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ELECTRICAL CONTACT ROLL

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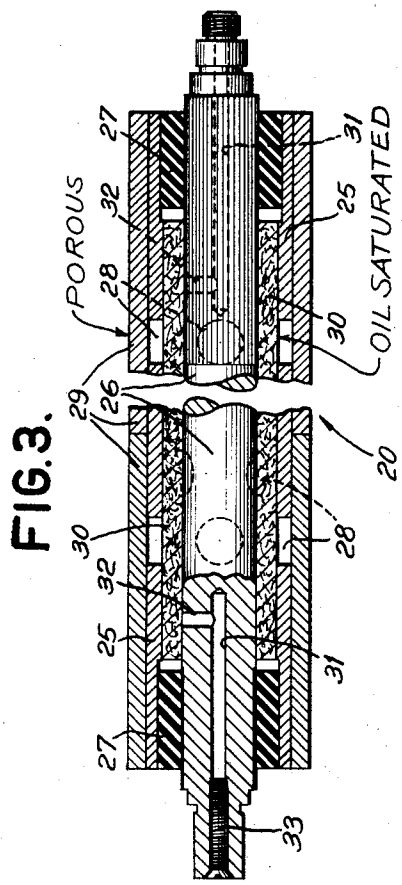


FIG. 3.

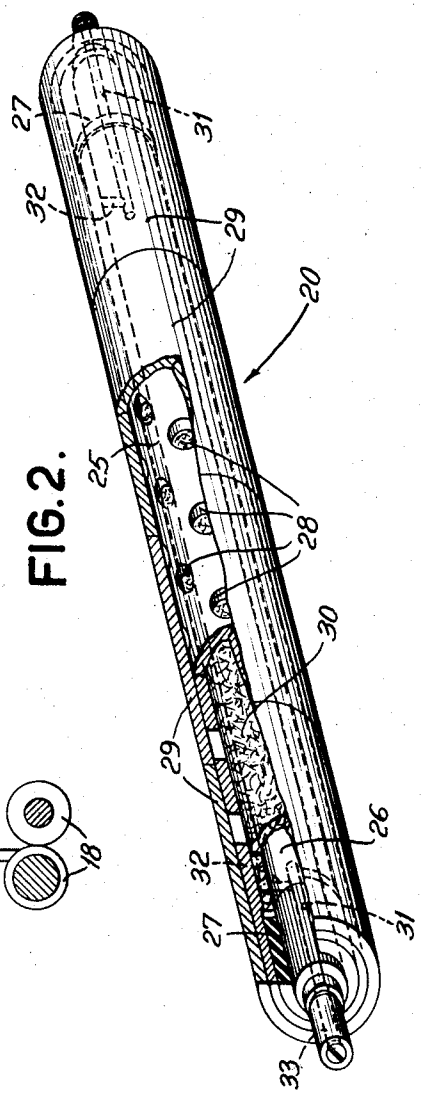


FIG. 2.

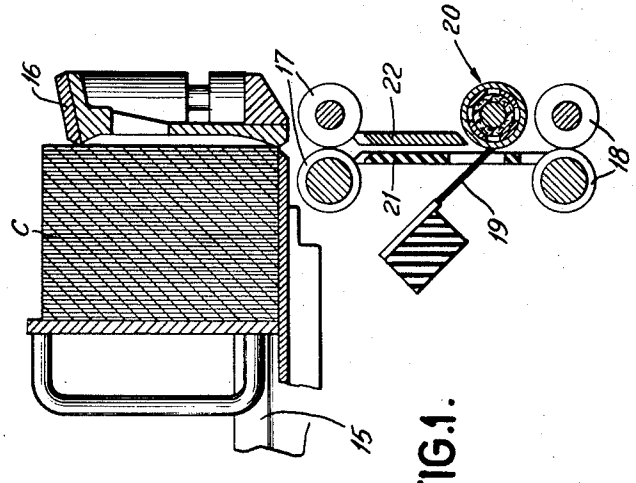


FIG. 1.

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ELECTRICAL CONTACT ROLL

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4 Claims. (Cl. 200—46)

This invention relates to improvements in electrical contact rolls, and more particularly to such contact rolls adaptable for use in electrically controlled statistical or similar machines.

In machines of this type, it is well known, that common contact rolls are provided to cooperate with a plurality of sensing or electrically conducting elements, such as metallic brushes, in order to complete the electrical connections of the circuits, associated with the said brushes, whenever the latter are permitted to engage the associated contact roll through the perforations in a control sheet or statistical card.

It is a known fact, that, the normal and average life of a contact roll is unduly limited, and that, after repeated usage, the said contact roll becomes burned or scored sufficiently to cause electrical contact failures between the roll and related brushes. Throughout this specification, by reference to the term "contact roll burning" or the like, it is meant, that condition ultimately produced on the usual contact roll which causes electrical conductivity failures between the contact roll and brushes, and which condition has sufficient deteriorating effects on the contact roll to impair its life or length of useful service. It has been determined, by experiment, that contact roll burns, in effect, are comparable to electrical insulating layers of elements, and are produced by many and varied factors; however, such burns, it can be said, are commonly caused by one or more of the following: (1) arcing conditions due to the making or breaking of current carrying circuits connected to the sensing brushes, (2) paper dust created by the friction of the sensing brushes and the constantly engaged cards or sheets, (3) metallic dust caused by the friction between the sensing brushes and the cards, and the common contact roll. Other known contributing factors for causing contact roll burns can be traced to the materials comprising the sensing brushes and contact rolls, the kind of paper stock used in the control sheets or statistical cards, and the amount of tension to which the sensing brushes are subjected.

Accordingly, an object of the present invention is the provision of an improved contact roll whereby the conductivity characteristics between the contact roll and related sensing brushes are improved.

Another object of the present invention is the provision of an improved contact roll whereby the burning of contact rolls, and similar deteriorating effects, are lessened to a marked degree.

Another object of the present invention is the provision of an improved contact roll whereby the average life thereof or period of useful service is greatly increased.

Still another object of the present invention resides in the provision of an improved contact roll for overcoming the above-mentioned conditions instrumental in producing contact roll burning.

To attain these and other objects, it is suggested to provide contact rolls having suitable means associated therewith, or incorporated therein, for maintaining a film of oil on the surface of the contact roll. It has been discovered, and determined by experiments, that, in record controlled machines of the type referred to, a film of oil on the surface of a contact roll prevents the formation of the elements constituting a non-conductive or insulating layer on the contact roll, and prevents the deposit of any such elements on the said roll whenever produced, or, in short, prevents burning of the contact roll. The following reasons are ascribed for eliminating contact roll burning by employing an oil film on a contact roll: (1) the presence of oil on a contact roll tends to coat the minute sheet or card and metal particles with oil thereby preventing oxidation of such particles, (2) oiled sheet or card dust becomes a fair electrical conductor in a high voltage arc, and whenever present does not produce an insulating layer on the contact roll, (3) the presence of oil on a contact roll reduces the amount of friction between the sensing brushes and contact roll and also between the said brushes and sheet or card, thereby reducing the amount of sheet or card and metallic dust produced, and (4) the presence of oil on a contact roll treats the surface thereof so as to prevent any sheet or card dust or metallic oxides from becoming imbedded in the contact roll thus, preventing the growth of any electrical insulating layer on the said roll.

It is believed by applicants, that they are the first in this art to discover and suggest the use of oil on contact rolls in record controlled machines of the type mentioned, and to discover that the presence of an oil film on contact rolls very effectively overcomes and substantially eliminates the defective conditions existing in such machines up to this time, and enumerated hereinabove. It has been found, that the film of oil can be maintained on a contact roller by several methods for successively improving the conductivity characteristics of used contact rolls. One such method constitutes the use of sheets or cards impregnated with oil, another method comprises the use of oil imparting means, such as an oil feed-

ing system, whereby the oil film is applied externally to the surface of the contact roll, and another method comprises the use of porous metallic materials, in the contact roll, which are impregnated with or capable of being impregnated with oil. The last mentioned method is preferred, wherein the oil imparting means are incorporated within the contact roll, and will be dealt with in detail, hereinbelow.

Accordingly, another object of the present invention resides in the provision of an improved contact roll having means cooperating therewith for imparting a film of lubricant, such as oil, to said roll.

Still another object of the present invention resides in the provision of an improved contact roll comprising porous electrical conducting material capable of being impregnated with a suitable lubricant.

Other objects of the invention will be pointed out in the following description and claims and illustrated in the acompanying drawing, which discloses by way of example, the principle of the invention and the best mode, which has been contemplated, of applying that principle.

In the drawing:

Fig. 1 is a view, partially in section, of a well known form of statistical card feeding mechanism.

Fig. 2 is an isometric view, several sections in partial sections, of an improved contact roll employed in the mechanism shown in Fig. 1.

Fig. 3 is a sectional view of the improved contact roll.

Before describing the preferred type of contact roll in detail, it might be well to describe briefly one form of well known mechanism in which the suggested contact roll is employed.

With reference now to Fig. 1, a statistical card feeding mechanism, of the type shown and described in U. S. Patent No. 1,976,617, is seen to comprise a feed hopper generally indicated by the reference character 15, in which the perforated statistical cards C are placed. From the feed hopper the cards are fed downwardly, one by one, by card picker 16 so that the leading edge is moved into cooperation with a pair of feed rollers 17, and thence downwardly past the pair of feed rollers 18 to a stacker mechanism (not shown). Between the said pairs of feed rollers are located sensing brushes 19 (of suitable electrically conductive material) which cooperate with the contact roll, generally indicated by the reference character 20 for sensing the perforations in the record cards, in order to complete the electrical circuits connected to the said brushes, thereby controlling data manifesting units in the machine in accordance with the data sensed on the cards. Since such control circuits associated with the sensing brushes are not pertinent to the present invention, they are not shown herein. The said cards are directed from one pair of rollers to the other past the sensing station consisting of the said brushes and contact roll by means of suitable card guide plates 21 and 22.

Referring now to Figs. 2 and 3 the improved contact roll will now be described in detail. A tubular sleeve 25 of suitable material is provided, which is suitably secured to shaft 26 by means of the annular sleeves 27 which are snugly pressed or fitted on the shaft and into both ends of sleeve 25. The said sleeve, in practice, is preferably formed from seamless steel tubing, and is provided with a plurality of spirally arranged holes or perforations 28. The annular sleeves, preferably are formed from suitably insulating material, such as laminated phenolic tubing. The said shaft, near its ends, is knurled or fluted, thus ensuring a fixed assembly of the said tubular sleeve 25, annular sleeves 27 and shaft 26. The tubular sleeve 25 is covered or surrounded with a suitable porous and electrically conductive material 29, which material must be capable of being impregnated with a suitable lubricant, such as oil. In practice, porous bronze material of approximately 18% porosity has been found to be extremely satisfactory, however, if desired, other porous metallic materials may be used, particularly those of the copper alloy group. The said porous electrically conducting material can be formed in a single solid tube and be suitably secured to the said sleeve, or as shown, can be divided into a plurality of tubular sections (four individual sections being shown in Fig. 2) which are then forced, in endwise fashion, on the perforated sleeve 25. The said porous sections are then impregnated with a suitable lubricant, such as the standard rated SAE 50 oil. For commercial purposes, it may be desirable to assemble the said perforated sleeve and porous bronze sections, and then impregnate the said sections with oil.

In order to insure a sufficient supply of oil for a long period of time, the space between the shaft 26 and the inner periphery of the perforated sleeve 25 is filled with a suitable absorbent material 30 which is saturated with oil. For this purpose, it was found that wool batting is suitable and satisfactory. In this manner, a constant oil film is provided on the outer surface of the contact roll for many thousands of cyclic operations of the record controlled machines referred to hereinabove. It should be obvious, from the above mentioned fittings between the perforated sleeve 25 and annular sleeves 27, and the latter and shaft 26, that, these connections are sufficiently snug, so that leakage of the mentioned lubricant through the said connections is not possible. In the event, it is necessary to replenish the supply of oil, after installation of the contact roll in a machine, suitable supply channels are provided in each end of shaft 26, such as the axial bore 31 and interconnecting radial bore 32, which are normally plugged, by means such as screw 33.

While there have been shown and described and pointed out the fundamental novel features of the invention as applied to a single modification it will be understood that various omissions and substitutions and changes in the form and details of the device illustrated and in its operation may be made by those skilled in the art, without departing from the spirit of the invention. It is the intention, therefore, to be limited only as indicated by the scope of the following claims.

What is claimed is:

1. An electrical contact roll of the character described comprising a shaft and a perforated tubular sleeve member, means for securing the latter to said shaft, a plurality of individual porous bronze sections secured in endwise fashion to said sleeve, said bronze sections capable of being impregnated with oil, and absorbent material packed between said shaft and sleeve member, said absorbent material being saturated with oil for maintaining a film of oil on the surface of the contact roll.

2. The invention set forth in claim 1 wherein

the said bronze sections have substantially 18% porosity characteristics.

3. An electrical contact roll of the character described comprising a shaft and a perforated tubular sleeve member, means for securing the latter to said shaft, electrically conductive porous material secured to said sleeve, said material capable of being impregnated with a lubricant, and absorbent material packed between said shaft and sleeve member, said absorbent material being saturated with the mentioned lubricant for maintaining a film of said lubricant on the surface of the contact roll.

4. An electrical contact roll of the character described comprising a tubular member consisting of electrically conductive porous material and capable of being impregnated with a lubricant, absorbent material capable of being saturated with said lubricant, disposed within said tubular member, and means for maintaining the said material disposed within the tubular member.

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