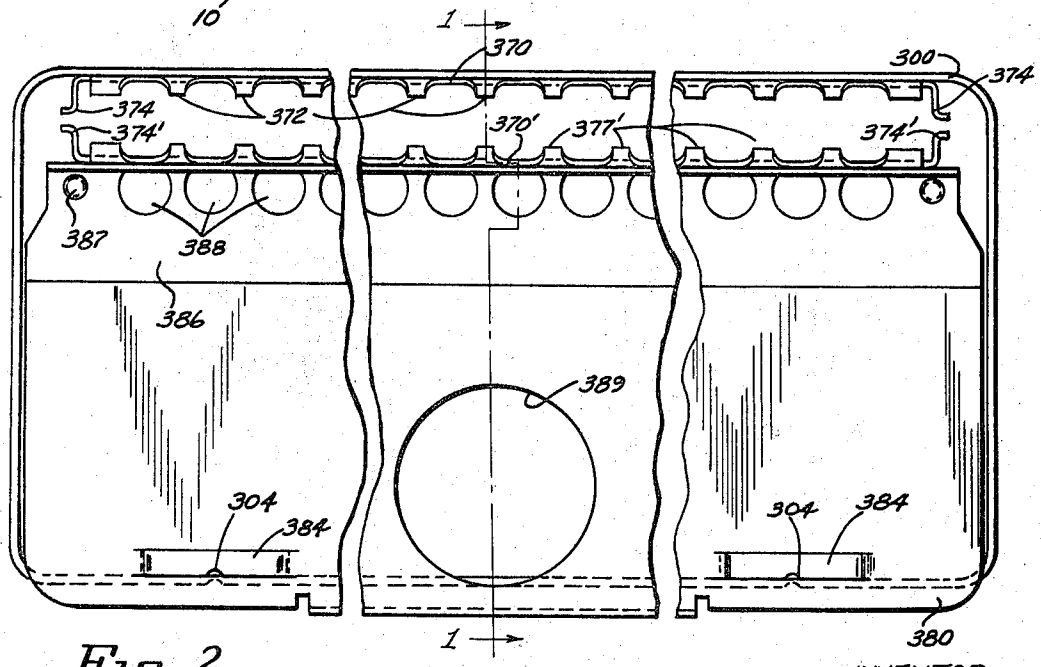


Fig. 2

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BLANKET CLEANER FOR ROTARY DUPLICATING MACHINE

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ABSTRACT OF THE DISCLOSURE

For use on a rotary offset duplicating machine, there is provided a blanket cleaner system of the type involving a reservoir of cleaning fluid, a cleaning roller for contact with the blanket cylinder, and a wiper or wick for feeding cleaning fluid up to the roller from the reservoir and wiping ink pigments from the roller surface. The wick is of improved configuration defining a short, direct, broad conducting path extending vertically between the body of cleaning fluid and the roller. The wick is of a special type of polyurethane sponge known as Scottfelt 3–900 and is releasably held in place for use and ready replacement by a removable cover on the reservoir whose edge carries jaw means cooperating with jaw means in the reservoir to grasp the wick therebetween and retain it against the tendency of the cleaning roller to dislodge it.

Background of the invention

The blanket cleaner of the present invention derives generally from that shown in the U.S. Reissue Patent to Janke et al., No. Re. 24,739 which operated quite effectively, but lacked the ability to come up to full operating efficiently as rapidly as desirable, was somewhat sensitive to the level of cleaning solution in the reservoir and would not continue effective without operator attention for as long periods as might be desired. The present invention has for its object, therefore, the provision of a blanket cleaning arrangement for a rotary offset duplicator which has even greater utility than that shown in the patent by reason of the reduction or elimination of these limitations.

Summary of the invention

It was discovered that by having a wick for cleaning fluid which is laterally broad, relatively short, and of the proper porosity, and which extends in a vertical direction between the fluid bath and the bottom of the cleaner roll, it is possible to cause the cleaner fluid to rise rapidly to the surface of the wick ready for use without delay. In addition, a wick thus configured avoids underlying supporting members which extend laterally of the roll axis, and hence provides for ready flow-off of the liquid with a cleaning action at the wick surface to discourage accumulation of pigment deposits. It was also discovered that with such an arrangement and with a wick of the proper porosity, the cleaning liquid level in the reservoir could become quite low without noticeably effecting the operation of the blanket cleaner. Moreover, it was also discovered that such a wick also provided within itself sufficient resiliency to provide resilient cleaning roller contact at all times so that an underlying resilient leaf spring support for the wick could be dispensed with.

Special ready release means for quick-changing of the wick were also devised for holding a wick of this novel configuration and consistency in such a way that it is not seriously compressed (which would change its porosity), but at the same time it is also reliably retained against

the dislodging forces exerted by the cleaning roller rotating rapidly in contact therewith.

Brief description of the drawing

FIG. 1 is a vertical transverse section of the improved blanket cleaner attached to a lithographic printing machine with portions only of the latter being shown, the section being taken substantially on line 1—1 of FIGURE 2;

FIG. 2 is a top plan of the reservoir for cleaning fluid shown in FIG. 1, with the wick removed.

Description of the preferred embodiment

In the drawings an offset printing machine of the lithographic type, well adapted for use as an office duplicator, is generally indicated as including a frame **10**. The printing machine includes an offset or transfer cylinder **16** rotatably journalled on the frame **10** and driven from a suitable source of power (not shown). As will be readily understood, an inked image is transferred by rolling contact from a printing plate to the offset surface of the transfer cylinder **16** and from there to the work sheet in the usual manner.

This invention is not concerned with the particular details of the printing or duplicating machine, accordingly the brief description above given should be found sufficient. However, it may be pointed out that the transfer surface of such a machine is generally provided by a relatively thin flexible blanket made of sheet rubber or other similar material. Such an offset or transfer blanket is indicated at **19** and is secured in position on the surface of the offset cylinder in any well known manner. The offset cylinder **16** generally is positioned so that the ink transfer surface of the transfer blanket is accessible for cleaning, either from the front or the rear of the machine. This is true in the machine illustrated.

The cleaning device, with which the present invention is particularly concerned, is generally indicated at **20**. As will be understood, many parts of the frame, such as side plates, are provided in pairs, one for each side of the machine. However, in a section such as FIG. 1 only one of such parts will appear. Accordingly where such paired parts are referred to hereinafter, only one being shown in the drawing, the reason will be clear, and the presence of the corresponding part on the other side of the machine will be understood, thereby obviating drawing views which would be superfluous to a comprehension of the invention. The cleaning device **20**, therefore, comprises a main frame unit **21** including a pair of end plates **22** spaced apart by suitable cross frame members such as the bars **23**. The end plates **22** are each flanged outward to provide vertically extending flanges **26** which receive suitable bolts **27** for readily attaching and aligning the cleaner to the frame **10** of the rotary printing or duplicating machine. The bars **23** of the frame unit **21** carry a pair of brackets **28** which removably support an elongate receptacle or pan **300** adapted to contain a supply of cleaning fluid such as an ink solvent. Screws **29**, carried by upturned ends **31** of the brackets **28**, clamp the receptacle **300** against upturned ends **32** at the opposite ends of the brackets.

A second frame unit **35** is removably mounted on the main frame **21** by ready release mounting means for giving access to the top of the receptacle **300**. This mounting means is not shown since it forms no part of the present invention.

A cleaner roll **40**, which removes ink from the surface of the offset blanket carried by the transfer cyinder **16**, is supported by the second frame unit **35** for movement to and from the surface to be cleaned. As shown, the roll **40** is mounted in a supplemental frame **45** which includes

a pair of end plates **46** spaced apart by suitable cross frame members such as rods **47**. The supplemental frame **45** is pivotally mounted on a rod **37** of the second frame unit, which rod passes through the upper ends of the supplemental frame plates **46**. The cleaner roll **40** is mounted on a rod **48**, the ends of which are secured to the supplemental frame plate **46**. The rod **48** is parallel with and spaced below the pivot rod **37**. When the cleaner is in position on a printing machine, it is so positioned that that the rod **48** is parallel with the axis of the offset or transfer cylinder **16**. The arrangement is such that the swinging of the supplemental frame **45** about the axis of the rod **37** moves the cleaner roll **40** into and out of rolling contact with the surface of the offset blanket **19** carried by the cylinder **16**.

The supplemental frame **45** may be swung to move the roll **40** into or out of peripheral contact with the surface to be cleaned at the will of the operator by means of a manually operable lever or handle **50**. As shown in FIG. 1, the lever **50** is secured to the outer end of a rod **51**, the ends of which are journaled in the frame plates **36** of the second frame unit **35**. The mid-portion **52** of the rod **50** is eccentric relatively to its end portions and is interconnected by an extensible link **53** with one of the cross frame rods **47** of the supplemental frame unit **45**. Any suitable means may be provided to limit either the throw of the lever **50** or the swinging movement of the frame **45**. The arrangement is such that as the lever **50** is moved from solid line to broken line position, the cleaner roll **40** will be moved from a position in contact with the blanket to an idle position, and vice versa.

The cleaner roll **40** is mounted for rotation and axial movement on the rod **48**, the latter being provided by any conventional oscillating mechanism (which, being unrelated to the invention, is not shown). The roll **40** is provided with a surface formed of rubber or rubber-like material and is of a hardness of from thirty to sixty as measured by a Shore A Durometer and preferably from three to six tenths that of the hardness of the offset blanket with which it is used to enable this roll to be both frictionally driven by the offset surface of the transfer roll **16** and effectively remove ink therefrom.

Ink remaining on the offset blanket **16** is softened by a film of ink solvent carried by the cleaner roll and is transferred to the cleaner roll **40** as the latter is driven by its frictional contact with such blanket. Such ink is removed from the roll **40** by a solvent charged wiper **360**.

The amount of solvent remaining on the surface of the roll **40** after it passes the wiper **360** is controlled by a metal roll **90** which is urged against the surface of roll **40** by leaf spring **97**. The force with which the roll **90** is held against the surface of roll **40** controls the amount of solvent, and can be adjusted by the spring force adjusting means **93**, **96** which forms no part of the preesnt invention.

As shown in FIG. 1 of the drawings, the wiper **360** is an elongate member extending along the margin of the pan **300** parallel to and directly beneath the cleaner roll **40** and is of continuous uninterrupted rectangular cross section of nearly equal dimensions in height and width so that there is a broad vertical conducting path for the cleaning liquid to pass upwardly through the wiper. As an example of suitable dimensions for the wiper or wick **360** when cooperating with a cleaner roll **40** of about 1¼ inches in diameter, a cross section which is uninterrupted, i.e. without hiatus or substantial reentrant surface, and whose height is about ¾ inch and whose width is about ⅝ inch proves very effective. Under most circumstances a width dimension of at least ⅜ inch would be needed to form a fluid conduit adequate for the purposes of the present invention. This property of the wiper or wick may be referred to as a "bulky" cross section, and when this designation is used hereinafter, the foregoing significance will attach to it.

The material of the wiper has special properties and consists in its preferred form of a product known commercially as Scottfelt. This is prepared from an intermediate in the form of an expanded, tough, flexible resin which in normal relaxed condition may be considered as an open sponge with connecting cells, or an open latticework of joined strands, whose share of volume occupied by solids is perhaps 10 percent or less. This lattice is placed under heat and pressure and drastically compressed, e.g. to about one third or less of its original volume so that it still retains a uniform connected-cell condition throughout, but the cells and passages are much reduced in size. The resulting product provides a resilient, porous, spongy body of great toughness and wear resistance, which is still easily compressible, and whose porosity and passage size are both closely controlled and highly uniform througout. Material conforming to the foregoing description can be conveniently and accurately referred to as a "compressed lattice of resilient resin," and when this expression is used hereinafter, material generally in accordance with the foreoing description will be understood as defined thereby.

The particular form of this material which is presently preferred for use as a wiper is known as Scottfelt 3–900. This is a polyurethane foam which in a previous expanded form comprised about 90 pores to the lineal inch, and which has been compressed to one third of its original volume. This compression is normally applied to a sheet of expanded material in a single direction normal to the surface of the sheet, and the wiper of the present invention is preferably made by cutting from such a sheet in a manner such that its vertical dimension is parallel to the direction in which the sheet was compressed, i.e. normal to the sheet surface. This gives the optimum upward feeding action for the cleaning liquid in addition to providing the degree of resilience needed to maintain the proper wiping force on the roll as will subsequently appear.

Several unexpected benefits flow from the substitution of the wiper **360** of the material and configuration above described for that shown in the Janke et al. patent, and these may be briefly enumerated as follows:

(1) The cleaning liquid rises almost instantaneously through the wiper or wick so that when the pan **300** is first filled with liquid after a shut down period, there is no delay before the cleaning device becomes operative.

(2) The porosity of the wick is such that a significant flow of cleaning liquid can be maintained upwardly through the wick during cleaning operation, whereby the top surface of the wick presents what amounts to a shallow pool of cleaning liquid in which the roller **40** runs, and the lateral motion imparted to this liquid by the roller, returns it to the pan **300** with an effective washing action which aids very significantly in preventing or delaying accumulation of ink solids at the wiping surface, which would require operator intervention to remove them. Moreover, it is noted that the open cell structure of this wick lends itself to return flow characteristics which allow any of insoluble material dispersed in the cleaning liquid to flow back, in part, through the wick and out through its lateral faces into the cleaning liquid reservoir.

(3) The erect, vertical column, position of the wick provides adequate downward access to the pan **300**, so that the pigment-laden cleaning liquid can be displaced rapidly from the wick surface by the roller action, and can be returned directly to the pan with no tendency to be trapped and held by the wick or its supporting means.

(4) Although pigment solids are returned to the cleaning liquid supply pan to mix with the body of cleaning fluid, they are separated out by the natural settling action in the receptacle so that the wick returns substantially clear liquid to its upper surface. This action will continue for extended periods unless excessive quantities of solids are permitted to accumulate in the pan **300** in which case, of course, a tendency to clog the pores of the wick may be noted. However, normally full day periods of running and refilling without any special attempt

to remove ink residue sludge from the pan and without noticeable wick clogging have proved quite usual. In general all that is needed to keep the device operative is the wiping of pigment deposits from the upper wick surface once or twice during a day of constant use, with a removal and complete flushing and wringing of the wick in clean fluid every three or four days.

(5) The wick has a strong, relatively permanent, vertical resiliency such that it is able not only to perform the function of conducting liquid from the receptacle **300** to the surface of the roll **40**, but is also able to supply its own in-built spring action to maintain the upper surface of the wick in continuous firm contact with the roll surface.

Special holding means are provided for the new form of wiper or wick **360**. It is important, for example, to have the wick firmly held in place, because the material of which it is made, especially in the case of polyurethane sponge, exhibits a rather strong frictional dragging action with respect to the surface of roll **40**. This holding of the wick against this drag, however, while extremely firm, must also be such that it does not significantly squeeze or compress the wick so as to defeat its liquid conducting properties, and the means which do the holding must be so arranged as to prevent minimum interference with the return flow of the liquid.

These conflicting requirements are admirably met by the present arrangement which provides opposed jaws with a large number of sharp-edged projections or snags which indent the surface of the wick slightly at many points and have the combined effect of holding it firmly in place. By "snags" is meant projections, such as those shown at **372** and **372'**, which retain the wick by catching in the material of the same while exerting only very nominal lateral compression on the readily compressible wick body.

The specific manner in which this principle is worked out is shown in the drawing wherein can be seen a strip **370** welded to the inside surface of the wall of the receptacle **300** adjacent the wick position. This strip is crenellated to form a large number of sharp-edged teeth **372** extending horizontally. The reservoir contents is protected by a removable cover **380** which has a vertical wall **382** adjacent the wick position. To this wall is welded a strip **370'** precisely like that attached to the reservoir wall and having corresponding snags **372'**.

The replacing of a wick, when this is required, is accomplished in a very simple manner by merely removing the cover **380** from the reservoir, removing the used wick **360**, placing a new wick **360** in position against the snags **372**, and then replacing the cover. The design is such that there is virtually no lateral compression of the wick **360** when the parts are in operative position and the snags **372** and **372'** are long enough to dig well into the material of the wick. In the preferred arrangement, the spacing between the inner surfaces of the strips **370** and **370'**, in correlation with length of the snags **372** and **372'** is adjusted so that, as the wick is lightly compressed by the tips of the snags in installed position, its side surfaces are slightly out of contact with the strips **370** and **370'** as indicated at X. This permits instantaneous gravity flowback of the ink-charged cleaning liquid to the reservoir through the lateral surfaces of the wick which promotes a highly efficient cleaning action and helps avoid deposits of solid material around the cleaning area.

The resilience of the novel wick material, however, plays an additional part in that it aids in holding the cover in assembled condition. Cover retention means is provided in the form of lanced, depressed loops **384** arranged to hook beneath projections **304** formed in a wall of the receptacle **300** opposite the wick position when the cover is fully to the right as seen in FIG. 1. In order to change this condition, as in removing or replacing the cover, it is necessary to move the cover to the left slightly against the resilience of the wick far enough to permit the loops **384** to clear the projections **304**.

To make a conveniently operable device, the strips **370** and **370'** have formed at each end fingers **374** and **374'** respectively which act as stops against leftward movement of the cover and thus prevent an incautious operator from compressing the wick excessively so that the cover could drop into the reservoir instead of properly overhanging the right hand edge as shown. The fingers also act as centering devices to guide a replacement wick into proper endwise location as it is being placed against the snags **372**.

The cover **380** is also preferably so shaped as to provide a well portion **386** into which the cleaning liquid is swept by the action of roll **40** when it is rotating. The bottom of the well portion has a plurality of openings **388** for returning the liquid to the bath in the receptacle **300**. Two feet **387** are attached to the well section to locate the left hand margin of the cover at the proper elevation so that the cleaning liquid will have ready access to the bottom of the wick **360**, and the snags **372'** will be at a level to cooperate effectively with snags **372** and properly retain the wick. A filler opening **389** may be provided in the cover **380** if desired.

The operation of the device can best be visualized in relation to FIG. 1, wherein it can be seen that whenever the roll **40** is in cleaning contact with the blanket cylinder **16**, its motion will cause it to continually pick up cleaning liquid from the surface of the wick **360**. This will be doctored to the appropriate film thickness by roller **90** and then applied to the blanket surface.

This same motion of the roll **40** tends to sweep excess cleaning liquid from the top of the wick with a consequent washing action on the wick surface helping to keep it clean and free from the deposits of ink solids which tend to collect as they are wiped by the wick from the surface of cleaner roll **40**.

As liquid is removed from the surface of wick **360**, it is instantaneously replaced by liquid raised by capillarity through the pores and passages of the wick, the latter being uniform and precisely designed to feed the proper amount of liquid at the proper rate as heretofore described.

Liquid swept from the surface of the wick, or doctored from the roll **40**, is returned by gravity to the well portion **386** of the cover, and drains through openings **388** back to the bath of liquid maintained in the receptacle **300**. By settling action and by the filtering action of the wick, the ink solids are essentially removed and virtually clear liquid is returned to the surface of the wick for use by the roller.

While preferred embodiments of the invention have been described and illustrated, it is to be understood that these are capable of variation and modification. Accordingly, the aim in the appended claims is to cover all such variations and modifications as may fall within the true spirit of the invention.

What is claimed is:

1. In a device for cleaning ink from a cylinder of a printing machine:

frame means for mounting on the printing machine adjacent the cylinder;

a cleaning roll rotatably supported by the frame means in position for cleaning contact with the cylinder;

a receptacle for cleaning liquid mounted on the frame means beneath the cleaning roll; and

a wick extending lengthwise of the cleaning roll having a lower portion within the receptacle and an upper portion in wiping contact with the roll; said wick having a bulky cross section which is broad and continuous in a horizontal direction and being so shaped as to form a short, substantially vertical conducting path, relatively broad transversely of the roll, and with a broad upper surface pressing against the roll for conducting liquid from the receptacle to the roll, and being made of a compressed lattice of resilient resin.

2. A cleaning device as set forth in claim 1 in which the wick is of polyurethane material identified as originally having had approximately 90 pores per inch and which has been compressed to about one third its normal size in the direction of the height of the wick.

3. A cleaning device as set forth in claim 1 in which there is provided holding means for the wick including two opposed rows of closely spaced snags engaging opposite upright faces of the wick and extending therealong, the spacing of the rows being such as to retain the wick between them with negligible compression of the wick.

4. A cleaning device as set forth in claim 3 in which there are means supporting the snags at either lateral face of the wick, and in which the supporting means are spaced from the wick surface so that the wick is supported solely by the snags and its lateral faces are exposed for liquid flow.

5. A cleaning device as set forth in claim 3 in which the cleaning liquid receptacle has a removable cover and in which one of the rows of snags is secured to the inner surface of the receptacle and the other is formed on an edge of the removable cover.

6. A cleaning device as set forth in claim 5 in which cooperating means are provided on the receptacle and

cover for holding the cover closed and in proper position to grip the wick between its snags and those on the receptacle in a readily releasable manner.

7. A cleaning device as set forth in claim 6 in which the cover and means for holding the same closed are so arranged that the release and retention of the cover depend upon lateral shifting thereof towards and away from the wick, and wherein the body of wick itself provides the resilience for controlling the lateral motion.

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