DAMPENING DEVICE FOR A PRINTING PRESS

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ABSTRACT

A dampening device applies moisture to the plate cylinder of a printing press by means of a dampening roll in engagement with the cylinder. Dampering fluid is supplied to the dampening roll via a transfer chain including a transfer roll in engagement with the dampening roll and driven with the same circumferential speed as the plate cylinder, a moisture-transmitting intermediate roll in engagement with the transfer roll and a fountain roll in engagement with the intermediate roll and taking up dampening fluid from a fountain basin. The intermediate roll is positively driven with a circumferential speed different from that of the fountain roll which may be driven by the power drive of the press or an independent drive. Such speed differential between the two rolls reduces the extent of the slippage between the same and permits an accurate control of the slippage thereby improving the uniformity of the flow of dampening fluid to the dampening roll.

13 Claims, 5 Drawing Figures
DAMPENING DEVICE FOR A PRINTING PRESS

The invention relates to a dampening device for a lithographic printing press and more particularly to a dampening device of the kind in which at least one dampening roll is in engagement with the plate cylinder of the press and dampening fluid is transferred to this roll via a transfer roll such as a distributing roll driven at the circumferential speed of the plate cylinder and, in turn, supplied with moisture by a fountain roll dipping into a fountain basin and driven at a variable speed.

BACKGROUND

It is essential for satisfactory functioning of dampening devices of the general kind above referred to in which during operation all rolls are in continuous engagement that a uniform layer of dampening fluid is already supplied to the roll which is the first one in the fluid transfer chain driven at the circumferential speed of the plate cylinder.

Published German Pat. application No. 1,051,289 describes a dampening device of the general kind above referred to but the device as disclosed in the German patent application does not satisfy the above pointed out basic requirement. Control of the layer of dampening fluid is effected by a squeezing roll movable into coaction with the fountain roll of the device. Such an arrangement as the sole control step has been found to be insufficient. Additional steps such as a change in the setting of coating rollers effecting the printing cannot be accurately supervised as to their efficiency. Metering of the moisture is dependent to a large extent on the type of material used for the sleeves covering the rolls and the roughness of this material or in other words, depends strongly on the wettability of the rolls.

Another disadvantage of the dampening device according to the German patent application is that the circumferential speed of the fountain roll depends on the quantity of moisture to be dipped out of the fountain basin. The circumferential speed of the fountain roll in practice, rather small but the circumferential speed of the transfer roll which is in direct contact with the fountain roll, depends upon the operational speed of the press itself and this is generally very high. Accordingly, the slippage between the fountain roll and the transfer roll is bound to be also high which is very unfavorable for a satisfactory control of the feed of dampening fluid.

THE INVENTION

It is a broad object of the invention to provide a novel and improved dampening device of the general kind above referred to which avoids the disadvantages of dampening devices as heretofore known in that a smooth and uniform transfer of dampening fluid to the plate cylinder is obtained.

A more specific object of the invention is to provide a novel and improved dampening device of the general kind above referred to in which the slippage between the fountain roll and the transfer roll can be very accurately regulated and the extent of the slippage is reduced. As the regulation of the slippage and the extent thereof affect the flow of dampening fluid to the dampening roller, reduction and accurate regulation of the slippage greatly improve the uniformity of the flow of dampening fluid.

SUMMARY OF THE INVENTION

The above pointed out objects, features and advantages which will be pointed out hereinafter are obtained by providing between the fountain roll and the transfer roll of the device a moisture-transmitting intermediate roll which is positively driven with a circumferential speed different from that of the circumferential speed of the fountain roll. When this intermediate roll has a circumferential speed higher than that of the fountain roll the total slippage is divided into a slippage factor existing between the fountain roll and the intermediate roll and a slippage factor existing between the intermediate roll and the transfer roll. The flow of dampening fluid by changing the total slippage can now be very accurately effected due to the division of the total slippage into two slippage factors as such division simultaneously causes a reduction of the total slippage.

According to one aspect of the invention, the intermediate roll is driven by a gearing which makes it convenient to select the required gear ratio.

The gear ratio of the gearing is advantageously variable whereby the differential between the circumferential speeds of the fountain roll and the intermediate roll is adjustable. The division of the slippage between the transfer roll and the intermediate roll on one hand and between the intermediate roll and the fountain roll on the other hand, can be conveniently selected in accordance with the specific requirements of the printing job to be performed.

According to another aspect of the invention, a motor is provided which drives the fountain roll independent of the main drive for the press. When the drive for the fountain roll is derived from the main drive for the press the conditions for controlling the speed of the fountain roll in accordance with the specific requirements of the printing job to be performed are limited. Such limitation is avoided by providing an independent drive for the fountain roll. Such independent drive permits programming for an increased supply of dampening fluid when the press is started or for a reduced supply at high speeds of the press as evaporation is then relatively lower. Moreover, rotation of the fountain roll may be continued when the press is temporarily stopped.

The intermediate roll can be moved into and out of engagement with the transfer roll and also adjusted with respect to its pressure of engagement by means known for the purpose. Such adjustability of the position of the intermediate roll provides a further means for controlling the moisture feed to the dampening roll. Furthermore, elastic rolls can be removed out of engagement with the coating rolls in the event the press is stopped for a prolonged period of time to avoid the formation of flattened areas on the circumferential wall of elastic rolls.

It is also an aspect of the invention to provide means for moving the fountain roll into and out of engagement with the intermediate roll and also for adjusting the pressure of engagement between the rolls. Such an arrangement also permits control of the feed of moisture, and rolls with an elastic surface can be protected against deformation when the press is stopped for a prolonged period of time.

According to the invention it is further possible to set the fountain roll axis at a slant with respect to the inter-
mediate roll axis. This permits adjustment of the gap between the rolls at the mid-portion thereof with respect to the gap at the ends of the rolls; an increase of the gap at the mid-portion of the rolls due to sagging of the rolls can be prevented in this manner.

The invention further contemplates the provision of a squeezing roll which is movable into and out of engagement with the fountain roll and can also be adjusted as to its engagement pressure. Such squeezing roll coating with the fountain roll and extending either across the entire length of the fountain roll or only across selected zones thereof, further improves the control capability of the dampening device.

According to still another aspect of the invention, a doctor or wiping assembly coats with the fountain roll. This assembly can be conveniently so arranged that it coats with the fountain roll at selected zones only.

The invention further provides that the dampening roll is positively driven with the circumferential speed of the plate cylinder and, in turn, drives a distributing roll in frictional engagement with it. Such distributing roll, made for example with a copper wall, is particularly advantageous when a dampening roll with a rubber sleeve is used. Any ink reaching the dampening roll is attracted by the copper wall of the distributing wall which thus acts as a cleaning roll. The positive drive of the dampening roll prevents slipping of the roll. Danger of slipping is particularly acute due to the relatively strong braking moment exerted by the distributing roll as this roll is driven by frictional engagement with the circumferential wall of the dampening roll.

It is further possible to drive the intermediate roll with the same circumferential speed as the transfer roll. However, it is then necessary to change the gear ratio of the gearing connected to the transfer roll simultaneously with a change in the circumferential speed of the fountain roll.

The structure of the dampening device may be simplified in this connection by positively driving the intermediate roll at the same circumferential speed as the transfer roll. This can be conveniently arranged by providing on the intermediate roll a gear in mesh with a gear secured to the transfer roll. Such an arrangement saves the need for a variable gearing which otherwise must be provided between the fountain roll and the intermediate roll. The resulting assembly is very simple and sufficient in most cases. It has the further advantage that a considerably more uniform film of water is supplied to the printing plate as with the exception of the fountain roll all rolls are driven with the circumferential speed of the plate cylinder. Hence, the coating of the rolls tends to make the film of water highly uniform.

DETAILED DESCRIPTION OF THE INVENTION

In the accompanying drawing several embodiments of the invention are shown by way of illustration and not by way of limitation.

In the drawing:
FIG. 1 is a elevational side view of a dampening device in which the moisture-transmitting intermediate roll is driven with a circumferential speed different from that of the rotational speed of the fountain roll;
FIG. 2 is a plan view of the dampening device of FIG. 1;
FIG. 3 is a fragmentary plan view of a modification of the dampening device in which the fountain roll of the dampening device is driven independently of the power drive for the press;
FIG. 4 is a plan view of a dampening device in which the intermediate roll is driven with the same circumferential speed as the transfer roll; and
FIG. 5 is a plan view of a dampening device similar to the device of FIG. 4 but having a drive means for the fountain roll independent of the power drive for the press.

Referring now to the figures in detail, the dampening device as exemplified in FIGS. 1 and 2 comprises a dampening roll 1 with an elastic but preferably uncovered surface in rolling engagement with the circumferential wall of a plate cylinder 3. This plate cylinder should be visualized as constituting a plate cylinder of an offset rotary printing press which is not shown in detail as it does not constitute part of the invention.

Dampening fluid such as water to be applied to plate cylinder 3 is transferred to dampening roll 1 from a pan or basin 4 into which dips a fountain roll 5 with a non-elastic water-wettable surface. The fountain roll transfers moisture picked up by it via an elastic moisture-transmitting intermediate roll 6 and a non-elastic transfer roll 7 to dampening roll 1 which, in turn, applies the moisture to the printing plate on plate cylinder 3. Transfer roll 7 is preferably a distributing roll mounted for axial reciprocation. Each end of the dampening roll is journaled in one end of a lever 8. The levers are pivotal by suitable means such as a pneumatic cylinder 9 about an axis 10 which is located slightly outside of the rotational axis 11 of transfer roll 7. As a result, pivoting of levers 8 in clockwise direction throws the dampening roll 1 out of engagement with plate cylinder 3 and transfer roll 7. The dampening roll is journaled in levers 8 by means of an eccentric bushing 12. This bushing can be turned by means of a handle 13 so that the spatial position of dampening roll 1 within levers 8 and thus also with reference to plate cylinder 3 and transfer roll 7 is adjustable when levers 8 are held stationary.

Levers 8 further journal a distributing roll 14 by means of an eccentric bushing 15 so that this roll can be moved into and out of engagement with roll 1 by pivoting a lever 16 mounted on bushing 15. Distributing roll 14 is driven by rolling engagement with the circumferential wall of dampening roll 1. This drive may be utilized in a conventional manner to effect also axial reciprocation of roll 14.

As stated before, the dampening roll is thrown into engagement with cylinder 3 by pneumatic cylinders 9 effecting pivoting of lever 8. A screw 17 with a fine thread such as a micrometer screw permits accurate adjustment of the pivot angle of levers 8 and thus controls the engagement between plate cylinder 3 and dampening roll 1.

Intermediate roll 6 is journaled by means of levers 18 which are pivotal about an axis 20 by pneumatic cylinders 19 for the purpose of throwing the intermediate roll into and out of engagement with transfer roll 7. The engagement between the two rolls 6 and 7 can be finely adjusted by a suitable setting means such as a finely threaded screw 21.
Fountain roll 5 is doubly eccentrically journalled, namely in an eccentric bushing 22 and also in an eccentric bushing 23. Bushings 22 and 23 can be independently rotated with reference to each other by handles 24 and 25 respectively. As a result, the fountain roll 5 may be thrown into and out of engagement with intermediate roll 6. Moreover, the axis of the fountain roll can be set at a slant with reference to the axis of the intermediate roll.

The fountain roll is coating with a squeezing roll 26 and a doctor blade or wiper 27. Both roll 26 and blade 27 can be moved into and out of coaction with roll 5 by setting means known and suitable for the purpose. Moreover, roll 26 and blade 27 can be so arranged that they coat either with the entire width of the fountain roll or only with selected zones thereof. Arrangements suitable for such selective coaction are well known in the art.

As it is shown in FIG. 2, transfer roll 7 is positively driven via an intermediate gear 28 which is in mesh with a gear 29 secured to the shaft of plate cylinder 3 and also with a gear 30 secured to the shaft of transfer roll 7, the shaft of the plate cylinder being driven by the main drive of the press (not shown). Damping roll 1 is driven by a pair of gears 31 and 32 secured to the shaft of transfer roll 7 and damping roll 1, respectively. The drive shaft of transfer roll 7 is further coupled to a gearing 33 of conventional design the transmission ratio of which can be varied by an actuating handle 34. Gearing 33 is drivenly coupled to a further gearing 36 with a variable transmission ratio by a suitable transmission means 35 such as a belt drive. A change in the gear ratio of gearing 36 is effected by means of an actuating member 37.

As it is now evident, the flow of moisture from fountain roll 5 to transfer roll 7 can be accurately adjusted by suitably varying the gear ratio of gearings 33 and 36. The gear ratio of gearing 36 is preferably maintained constant after the optimal setting thereof has been determined. In other words, the fine setting is effected by adjusting gearing 33 only.

According to FIG. 3 fountain roll 5 is driven independently of the main drive for the press by a speed variable motor 38 via transmission means 35. With such an arrangement gearing 33 may be omitted but the positive coupling between fountain roll 5 and intermediate roll 6 by gearing 36 is retained.

According to FIGS. 4 and 5 a gear 40 fixedly secured on the shaft of intermediate roll 6 is in mesh with gear 31 on the shaft of transfer roll 7. The gear ratio between gears 30, 31 and 40 is selected so that rolls 1, 7 and 6 rotate with the same circumferential speed as plate cylinder 3.

According to FIG. 4, the circumferential speed of fountain roll 5 can be varied by changing the gear ratio in gearing 33 by means of actuating member 34, the gearing being coupled to roll 5 by transmission 35, or according to FIG. 5 by means of an actuating member 41 of a gearing 43 with a variable gear ratio which couples a motor 42 to the fountain roll.

While the invention has been described in detail with respect to certain preferred examples and embodiments of the invention, it will be understood by those skilled in the art, after understanding the invention, that various changes and modifications in the appended claims.

What is claimed is:
1. A dampening device for a printing press including a plate cylinder driven by the power drive of the press, said device comprising in combination:
   a dampening roll in rolling engagement with the plate cylinder for dampening the circumferential wall thereof;
   a transfer roll in engagement with the dampening roll for transferring dampening fluid to said roll;
   first drive means for driving the transfer roll with a circumferential speed equal to the circumferential speed of the plate cylinder;
   a dampening fluid supplying fountain roll rotated at a selected circumferential speed;
   a fluid transmitting intermediate roll interposed between the fountain roll and the transfer roll engageable with said rolls for transferring dampening fluid from the fountain roll to the transfer roll; and
   second drive means for positively driving said intermediate roll with a circumferential speed different from the circumferential speed of the fountain roll.
2. The dampening device according to claim 1 wherein a gearing means is interposed between said intermediate roll and the drive means therefor.
3. The dampening device according to claim 2 wherein said gearing means has a variable transmission ratio.
4. The dampening device according to claim 1 and comprising a drive means for driving the fountain roll independent of the power drive of the press.
5. The dampening device of claim 1 and comprising setting means for selectively throwing the intermediate roll into and out of engagement with the transfer roll and also for varying the engagement pressure between said rolls.
6. The dampening device according to claim 1 and comprising setting means for selectively throwing the fountain roll into and out of engagement with the intermediate roll and the drive means therefor.
7. The dampening device according to claim 6 wherein said setting means include means for placing the rotational axis of the fountain roll at an angle with reference to the rotational axis of the intermediate roll.
8. The dampening device according to claim 1 and comprising a squeezing roll coating with the circumferential wall of the fountain roll, and setting means for throwing said squeezing roll into and out of engagement with the fountain roll and also for varying the engagement pressure between said rolls.
9. The dampening device according to claim 1 and comprising a doctor blade coacting with the fountain roll for wiping the circumferential wall thereof.
10. The dampening device according to claim 1 wherein transmission means positively couple said first drive means to the dampening roll for positively driving the latter with a circumferential speed equal to the circumferential speed of the plate cylinder.
11. The dampening device according to claim 1 wherein a distributing roll is in rotation transmitting frictional engagement with the circumferential wall of the dampening roll.
12. The dampening device according to claim 1 wherein transmission means positively couple the intermediate roll with the transfer roll for positively driving said rolls at the same circumferential speed.
13. The dampening device according to claim 12 wherein said transmission means comprise a gearing coupled to the intermediate roll and the transfer roll.

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