Nov. 7, 1933. J. S. BELTZ 1,933,651

ELECTRIC CURRENT GROUNDING DEVICE

Filed April 3, 1929 2 Sheets-Sheet 1

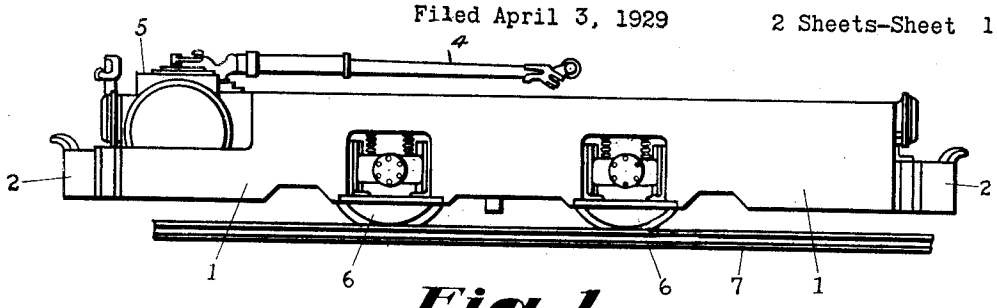


Fig. 1

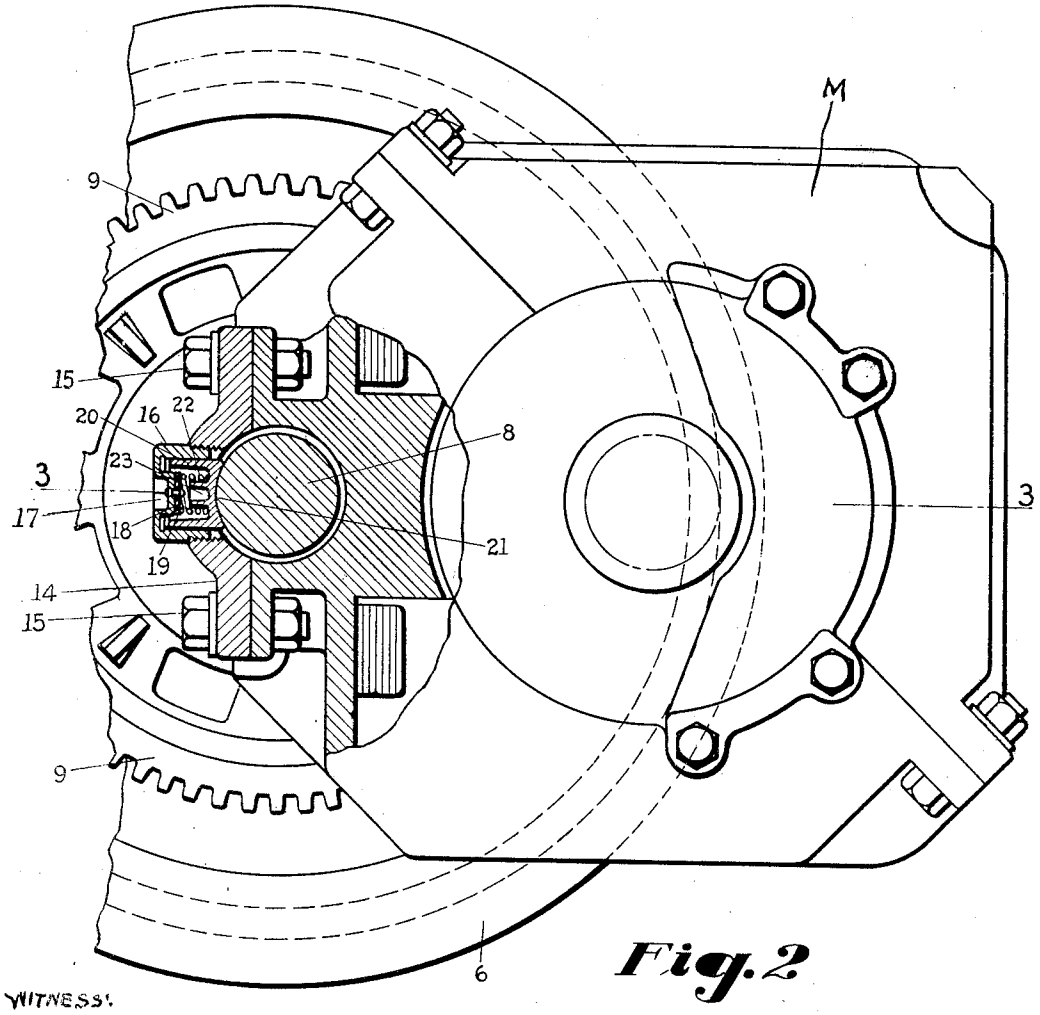


Fig. 2

WITNESS:
J. W. Barnhart.

Inventor
John S. Beltz
By Lueders, Bryant & Worley
Attys.

Nov. 7, 1933. J. S. BELTZ 1,933,651

ELECTRIC CURRENT GROUNDING DEVICE

Filed April 3, 1929 2 Sheets-Sheet 2

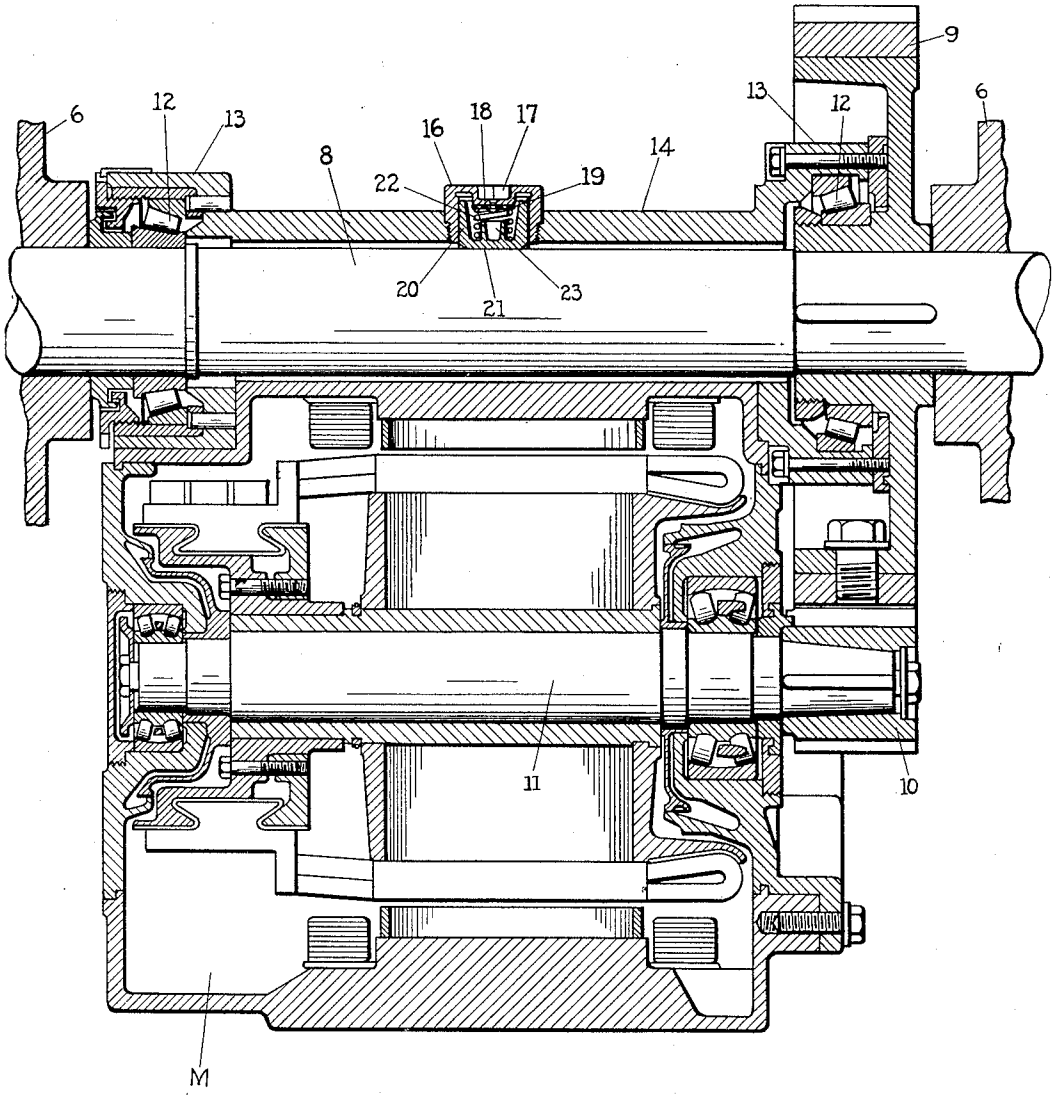


Fig. 3

WITNESS:

J. W. Barnhart.

Inventor
Julius S. Beltz
By Lenhuman, Dupuis & Warfield
Attys

Patented Nov. 7, 1933 1,933,651

UNITED STATES PATENT OFFICE

1,933,651

ELECTRIC CURRENT GROUNDING DEVICE

John S. Beltz, Columbus, Ohio, assignor to The Jeffrey Manufacturing Company, Columbus, Ohio, a corporation of Ohio

Application April 3, 1929. Serial No. 352,282

8 Claims. (Cl. 105—49)

This invention relates to new and useful improvements in electrical current grounding devices of the type particularly applicable to railway vehicles.

It is a primary object of this invention to provide an electric contact device which will shunt or by pass the negative or ground currents of an electric circuit around anti-friction bearings normally in the path of such ground currents in order to prevent a passage of the same through such anti-friction bearings. When current is permitted to pass through such anti-friction bearings which are very slightly worn, arcing necessarily takes place and the anti-friction rollers, balls or the like as well as other parts of the bearing become pitted and destroy all smoothness of operation of the bearings.

Another object of the invention is to provide a device of the above character which is of simple and durable construction and which can be readily and inexpensively installed without interference with other parts of the apparatus with which it is associated.

A still further object of the invention is to provide such devices with automatic wear compensating instrumentalities to maintain efficient electrical connections between the parts with which it is associated.

Other objects and advantages of the invention will become apparent during the course of the following description.

In the accompanying drawings forming a part of the application and wherein like numerals are employed to designate like parts throughout the several views,

Figure 1 is a side elevation of an industrial electric locomotive especially adapted for use in coal or other mines, equipped with the devices of my invention.

Figure 2 is an end elevation of an electric motor for driving a locomotive, and illustrated with parts broken away to reveal the invention, and

Figure 3 is a horizontal sectional view taken on the line 3—3 of Figure 2 illustrating a portion of the axle shaft upon which the traction wheels of the locomotive are mounted.

Referring now more particularly to the drawings, I have illustrated a locomotive of the well known type especially adapted for use in coal and other mines, which is equipped with the devices of my invention. As here illustrated and as more particularly described in the pending application of Frederick C. Coseo for Axle journal bearings, Serial No. 350,366, filed March 27, 1929, the numeral 1 designates the side frames of a locomotive, which frames are preferably formed of rolled steel slabs and which are joined together by suitable end frames 2 to form a rigid hollow rectilinear frame within which is mounted the operating parts of the locomotive. The locomotive here illustrated is equipped with suitable electric motors, of the type described in the pending application of Nils D. Levin, Serial No. 549,765, filed July 9, 1931, one of which motors is designated by the letter M, which is furnished electric current through a suitable trolley pole 4 and is controlled by the electric controller 5 positioned convenient to the hand of the operator in a manner which is well understood in the art. It is to be understood, however, that any other suitable power devices may be substituted for the electric equipment here illustrated, since these devices form no part of the present invention. The locomotive above described is mounted upon traction wheels 6 adapted to rest upon and travel along the rails 7 of a suitable track, and these wheels are attached to axles 8, which are driven by a spur gear 9 keyed to the axle meshing with a pinion 10 carried by the armature shaft 11 of the motor M, whereby the locomotive may be propelled along the trackway.

The spur gear 9 has its hub mounted by an anti-friction bearing 12 of any suitable type housed within a cup extension 13 formed upon a suspension bearing housing or sleeve 14 in which the axle shaft 8 is mounted and spaced therefrom as clearly shown in Figures 2 and 3. The other end of this suspension bearing housing is formed with a second cup extension 13 which receives a roller bearing 12 forming a bearing for the axle shaft 8. The ends of this axle shaft are mounted in roller bearings in axle boxes movable vertically as fully disclosed in the copending application of Nils D. Levin for Motor suspensions, Serial No. 350,635, filed March 28, 1929 of which the above mentioned Levin application Serial No. 549,765 is a division.

The suspension bearing housing 14 forms a detachable part of the field frame of the motor held in spaced relation around the axle 8 by means of bolts 15, as best seen in Figure 2. Ordinarily, the ground or negative current passes from the extension bearing housing through the roller bearings 12, into the axle shaft 8 and is thus grounded through the wheels of the locomotive and rails of the trackway. I propose to alter the normal path of the negative current and shunt it directly through the axle shaft to prevent its

passage through the anti-friction bearings and thereby prevent the detrimental effects of arcing in worn bearings. This object may be accomplished in several ways of offering a path of least resistance to the ground or negative current whereby it will not seek to pass to the ground by way of the anti-friction bearings and one of these ways is to establish a highly conductive contact between the extension bearing housing 14 and the axle shaft 8. Instead of grounding the current through the traction wheels, it may be returned to the source by a conductor leading from such a contact device or field frame back to the generator.

In the present illustration, the preferred type of contact device between the suspension bearing housing 14 and the axle shaft 8 consists of a cap 16 of bronze or any other suitable conductive material having its open end exteriorly screw threaded to be screwed into a threaded aperture in the extension bearing housing 14. This cap is provided with a polygonal socket or depression 17 in which a wrench may be inserted and which provides the interior of the cap with a concentric inwardly extending boss 18 to the inner surface of which may be secured, by any suitable means, an insulating washer 19. Positioned within the cap or plug 16 and having a snug sliding fit therein, is an element 20 of bronze or any other suitable conductive material, the fit between these parts being sufficient to establish a proper electrical connection between the two. As best seen in Figure 2, the outer end of the element 20 which projects beyond the cap, is provided with an arcuate bearing and contact surface 21 for wiping engagement with the axle shaft 8. This bearing surface is constantly pressed into firm contact with the axle shaft by means of a coiled spring 22, one end of which abuts the insulating washer 19, while the other end abuts the cup-shaped element 20 and surrounds an inwardly extending hollow stud 23 formed on the element 20. Thus, it will be seen that a highly conductive contact is established between the axle shaft 8 and the extension bearing housing 14, so that the ground current will be induced to travel directly from the extension bearing housing to the axle shaft and will thereby be prevented from passing through the anti-friction bearings 12 to such an extent as to cause pitting of the rollers.

It is to be understood that various changes in the construction and arrangement of parts may be resorted to without departing from the spirit of the invention and the scope of the appended claims.

What I claim is:

1. In a machine of the class described, the combination of an electrical circuit including a conductor frame, a shaft mounted therein, an anti-friction bearing between said shaft and frame, and a conductor forming a ground circuit connection between said frame and shaft and engaging the shaft between its end to prevent the passage of current through said bearing.

2. In a machine of the class described, the combination of an electrical circuit including a conductor frame, a shaft mounted therein, an antifriction bearing forming a conductor connection between said shaft and frame, and a conductor forming a ground circuit connection between said frame and shaft and engaging the shaft between its ends to form a path of less resistance than through said bearing to prevent the passage of current through said bearing.

3. In a machine of the class described, the combination of an electrical circuit including a conductor frame, a shaft mounted therein, a roller bearing forming a conductor connection between said shaft and frame, and a conductor forming a ground circuit connection between said frame and shaft and engaging the shaft between its ends to be arranged in the path of least resistance to said current to prevent the passage of current through said roller bearing.

4. In a machine of the class described, the combination of an electrical circuit including a conductor frame, a shaft mounted therein, an anti-friction bearing between said shaft and frame, and a yielding conducting member carried by said frame and engaging said shaft between its ends to form a path of lesser resistance to the passage of electric current than through said anti-friction bearing to prevent the passage of current through said anti-friction bearing.

5. In a machine of the class described, the combination of an electrical circuit including a conductor frame, a shaft mounted therein, an anti-friction bearing between said shaft and frame at one end of said shaft, a contact member carried by said frame between the ends of said shaft, a spring to force said contact against said shaft, and means to prevent currents passing through the spring.

6. In an electric locomotive having a circuit grounded through the axle and wheels thereof, an axle housing through which current passes to said axle, anti-friction bearings between said housing and axle at the ends thereof, and a conductor forming a ground circuit connection between said housing and axle at a point intermediate the ends of said axle to present a path of less resistance to the grounding current than is offered to the current through said bearings.

7. An electrical contactor comprising two telescoped conductive tubular members having closed outer ends, and a compression spring within said members and acting to expand the same, one of said ends having an inner lug extending within the spring to position the same.

8. An electrical contactor comprising two telescoped conductive tubular members having closed outer ends, a compression spring within said members and acting to expand the same, one of said ends having an inner lug extending within the spring to position the same, and an insulating washer between the other end and the spring.

JOHN S. BELTZ.