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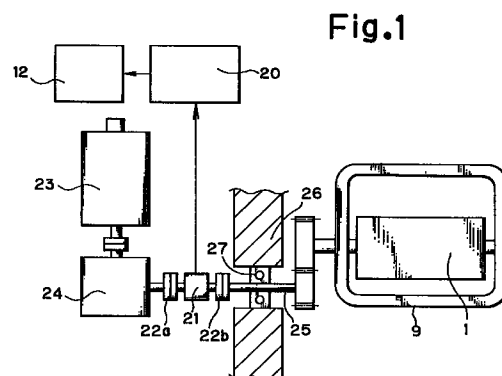
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(54) Contact pressure adjusting device of printing press

(57) A contact pressure adjusting device of a printing press is provided which, even when the cylinder diameters vary, can easily maintain an appropriate contact pressure to ensure stable printing quality. In the printing press having contact pressure adjusting means comprising an eccentric bearing (2) for supporting the shaft end of a wiping roller (1), and a contact pressure adjusting motor (12) for rotating the eccentric bearing relative to a frame to vary the core-to-core distance between the wiping roller (1) and an intaglio cylinder (4), the contact pressure adjusting device is constructed such that a torque sensor (21) is provided for detecting the torque of a gear shaft (25) in a drive system for the wiping roller, and the contact pressure adjusting motor (12) is feedback controlled by a control device (20) based on the detected value of the torque sensor (21) so that the detected value of the torque sensor will become the torque under appropriate contact pressure.



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## Description

### BACKGROUND OF THE INVENTION

#### 1. Field of the Invention

This invention relates to a contact pressure adjusting device of a printing press.

#### 2. Description of the Related Art

An intaglio printing press, for example, has an intaglio cylinder, as a rotating part, which has an intaglio mounted on the peripheral surface thereof, and an impression cylinder contiguous to the intaglio cylinder. A paper is fed by a feeder, conveyed to a swing arm shaft pregripper, and then gripped by a gripper of the impression cylinder. The paper is printed with ink supplied to the plate surface of the intaglio to have images transferred thereto. A printed paper is delivered by a discharge chain for discharge.

This type of intaglio printing press is equipped with a wiping device. This wiping device comprises a wiping roller, as a rotating part, contiguous to the intaglio cylinder, and rotating such that the contiguous peripheral surfaces of the wiping roller and the intaglio cylinder move in opposite directions to each other; a plurality of brushes each having a pad surface contiguous to the peripheral surface of the wiping roller; and a doctor blade of steel or the like located downstream from the brushes in the direction of roller rotation and having a forward end in contact with the wiping roller. Part of ink, supplied from ink form rollers of an inking device to an intaglio surface, migrates and adheres to the surroundings of the ink-retaining cups as patterns. This surplus part of ink is wiped off with the wiping roller rotating in contact with the plate surface, and only the patterns of the cups are transferred to a paper. The wiping roller is rotating while being dipped in a solvent, such as trichloroethylene, contained in a solvent tank. The ink passed on to the wiping roller by the wiping-off action is removed by the cleaning action of this solvent and the brushes. The solvent carried by the wiping roller is scraped off with the doctor blade into the solvent tank.

With the ink wiping-off action by the wiping device, if the contact pressure of the wiping roller on the plate surface is too high, even the ink of the cups as patterns will be scraped off, with the result that very thin lines cannot be printed. If the contact pressure is too low, surplus ink will remain in the surroundings of the cups. This will make the line widths of images wide, resulting in bleeding prints, or will cause the ink to remain in the whole of limited non-image areas, leaving considerable smears. Thus, adjustment of the contact pressure has required skill.

The wiping roller also varies in the roller diameter because of wear or thermal expansion. Every time its roller diameter changes, the contact pressure must be readjusted. This has been tiresome and difficult.

After several tens of minutes pass after start of printing, the wiping roller thermally expands owing to friction against the plate surface. Thus, the contact pressure increases, causing variations in printing quality.

Under these circumstances, the applicant proposed in Japanese Laid-Open Patent Publication No. 4-37542, etc. a wiping device in which the way of contact pressure adjustment is too simple to require an operator specializing in this adjustment.

It is a wiping device in which both ends of a wiping roller are journaled by inner holes of eccentric bearings each having the axis on the outer periphery side and the center of the inner hole eccentric relative to each other, and when the outer periphery sides of the eccentric bearings are turned, the wiping roller is thrown on and off an intaglio cylinder. This wiping device includes a hydraulic cylinder having a piston rod tip pivotably mounted on the outer periphery side of the eccentric bearing; a threaded shaft being connected concentrically to the head side of the hydraulic cylinder so as to transmit a movement along the axial direction, but not to transmit a rotation, and being screwed to a threaded bearing set in place; and a contact pressure adjustment motor for rotating the threaded shaft. This wiping device is designed such that the hydraulic cylinder is operated to throw the wiping roller on and off the intaglio cylinder, and the contact pressure adjustment motor is actuated during the throw-on to adjust the contact pressure of the wiping roller on the intaglio cylinder.

The above-described conventional wiping device, however, performs the adjustment in the following manner:

An operator sees printing products, or may look at a warning light or hear an alarm as a sign which tells that the electric current of a motor, a drive source for the wiping roller, has become too high. Only then, the operator gives a command to a contact pressure adjustment input device to drivingly control the contact pressure adjusting motor.

This way of adjustment has not only posed the problem of poor printing quality, such as scratches on printing products during the adjustment time, but also necessitated readjustment work which requires skill of the operator. There has also been a problem of low operation efficiency such that adjustment in a short time is impossible.

### SUMMARY OF THE INVENTION

It is an object of the present invention to provide a contact pressure adjusting device of a printing press capable of easily maintaining an appropriate contact pressure to ensure stable printing quality.

To attain this object, the present invention constructs a printing press having contact pressure adjusting means for adjusting the pressure of contact between cylinders contiguous to each other, wherein a torque sensor is provided for detecting the torque of a trans-

mission shaft in a drive system of any of the cylinders, and the contact pressure is managed based on the detected value of the torque sensor.

According to this construction, as the appropriate contact pressure increases owing to thermal expansion of the roller, or decreases because of its wear, the torque of the transmission shaft increases or decreases accordingly. This change in the torque is detected by the torque sensor, and the contact pressure is managed based on the detected value of the torque sensor.

Preferably, the contact pressure adjusting means comprises an eccentric bearing for supporting the shaft end of a wiping roller, and a drive device for rotating the eccentric bearing relative to a frame to vary the core-to-core distance between the wiping roller and an intaglio cylinder. This makeup enables the pressure of contact between the wiping roller and the intaglio cylinder to be adjusted without requiring a considerable change in the structure of the conventional wiping device.

Preferably, the drive device has a contact pressure adjusting motor, and the contact pressure adjusting motor is feedback controlled by a control device so that the detected value of the torque sensor will become the torque under appropriate contact pressure. As a result, adjustment work for contact pressure can be automated.

#### BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will become more fully understood from the following detailed description in conjunction with the accompanying drawings which are given for the purpose of illustration only, and thus are not limitative, and wherein:

FIG. 1 is side view showing a control system for a contact pressure adjusting device in a wiping device; and

FIG. 2 is a side view showing a drive system for the contact pressure adjusting device.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

An embodiment of a contact pressure adjusting device of a printing press concerned with the present invention will be described by reference to the accompanying drawings.

As shown in FIG. 2, a wiping roller 1 is journaled in an inner hole of an eccentric bearing 2. When a fitment 3 locked to the outer peripheral side of the eccentric bearing 2 is moved to reciprocate, the wiping roller 1 makes throw-on and throw-off motions relative to an intaglio cylinder 4.

A piston rod tip of a hydraulic cylinder 5 is pivotably joined to the fitment 3 by means of a pin 6. To the head side of the hydraulic cylinder 5, a threaded shaft 8 is connected via a thrust bearing 7. The thrust bearing 7 transmits a movement of the threaded shaft 8 along the

axial direction to the hydraulic cylinder 5, but does not transmit the rotation of the threaded shaft 8 to the hydraulic cylinder 5. The threaded shaft 8 is screwed to a threaded bearing 10 locked to a solvent tank 9.

To a coupling 11 housing the thrust bearing 7, a contact pressure adjusting motor 12 is locked. A gear 13 locked to a motor shaft 17 of the contact pressure adjusting motor 12 meshes with a gear 14 locked to the threaded shaft 8. The hydraulic cylinder 5 is equipped with a detection member 15, and a direct acting potentiometer 16 is provided to detect the position of this detection member 15.

Thus, when the hydraulic cylinder 5 stretches, the wiping roller 1 contacts the intaglio cylinder 4, while when the hydraulic cylinder 5 retracts, the wiping roller 1 leaves the intaglio cylinder 4. When the contact pressure adjusting motor 12 is rotated during contact between the wiping roller 1 and the intaglio cylinder 4, the threaded shaft 8 makes a rotation and moves axially. The hydraulic cylinder 5 also moves accordingly, permitting the adjustment of the contact pressure between the wiping roller 1 and the intaglio cylinder 4. FIG. 2 shows the left side (the operator's side) of the wiping roller 1. An apparatus of the same construction as described above is assembled to the right side (the drive side) of the wiping roller 1.

As shown in FIG. 1, the contact pressure adjusting motor 12 rotates at a drive command from a control device 20. During contact between the wiping roller 1 and the intaglio cylinder 4, normal rotation of the contact pressure adjusting motor 12 increases the contact pressure, whereas its reverse rotation decreases the contact pressure.

The control device 20 receives detection signals from a torque sensor 21 provided in a drive system for the wiping roller 1. This torque sensor 21 is a high durability sensor which can detect the torque of a rotating shaft in a magnetic, non-contact manner by utilizing magnetostriction. The torque sensor 21 is connected to a speed reducer 24 on the side of a drive motor 23, and a gear shaft 25 on the side of the wiping roller 1 via couplings 22a and 22b, respectively. The numeral 26 denotes a drive-side frame through which the gear shaft 25 is passed and supported rotatably via a bearing 27.

During printing, the control device 20 constantly compares a set torque value, which has been determined previously, with a detected torque value from the torque sensor 21, and performs feedback control of the contact pressure adjusting motor 12 so that the detected torque value will coincide with the set torque value.

According to the foregoing construction, the contact pressure adjusting motor 12 is rotated during contact between the wiping roller 1 and the intaglio cylinder 4 to make an initial adjustment of the contact pressure of the wiping roller 1 on the intaglio cylinder 4. Then, printing is started, whereupon the wiping roller 1 undergoes rotational resistance because of friction against the plate surface. As a result, the gear shaft 25 is subject to

torque, and is twisted. This torque at the initial stage of printing is detected by the torque sensor 21, serving as the set torque value.

As printing proceeds, the aforementioned appropriate contact pressure increases owing to the thermal expansion of the wiping roller 1 (the roller surface comprising vinyl chloride resin thermally expands under friction with the intaglio cylinder 4), or decreases because of its wear. In response, the torque of the gear shaft 25 increases or decreases.

In the instant embodiment, however, changes in the torque are detected by the torque sensor 21. Based on the detected torque value from the torque sensor 21, the control device 20 carries out feedback control of the contact pressure adjusting motor 12 so that the detected torque value will become the set torque value at the appropriate contact pressure. That is, when the detected torque value increases with increasing contact pressure, the contact pressure adjusting motor 12 is reversely rotated so as to bring the detected torque value into agreement with the set torque value at the appropriate contact pressure. Whereas when the detected torque value decreases with decreasing contact pressure, the contact pressure adjusting motor 12 is normally rotated so that the detected torque value will agree with the set torque value at the appropriate contact pressure.

Consequently, the appropriate contact pressure is constantly maintained during printing, thus decreasing wasted papers. Since contact pressure adjustment is automatically made, moreover, there is no need for the operator to be always available, leading to labor saving.

In the above-mentioned embodiment, the contact pressure adjusting motor 12 is used for automatic adjustment of the contact pressure. However, the detected torque value from the torque sensor 21 may be displayed on an indicator. An operator reading this value may adjust the contact pressure using a manually operated handle or the like.

The instant embodiment, furthermore, discloses an example of adjusting the contact pressure between the intaglio cylinder and the wiping roller as rotating parts contiguous to each other in an intaglio printing press. However, the claimed contact pressure adjusting device may be provided for a cylinder such as an impression cylinder, a blanket cylinder or a plate cylinder, or a roller of an inking device or a dampener in an offset printing press, or may be applied to any rotating parts which require contact pressure adjustment.

As described above, the present invention provides a printing press having contact pressure adjusting means for adjusting the pressure of contact between cylinders contiguous to each other, wherein a torque sensor is provided for detecting the torque of a transmission shaft in a drive system for any of the cylinders, and the contact pressure is managed based on the detected value of the torque sensor. Thus, even when the cylinder diameters vary, an appropriate contact pressure can be easily maintained, thereby stabilizing

printing quality, and cutting back an expert operator.

Preferably, the contact pressure adjusting means comprises an eccentric bearing for supporting the shaft end of a wiping roller, and a drive device for rotating the eccentric bearing relative to a frame to vary the core-to-core distance between the wiping roller and an intaglio cylinder. In this case, the pressure of contact between the wiping roller and the intaglio cylinder can be adjusted without requiring a considerable change in the structure of the conventional wiping device. This is cost-effective.

Also preferably, the drive device has a contact pressure adjusting motor, and the contact pressure adjusting motor is feedback controlled by a control device so that the detected value of the torque sensor will become the torque under appropriate contact pressure. This automated adjustment work for contact pressure achieves labor saving.

While the present invention has been described in the foregoing fashion, it is to be understood that the invention is not limited thereby, but may be varied in many other ways. Such variations are not to be regarded as a departure from the spirit and scope of the invention, and all such modifications as would be obvious to one skilled in the art are intended to be included within the scope of the following claims.

#### Claims

1. In a printing press having contact pressure adjusting means (2, 12) for adjusting the pressure of contact between rotating parts (1, 4) contiguous to each other, a contact pressure adjusting device of said printing press wherein a torque sensor (21) is provided for detecting the torque of a transmission shaft (25) in a drive system for one rotating part (1) of said rotating parts (1,4), and said contact pressure is managed based on the detected value of said torque sensor (21).
2. The contact pressure adjusting device of claim 1, wherein said contact pressure adjusting means comprises a bearing (2) for supporting the shaft end of said one rotating part (1), and a drive device (12) for moving said bearing (2) relative to a free to vary the core-to-core distance between said one rotating part (1) and the other rotating part (4).
3. The contact pressure adjusting device of claim 2, wherein said drive device has a contact pressure adjusting motor (12), and said contact pressure adjusting motor (12) is feedback controlled by a control device (20) so that the detected value of said torque sensor (21) will become the torque under appropriate contact pressure.

Fig.1

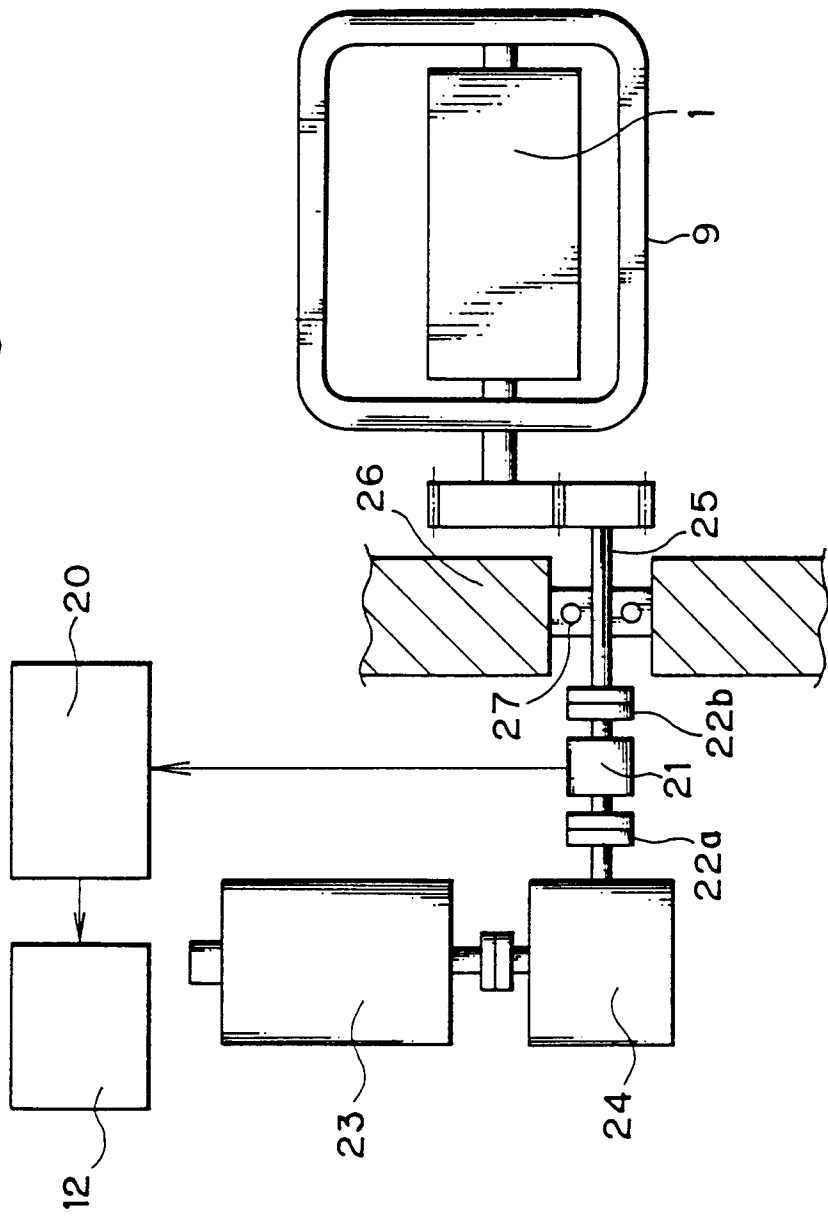


Fig.2

