Jan. 7, 1941. B. W. BENBOW 2,227,625

TRAVELING ELECTRICAL CONTACTOR

Filed July 18, 1938 2 Sheets-Sheet 1

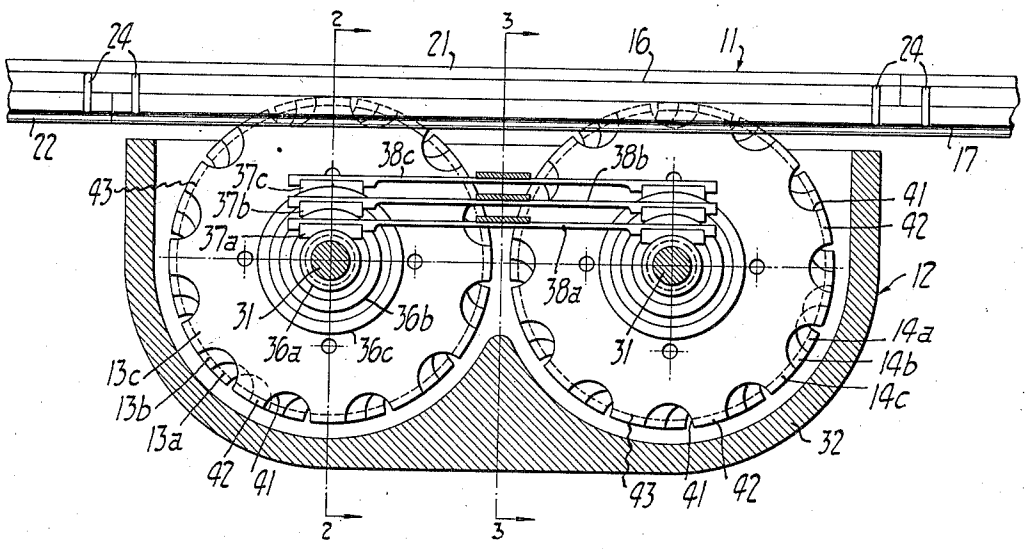


FIG_1_

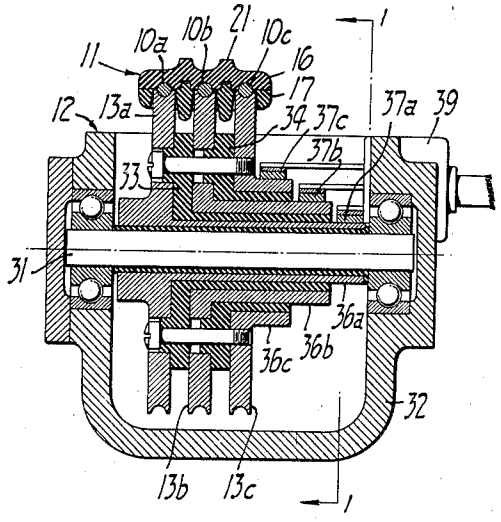


FIG_2_

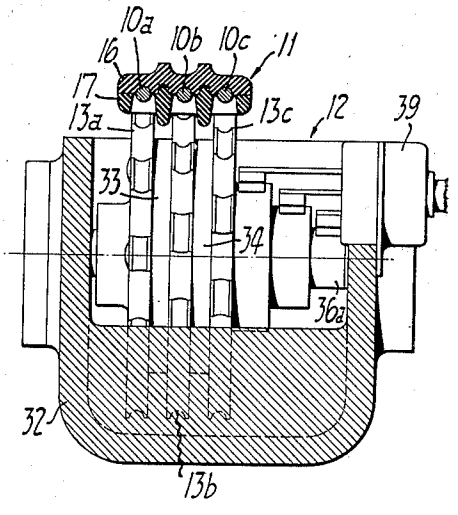


FIG_3_

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TRAVELING ELECTRICAL CONTACTOR

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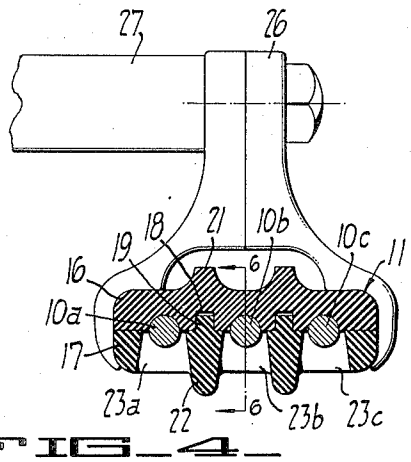


FIG_4_

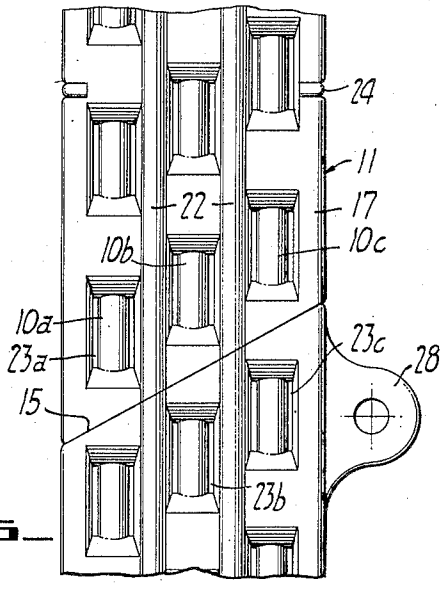


FIG_5_

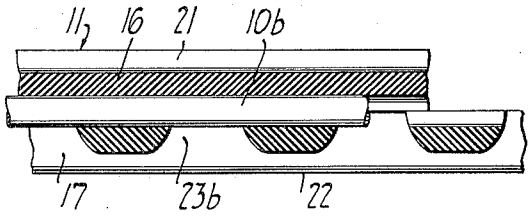


FIG_6_

FIG_8_

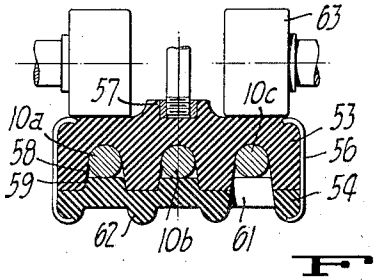


FIG_7_

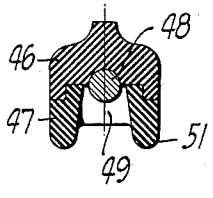
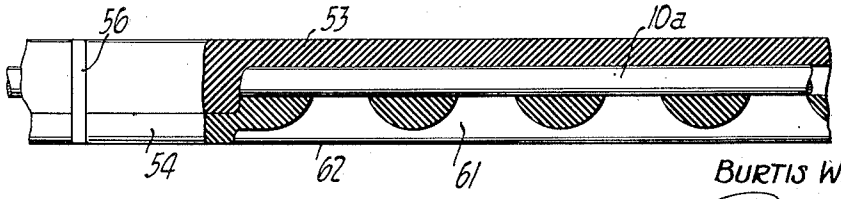


FIG_9_



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UNITED STATES PATENT OFFICE

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TRAVELING ELECTRICAL CONTACTOR

Burtis W. Benbow, Benbow, Calif.

Application July 18, 1938, Serial No. 219,692

5 Claims. (Cl. 191—35)

This invention relates generally to electrical equipment of the type making use of a traveling contacting device together with one or more extended electrical conductors. It can be used to advantage where a trolley arrangement is desired to supply current to movable appliances like hoists, cranes, or small locomotives.

It is a primary object of the invention to provide apparatus of the above character which will afford utmost insurance against accidental contact with the current carrying conductors. A further object is to afford means for securing positive and continuous electrical engagement with the conductors, while at the same time enabling use of an effective protective sheath about the conductor or conductors.

Further objects of the invention will appear from the following description in which the preferred embodiments of the invention have been set forth in detail in conjunction with the accompanying drawings.

Referring to the drawings:

Fig. 1 is a vertical cross-sectional view taken along the line 1—1 of Fig. 2, and showing one embodiment of my invention.

Fig. 2 is a vertical cross-sectional view taken along the line 2—2 of Fig. 1.

Fig. 3 is a vertical cross-sectional view taken along the line 3—3 of Fig. 1.

Fig. 4 is a side elevational view of a suitable hanger for the conductors and enclosing sheath.

Fig. 5 is a fragmentary plan view of the conductor sheath shown in Fig. 1.

Fig. 6 is a cross-sectional view taken along the line 6—6 of Fig. 4.

Fig. 7 is a cross-sectional view showing an embodiment using a single extended conductor.

Fig. 8 is a cross-sectional view showing a modified form of sheath.

Fig. 9 is a side elevational view of the sheath shown in Fig. 8, partly in cross-section.

The apparatus illustrated in Figs. 1 to 6 inclusive of the drawing, consists of a plurality of extended electrical conductors 10*a*, 10*b* and 10*c*, which may be in the form of hard drawn copper wire. These conductors are disposed within a sheath 11 of insulating material, and they cooperate with the traveling contacting device 12. While the preferred form of contacting device will be presently described in detail, it may be pointed out that it includes at least two sets of trolley wheels, one set being designated by numerals 13*a*, 13*b* and 13*c*, and the second by numerals 14*a*, 14*b* and 14*c*.

The material from which the sheath 11 is made may vary in different instances, but I prefer to make use of a molded plastic which will have sufficient strength to properly retain the conductors. A molded plastic such as Bakelite or like phenolic condensate product, which may be reinforced with fabric, will afford proper strength. In physical form I prefer to manufacture the sheath 11 in two parts 16 and 17. Between the conductors the part 16 is shown provided with grooves 18, adapted to accommodate raised ribs 19 formed on the inner face of part 17. Such an arrangement aids in locking the two parts together and affords better insulation between the conductors. The part 16 is also shown provided with raised ribs 21 to afford greater strength, and the lower part 17 is provided with ribs 22 for the same purpose, and also for the purpose of guiding the trolley wheels, as will be presently explained.

The lower part 17 of the sheath is provided with a plurality of openings 23*a*, 23*b* and 23*c*. These openings are disposed in three rows, there being one row for each of the conductors. Preferably the openings of adjacent rows are staggered as illustrated in Fig. 5, in order to afford greater mechanical strength and to preclude improper application of the trolley wheels. It will be noted from Fig. 5 that these openings serve to expose spaced portions of the conductors 10*a*, 10*b* and 10*c*.

Any suitable means can be utilized for holding the two parts 16 and 17 together. In Fig. 5 a simple type of holding means is illustrated consisting of U-shaped clips 24 extending over the side edges of the parts 16 and 17, and engaging within grooves whereby the two parts are held together. As shown in Fig. 1 the parts 16 and 17 are preferably made in lengths of suitable size which are overlapped in order to afford substantially a continuous sheath of any desired length without use of special couplers. The abutting end faces 15 can be on an angle as shown in Fig. 5 to avoid interrupting an opening. The assembly of conductors and insulating sheath as described can be supported in any suitable manner for cooperating with the contacting device 12. For example it can be supported at spaced points by brackets 26 of suitable design, with these brackets in turn being attached to structural parts 27 of a building. It is also possible to provide the insulating sheath with integral tabs 28, for attachment to supporting means.

The trolley wheels of the contacting device 12 are formed of suitable material such as hard copper or bronze. The wheels of each set may

be carried by an individual mounting or as shown they may be carried on a common operating axis. Thus taking the set formed by wheels 13a, 13b and 13c, the wheel 13a is insulated from the rotatable shaft 31, and is secured to a concentric hub or sleeve. The ends of this shaft are journalled to the body or frame 32 of the contacting device. Wheels 13b and 13c are likewise attached to shaft 31, there being insulating material 33 and 34 in order to avoid short-circuiting. One end of the shaft 31 and the extended portions of the hubs for wheels 13a, 13b and 13c, form a series of collector rings 36a, 36b and 36c, with which the brushes or blocks 37a, 37b and 37c, may make electrical engagement. The insulation for securing the wheels to the shafts may be resilient synthetic rubber in order to afford a certain amount of "give" or self-aligning action.

The set of wheels 14a, 14b and 14c are mounted in the same manner as described above and they likewise are provided with collector rings for electrical connection with the corresponding brushes or blocks 37a, 37b and 37c. The corresponding brushes or blocks for the two sets of trolley wheels can be directly inter-connected as by the resilient bus conductors 38a, 38b and 38c, and these conductors in turn can connect to a suitable terminal block 39.

Each trolley wheel has its periphery provided with a series of spaced notches 41 (see Fig. 1) thus providing a series of circumferentially spaced teeth 42. In contour the end face of each tooth is curved to a radius corresponding to the axis of rotation of the wheel, and the pitch distance between two adjacent teeth corresponds to the distance between centers of the openings in the sheath. In order to afford a greater area of contact for each tooth with its associated conductor, the teeth can be grooved as indicated at 43.

As will be evident from the above, each trolley wheel may track within a particular row of openings in the insulating sheath, with the teeth of that wheel being brought successively into rolling contact with the successive exposed areas of the conductor wire. As previously pointed out there are at least two trolley wheels for each conductor, and as shown in Fig. 1, two corresponding trolley wheels, as for example wheels 13a and 14a, have an angular relationship with respect to each other whereby one wheel is displaced by an angular distance equal to one-half the pitch between adjacent teeth. The purpose of this is to insure positive contact at all times between either one or both of the wheels 13a or 14b, thus making for continuous flow of current without arcing.

Operation of the apparatus described above can be reviewed as follows: The contacting device 12 can be carried by a suitable trolley pole or any other movable mechanism tending to urge this device toward the conductors 10a, 10b and 10c. All of the trolley wheels track within the openings 23a, 23b and 23c, and the engagement between each trolley wheel and an associated conductor is one in which the contacting surfaces are brought into rolling contact, as the trolley wheel is moved along the conductor. The electrical conductors 10a, 10b and 10c are thoroughly insulated with respect to accidental contact. For example when used to take the place of overhead trolley wires, it is practically impossible for a workman to accidentally make electrical engagement with one of the conductors, even though a portion of the body should be placed directly against the lower side of the insulating sheath. The thorough character of the insulation afforded does not in any way interfere with the good electrical contact between the conductors and the trolley wheels. In fact the contact afforded by my apparatus is as good if not superior to the contact afforded by an ordinary trolley arrangement as applied to an exposed trolley wire.

The insulating sheath 11 can be readily applied about the conductors at the time the conductors are being installed for use with a particular apparatus. As previously stated, it is preferable to mold the parts 16 and 17 in convenient lengths, with these individual lengths overlapped in order to avoid the necessity of special coupling device.

In the foregoing I have described an arrangement making use of three extended conductors, such as are suitable for a three phase circuit arrangement. It is also possible to use two conductors, or more than three conductors, depending upon the requirements, or in certain installations a single conductor can be employed, with the contacting device 12 provided with only two trolley wheels for making electrical engagement with the one conductor. The manner in which the insulating sheath can be formed in this instance, is illustrated in Fig. 7. Thus the sheath is formed in two parts 46 and 47, which enclose the single linear conductor 48. A single row of openings 49 afford access to spaced portions of the conductor. The lower part 47 of the sheath can be formed to provide spaced ribs 51 alongside the openings, in order to guide the trolley wheels.

The embodiment of the insulating sheath shown in Figs. 8 and 9 is similar to that shown in Figs. 5 and 6, except that features have been simplified to facilitate manufacture. The sheath is formed by the two molded parts 53 and 54 which are held together by the side clips 56. At spaced intervals along the upper part 53, threaded pads 57 are provided, for making attachment to a suitable support. The part 54 is provided with simple grooves 58 to receive the conductors, and the lower part 54 is provided with ribs 59 to interfit the grooves 58. The lower part 54 is provided with spaced openings 61, the same as shown in Fig. 5, and ribs 62 on the lower face of part 5 serve to guide the trolley wheels. The upper face of part 53 may serve to guide rollers or wheels 63 and which in turn may serve to support the contacting mechanism.

I claim:

1. In electrical apparatus of the character described, a pair of parallel electrical conductors, a sheath of insulating material formed about the conductors, said sheath being provided with a plurality of rows of spaced openings, whereby spaced areas of each conductor are exposed through said openings, there being a row of openings for each conductor, with one row of openings being staggered with respect to an adjacent row, a member adapted to travel longitudinally of the conductors, and means carried by said member serving to maintain continuous electrical connection with said conductors through said openings, as said member is traversed longitudinally of the conductors.

2. In apparatus of the character described, a pair of parallel conductors, a sheath of insulating material formed about the conductors, said sheath having a plurality of rows of spaced openings through one side of the same whereby spaced areas of the conductors are exposed

through said openings, there being one row of openings for each conductor and adjacent rows of openings being staggered, a member adapted to travel longitudinally of said conductors, and a plurality of trolley wheels rotatably carried by said member and adapted to make electrical connection with said conductors through said openings, there being two trolley wheels for each conductor, the peripheries of said trolley wheels being notched to enable said wheels to make rolling electrical engagement with said conductors through said openings.

3. In electrical apparatus of the character described, a pair of parallel conductor wires, a sheath of molded insulating material formed about both said wires, one side of said sheath being provided with two rows of spaced openings through which spaced areas of each conductor are exposed for electrical engagement, there being one row of openings for each conductor, the two rows of openings being staggered.

4. In apparatus of the character described, an electrical cable comprising a substantially linear conductor covered by a sheath of insulating material, said insulating sheath being interrupted by a row of spaced openings whereby spaced areas of the conductor are exposed through said openings, a member adapted to travel along the length of said cable, at least two toothed trolley wheels rotatably carried by said member, each of said trolley wheels having a toothed periphery with the teeth of each trolley wheel adapted to enter said openings to establish rolling contact with the exposed areas of the conductor, the angular relationship between the two trolley wheels being such that one wheel is displaced with respect to the other wheel by an angle substantially equal to one-half the tooth pitch.

5. In electrical apparatus of the character described, an extended sheath of substantially rigid molded insulating material, two extended conductors carried within the sheath, said sheath being formed of an imperforate part and a perforated part clamped together and having longitudinally extending inter-engaging rib and groove means, said perforated part providing two rows of spaced openings through which spaced areas of each conductor are exposed for electrical engagement, there being one row of openings for each conductor and the two rows of openings being staggered.

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