

"APPARATUS FOR EARTHING THE INK RIBBON OF AN INK
RIBBON CASSETTE"

The present invention relates to apparatus for earthing the ink ribbon of an ink ribbon cassette.

Nowadays, in a printer or a typewriter, the case and many other parts of an ink ribbon cassette are made of synthetic resin. It is therefore necessary to provide a means for preventing a build up of static electricity which is produced by friction between the ink ribbon of the cassette and guide rollers and other parts of the cassette. Once static electricity occurs, smooth operation of the ink ribbon is impaired and the printer or the typewriter may operate erroneously due to discharge of the accumulated static electricity.

In order to prevent the disadvantages due to static electricity, it has in the first place been suggested to provide an earth point at a print head so that electric current may flow from the earth point to a chassis through a flexible flat cable. It has also been suggested that an earth point should be provided in an ink ribbon cassette, the earth point being designed to contact a chassis when the ink ribbon cassette is set in position in the chassis.

In the first-mentioned suggestion in which an earth point and a flat cable are employed, the number of wires in the flat cable are increased and width of the flat cable

is also increased, resulting in high cost. In the second-mentioned suggestion in which an earth point is provided in the ink ribbon cassette, there will be a mechanical contact point between the earth point and the chassis, and such a structure is liable to have insufficient electrical contact, while the number of parts is increased.

According to the present invention, there is provided an apparatus comprising an electrically conductive frame provided with support means for supporting an ink ribbon cassette, the support means being electrically conductive and being in electrical contact with the frame; at least one electrically conductive earthing post which is mounted on and in electrical contact with the support means; and an ink ribbon cassette mounted in the support means, the earthing post or posts extending through a hole or holes in the ink ribbon cassette and making direct mechanical and electrical contact with an ink ribbon in the ink ribbon cassette.

Preferably the ink ribbon cassette has a case of synthetic resin material.

The apparatus of the present invention enables the earthing to be performed effectively by means which are simple in structure and can be fabricated with a small number of parts.

The support means preferably comprises at least one support plate. Thus there may be two spaced apart support plates for supporting opposite ends of the ink ribbon cassette, each support plate being provided with a respective earthing post.

The or each hole is preferably of non-circular, elongated shape in cross section.

The ink ribbon cassette may have a resilient flange or flanges each of which is provided with a projection arranged to enter an aperture or recess in the support means so as to be releasably retained therein.

There are preferably means for subjecting the ink ribbon to tension.

The invention also comprises a printer or typewriter provided with apparatus as set forth above.

The invention is illustrated, merely by way of example, in the accompanying drawings, in which:-

Figure 1 is a plan view of an apparatus according to the present invention having support plates for supporting an ink ribbon cassette, the support plates being secured to a chassis,

Figure 2 is a plan view of the ink ribbon cassette with its upper case removed,

Figure 3 is a sectional view taken on the line A-A in Figure 2, and

Figure 4 is a sectional view taken on the line B-B in Figure 2.

In Figure 1 there is shown a printer having a frame or a chassis 1 which is made of electrically conductive material.

Two spaced apart support plates 2, 3, for supporting opposite

ends of an ink ribbon cassette 10, are secured to opposite sides of the chassis 1. The support plates 2, 3 are also made of electrically conductive material and are in electrical contact with the chassis 1. An earthing post 4, which is made of electrically conductive material, is mounted on and in electrical contact with the support plate 2 and is retained in position by deformation or caulking. The support plate 2 is provided at spaced apart points with two engagement members 5, 6 which project from the support plate 2. The support plate 3 is also provided with an earthing post 7 and engagement members 8, 9.

Referring to Figure 2, a lower case 11 of the ink ribbon cassette 10, which, like the upper case thereof (not shown) is made of synthetic resin material, is provided with two holes 12, 13 through which the earthing posts 4, 7 respectively extend, the holes 12, 13 being of non-circular elongated shape in cross-section. The ink ribbon cassette 10 is provided at four places with engagement projections 14, 15, 16, 17 each of which is arranged to enter a respective aperture or recess 33 (Figure 4) in the respective engagement members 5, 6, 8, 9, thereby fixing the ink ribbon cassette 10 on the support plates 2, 3. Each of the engagement projections 14, 15, 16, 17 is provided adjacent the outer end of a resilient flange portion 34 of

the lower case 11. When the ink ribbon cassette 10 is set in position on the support plates 2, 3, the earthing posts 4, 7 protrude through the holes 12, 13 respectively. The reason the holes 12, 13 are not round holes and are rather long in cross section is that the case of the ink ribbon cassette 10 is made of synthetic resin and some allowance or play is required because there may be shrinkage of the synthetic resin.

The ink ribbon cassette 10 is further provided with an ink cartridge 18, transfer rollers 19, 20 and a biasing roller 21. An ink ribbon 22 is driven forwardly passing between the transfer roller 20 and the biasing roller 21 as the transfer roller 20 rotates. The ink ribbon 22 is formed as an endless ribbon and is supported by guide rollers 23, 24, 25, 26, 27, 28, 29 and a guide pin 30 so as to adopt a zigzag configuration. The guide roller 26 is rotatably supported on a slide member 31. A coil spring 32 is secured at one end thereof to the slide member 31 and is secured at its other end thereof to a pin fixed on the lower case 11. Thus the slide member 31 is always urged leftwards as seen in Figure 2 and the ink ribbon 22 is thus always kept tight. The earthing posts 4, 7 mounted on the support plates 2, 3 protrude into the cassette case to make direct mechanical and electrical contact with the ink ribbon 22.

In operation, as the printing operation begins, the

ink ribbon 22 frictionally contacts both a print head
(not shown in the drawings), and also the guide rollers
23-29 and the guide pin 30 to produce static electricity.
However, there is no build up of static electricity in
5 the ink ribbon 22 since the latter is earthed down to the
chassis 1 through the earthing posts 4, 7 and through the
support plates 2, 3. Thus when the ink ribbon cassette 10
is mounted in position on the support plates 2, 3, the
earthing posts 4, 7 extend through the holes 12, 13 and make
10 direct mechanical and electrical contact with the ink ribbon 22.

In the embodiment described above two earthing posts
4, 7 are provided but the number of such posts is not
critical.

According to the present invention earthing can be
15 effectively performed since the earthing posts 4, 7
fixed on the support plates 2, 3 directly contact the
ink ribbon. It is therefore unnecessary to provide
earthing points in the ink ribbon cassette 10 so that the
number of parts of the latter can be reduced.



C L A I M S

1. Apparatus comprising an electrically conductive frame provided with support means for supporting an ink ribbon cassette, the support means being electrically conductive and being in electrical contact with the frame;
5 at least one electrically conductive earthing post which is mounted on and in electrical contact with the support means; and an ink ribbon cassette mounted on the support means, the earthing post or posts extending through a hole or holes in the ink ribbon cassette and making direct
10 mechanical electrical contact with an ink ribbon in the ink ribbon cassette.
2. Apparatus as claimed in claim 1 in which the ink ribbon cassette has a case of synthetic resin material.
3. Apparatus as claimed in any preceding claim in
15 which the support means comprises at least one support plate.
4. Apparatus as claimed in claim 3 in which there are two spaced apart support plates for supporting opposite ends of the ink ribbon cassette, each support plate being
20 provided with a respective earthing post.
5. Apparatus as claimed in any preceding claim in which the or each hole is of non-circular, elongated shape in cross-section.



- 5 6. Apparatus as claimed in any preceding claim
in which the ink ribbon cassette has a resilient flange or
flanges each of which is provided with a projection arranged
to enter an aperture or recess in the support means so
as to be releasably retained therein.
7. Apparatus as claimed in any preceding claim
in which there are means for subjecting the ink ribbon
to tension.
- 10 8. Apparatus for earthing the ink ribbon of an
ink ribbon cassette substantially as hereinbefore
described with reference to and as shown in the
accompanying drawings.
9. A printer or typewriter provided with apparatus
as claimed in any preceding claim.
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