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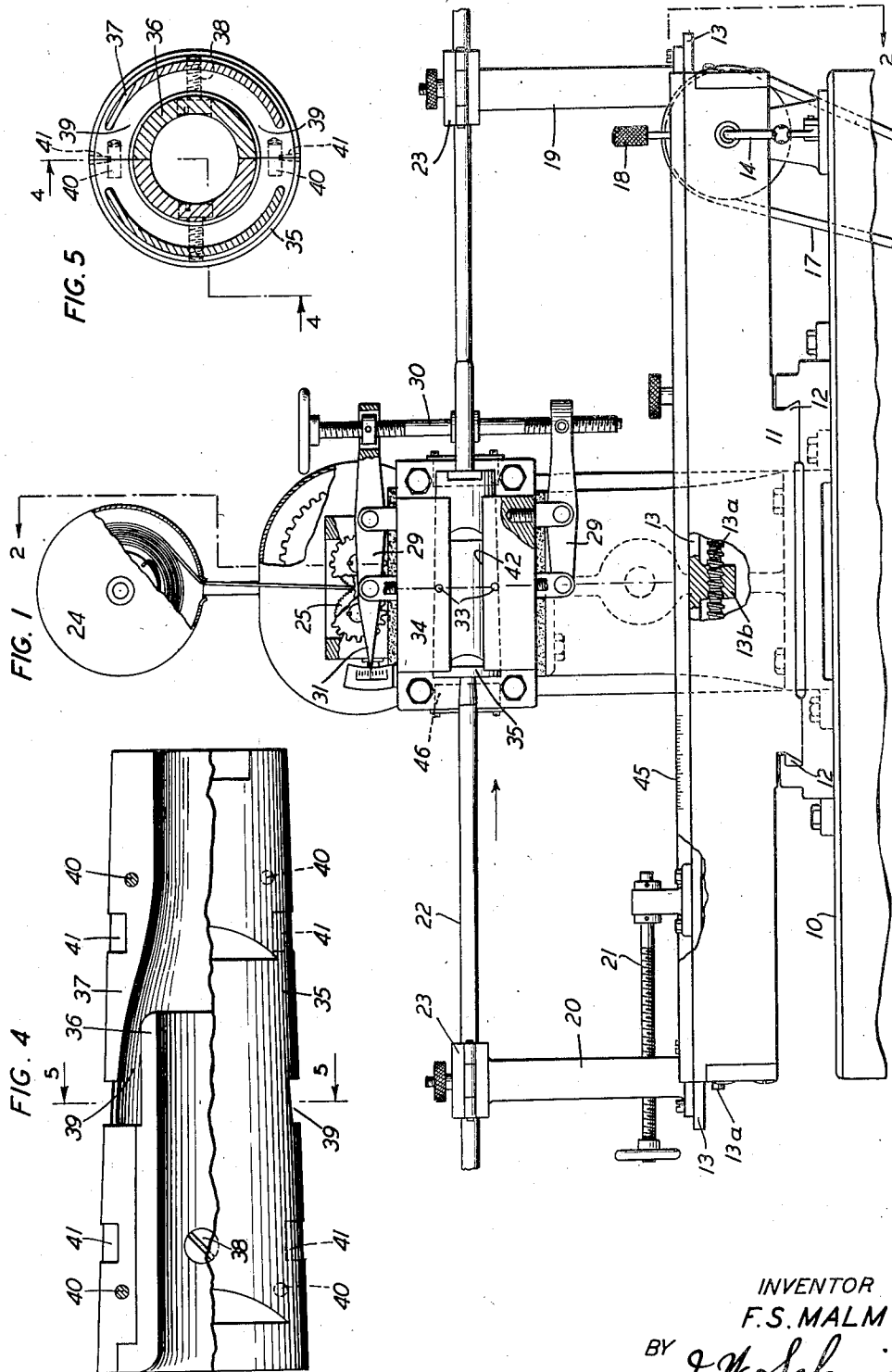
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MACHINE FOR JOINTING THE INSULATION OF CABLE CORES

Filed Dec. 29, 1932

2 Sheets-Sheet 1



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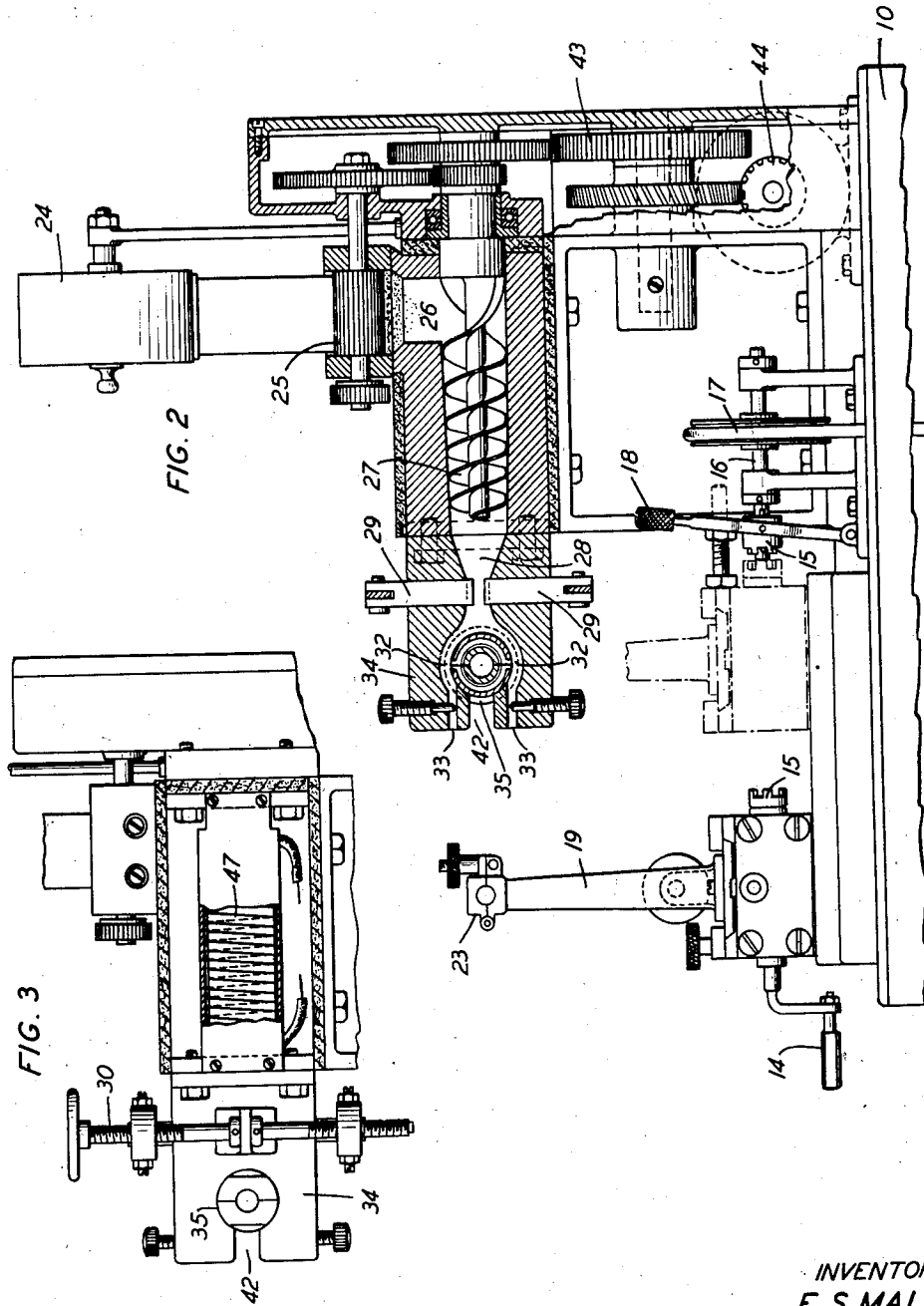
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UNITED STATES PATENT OFFICE

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MACHINE FOR JOINTING THE INSULATION
OF CABLE CORESFrank S. Malm, Millburn, N. J., assignor to Bell
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5 Claims. (Cl. 18—13)

This invention relates to machines for jointing the insulation of cable cores provided with thermoplastic insulation such as gutta percha and rubber compounds.

5 An object of the invention is to provide improved machines for jointing the insulation of such cables, and in particular to improving the means and methods for controlling the temperature of the thermoplastic material prior to and during its application to the joint, to provide 10 means for producing an improvement in the manner in which the thermoplastic insulating material flows through the extrusion die, to provide 15 arrangements by which the feeding of the thermoplastic material to the machine may be regulated in a uniform manner, to provide means in which the traversing of the cable joint through the machine may be more accurately regulated and controlled, to regulate the volume of material 20 flowing through the extrusion head, to facilitate the manipulation of the machine, and to more effectively locate and hold the cable during jointing.

25 An embodiment of a machine in accordance with the invention is disclosed in the attached drawings in which:

30 Fig. 1 is a side view of the operating portions of the machine with a cable joint in place, the view being taken transversely to the cable, and the machine having certain portions cut away to better indicate the construction thereof;

Fig. 2 is a side view partly in section taken along the line 2—2 of Fig. 1;

35 Fig. 3 is a side view of the extrusion head and the associated parts with certain portions cut away, this view being taken at right angles to Fig. 1; and

Fig. 4 is a view of one-half of an extrusion die.

40 In the drawings the operating parts are mounted upon a base plate 10 below which there are provided suitable motors for operating the parts which will be hereinafter described, together with switches, fuses, meters and similar equipment for controlling and regulating the operation of the 45 motors. A transverse sliding member, plate or structure 11 is mounted upon the base plate to slide transversely thereof in guides 12. The transverse sliding plate may be moved back and forth manually. A longitudinally sliding plate 50 13 is mounted upon the transverse sliding plate. The longitudinally sliding plate may be moved back and forth upon the screw 13a which is operated either by a handle 14 or by a clutch 15. For this purpose a dependent member 13b is 55 screw threaded and rides upon the screw 13a

which is journaled at its ends in member 11. The clutch 15 is mounted upon a shaft 16 driven by a belt 17 from a pulley (not shown) below the base plate 10. The movable element of the clutch is moved into and out of engagement with 5 the fixed element by a lever 18. Mounted upon the longitudinally sliding plate 13 are the two cable supporting standards 19 and 20. The standard 19 is rigidly attached in place and the standard 20 may be adjusted longitudinally by 10 means of the manually operable screw 21 to tighten the cable 22 and stretch it firmly before applying the insulation to the joint. Each standard 19, 20 is provided with a clamp 23 for 15 firmly holding the cable therein.

The insulating material is fed to the machine from a container 24 which contains a support upon which is wound a strip of thermoplastic composition, such as gutta percha, composition of rubber, or other suitable insulating compound. 20 The strip is fed out from the bottom of the container 24 between two rollers 25. The rollers 25 serve to masticate the material somewhat and it proceeds into the inlet opening 26 (Fig. 1). The feeding screw 27 forces the material toward 25 the extrusion head. In previous machines difficulty has been encountered in attaining sufficient pressure at the extrusion head. In order to increase the pressure the screw 27 is tapered and revolves in a tapered opening. At the exit 30 end of the screw a relatively large reservoir 28 is provided. The passage between the reservoir 28 and the extrusion die can be regulated by the sliding gate or valve members 29 which are controlled by a manually operable screw 30 (Fig. 1) 35 to regulate the size of the opening between the reservoir and the extrusion die. An indicating pointer 31 indicates the extent to which the valve members 29, 29 close the passage at any particular adjustment of the screw 30. 40

From the reservoir 28 the insulating material passes into two passageways 32, one on each side of the extruding die and thence into the die. For adjusting and equalizing the pressure upon 45 either side of the die two by-pass ports 33 are connected to the respective passages 32. Each by-pass port is provided with a screw which normally closes it. If the pressure on either the top or the bottom of the extruding die tends to become disproportionately great its by-pass port 50 may be wholly or partly opened to allow some of the material to pass around the extruding die. These by-pass ports may also be opened at the beginning of operations in order to allow all 55 portions of the feeding apparatus to become fully

filled before attempting to produce a joint and they may also be both opened to different degrees during operation as circumstances may indicate.

5 The extruding head 34 is designed to receive the extruding die and for this purpose the outer cylindrical surface of the die and of the corresponding inner surface of the head are slightly tapered to a smaller dimension as one proceeds
10 in the direction of the arrow in Fig. 1.

The extruding die is made in two parts, one of which is shown in Fig. 4. One-half the die as a whole is designated 35. This half is made up of two principal parts, the inner part 36 of which
15 fits into the outer part 37 and is secured therein by machine screw 38. A cable joint passes through the inner member 36 from left to right and the thermoplastic insulating material flows in through a plurality of passages 39. The one-half of the die shown in Fig. 4 is provided with a plurality of openings 40 into which pins upon
20 the other half of the die fit. Slots 42 are provided for prying the halves of the die apart. The two halves of the die are placed around the cable upon the right-hand end of the joint to be made,
25 the cable is then moved laterally through the opening 42 of the extrusion head and then the die and cable are moved transversely until the die fits snugly in the head.

30 The rollers 25 and the feed screw 27 are driven at fixed relative rates by suitable gearing 43, driven in turn by a bevel gear 44 which is operated by a main driving motor or other suitable source of power (not shown). The main drive
35 motor and the motor which drives the clutch 15 to traverse the cable joint through the extruding head are operated independently and consequently they may, if desired, be driven at different relative speeds during the operation of making a joint. It will be noted that the longitudinally sliding plate which carries the cable supporting standards 19, 20 may be provided with a graduated scale, a portion of which is shown
40 at 45 by which the speed of movement of the cable joint through the machine may be accurately determined and regulated.

The control of the temperature of the thermoplastic material is effected by providing in each side of the extruding head adjacent the screw
50 27 hollow spaces 46 (Fig. 1) in which are located electric heating units 47 (Fig. 3). The extruding head 34 is made relatively massive and approximately equal in length to the length of the extrusion die itself. This head becomes warmed
55 by conduction from the parts adjacent the unit 47 and from the heat stored in the insulating material. The head, being massive, retains the heat and produces a well and uniformly heated condition of the insulating material at the instant
60 of application to the joint.

In the operation of jointing a cable the conductors of two adjacent core ends are first connected by welding, brazing or other acceptable method. The insulation upon the core ends is
65 tapered down to a conical form and heated with hot water or steam or covered with an insulating adhesive. The longitudinally sliding member 13 is traversed to the left as shown in Fig. 1 and the transversely sliding member is moved to the
70 left as shown in Fig. 2. The cable is then put

into the clamps 23 and the die applied at the right-hand end of the joint. The parts are then moved until the die fits into the extrusion head and the screw 21 is operated to draw up the cable to a taut condition. Meantime insulating
5 material has been supplied to the machine and it is operated to draw the cable through the die to extrude the insulating material around the joint. The clutch 15 is operated by a variable speed motor so that its speed is independent of
10 the main drive motor which operates the feed screw 27. Furthermore, for any particular size of cable, thickness of insulation, and length of joint, a definite schedule of operation may be experimentally evolved so that the rate of traveling the cable through the extrusion head may
15 be varied at intervals during the process.

Various sizes of extruding die may be provided for the different size cores and furthermore the length of the die may be varied somewhat to suit
20 conditions.

What is claimed is:

1. A cable insulation jointing machine having cable supporting clamps for holding the cable ends of which the insulation is to be joined, an
25 extrusion head in said machine said clamps being mounted to move transversely to said extrusion head to present the cable thereto for jointing and said clamps being also mounted to be moved longitudinally of said head for drawing the cable
30 joint therethrough.

2. A cable insulation jointing machine having an extruding head, a feed screw for forcing thermoplastic insulating material into said head and a valve between said screw and said head for
35 adjusting the size of the passage therebetween, and means external to said head for adjusting the opening provided by said valve.

3. A machine in accordance with claim 2 in which a reservoir is provided between the feed
40 screw and the valve.

4. A cable insulation jointing machine having an extrusion head, supporting devices for holding the cable core of which the insulation is to be joined, said devices being mounted for transverse and longitudinal movement with respect to said
45 head, a manually slidable device for adjusting said supporting devices longitudinally with respect to said head and a power-driven clutch device by which said supporting devices may be moved longitudinally with respect to said head
50 during the extrusion of the material to form a joint.

5. A cable insulation jointing machine having an extrusion head open at the side, a longitudinally divided extrusion die designed to fit over a cable core of which the insulation is to be joined to another cable core having its conductor joined to the conductor of the first cable core, clamps for firmly holding said cable cores, means to give
60 said clamps a sliding movement laterally with respect to said head, other means to give said clamps a slow and forceful sliding movement longitudinally with respect to said head, and means to give one of said clamps a limited longitudinal movement with respect to the other for tensioning the joined conductor of the cores into a taut
65 condition.

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