(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 300 389 A2**

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **88111464.9**

(51) Int. Cl.[4]: **B41F 31/14**

(22) Date of filing: **16.07.88**

(30) Priority: **21.07.87 JP 179950/87**

(43) Date of publication of application:
25.01.89 Bulletin 89/04

(84) Designated Contracting States:
CH DE FR GB IT LI SE

(71) Applicant: **Maruta, Kazuo**
346-8, Oaza Takuma Takuma-cho
Mitoyo-gun Kagawa(JP)

(72) Inventor: **Maruta, Kazuo**
346-8, Oaza Takuma Takuma-cho
Mitoyo-gun Kagawa(JP)

(74) Representative: **Patentanwaltsbüro Cohausz & Florack**
Postfach 14 01 47
D-4000 Düsseldorf 1(DE)

(54) Ink feeding method and apparatus for printing press.

(57) An apparatus for feeding ink from an ink pan (11) to a vibration roller (16), incorporated in a printing press, such as an offset press or a letter press, including a dip roller (13) rotatably in contact with an ink (12) received in the ink pan (11), a doctor blade (14) for forming an ink layer (2a) having a predetermined thickness on the surface of the dip roller (13), a vibration roller (16) disposed downstream of the dip roller (13), and a plurality of small rollers (15a through 15g) interposed between the dip roller (13) and the vibration roller (16) and periodically movable to be alternately in contact with either the surface of the dip roller (13) or the surface of the vibration roller (16). The reciprocation of each respective small rollers (15a through 15g) is controlled independently from the other small rollers (15a through 15g), through a drive mechanism comprising a solenoid (14), by a program memorized in a microcomputer so that the contact time period of the small roller (15a through 15g) in a cycle varies in accordance with a variation of the ink consumption in the widthwise direction of the press.

EP 0 300 389 A2

INK FEEDING METHOD AND APPARATUS FOR PRINTING PRESS

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to an ink-feeding method and apparatus for an offset press or letterpress in which a distribution of ink in the widthwise direction of the press varies in accordance with a desired printed material.

2. Description of the Related Art

In general, the ink amount required for printing of most printed materials is uneven in the widthwise direction of a printed paper, and therefore, the ink amounts delivered to each section of the paper, divided in the running direction thereof, should be varied in accordance with the printing density of the paper when the paper is processed by a printing press such as an offset press.

In the conventional press, as illustrated in Fig. 4, an ink 2 is fed from an ink pan 1 onto the surface of a rotating dip roller 3 partially immersed in the ink 2. A doctor blade 4 is provided along the width of the dip roller 3 to define a gap (gauge), through which the ink 2 flows from the ink pan 1 and is adhered as a layer (hereinafter, ink layer 2) on the surface of the dip roller 3. This gap varies in the widthwise direction of the doctor blade 4 so that a thickness of the ink layer 2 formed widthwise on sections of the surface of the dip roller 3 is adjusted in accordance with the expected rate of consumption of the ink 2 at each section of the dip roller 3.

The ink layer 2 having a different thickness at each section in the widthwise direction is transferred to the surface of a ductor roller 5 disposed between the dip roller 3 and a vibration roller 6, by a repeated cycle in which the ductor roller 5 periodically swings into contact with the dip roller 3 at a predetermined time interval so that the ink layer 2 formed on the dip roller 3 is transferred to the ductor roller 5 over the whole width thereof, and then the ductor roller 5 swings back into contact with the vibration roller 6 so that all of the thus-transferred ink layer 2 on the ductor roller 5 is transferred to the vibration roller 6. The ink layer 2 adhered to the vibration roller 6 is then kneaded and homogenized until it has a fluidity suitable for printing while being transferred to a series of similar vibration rollers (not shown), and finally adhered on the surface of a plate secured on a plate cylinder (not shown).

The thickness of the ink layer 2 must be varied when the desired product to be printed is changed. Moreover, even when the same product is treated continuously, the thickness of the ink layer 2 may naturally vary in accordance with variations in the viscosity of the ink 2 due to a rise or fall of the ambient temperature or other factors. Therefore, the colour density of the resultant product must be frequently checked and a feed-back thereof carried out, if necessary, to adjust the thickness of the ink layer 2 formed on the surface of the dip roller 3. For this purpose, the press is provided with a set of adjusting screws, each arranged at a certain distance from each other widthwise of the doctor blade, for controlling the gap between the surface of the dip roller 3 and tip of the doctor blade 4. The adjustment of this gap is extremely sensitive, in that the thickness of the ink layer 2 can be significantly varied by screwing the adjusting screw in or out to displace the tip of the doctor blade 4 by only several microns. In addition, when the doctor blade 4 is formed as a single plate, the adjustment of one screw affects not only the gap of the corresponding blade portion but also that of the adjacent area of the doctor blade 4, due to an elastic deformation thereof. To eliminate this drawback, it has been proposed to divide the doctor blade 4 into several sections and provide an adjusting screw at each of the sections. In this arrangement, however, a frictional contact between the neighboring sections of the doctor blade 4 cannot be avoided, and this prevents a precise adjustment of the doctor blade 4 as a whole.

In addition, variations in the thickness of the ink layer 2 cannot be clearly and directly observed by the naked eye but can be judged only by the feedback from the resultant printed material. This means that the adjustment of the thickness of the ink layer 2 must be made by an experienced operator.

SUMMARY OF THE INVENTION

Accordingly, it is an object of the present invention to solve the abovesaid problems of the regulation of the ink thickness according to the prior art, and to provide a method and apparatus by which an adjustment of the ink layer thickness can be correctly and easily carried out even by an inexperienced operator.

The above object is achieved, according to a first aspect of the present invention, by a method

for feeding ink from an ink pan to a vibration roller, comprising the steps of: forming an ink layer having a predetermined thickness on the surface of a dip roller by a doctor blade, transferring a portion of the ink layer on the dip roller surface to an intermediate surface by contact between the intermediate surface for a predetermined time and the surface of the dip roller, and then transferring the ink layer on the intermediate surface to the surface of the vibration roller by contact between the intermediate surface and the surface of the vibration roller, characterized in that the intermediate surface is divided widthwise into a plurality of sections, each of the sections being independently displaced from the other to be in contact with and apart from the surface of the dip roller, and in that the time for which each section of the intermediate surface is in contact with the surface of the vibration roller is independently controlled from that of the other sections so that a length of the ink layer transferred to the respective section of the surface of the vibration roller is varied as required.

According to a second aspect of the present invention, an apparatus for carrying out the above method is proposed, which comprises a dip roller rotatably in contact with an ink received in an ink pan, a doctor blade for forming an ink layer having a predetermined thickness on the surface of the dip roller, a vibration roller disposed downstream of the dip roller, and a means for transferring the ink layer on the surface of the dip roller to the surface of the vibration roller, this means being interposed between the dip roller and the vibration roller and intermittently movable to be alternately in contact with either the surface of the dip roller or the surface of the vibration roller, characterized in that the means for transferring the ink layer comprises a plurality of small rollers, each of which is arranged substantially on a common imaginary line extending widthwise of the dip roller and means for intermittently reciprocating each small roller between the dip roller and the vibration roller independently from the other small rollers.

Preferably, the apparatus according to the present invention further comprises a means for controlling the operation time of the reciprocating means for the small roller.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will be described in more detail with reference to the drawings illustrating preferred embodiments thereof, wherein:

Fig. 1 is a diagrammatic side view of an ink feeding apparatus, illustrating a principle of the present invention;

Fig. 2(a) is a diagrammatic front view of the apparatus of Fig. 1;

Fig. 2(b) is an example of a development of ink layers transferred onto the respective small rollers shown in Fig. 1(b);

Fig. 3 is a diagrammatic side view of a mechanism for reciprocating a small roller; and

Fig. 4 is a diagrammatic side view of a prior art ink feeding apparatus.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

As shown in Figs. 1 and 2, an ink feeding apparatus according to the present invention includes a single dip roller 13 rotating at a predetermined speed while in contact with an ink 12 received in an ink pan 11, a doctor blade 14 for forming an ink layer on the surface of the dip roller 13, a single vibration roller 16 disposed downstream of and in parallel to the dip roller 13, for kneading and homogenizing the ink by a nipping action in association with an adjacent vibrating roller (not shown) while vibrating in the axial direction thereof, and an ink transferring means 15 arranged along and between the dip roller 13 and the vibration roller 16.

The ink transferring means 15 has a function similar to the ductor roller 5 shown in Fig. 4, i.e., the means 15 is intermittently displaceable in opposite directions from a neutral position shown in Fig. I, to be brought into contact with either the surface of the dip roller 13 or the surface of the vibration roller 16, whereby an ink layer 12a formed on the surface of the dip roller 13 is transferred via the surface of the means 15 to the surface of the vibration roller 16. The ductor roller 5 used in the conventional ink feeding apparatus as shown in Fig. 4 is a relatively elongated single roller, but the ink transferring means 15 according to the present invention is a series of small rollers 15a through 15g, each having a relatively narrow width and arranged side-by-side. Each of the small rollers 15a through 15g is provided with a drive mechanism, respectively, for intermittently reciprocating each small roller 15a - 15g.

An example of the above drive mechanism is illustrated in Fig. 3, in which a shaft 20 of the small roller 15a is rotatably held at one end of an angled arm 21. The arm 21 is pivoted by a pin 22 at the center thereof, and the other end of the arm 21 is biased by a spring 23 in the counter-clockwise direction, as shown by an arrow, whereby the small roller 15a is always urged into contact with the surface of the vibration roller 16. A solenoid 24 is disposed in an intermediate position between the pivot pin 12 and the spring 23, and a tip end of an

actuator 24a of the solenoid 24 is in contact with the upper side of the arm 21. In this structure, when the solenoid 24 is energized, the actuator 24a pushes the arm 21 downward to cause the arm 21 to rotate in the clockwise direction in Fig. 3 about the pin 22, thus moving the small roller 15a away from the surface of the vibration roller 16 and into contact with the surface of the dip roller 13.

The solenoid 24 associated with the small roller 15a can be energized for a predetermined time period defined by a designed program in accordance with a command signal issued from control means such as a microcomputer (not shown).

Next, the operation of the ink feeding apparatus of the above described structure will be explained.

A gap between the dip roller 13 and the doctor blade 14 is maintained at a predetermined constant value over the whole width thereof so that an ink layer 12a having a uniform thickness is formed on the surface of the dip roller 13.

A command signal is cyclically issued from the not shown microcomputer to the respective solenoid 24 at each of the small rollers 15a through 15g, to energize the solenoid 24 in accordance with a required program. The program is designed so that the time for which the respective solenoid 24 is energized corresponds to the actual area to be printed of the section of the desired product, divided in the running direction. This section is covered by a small roller associated with a respective solenoid. Namely, a solenoid associated with a small roller covering a section at which a larger amount of ink 12 is consumed is energized for a larger time, so that a longer contact time between the small roller and the dip roller 13 is obtained, and vice versa. The difference of the contact time between the respective small rollers 15a through 15g is visually presented by the difference of the length of ink layers 12a stripped from the dip roller 13 by the respective small roller 15a through 15g, as illustrated in Fig. 2(b) as one example of a development thereof. These lengths of the ink layer 12a on the small rollers 15a through 15g are all transferred to the surface of the vibration roller 16 during the non-energized period of the solenoid 24 at the latter half stage of the cycle when the small rollers 15a through 15g are in contact with the vibration roller 16, and thus an ink layer 12a having a nonuniform distribution in the widthwise direction is obtained on the surface of the vibration roller 16.

It is also possible to adopt a drive mechanism for each respective small roller in which the small roller is in contact with the vibration roller 16 only when the solenoid 24 is energized, contrary to the above embodiment. Further, instead of the combination of solenoid and spring used in the above embodiment, a double acting cylinder may be utilized as the actuator for each small roller.

As described before, according to the present invention, an ink amount required to be fed to the surface of the ductor roller 15 is varied in accordance with the area to be printed of the desired printed material in the widthwise direction, by a plurality of small rollers constituting the ductor roller 15. The gap between the dip roller 13 and the doctor blade 14 is always maintained at a constant value in the widthwise direction, and the times for which the respective small rollers 15a through 15g are in contact with the dip roller 13 are controlled independently from each other by a program memorized in a microcomputer, so that an ink layer 12a having different lengths is formed by each respective small roller 15a through 15g. Accordingly, that when the desired product to be printed is changed, it is not necessary for the operator to adjust the doctor blade 4, since only a selection of a suitable program for controlling the movement of the small rollers is needed, which program is preliminarily prepared in accordance with the variations of the area to be printed of the desired product, and memorized in the microcomputer.

The cost of adapting a conventional ink feeding apparatus to include the practice of the present invention is very low, because it is not necessary to replace the ink pan, which is expensive, but only to replace a single ductor roller with a plurality of small rollers.

Particularly, the total manufacturing cost of the apparatus is drastically decreased because the doctor blade and the adjustment mechanism thereof, which comprises a large part of the manufacturing and assembling costs of the ink feeding apparatus of the prior art, is greatly simplified.

Claims

1. A method for feeding ink from an ink pan (11) to a vibration roller (16), comprising steps of:
forming an ink layer (12a) having a predetermined thickness on the surface of a dip roller (13) by a doctor blade (14), transferring a portion of the ink layer (12a) on the dip roller surface to an intermediate surface by contact for a predetermined time between the intermediate surface and the surface of the dip roller (13), and then transferring the ink layer (12a) on the intermediate surface to the surface of the vibration roller (16) by contact between the intermediate surface and the surface of the vibration roller (16),
characterised in that the intermediate surface is divided widthwise into a plurality of sections (15a-15g), each of said sections being independently displaced from the other to be in contact with and apart from the surface of the dip roller (13), and in that a time for which each section (15a-15g) of the

intermediate surface is in contact with the surface of the vibration roller (16) is independently controlled from that of the other sections (15a-15g) so that a length of the ink layer (12a) transferred to the respective section (15a-15g) of the surface of the vibration roller (16) is varied as required.

2. An apparatus for feeding ink from an ink pan (11) to a vibration roller (16), incorporated in a printing press, comprising a dip roller (13) rotably in contact with an ink (12) received in an ink pan (11), a doctor blade (14) for forming an ink layer (12a) having a predetermined thickness on the surface of the dip roller (13), a vibration roller (16) disposed downstream of the dip roller (13), and a means (15) for transferring the ink layer (12a) on the surface of the dip roller (13) to the surface of the vibration roller (16), said means (15) being interposed between the dip roller (13) and the vibration roller (16) and intermittently movable to be alternately in contact with the surface of the dip roller (13) and the surface of the vibration roller (16),
characterized in that the means (15) for transferring the ink layer (12a) comprises a plurality of small rollers (15a-15g), each of which small rollers (15a-15g) is arranged substantially on a common imaginary line extending widthwise of the dip roller (13) and means (21-24) for intermittently reciprocating each small roller between the dip roller (13) and the vibration roller (16) independently from each other small roller (15a-15g).

3. An apparatus as defined in claim 2,
characterized in that said apparatus further comprises a means for controlling the operation time of the reciprocating means for each small roller (15a-15g).

4. An apparatus as defined in claim 2 or 3,
characterized in that said means (21-24) for reciprocating each small roller (15a-15g) comprises an angled arm (21), one end of which rotatably carries a small roller (15a-15g) and the other end of which is urged by a spring (23) so that said small roller (15a-15g) is always in contact with the surface of the vibration roller (16); and a solenoid (24) having an actuator (24a) which is projected when the solenoid (24) is energized to move the angled arm (21) so that said small roller (15a-15g) is moved away from the vibration roller 16) and into contact with the surface of the dip roller (13).

Fig. 1

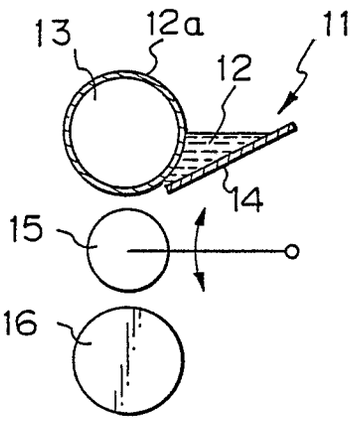

Fig. 2

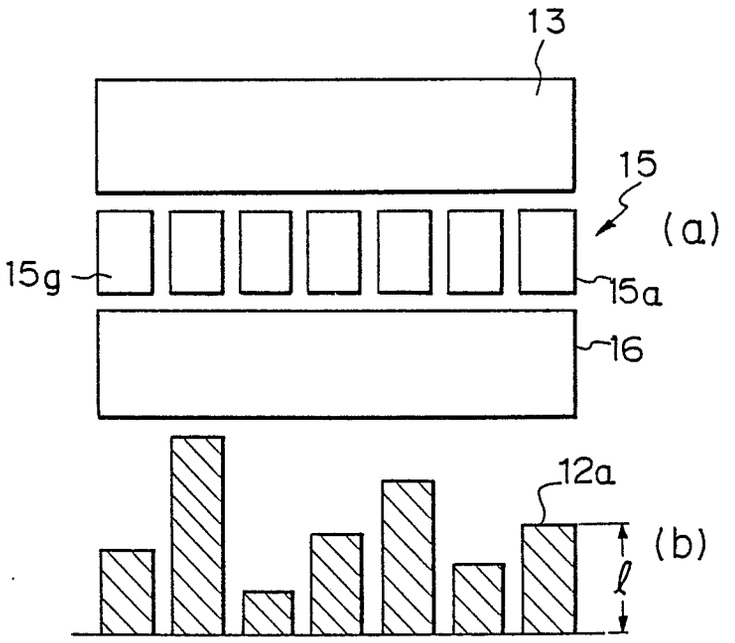

Fig. 3

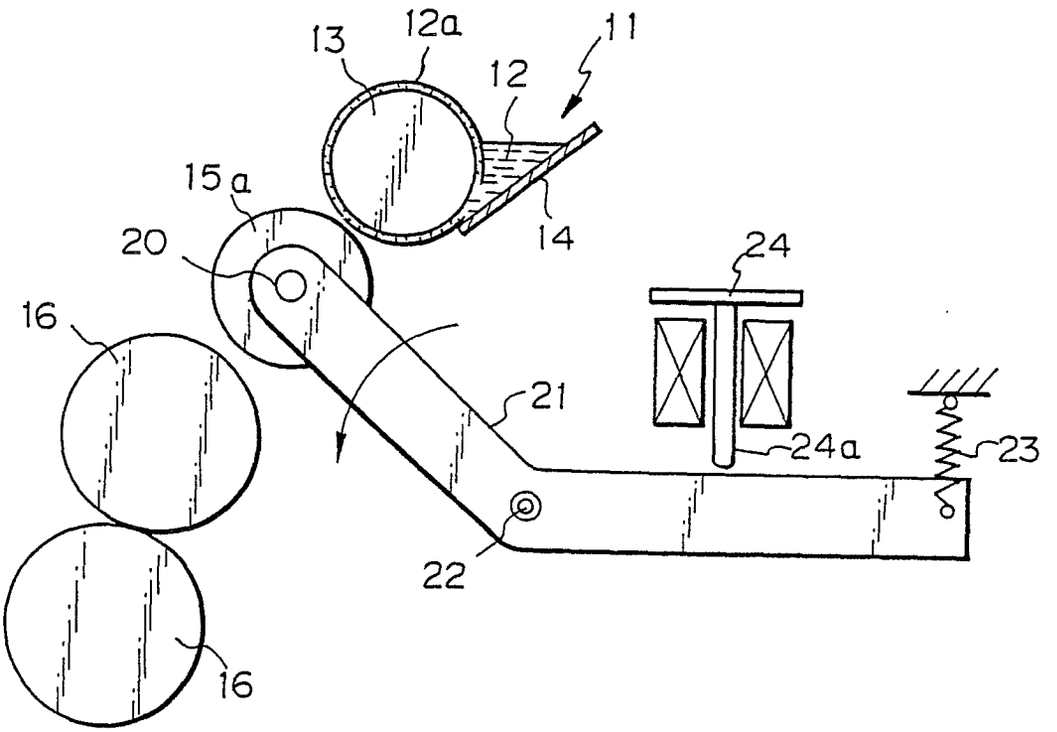

Fig. 4