July 19, 1932. T. B. HUESTIS 1,867,625

PROCESS AND APPARATUS FOR COMPACTING CONDUCTORS

Filed Nov. 4, 1927 3 Sheets-Sheet 1

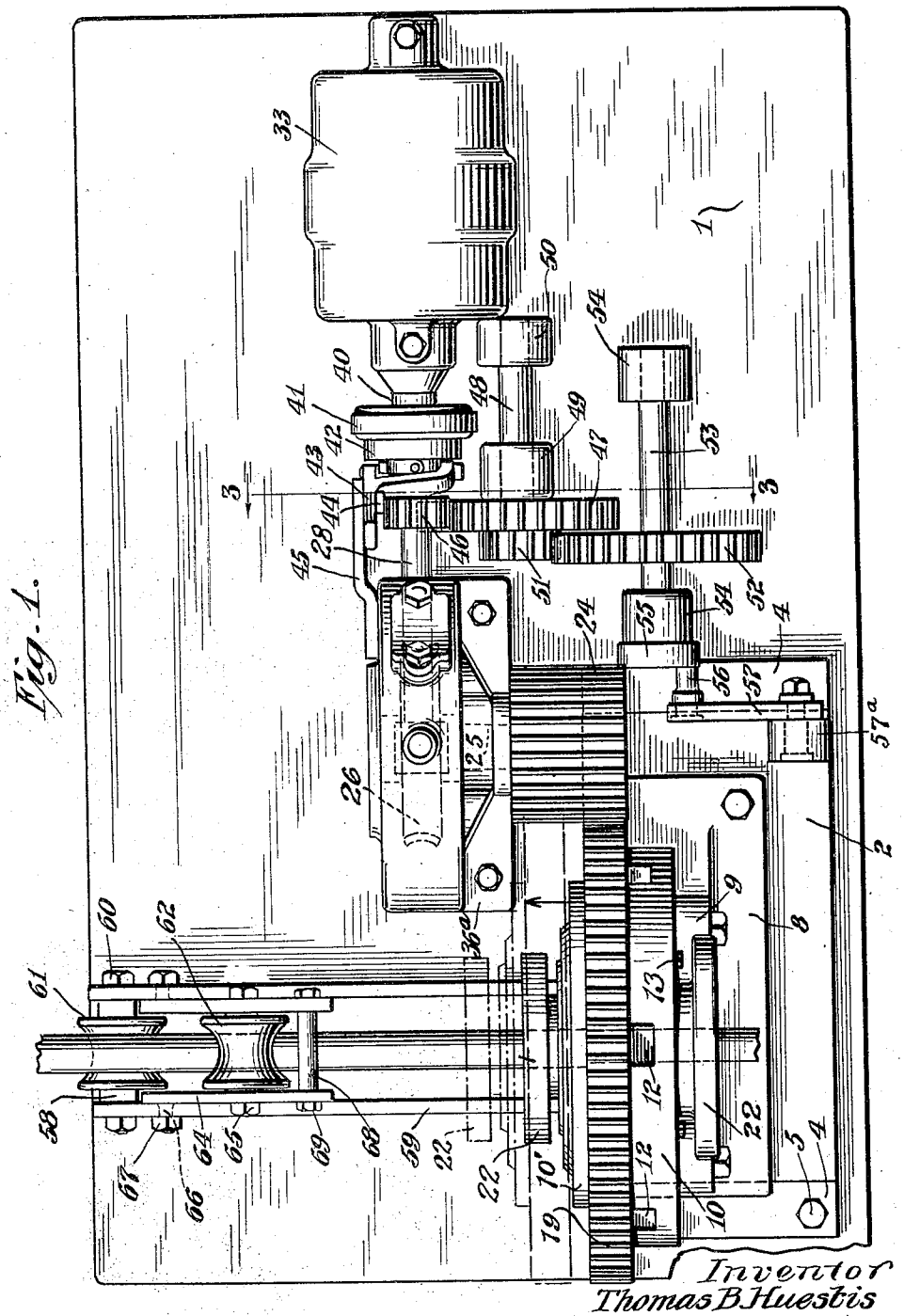


Fig. 1.

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Fig. 4.

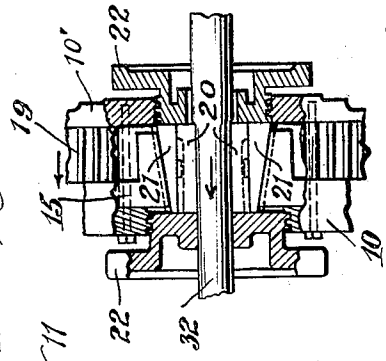


Fig. 5.

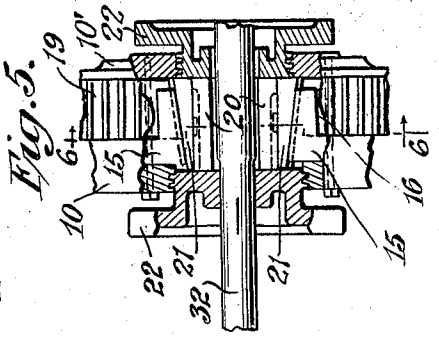


Fig. 6.

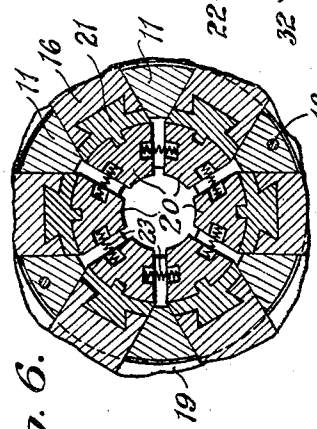
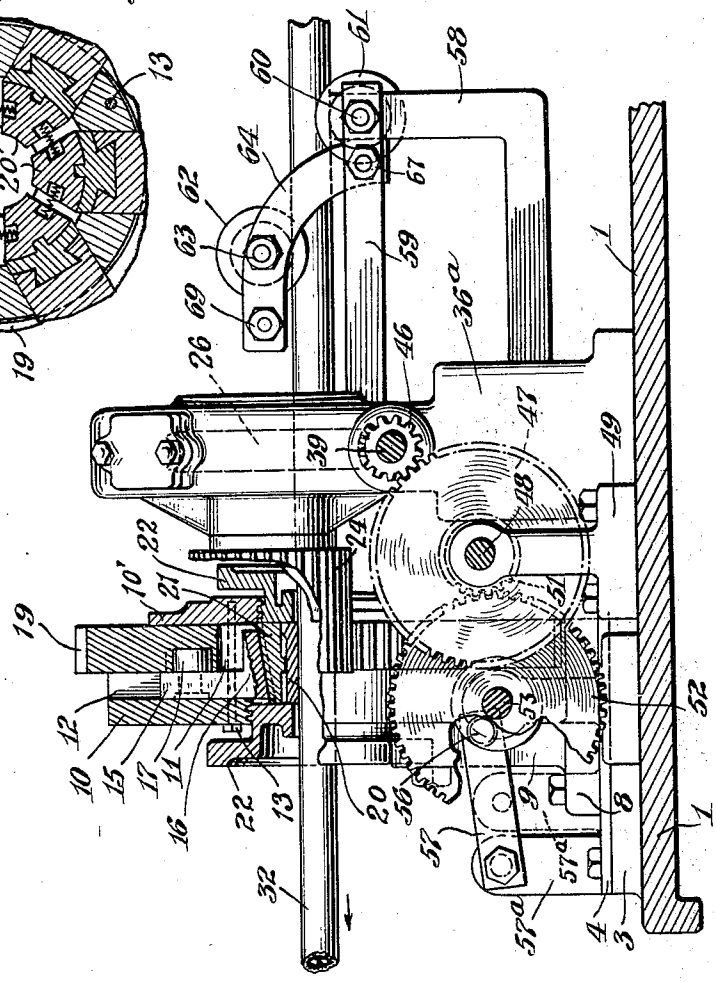


Fig. 3.



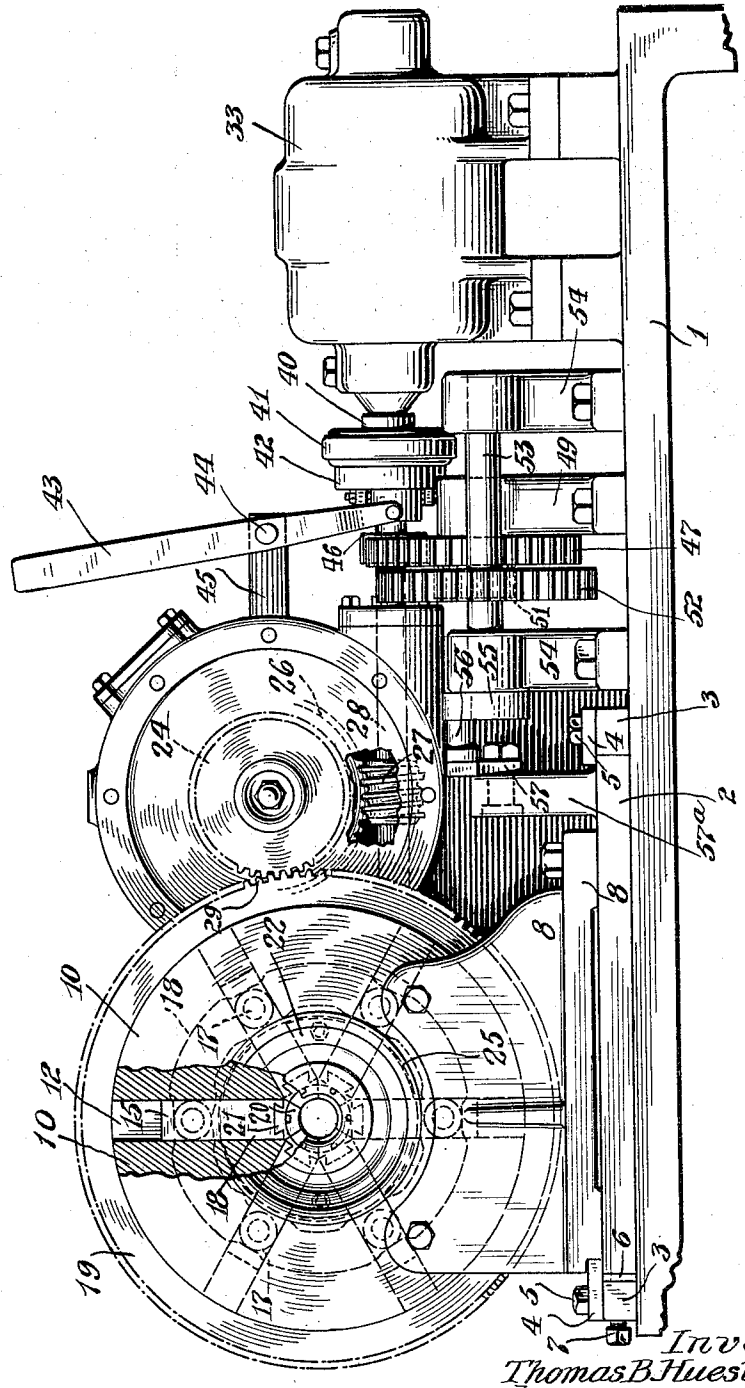
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PROCESS AND APPARATUS FOR COMPACTING CONDUCTORS

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Fig. 2.



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Patented July 19, 1932

1,867,625

UNITED STATES PATENT OFFICE

THOMAS B. HUESTIS, OF BRISTOL, RHODE ISLAND, ASSIGNOR TO THE NATIONAL INDIA RUBBER COMPANY, OF BRISTOL, RHODE ISLAND, A CORPORATION OF RHODE ISLAND

PROCESS AND APPARATUS FOR COMPACTING CONDUCTORS

Application filed November 4, 1927. Serial No. 231,152.

This invention relates to a method and apparatus for making insulated electrical conductors, more particularly to a method and apparatus for compacting such conductors either with or without an outer sheath of soft metal.

In the making of the various forms of electrical conductors, either single or multiple, these conductors are provided with a wear covering of insulation, which may preferably be surrounded by a sheath of soft metal. The insulating material, as usually deposited, frequently does not come into intimate contact with all parts of the conductors which it surrounds, particularly if they are of twisted form or are covered with woven or other fabric and it is not dense enough to provide the greatest dielectric strength for the particular material used. It is therefore desirable to subject the insulated conductor to a compacting operation. A convenient method of handling the conductor during this process is to thread one end of the conductor from a coil of the same upon a reel through a compacting machine to a take-up reel upon which the conductor is wound as it is compacted. With the previously known compacting devices, it has been necessary to stop the progress of the conductor while it is engaged by the hammers of the compacting device. As a result, it has been necessary to stop both the let-off and take-up reels at this time. Due to the weight of the heavy lead covered wire, it is difficult to stop and start the reels quickly. The intermittent stopping of the passage of the conductor through the compacting machine has also been relatively time consuming.

It is an object of this invention to provide a method and apparatus for passing an electrical conductor continuously through a compacting device while subjecting the same to intermittent blows.

The invention consists broadly in closely compacting the outer insulating covering of an electrical conductor through exertion of a relatively heavy pressure radially of the conductor while passing the conductor in continuous movement through the machine. The invention also comprises the apparatus for carrying out the method.

For a detailed disclosure of the nature and objects of the invention, reference is had to the accompanying drawings, in which:

Fig. 1 is a plan view of the machine;

Fig. 2 is a front elevation with parts broken away;

Fig. 3 is a transverse view through the machine along the line 3—3 of Fig. 1 with parts broken away;

Fig. 4 is a detailed sectional view of the device showing the hammers compacted against the conductor;

Fig. 5 is a detailed sectional view showing the hammers in withdrawn position and at the end of their reverse stroke; and,

Fig. 6 is a section along the line 6—6 of Fig. 5.

Referring particularly to the drawings, in which is disclosed one embodiment of the invention, the numeral 1 designates the base of the apparatus upon which, in the present instance, is carried a support 2 mounted for slidable movement upon the base 1 between suitable runways which are formed of members 3 and 4 rigidly secured to the base by bolts 5. Adjustment of the runways is provided for by a shim 6 disposed between the support and one of the members 3 and adjusted by means of a bolt 7. A frame 8 is rigidly secured to the support 2 by suitable bolts and carries bolted thereto the front plate 10 of the head of the compacting device. An extension or hub 11 projects rigidly from the plate 10, and a plate 10′ is rigidly secured to the hub by means of bolts 13 or otherwise. The hub 11 and the rear portion of the plate 10 are provided with a plurality of radially extending slots 12 which terminate in the central recess through which the conductor is to be passed. A plunger 15 is adapted to be positioned in each slot for reciprocating movement therein. The plunger carries a laterally extending foot 16 at the base thereof, and carries also a cam follower 17, which is adapted to engage with a cam slot 18 in the cam plate 19 which latter is mounted for rotation on the hub 11. Cam plate 19 is provided with a plurality of teeth upon its

periphery whereby it is driven in rotation causing reciprocation of the plungers 15. A hammer 20 is connected to the foot 16 of each plunger by means of an adjusting block 21. The hammers are substantially of truncated wedge shape, and the operative faces of the hammers have a cylindrical curvature. Each hammer is connected to its adjusting block by means of a key and slot connection which permits longitudinal adjustment between them. The adjusting block is connected to the foot 16 by means of a dove-tailed connection which is inclined longitudinally with respect to the working face of the hammer. The unit comprising each adjusting block and its attached hammer is moved longitudinally with respect to the foot 16 by actuation of the hand wheels 22 which have screw threaded engagement with the plates 10 and 10'. The hammers and adjusting blocks are somewhat longer than the foot 16 in order to permit of longitudinal adjustment. The longitudinal adjustment just described causes also radial adjustment of the hammers due to the inclination of the connections between the adjusting blocks and feet 16, and thereby determine the size of the orifice circumscribed by the hammers. Additional means for securing the hammers in place are had in the springs 23 which are positioned between each adjoining pair of hammers in recesses formed in the sides of the hammers. Pressure of the springs serves to maintain the hammers in spaced relation and abutting against the adjoining blocks 21.

Rotation of the cam plate 19 is effected by engagement of its gear teeth with an elongated gear 24 which is rigidly mounted upon a shaft 25. The shaft 25 carries a worm gear 26 which is adapted to engage a worm 27 rigidly carried by the shaft 28. Shaft 28 is driven by the motor 33 through a suitable clutch mechanism. The clutch mechanism is of standard design and comprises a drum 41 carried rigidly by the drive shaft 40 which drum is adapted to be engaged by a cooperating clutch member 42 mounted non-rotatably upon the shaft 28 with provision for longitudinal play thereon. Longitudinal movement of clutch member 42 is effected manually through a forked lever 43 which is pivoted at 44 to an arm 45 and which is provided with rolls adapted to engage in a groove in the surface of the clutch member 42.

The head 2 is carried forward in the guide ways for a distance equal to about one half the length of the hammers while the hammers carried thereby are compacting the conductor. When the head 2 reaches the forward end of its stroke the grip of the hammers upon the conductor is released. The head is then drawn back to the opposite end of its path bringing the greater part of the operative faces of the hammers into position to engage an uncompacted section of the conductor. The extent of lateral movement of the compacting mechanism is indicated in dotted lines in Fig. 1. The reciprocating movement is effected through the following train of connections. The shaft 28 carries rigidly thereon a gear 46 adapted to mesh with and drive a gear 47 which latter is rigidly secured to a shaft 48. Shaft 48 is mounted for rotation in supports 49 and 50 upon the base 1. A second gear 51 is rigidly carried by the shaft 48 and meshes with a gear 52 affixed to the shaft 53. Shaft 53 is mounted for rotation in supports 54 carried upon the base 1. A crank 55 revolves with the shaft 53 and carries a crank arm 56, one end of which is rotatably fastened in the link 57. The link is pivotally attached to a bracket 57*a* carried rigidly upon the head 2. The gear 24 is made of a suitable width to maintain the same in mesh with the gear teeth of disc 19 throughout the lateral reciprocating movement of the head.

A suitable support is provided for the conductor at the intake side of the machine through which it can be fed in alignment with the orifice between the compacting hammers. Such support comprises the two pairs of brackets 58 and 59 which are rigidly carried by the base of the apparatus. The adjacent arms of each pair are connected at their extremities by the bolt 60. A grooved guide roll 51 is mounted for rotation upon the bolt 60 between the arms of the brackets. This roll serves as a support for the under side of the conductor. A cooperating grooved roll 62 is adapted to bear against the upper surface of the conductor. This roll is suitably positioned between the first roll and the compacting device to direct the course of travel of the conductor. Roll 62 is rotatably mounted on a spindle 63 between the supporting arms 64, the spindle 63 being secured between the arms by nut 65. The arms 64 are supported upon arms 59 by means of screw threaded projecting lugs 66 which pass through openings in the brackets 59 and are held in position by the nuts 67. A bracing arm 68 extends between the arms 64 and is secured thereto by means of nuts 69.

In the operation of the device a conductor is continuously fed by any suitable device from a coil of the same upon a reel, or from any other source of supply through the guide rolls 61 and 62 and into the opening formed by the hammers. The motor is actuated and the clutch members thrown into engagement. Resulting rotation of the disc plate 19 causes the plungers 15 carrying the hammers 20 to simultaneously and intermittently be moved radially inward with the result that the concave surfaces of the hammers are forced against the conductor with sufficient pressure to compact it to a minimum and uniform diameter. While the hammers are striking

the conductor to compact the same, they are carried laterally forward at the same rate of speed that the conductor is being fed for a distance equal to approximately one-half the length of the hammers. At the completion of the lateral forward movement, the grip of the hammers upon the conductor is released, after which they are drawn laterally to their rear position in which the major portion of the area of the operative faces of the hammers is positioned opposite an uncompacted area of the conductor. While in this position they are again actuated to strike the conductor. As the conductor issues from the machine, it is disposed of in any suitable way, as for example, by winding upon a suitable reel. The cycles of movement of the hammers both laterally and radially are illustrated in Figs. 4 and 5. In Fig. 4 the hammers are shown in process of making their forward lateral stroke while compacting the conductor. In Fig. 5, the grip of the hammers upon the conductor has been released and they have been passed through their rearward lateral movement to a position in which a portion of the hammers is opposite an uncompacted area.

While the invention has been particularly described as applied to the method and apparatus for compacting insulated electrical conductors it will be apparent that it can be used for the compacting of any elongated article formed wholly or in part of compressible material and the claims are to be so understood.

Having thus described my invention, what I claim and desire to protect by Letters Patent is:

1. A device for compacting a continuously longitudinally moving electrically insulated conductor having in combination, an apertured frame through which the conductor moves continuously, members mounted for radial movement on the frame and adapted to apply pressure to the surface of the conductor when in innermost position, means for simultaneously actuating the members so as to apply a uniform radial pressure throughout the circumference of a length of the conductor, means for reciprocating the frame in the direction of movement of the conductor, and synchronizing means to effect the operation of the members into pressure applying relation with the conductor only when the frame and conductor are moving in unison.

2. A device for compacting a continuously longitudinally moving electrically insulated conductor having in combination, an apertured frame through which the conductor moves, radially movable hammers carried by the frame and adapted to contact with the surface of the conductor when in innermost position, means for moving the hammers inwardly and outwardly, means for moving the frame in reciprocation and in the direction of movement of the conductor, and synchronizing means arranged to operate the hammers into clamping engagement with the conductor simultaneously with the movement of the frame and conductor in unison and to actuate the hammers into disengaging position during the movement of the frame in a direction opposite to that of the conductor.

Signed at Bristol, county of Bristol, State of Rhode Island, this 31st day of October, 1927.

THOMAS B. HUESTIS.