March 24, 1936. V. E. ROYLE 2,035,247

WIRE INSULATING MACHINE

Filed Feb. 8, 1933 2 Sheets-Sheet 1

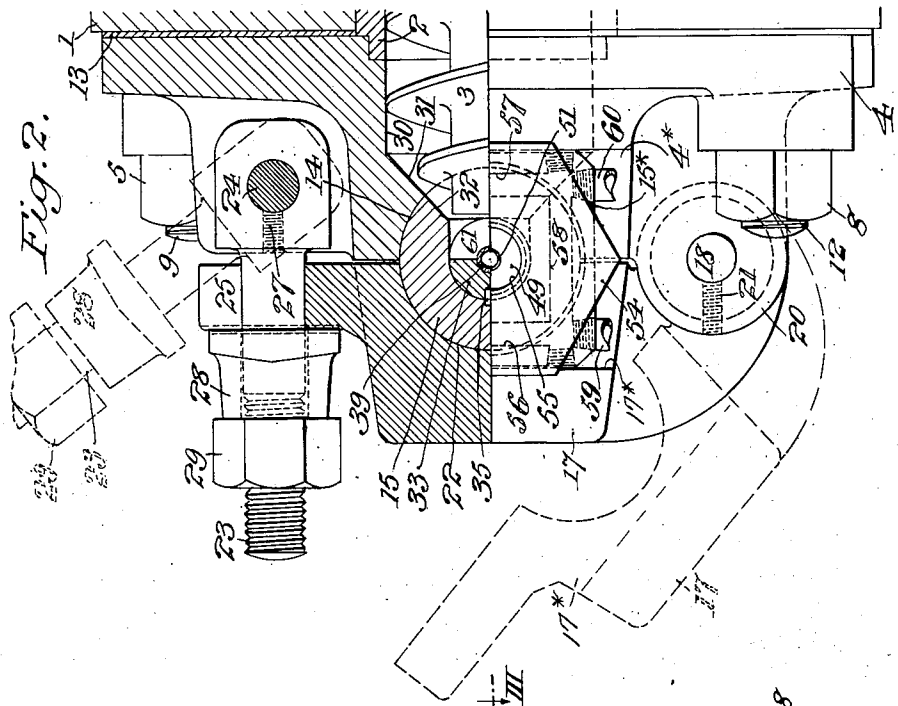


Fig. 2.

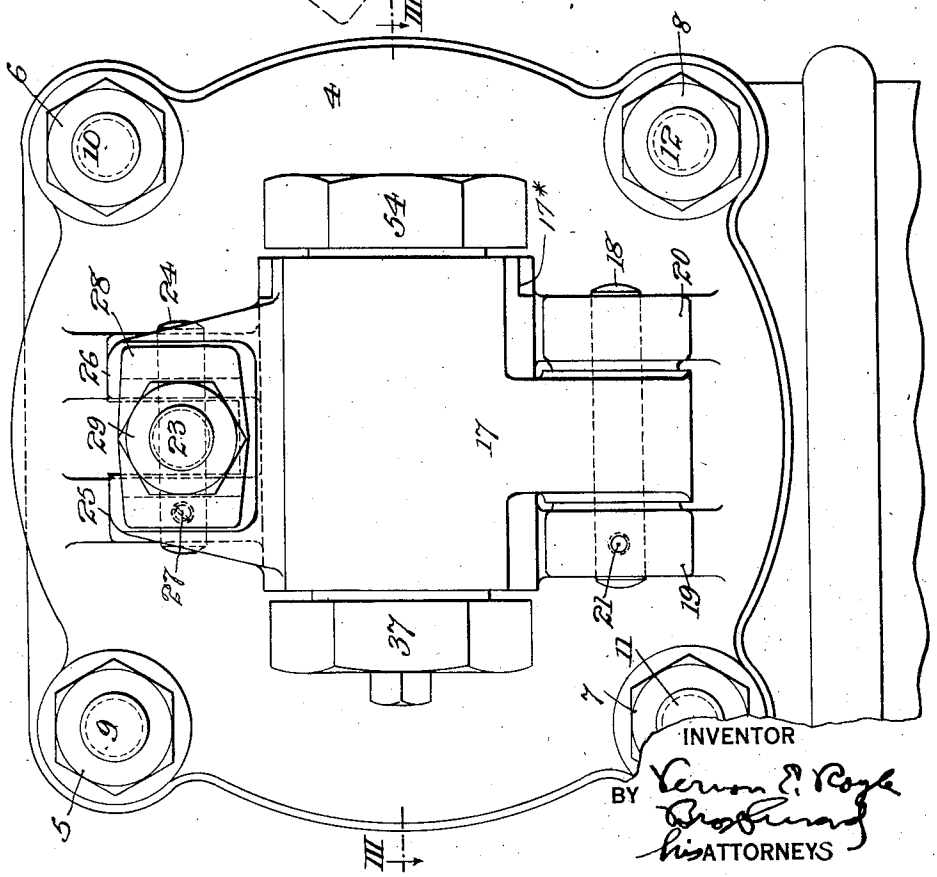


Fig. 1.

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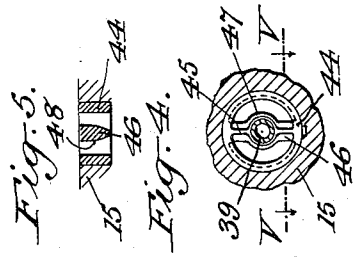
BY Vernon E. Royle

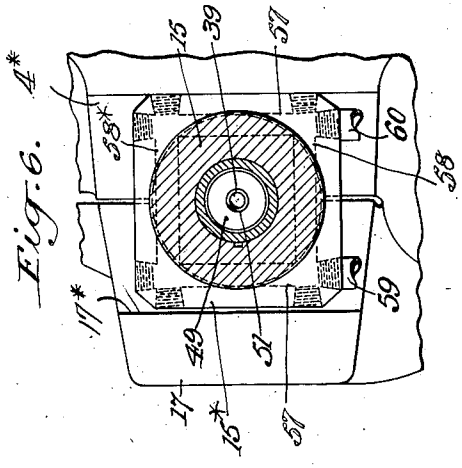
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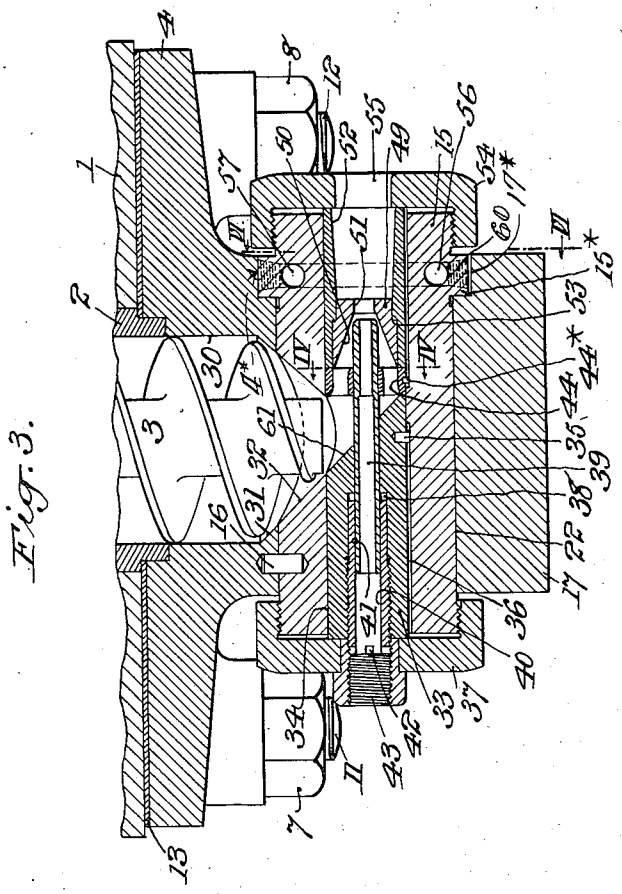
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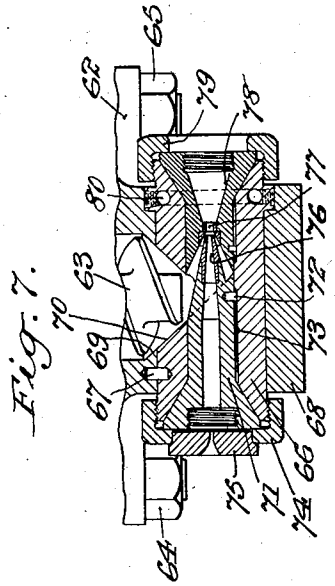
WIRE INSULATING MACHINE

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INVENTOR
Vernon E. Royle
BY
his ATTORNEYS

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2,035,247

UNITED STATES PATENT OFFICE

2,035,247

WIRE INSULATING MACHINE

Vernon E. Royle, Paterson, N. J.

Application February 8, 1933, Serial No. 655,779

13 Claims. (Cl. 18—13)

This invention relates to an improvement in wire insulating machines and, more particularly, to that portion of the machine directly connected with the application of the insulating material or covering to the wire.

It has for an object to provide an apparatus of this character which includes improved means for evenly distributing the covering around the wire.

Another object consists in providing improved means for regulating the thickness of the coating.

Another object consists in providing such an apparatus which may be very readily assembled and disassembled for use and cleaning.

Another object consists in providing such an apparatus in which, upon assembly, the important parts automatically assume a correct operative relation with respect to each other.

A further object consists in providing certain improvements in the form, construction, and arrangement of the several parts, whereby the above named and other objects may effectively be attained.

Practical embodiments of the invention are represented in the accompanying drawings in which

Fig. 1 represents a detail elevation of the operating head of the machine.

Fig. 2 represents a side elevation, partly in section, of the parts shown in Fig. 1, certain parts being indicated in different positions in full and broken lines.

Fig. 3 represents a section taken in the plane of the line III—III of Fig. 1, looking in the direction of the arrows.

Fig. 4 represents a detail section taken in the plane of the line IV—IV of Fig. 3, looking in the direction of the arrows.

Fig. 5 represents a section taken in the plane of the line V—V of Fig. 4, looking in the direction of the arrows.

Fig. 6 represents a detail section taken in the plane of the line VI—VI of Fig. 3 looking in the direction of the arrows, and

Fig. 7 represents a detail horizontal section, similar to Fig. 3 but on a smaller scale, showing a modified form.

Machines for the purpose of covering wire with insulation are, in general, ordinarily similar to tubing or extruding machines, and have the usual cylinder with means for supplying the insulating material, such as a rubber compound, and stock screw or plodder within the cylinder for advancing the material. In the particular form of extruding machines adapted for coating wire, the head of the machine is fitted for the passage of the wire therethrough and includes a die for applying the insulating material to the wire as it passes through the head. The present invention relates to the head portion of the machine.

Referring to the preferred form of the invention which is represented in Figs. 1 to 6, the cylinder is marked 1, the bore liner therefor 2, and the stock screw or plodder 3. These parts are conventional and will not further be described.

The face plate for supporting the head is denoted by 4 and it is secured to the cylinder by means of nuts 5, 6, 7, 8, that are threaded upon stud bolts 9, 10, 11, 12, which project from the cylinder 1. A washer or gasket 13 of suitable material may be interposed between the face plate and cylinder.

The face plate 4 is fashioned with a horizontally extending groove 14 that is semi-circular in cross section and is fitted to receive the cylindrical head 15 with a snug fit. A dowel 16, carried by the head 15 is fitted to enter a complementary recess in the face plate 4 for the purpose of centering the head when the parts are being assembled.

A gate 17 is hinged at its lower end on a pintle 18 that is carried in bearings 19, 20 which are formed on bosses protruding from the lower portion of face plate 4. A set screw 21 serves to hold the pintle in the bearings. The gate is fashioned on its inner face with a horizontally extending groove 22 that is semi-circular in cross section and corresponds to the groove 14 in the face plate 4, which groove 22 is adapted to embrace with a snug fit the half of the head 15 which protrudes from groove 14. When the gate 17 is swung into position embracing the head, it may be locked in said position by a keeper consisting of a stud bolt 23 which has its inner end mounted on a pintle 24 journaled in bearings 25, 26 formed in bosses on the face plate 4 above groove 14. A set screw 27 holds the pintle in place. The upper end of gate 17 is bifurcated so as to straddle bolt 23, and a collar 28 is fitted on the bolt to engage the bifurcations of the gate and hold it in operative position. A nut 29 is threaded on bolt 23 to hold collar 28 in place. The operative and inoperative positions of the gate and keeper are indicated in full and broken lines respectively in Fig. 2 of the drawings and it will be observed that the cylindrical shape of the head 15 to-

gether with the semi-cylindrical shape of the grooves 14 and 22 cooperate so as to cause the parts, upon assembly, automatically to assume a correct operative relation with respect to each other. The dowel 16, of course, prevents the head 15 from turning in the face plate 4 and gate 17 but, in order to provide stronger resistance to any such turning movement, the head is fashioned with an angular flange 15* which fits into complementary grooves 4* and 17* formed in the face plate 4 and gate 17 respectively, as shown in Figs. 2, 3 and 6. The provision of this flange and groove engagement obviates any possibility of shearing dowel 16 through the application of wrenches to nuts engaging the head 15 as will be hereinafter described, and it also promotes the automatic assembly of the parts just mentioned.

The face plate 4 is centrally bored as indicated at 30 to receive the forward end of stock screw 3, and the extreme forward portion of the bore 30 is provided with an inwardly beveled margin 31 that serves somewhat to contract the opening of the bore 30. The said margin coincides with a frusto conical opening 32 formed in the adjacent side of the head 15, so that the said margin 31 and opening 32 together form a restricted frusto conical outlet for the insulating material which is forced from the cylinder of the machine by the stock screw 3 in the usual manner.

The wire to be covered or insulated is intended to be fed from one side of the head 15 therethrough and coiled up, after insulation, on the other side. As this procedure and means for accomplishing the same are thoroughly well understood by those skilled in the art, it is deemed unnecessary to show either the wire or the said means.

The guider, through which the wire passes before it is covered or insulated is marked 33. It is cylindrical in form and fitted to rest in one portion of a cylindrical bore 34 that passes centrally through the head 15 from end to end. A pin or feather 35 is carried by the guider 33 and fitted to enter a keyway 36 fashioned in the head 15 to prevent the guider from turning in the head. A cap nut 37 is threaded onto an end of the head 15 and engages the guider 33 in order to hold the latter in position within the head.

The guider is centrally bored with a passage 38 that is of two diameters and is fitted to receive the telescopically arranged tubular members 39 and 40 constituting the guider tip which is the part through which the wire to be insulated immediately passes. The member 39 of the tip has a snug telescopic fit within the member 40 and is held in position by a pin 41; while the member 40 is threaded into bore 38 and is provided with a kerf 42 for adjusting it, and hence the member 39 carried thereby, longitudinally in the guider 33. An interiorly threaded nut 43 is adapted to fit within cap nut 37 and to engage the threads on member 40 for the purpose of locking the latter against turning within the guider 33. The member 39 of the guider tip constitutes, in effect, a core for the wire covering or insulating operation and its end which projects from the guider 33 is supported by a core bridge 44 that is circular in cross section and snugly mounted within bore 34 formed in the head 15, in which it is held against rotation by a pin or feather 44* that rides in a complementary keyway formed in the head. A pair of arms 45, 46 connect the hub 47 of the core bridge with the rim thereof and the said hub directly supports the end 39 of the tip or core. The shape of the arms 45, 46 in cross section is somewhat streamline as indicated at 48 in Fig. 5, to facilitate the flow of the insulating material through the core bridge and its collection around the extremity of the tip or core 39.

A die 49 which has a frusto conical opening 50 and a cylindrical opening 51, surrounds the extremity of the tip or core 39 and is fixed in position by a die holder 52 that fits snugly within bore 34 of the head 15. The said die holder is shouldered to engage the die as indicated at 53; and the inner end of the holder abuts the core bridge 44, while the outer end is engaged by a cap nut 54 that is threaded on the head 15 for securing the die holder in place. The nut 54 has a central opening 55 which registers with the flaring interior of the die holder 52 to constitute an outlet for the covered or insulated wire.

Four passages, 56, 57, 58, 58* are formed in the head 15 surrounding the die and die holder for the circulation of a temperature controlling medium such, for instance, as hot water or steam. Said four passages communicate with each other, and all the openings where they are bored through the head are plugged except two openings which are used for the circulation of the temperature controlling medium. Said last named openings may be, for instance, those marked 59 and 60.

The guider 33 is cut away, as indicated at 61, to provide a wall continuing one wall of the opening 32 in the head 15, thus establishing a passage for the insulating material extruded by the stock screw 3 from the cylinder 2, through the face plate 4, through the head 15, past the guider 33, through the core bridge 44, and between the tip or core 39 and die 49. The shape of the wall 61, as well as the shape of the core bridge 44, tip or core 39, and die 49, provide for effectively leading the material to its point of application to the wire and ensuring an even and compressed application thereof. These parts are so effective in form and arrangement that the flow of the insulating material from the screw 3, along the wall 61, around the core 49, through the core bridge 44, and to the space between the core and die 49 is very even and uniform, and the wire passing through the core is, so to speak, automatically centered within the insulating material, while an even and uniform thickness of insulation or covering is applied at all points on the wire. This is a matter of importance, as an improperly adjusted flow of the covering or insulating material tends to arrange the wire eccentrically therein and produce thin points of insulation calculated to prove defective.

In operation, the wire is passed centrally through the head 15 from left to right, Fig. 3 directly traversing parts 43, 40, 39, 51, 52, and 55. The insulating material such, for instance, as a suitable rubber compound, is extruded by the stock screw 3 and applied to the wire at the point where the latter passes through opening 51 in die 49, as above indicated. The covered or insulated wire thereafter continues its movement and is handled in any well known or approved manner. The parts are arranged, as hereinbefore indicated, not only to ensure an even, uniform and rapid application of the covering to the wire, but they are also constructed and arranged

so as to promote adjustability of the die and core relationship by application of a screw driver to kerf 42, as well as to enable ready assembly and quick disassembly for purposes of repair, cleaning, etc. Likewise disassembly and reassembly does not tend to alter the operative relationship of the parts which automatically assume correct positions when they are put together and locked by gate 17.

Turning now to the modified form represented in Fig. 7, it may be said that this form is particularly desirable for the application of coverings to wires of small diameter such, for instance, as sixteen gage and under, while the preferred form is particularly efficient in the treatment of larger wires.

In this modified form the face plate is marked 62 and the stock screw 63. The face plate is held in position by nuts and bolts collectively marked 64 and 65. These parts are conventional and need not further be described. The head is denoted by 66 and it is located with respect to the face plate by a dowel 67. It is supported in the face plate 62 by a gate 68 as in the case of the preferred form. The face plate has a restricted margin 69 and the head has a tapered opening 70 corresponding to the parts 31 and 32 of the preferred form.

A guider 71, which is shaped as indicated in Fig. 6, is mounted in the head 66. It is held against rotation therein by a pin or feather 72 projecting in keyway 73, and it is locked in the head by a cap nut 74, in which nut is jammed a guide 75 for the wire.

The forward end of the guider is tapered and provided with a tip or core 76 which is shouldered and jammed therein, as indicated in the drawing. This core is fitted to cooperate with a die 77 that is shouldered and jammed into a die holder 78 which is set in the head 66 and clamped therein by a cap nut 79. The die holder 78 and the guider 71 are provided with interior screw threads adapted to receive instruments for withdrawing the said parts for cleaning or repair.

Passages, collectively indicated by 80, are formed in head 66 for the circulation of a temperature controlling medium, which passages are similar to those described in connection with the preferred form.

The tapered shape of the guider and core, in combination with the flared shape of the adjacent parts of the die and die holder provide a space for the passage of the insulating material that is extruded by the screw 63 through opening 70 so that, as the wire passes through the core and die, it is covered with the insulating material that surrounds the core and is being urged forward by the screw. The shape of the parts insures the even distribution of the material so that the wire is automatically arranged centrally therein. This is particularly true in the case of wires of small diameter, as previously indicated.

The operation of the modified form is the same as the operation of the preferred form, except that there is no provision for adjusting the core and die with relation to each other.

It will be understood that various changes may be resorted to in the form, construction and arrangement of the several parts without departing from the spirit and scope of my invention, and hence I do not intend to be limited to the details herein shown and described except as they may be included in the claims.

What I claim is:

1. Apparatus of the character described comprising, an extruding cylinder, a cylindrical head, transversely arranged means on the cylinder adapted to embrace a portion of the head, and a gate adapted to embrace another portion of the head for securing it in operative position and crosswise of the end of the cylinder.

2. Apparatus of the character described comprising, an extruding cylinder, a cylindrical head, transversely arranged means on the cylinder adapted to embrace a portion of the head, and a swinging gate adapted to embrace another portion of the head for securing it in operative position and crosswise of the end of the cylinder.

3. Apparatus of the character described comprising, an extruding cylinder, a cylindrical head, transversely arranged means on the cylinder adapted to embrace a portion of the head, a gate adapted to embrace another portion of the head for securing it in operative position and crosswise of the end of the cylinder, and means on one end of the head arranged to be connected with the cylinder for holding the head against rotary movement.

4. Apparatus of the character described comprising, an extruding cylinder, a cylindrical head, transversely arranged means on the cylinder adapted to embrace a portion of the head, a swinging gate adapted to embrace another portion of the head for securing it in operative position, and crosswise of the end of the cylinder, and means on one end of the head arranged to be connected with the cylinder for holding the head against rotary movement.

5. Apparatus of the character described comprising, an extruding cylinder, a stock screw having a tapered end, and a bored head disposed transversely of the end of the cylinder, the cylinder being provided with a restricted stock screw opening, and the head being provided with a frusto conical opening adapted to constitute a continuation of the restricted opening of the cylinder for receiving the tapered end of the stock screw when the parts are in operative position.

6. Apparatus of the character described comprising, a head provided with a longitudinal bore and an opening leading to said bore, said opening being substantially at right angles to the longitudinal bore, and a guider fitted in said bore, said guider having a flat angular face adapted to cooperate with said opening.

7. Apparatus of the character described comprising, a head provided with a longitudinal bore and a frusto conical opening leading to said bore, said opening being substantially at right angles to the longitudinal bore, and a guider fitted in said bore, said guider having a flat angular face adapted to cooperate with said opening.

8. Apparatus of the character described comprising, a head provided with a longitudinal bore, a guider having a flat angular face and fitted in said bore, and a tubular guider tip or core carried by the guider and projecting through said angular face, said guider tip or core being composed of two members telescopically assembled, one of said members being screw threaded in the guider for longitudinal adjustment therein.

9. Apparatus of the character described comprising, a head provided with a longitudinal bore, a guider having a flat angular face and fitted within the bore, a die holder also fitted within the bore, a core bridge provided with radial wide

faced arms also fitted within the bore, said core bridge being located between the angular face of the guider and die holder, and a core carried by the guider and projecting through the core bridge, whereby plastic material fed laterally to said inclined face will be retarded by the wide faced arms and evenly distributed around the core.

10. Apparatus of the character described comprising, a head provided with a longitudinal bore, a guider fitted within the bore and having its inner end provided with a flat angular face, a die holder also fitted within the bore, a die carried by the holder, and a core bridge also fitted within the bore and interposed between the forward end of the angular face of the guider and said die holder, whereby insulating material fed laterally to the angular face will be directed around the guider before passing through the core bridge to the die.

11. Apparatus of the character described comprising, a head provided with a longitudinal bore, a guider fitted within the bore and having its inner end provided with a flat angular face, a die holder also fitted within the bore, a die carried by the holder, a core bridge also fitted within the bore and interposed between the forward end of the angular face of the guider and said die holder, and a core carried by the guider disposed to project from the angular face and through the core bridge into co-operative relationship with the die, whereby insulating material fed laterally to the angular face will be directed around the core before passing through the core bridge to the die.

12. In apparatus of the character described, a guider provided with a flat angular face, a tubular guider tip or core carried by the guider and projecting through said angular face, and a core bridge disposed adjacent the forward edge of the angular face of the guider and supporting the projecting end of the tip or core, said core bridge being provided with radial arms and restricted openings therethrough, each arm having a relatively wide face with respect to the openings in the core bridge, whereby insulating material fed laterally to said angular face will be directed around the guider tip or core and retarded by the wide face on the arms before passing through the core bridge so as to be evenly distributed around the end of the tip or core projecting from the core bridge.

13. In apparatus of the character described, a guider provided with a flat angular face, a tubular guider tip or core carried by the guider and projecting through said angular face, and a core bridge disposed adjacent the forward edge of the angular face of the guider and supporting the projecting end of the tip or core, said core bridge being provided with radial arms and restricted openings therethrough, each arm having a relatively wide face with respect to the openings in the core bridge, and converging side walls for increasing the area of the openings, whereby insulating material fed laterally to said angular face will be first directed around the guider tip or core and retarded by the wide face on the arms and then allowed to expand while passing through the core bridge so as to be evenly distributed around the end of the tip or core projecting from the core bridge.

VERNON E. ROYLE.