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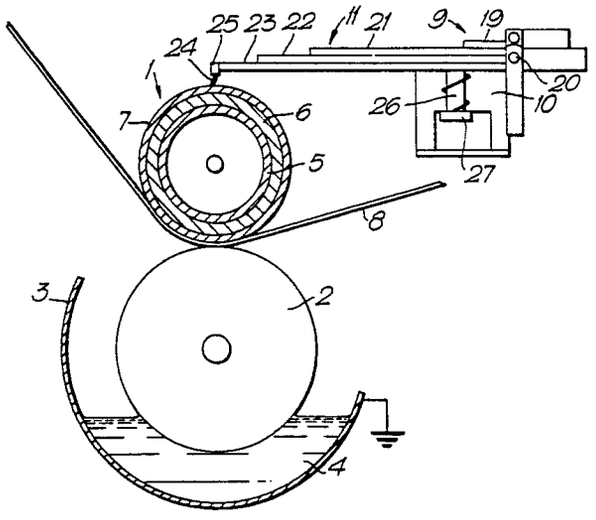
(54) Improvements relating to gravure printing.

(57) Apparatus for use in a gravure press comprises an electrically semiconducting impression roll (1) and a plurality of laterally spaced electrical contacts (11 -18), which contact the surface of the impression roll (1). The .contacts (11 - 18) are connected to a power supply which enables a charge to be applied to the surface of the impression roll (1) via the contacts (11 -18), each of the contacts (11 - 18) comprising a plurality of deflectable electrically conduction filaments (24).

Fig.1.



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IMPROVEMENTS RELATING TO GRAVURE PRINTING

The invention relates to gravure printing and in particular apparatus for use in a gravure press.

WO-A-84/03068 describes an electrostatic assist gravure press in which the impression roll is charged directly via a number of spaced, stainless steel wiper blades which, in the operating position are urged under spring action against the roll. As the roll rotates, charge is transferred from the contacts onto the roll. The wiper blades are individually pivotable away from the impression roll so that the gravure press can deal with webs of different widths and keep charge losses to a minimum.

One problem which has led to this type of gravure press having very little commercial success is that the wiper blades have been found to wear grooves on the impression roller. This is particular undesirable and leads to inefficient transfer of ink onto a web at the nip between the impression roll and the gravure cylinder.

Another problem is that the wiper blades cause paper dust to build up on the impression roller. This causes variations in impression (ie. pressure) and electrical insulation, and decreases the efficiency of the ink transfer.

In accordance with the present invention, we provide apparatus for use in an electrostatic assist gravure press, the apparatus comprising an impression roll and a plurality of laterally spaced electrical contacts contacting the surface of the impression roll, the plurality of spaced contacts being connected to a power source, in use, to enable a charge to be applied to the surface of the impression roll by each contact wherein the spaced contacts comprise a plurality of deflectable electrically conductive filaments.

We have found that by interposing a plurality of deflectable, electrically conductive filaments between the electrical contacts (corresponding to the wiper blades of WO-A-84/03068) and the impression roll, there is no grooving on the impression roll and no paper dust builds up on the impression roll.

Preferably, the electrically conductive filaments are fabricated from stainless steel and most conveniently comprise bristles.

An example of a commercial product which could be adapted for use with this invention is Statstrip (manufactured by Kleeneze Industrial of Martins Road, Hanham, Bristol) which is conventionally used for reducing or eliminating static charges on webs.

An example of apparatus for use in a gravure press in accordance with the present invention will now be described with reference to the accompanying drawings in which:-

Figure 1 is a side elevation of an electrostatic assist gravure press including a direct charging system illustrating an embodiment of the present invention;

Figure 2 is a side elevation similar to Figure 1 showing the contacts removed from engagement with the impression roll;

Figure 3 is a plan of the direct charging system illustrated in Figure 1; and,

Figure 4 is a front elevational view of the direct charging system illustrated in Figure 1.

Figure 1 illustrates an electrostatic assist gravure press. An impression roll 1 is positioned adjacent to and in contact with a gravure cylinder 2. An ink fountain 3 is arranged concentrically with the gravure cylinder 2 to supply ink 4 to the surface of the gravure cylinder 2 as the gravure cylinder 2 is rotated by conventional means through the ink fountain 3. A doctor blade (not shown) removes excess ink from the surface of the gravure cylinder 2. The impression roll 1 includes a hollow metal core 5, an intermediate rubber insulating layer 6 and an outer semi-conducting layer 7. The metal core 5 of the impression roll 1 is electrically earthed. The impression roll 1 typically has a maximum current leakage of 0.2 milliamperes at 4000 volts. The intermediate insulating layer 6 is approximately 3 to 5 mm thick and covers the length of the core 5. The semiconducting layer 7 is only moderately conductive and is approximately 8 to 13 mm thick. The resistivity of the semiconducting layer is preferably approximately 2×10^7 ohm cm. However, it should be understood that in other arrangements the impression roll may have only one layer over the core 5 or include multiple semiconducting layers of varying conductivity as desired. Further details regarding electrostatic assist including press and ink parameters may be obtained from the "Electrostatic Assist Manual" published by Gravure Research Institute, Inc. of Port Washington, New York in 1981.

A web 8 transmitted between conventional delivery and take up rolls (not shown) is pressed between the impression roll 1 and the rotating gravure cylinder 2. The impression roll 1 is placed in pressure contact with the gravure cylinder 2 by conventional means. At the nip between the impression roll 1 and the rotating gravure cylinder 2 ink is transferred from the gravure cells of the gravure cylinder 2 to the web 8. The web 8 may be a full or partial web and may be located anywhere along the width of the impression roll 1 as desired.

The charge coupling system designated generally by 9 includes a supporting cross member 10 that is either made of an insulating material such as

phenolic, or coated with such an insulating material in such a fashion as to prevent earthing of any electrically charged part. Pivotally mounted on the supporting cross member 10 are a plurality of electrically conducting blades 11 to 18 (see also Figures 3 and 4). The blades 11 to 18 are fixed to an insulating holder 19 for example with screws. The holder 19 and blades 11 to 18 are pivotally mounted to the supporting cross member 10 via a pin 20.

Preferably the blades are deflectable and they each include three segments of varying lengths 21, 22, and 23. The segments 21 to 23 are stainless steel and are fixed to one another at the pivoting end to form a leaf-type spring.

Attached to the end of each section 23 of the blades 11-18 are respective groups of stainless steel, flexible filaments or bristles 24 which are typically 18mm long. Each group of filaments is held in an aluminium holder 25. The aluminium holder 25 is attached for example by rivets or screws to the free end of the corresponding segment 23 to form an electrical contact between the filaments 24 and the conducting blades 11 to 18. Suitable filaments can be purchased ready mounted on an aluminium holder for example "Statstrip" produced by Kleeneze Industrial.

The free ends of the filaments 24 contact the surface of the impression roll 1 when the blades are in the operating position as shown in Figure 1. The filaments 24 are pressed against the impression roll 1 with a slight amount of pressure by adjusting the position of the supporting cross member 10 relative to the impression roll 1 to maintain good contact with the surface of the impression roll 1 while the impression roll is rotating. Thus the filaments 24 are deflected slightly as shown in Figure 1. However, since the filaments are flexible they cause very little wear on the impression roll 1.

Spring loaded contacts 26 are arranged within the supporting cross-member 10 and are biassed towards engagement with the respective blades 11 to 18 when the blades are in their operating position as shown in Figure 1. The member 10 includes a copper member 28 to enclose and isolate the contacts 27 from the ink vapours normally present in the nip area. The other ends of the spring loaded contacts 26 are then electrically coupled to a charging circuit via contacts 27. A suitable charging circuit is described in International Patent Application WO84/03068.

Figure 2 illustrates the blade 11 in the non-operating position, ie. removed from electrical contact with the impression roll 1 and its respective spring loaded contact 26 by being pivoted about pivot pin 20. Since the blades 11 to 18 are individually mounted to the cross-member 10 they can be lifted away from electrical contact with the impression roll 1 at those areas where a web is not present, thereby reducing current leakage. This is useful where, as shown in Figures 3 and 4, the width of the web 8 is substantially less than the width of the impression roll 1. Advantageously the positioning of the blades 11 to 18 is such that any of the blades 11 to 18 which extend beyond the width of the web 8 being used may be moved out of electrical contact with the impression roll 1. That is blades 13 to 16, are kept in the operating position so that they electrically contact via the fibres 24 the area of the impression roll 1 which directly contacts the web 8, while the blades 11, 12, 17 and 18 which would in the operating position electrically contact via the fibres 24 the area of the impression roll 1 which directly contacts the gravure cylinder 2 are moved away, by being pivoted into the disengaged position.

Preferably the distance or gap between each pair of the blades 11 to 18 is in the order of about 3 to 10 mm.

Filaments 24 are ultrafine to substantially prevent any wear occurring to the semiconducting surface 7 of the impression roll 1.

Claims

1. Apparatus for use in a gravure press, the apparatus comprising an electrically semiconducting impression roll (1) and a plurality of laterally spaced electrical contacts (11 - 18) contacting the surface of the impression roll (1), the plurality of spaced contacts (11 - 18) being connected to a power source, in use, to enable a charge to be applied to the surface of the impression roll (1) by each contact wherein the spaced contacts (11 - 18) comprise a plurality of deflectable electrically conductive filaments (24).

2. Apparatus according to claim 1, wherein the deflectable conductive filaments (24) are placed in pressure contact with the impression roll (1).

3. Apparatus according to claim 1 or claim 2, wherein the conductive filaments (24) are fabricated from stainless steel.

4. Apparatus according to any of the preceding claims, wherein the conductive filaments (24) are bristles.

Fig.1.

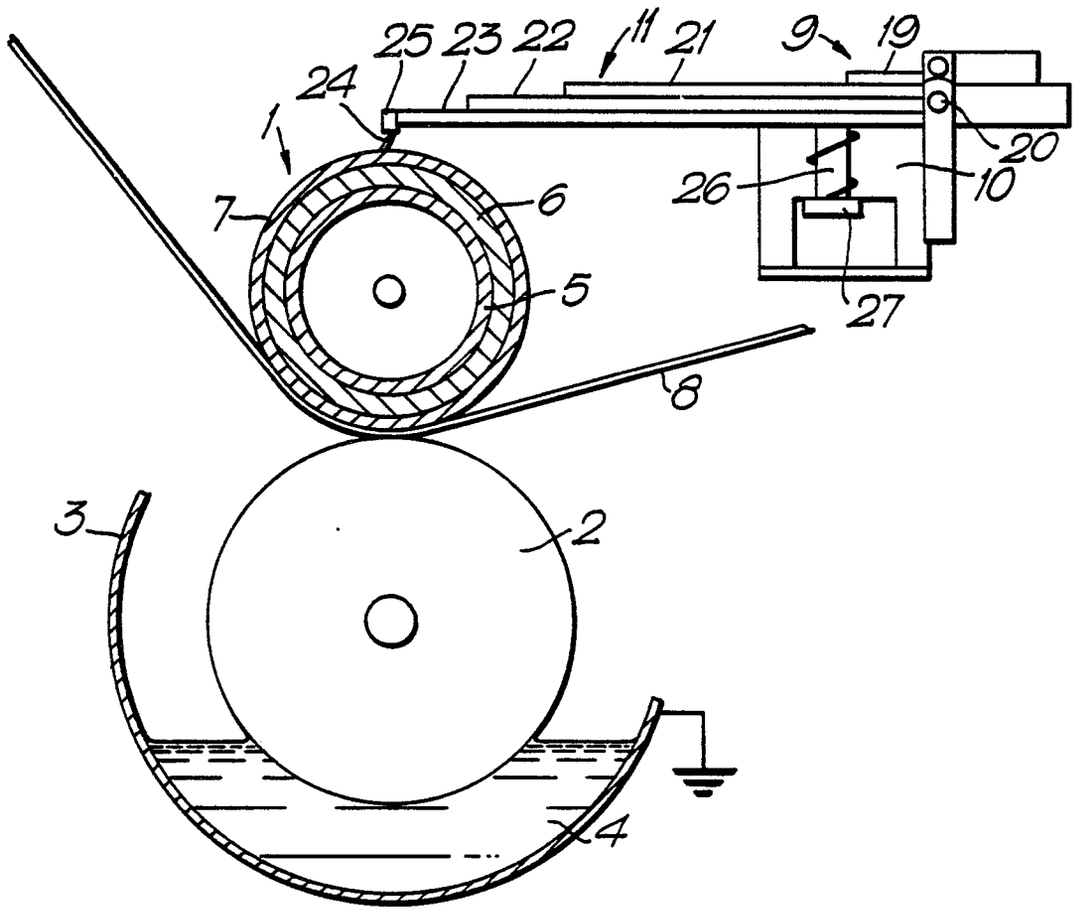

Fig. 2.

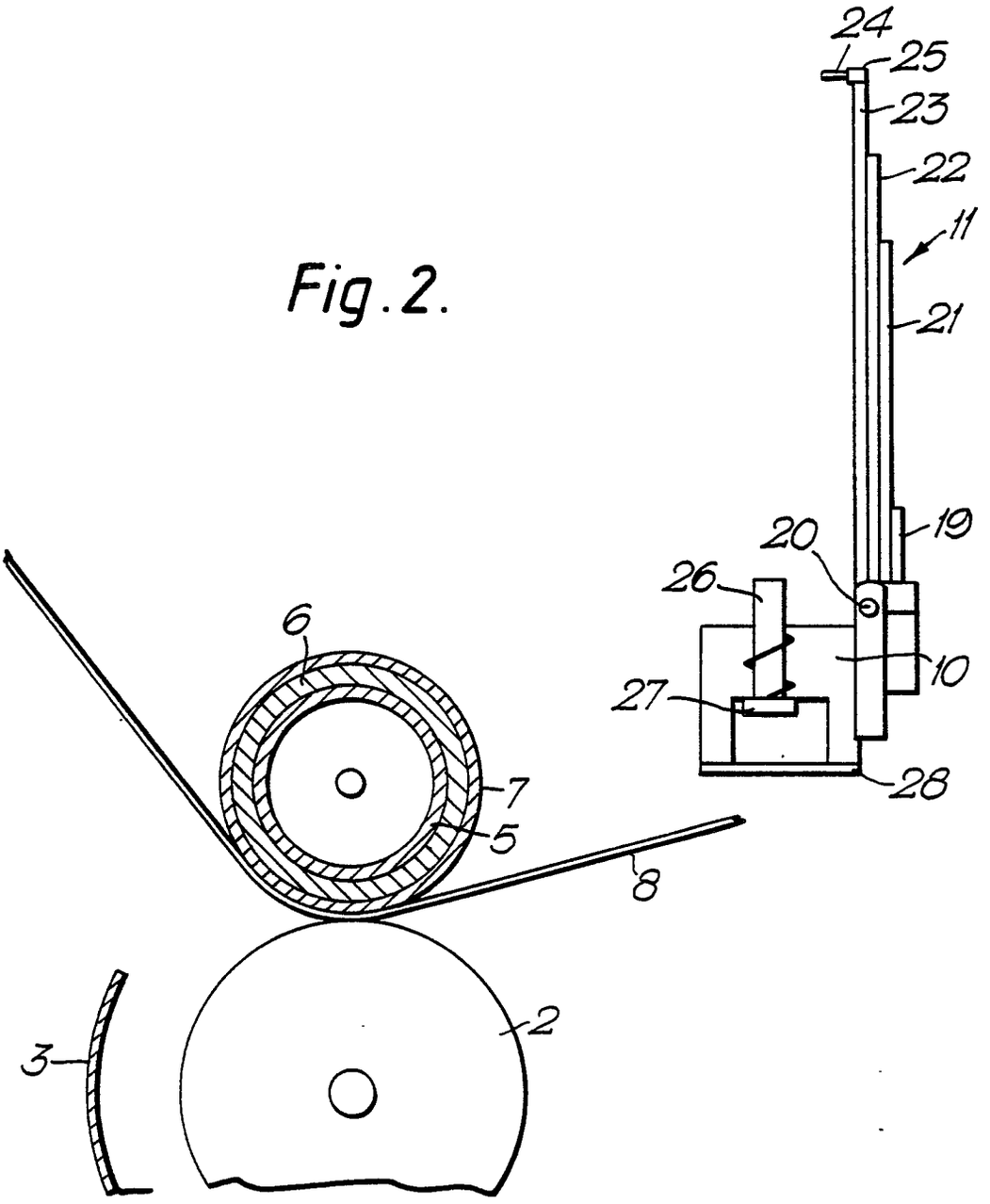

Fig.3.

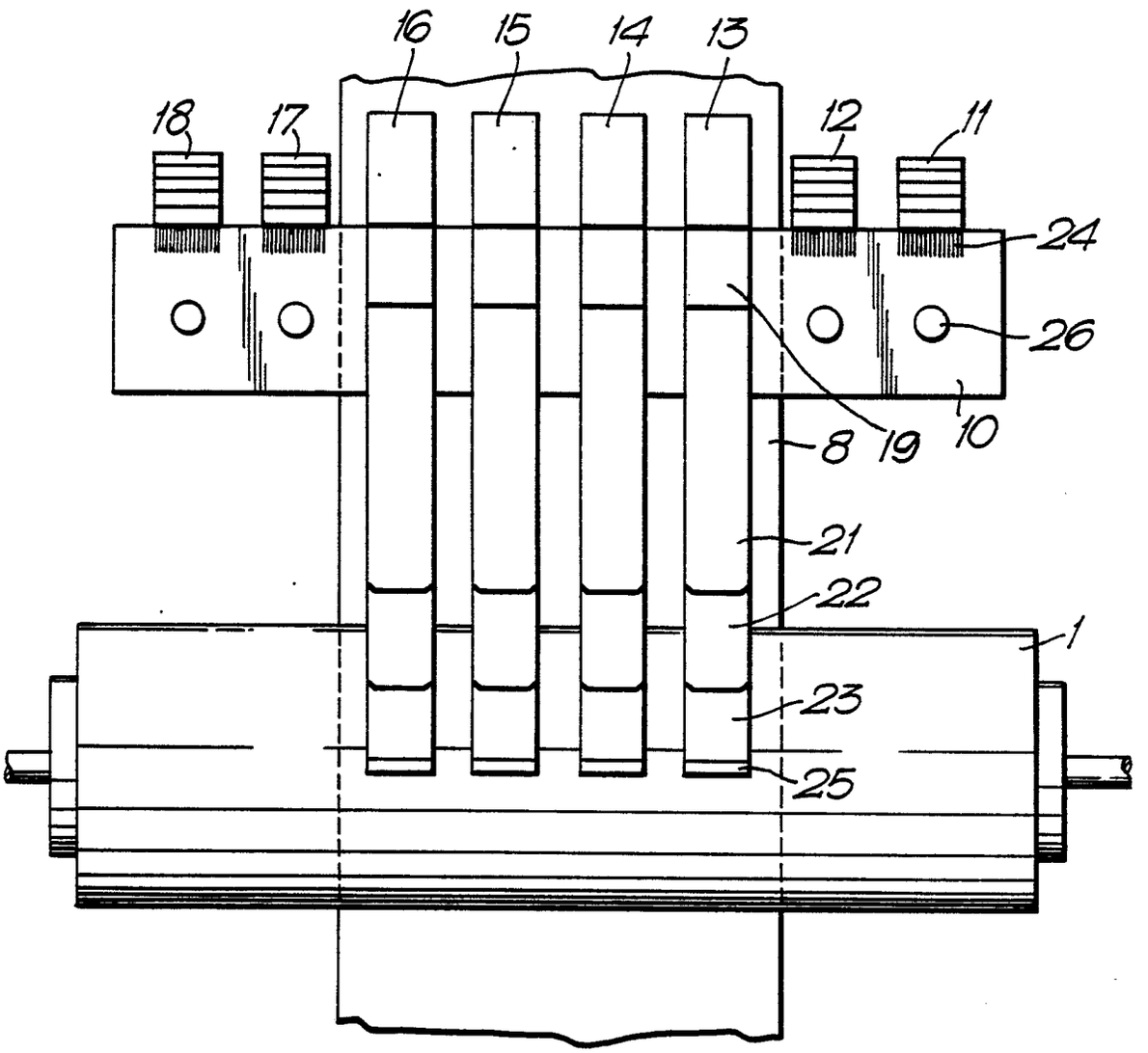

Fig. 4.