

[54] **DEVICES FOR CLEANING WIPING CYLINDERS IN A PRINTING APPARATUS**

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[57] **ABSTRACT**

A device for cleaning a rotatable wiping cylinder of a printing apparatus comprises a receptacle for cleaning fluid adapted to operatively receive a portion of the periphery of the wiping cylinder, and a scraper mounted for movement between a first position in which it engages the periphery of the wiping cylinder and a second position in which it is spaced from the periphery of the wiping cylinder. A plurality of scrapers and a brush are provided downstream of the scraper in the direction of rotation of the wiping cylinder for engaging the periphery of the wiping cylinder.

8 Claims, 2 Drawing Figures

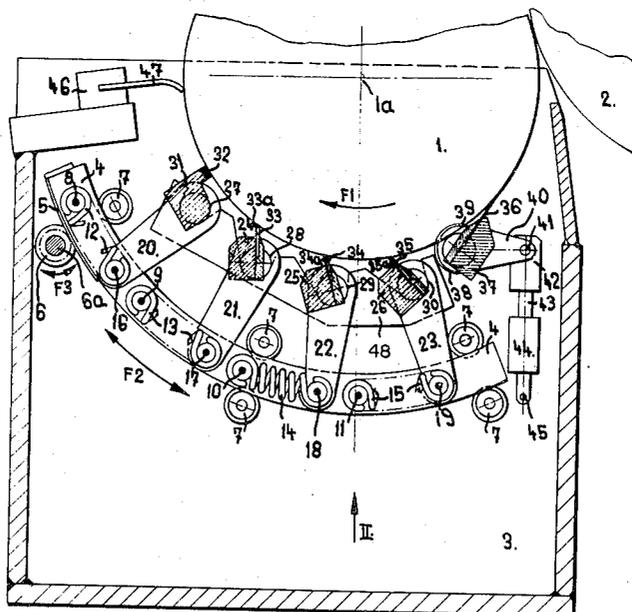
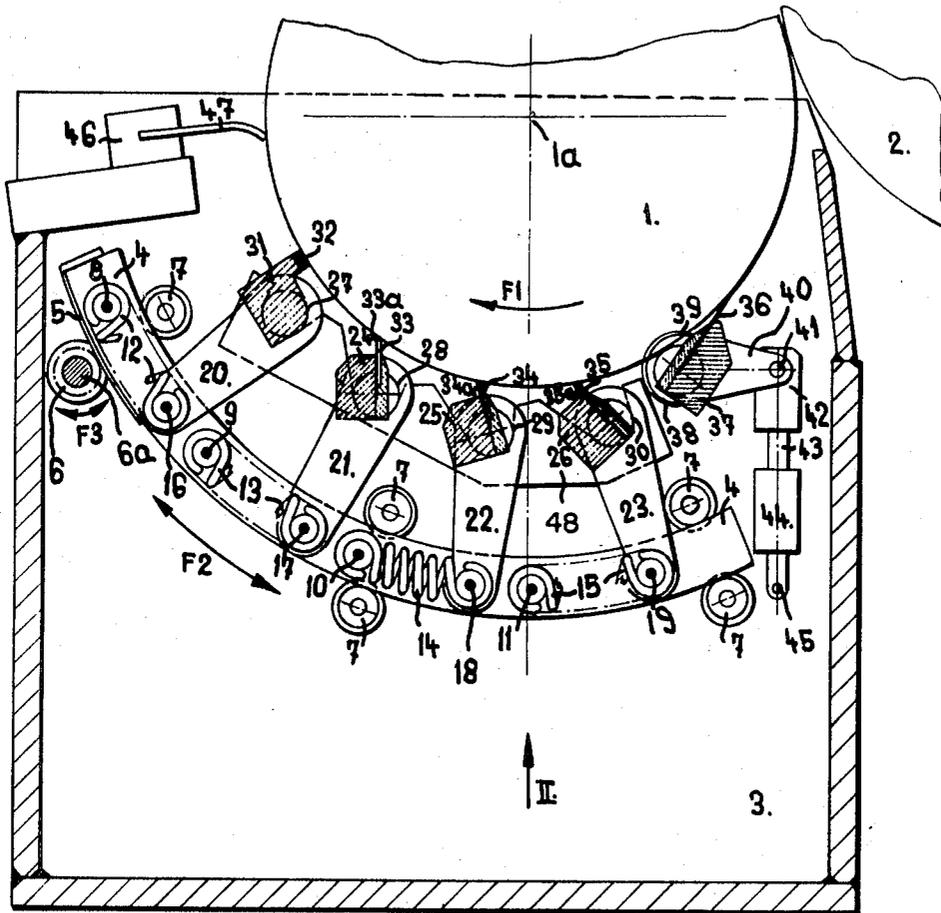


Fig.1



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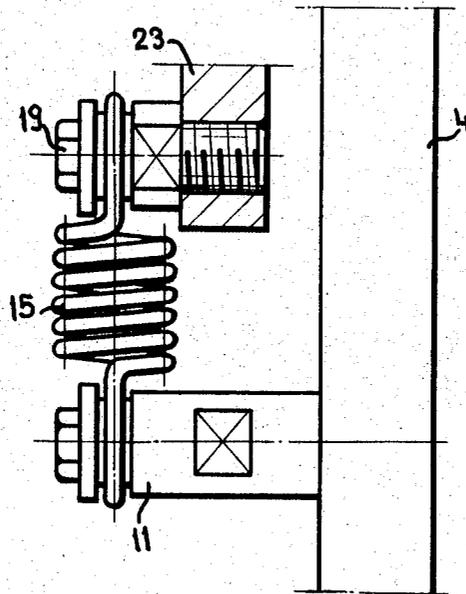


Fig. 2

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DEVICES FOR CLEANING WIPING CYLINDERS IN A PRINTING APPARATUS

BACKGROUND OF THE INVENTION

The present invention relates to printing apparatus, and in particular to devices for cleaning rotatable wiping cylinders of printing apparatus for copper-plate printing in at least one color.

Printing apparatus is known comprising at least one revolving brush applied at a predetermined point to the wiping cylinder within the damping zone, a scraper placed downstream of the damping zone, in the direction of the rotation of the wiping cylinder and downstream of the scraper, a system of nozzles, spraying water onto the surface of the wiping cylinder, as well as a supplementary scraper to remove the film of water from the surface of the wiping cylinder. This known apparatus permits the use of an aqueous solution which includes an alkaline washing ingredient, a cleaning agent well known in the trade, with a base of alkaline phosphate and a wetting agent. As a result, the expensive organic solvent, trichlorethylene which was used in a practically exclusive manner in printing apparatus before the disclosure of this known apparatus, is not now required. With this known apparatus, the revolving brushes, combine with the action of the cleaning liquids, to eliminate the total volume of ink on the wiping cylinder with the result that the brushes rapidly become clogged up, and wear out so that they must often be renewed. In addition, the support, driving the rotating brushes employed up to the present time, and the replacement of the said brushes leads to a complicated assembly and maintenance of this device.

Another disadvantage with revolving brushes results from the fact that the bristles, because of their relatively high speed, break down the ink lifted off the wiping cylinder, into small particles thereby creating a constant, severe turbulence of the cleaning liquid, in such a way that after a short working period the cleaning liquid is saturated with small particles of ink disposed in constant suspension and agitation. It is, therefore, necessary to replace the cleaning liquid frequently. However, it is thought that the fragmentation of the ink, caused by the turning brushes, producing fine particles, is better in order to obtain a good cleaning action, as it then produces a very quick dispersion. It is true to say, that this problem is not evident when trichlorethylene is used as, in this case, a rapid physical dispersion of the ink is produced.

Moreover, in the known apparatus, the scraper which takes off the greater part of the ink on the rim of the wiping cylinder, before the damping zone, is very strongly pressed against the wiping cylinder and there is a risk than when the wiping cylinder closes to rotate, that the edge of the scraper will penetrate the cylinder surface, which is usually made of synthetic material, and make the cylinder unusable.

OBJECTS OF THE INVENTION

The invention is based on this problem; to remedy the aforementioned drawbacks, inherent with a scraper statically mounted in front of the damping zone of the wiping cylinder, and to provide a simple device which is more economical than those of cleaning systems fitted with rotating brushes, and which at the same time benefits from advantages which are brought about by the use of a first scraper, mounted upstream in the direction of the rotation of the wiping cylinder relative to cleaning means which scraper mechanically takes off the greater part of the ink on the periphery of the cylinder. At the same time a preferred embodiment of the invention minimizes the too fine dispersion of the ink volume in the cleaning liquid which can, as a result, be used for a longer time without being replaced.

According to the present invention, a device for cleaning a rotatable wiping cylinder of a printing apparatus comprises a receptacle for cleaning fluid, and a scraper mounted for movement between first and second positions, the device being so arranged that when operatively combined with the wiping

cylinder, the receptacle receives a portion of the wiping cylinder, and the scraper engages the periphery of the wiping cylinder when in its first position and is spaced from the wiping cylinder when in its second position.

The scraper, which may be made from sheet steel, may be placed before or within the damping zone of the wiping cylinder. It removes the ink from the wiping cylinder in large shavings like swarf, and because of its position in, for example, the damping zone, the cleaning fluid in the receptacle serves as a complementary lubricant and cooling fluid. When the volume of ink so removed remains in one piece, i.e., a shaving, it sinks rapidly to the bottom of the receptacle, without substantially effecting the next cleaning process, such that, if brushes are used, these only become dirty very slowly. In addition, there is no need to install cleaning devices other than static cleaning means in the receptacle, which cleaning means are easily detachable and, preferably interchangeable.

DESCRIPTION OF DRAWINGS

An embodiment of the invention will now be described, by way of example, reference being made to the accompanying drawings in which:

FIG. 1 is a partly sectional side elevation of a device for cleaning a rotatable wiping cylinder of a printing apparatus; and

FIG. 2 is an enlarged detail of FIG. 1.

DESCRIPTION OF PREFERRED EMBODIMENT:

As shown, a wiping cylinder 1 of a printing apparatus for copper-plate printing in one or several colours is rotatable about position 1a in a sense indicated by arrow F1, and contacts at its periphery the periphery of a plate cylinder 2 provided with a printing plate. The lower portion of the periphery of wiping cylinder 1 is received in a receptacle 3 filled with a known aqueous alkaline cleaning liquid.

Adjacent the two opposed side walls of receptacle 3, facing the sides of wiping cylinder 1, two elongated, arcuate rails 4 (only one shown) are co-axially positioned with respect to wiping cylinder 1, and mounted on guide means in the form of guide rollers 7. Rollers 7 are rotatably mounted on the opposed side walls to permit the rails 4 to slide along an arcuate path substantially co-axial with the wiping cylinder 1. Each rail 4 has attached to its left hand end, as seen in FIG. 1, a rack rail 5 having gear teeth which co-operate with the teeth of a pinion 6 mounted on an operating shaft 6a.

A plurality of spiral springs 12 to 15 are each attached at one end to a rail 4 by means of pins 8 to 11. At its opposite end, each spring 12 to 15 is pivotally connected by means of a pin 16 to 19 to an operating arm 20 to 23. As shown, the springs are arranged to lay generally in the lengthwise direction of the rail. Each operating arm 20 to 23 is connected adjacent one end, to a support shaft 27 to 30 arranged parallel to the rotational axis of the wiping cylinder 1. Each support shaft is mounted at each end in a semi-circular groove in a support plate 48, the groove being open in the direction facing the periphery of the wiping cylinder. The support plates 48 (only one shown) are fixed to the opposed side walls of receptacle 3.

Scraper support members 24 to 26 are mounted on shafts 28 to 30 respectively. The scrapers are each made of rubber 33 to 35 mounted on a stiffening plate of sheet steel or iron 33a to 35a.

A brush support 31 fitted with a brush 32 is mounted on shaft 27. The bristle head of brush 32 is detachable, for example, by means of a screw, and is fitted to support 31 so that the bristle head can be replaced without dismantling support 31 or the shaft 27.

The scrapers 33 to 35 and brush 32 extend over the full width of the periphery of wiping cylinder 1 and bear against the periphery at a predetermined pressure. The pressure at which the scrapers 33 to 35 and brush 32 engage the periphery is adjustable by slidably moving the rails 4.

To reduce the pressure of engagement of the scrapers 24 to 26 and brush 32 on the periphery, a screw mechanism (not shown) is turned outside the receptacle 3, rotation of which turns shaft 6a and pinion 6 which engages the gear teeth of ratchet rails 5 to move rails 4 in a counter-clockwise sense (as seen in FIG. 1). By means of pins 16 to 19, springs 12 to 15, pins 16 to 19, and operating 20 to 23, the support shafts 27 to 30 are rotated in a counter-clockwise sense taking with them support members 24 to 26 and 31, so that scrapers 33 to 35 and brush 32 are moved away from the periphery of the wiper cylinder 1.

Movement of the shaft 6a in the opposite direction of rotation will have the reverse effect and scrapers 33 to 35 and brush 32 will move towards the periphery of the wiper cylinder.

As operating arms 20 to 23 are connected to rails 4 by springs 12 to 15, these springs exert a tightening down pressure and consequently the scrapers 33 to 35 and brush 32 having a spring and flexible contact with the wiping cylinder.

As is shown in FIG. 1, scrapers 33 to 35, in their working positions, form different acute angles with the periphery of the wiping cylinders 1.

As the wiping cylinder 1 rotates, it first comes into contact with a scraper 36, made from sheet steel, the support member 37 of which is connected to a shaft 38 rotatably mounted in bearings 39. An operating arm 40 is attached at each end to shaft 38, and each arm 40 is pivotally mounted on pin 40 on a head 42 of a hydraulic piston 43 of a piston and cylinder device 44 mounted for pivotal movement about pivot 45. Two hydraulic devices (only one shown) able to be driven simultaneously, are so arranged for the rotation of shaft 38 on the two sides of the receptacle. In the working position, piston 43 is raised in such a way that scraper 36 is pressed against the wiping cylinder 1, at a given pressure. This scraper 36 is, as shown in FIG. 1, at least practically tangential to the wiping cylinder and forms an acute angle with the periphery of the latter. To lift the scraper 36 off the periphery of the wiping cylinder 1 when the cylinder 1 is not working, it is only necessary that the piston 43 is retracted or moved to its lower position, by means of a conventional electro-hydraulic relay (not shown). Lowering the piston 43 causes shaft 38 and, scraper 36 to be rotated in a clockwise direction. The operating relay on the hydraulic adjusting device can also be coupled with an electric circuit for driving the wiping cylinder 1 and the printing machine, in such a way that when the wiping cylinder stops rotating, an automatic control for the piston 43 intervenes to lift off the scraper 36 and, when the wiping cylinder 1 is again rotated scraper 36 is moved to engage the periphery position. In this way when the wiping cylinder 1 is stopped, scraper 36, is prevented from exerting a pressure and penetrating into the material from which the wiping cylinder 1 is made.

A flexible scraper 47 fixed to a support 46, and made, for example, of polytetrafluorethylene ("TEFLON" registered Trademark), is in contact with the periphery of the wiping cylinder 1 emerging from the receptacle 3 so as to remove the film of liquid on the periphery of the cylinder.

In the above described embodiment, the first scraper 36 enables practically the total amount of ink to be lifted from the surface of the wiping cylinder 1, this volume of ink being thus peeled off in large shavings and quickly falling to the bottom of the receptacle 3. The other rubber scrapers 33 to 35, as well as brush 32 which follows them, then ensure a final cleaning of the wiping cylinder to remove the residue of ink. After the removal of the liquid film by scraper 47, a sprinkling of water on the surface of the wiping cylinder 1 may be provided, whereafter the film of water can be removed by another scraper, or by a felt wiper. Jets may be used to dampen the wiping cylinder 1 above receptacle 3 with the new cleaning solution, in which case it is not necessary that the wiping cylinder 1 is immersed in a bath of liquid contained in the receptacle 3.

When the first scraper 36 is disposed before the damping zone, the ink removed by this scraper can be collected in a

reservoir, this practice increasing the economy for monochrome printing where the ink is not mixed with several colours.

Modifications can be made to the above described embodiment. For example, the choice of the number and of the angular positions of the scrapers and brushes can be varied. Also the use of a brush can be omitted and the work carried out only with scrapers.

The succession of supports for scrapers and brushes on the shafts, a simple mounting of the said shafts and, similarly, the simple fixation of the operating arms by means of spiral springs on guide rails 4, enables an easy exchange of the scrapers and brushes and permits, according to these, the replacement of a scraper by a brush and vice versa.

What is claimed is:

1. In a printing apparatus having a rotatable wiping cylinder and a receptacle for cleaning fluid, the receptacle being arranged to receive a portion of the periphery of the wiping cylinder, an improvement which comprises a scraper mounted for movement between a first position for engaging the periphery of the wiping cylinder and a second position in which it is spaced from the periphery of the wiping cylinder, a plurality of secondary scrapers arranged downstream of the main scraper in the direction of rotation of the wiping cylinder, the secondary scrapers being spaced from each other and engaging the periphery of the wiping cylinder, means being provided whereby the pressure with which each of said secondary scrapers engages the periphery of the wiping cylinder is adjustable by altering the angular position of each scraper with respect to the periphery of the wiping cylinder, and wherein a support assembly is provided for the secondary scrapers, the support assembly including a plurality of support members on which the respective secondary scrapers are mounted, a plurality of support shafts connected one each to said support members, a plurality of operating arms connected one each to the support shafts and being mounted in the receptacle, an elongated arcuate rail arranged co-axially with the wiping cylinder and having each said operating arm resiliently coupled thereto, means mounting the rail for slidable movement in an arcuate path substantially co-axial with the wiping cylinder, for adjusting the pressure with which the secondary scrapers engage the periphery of the wiping cylinder.

2. A printing apparatus as claimed in claim 1 in which two said support assemblies are provided one adjacent each side surface of the wiping cylinder, and including an operating shaft connected between said two support assemblies for controlling said sliding movement of the rails.

3. A printing apparatus as claimed in claim 2, further comprising a pinion mounted on said operating shaft, and in which gear teeth are provided on each rail for co-operating with said pinion mounted on the operating shaft.

4. A printing apparatus as claimed in claim 1, further comprising a plurality of spiral springs interconnected between said respective operating arms of the support assembly and said elongated rail, the springs being arranged generally in the lengthwise direction of the rail.

5. A printing apparatus as claimed in claim 1, wherein support plates are provided having semicircular grooves open in the direction facing the periphery of the wiping cylinder, the support shafts being supported in said grooves of said support plates.

6. A printing apparatus as claimed in claim 1, in which means are provided for inter-changeably mounting a brush-holder and a scraper support downstream of the secondary scrapers in the direction of the wiping cylinder.

7. A printing apparatus as claimed in claim 1, wherein a flexible scraper engages the periphery of the wiping cylinder downstream of the secondary scrapers in the direction of rotation of the wiping cylinder.

8. In a printing apparatus having a rotatable wiping cylinder and a receptacle for cleaning fluid, the receptacle being arranged to receive a portion of the periphery of the wiping

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cylinder, an improvement which comprises a scraper, means for mounting said scraper for movement between a first position for engaging the periphery of the wiping cylinder and a second position in which it is spaced from the periphery of the wiping cylinder, a plurality of interchangeable secondary scraper means and brush means arranged downstream of the main scraper in the direction of rotation of the wiping cylinder, the secondary scraper means and brush means being spaced from each other and engaging the periphery of the wiping cylinder, means for individually supporting and mounting each of said scraper means and said brush means for pivotal

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movement about respective axes spaced from one another, means for rotating said scraper means and said brush means about their respective axes including a single member, means for coupling each of said supporting means to said single member at locations spaced from the said respective axes, means for mounting the said single member for sliding movement to simultaneously pivot each said scraper means and said brush means about their respective axes to thereby alter the pressure exerted on said wiping cylinder by said scraper means, and means for adjustably moving said single member.

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