

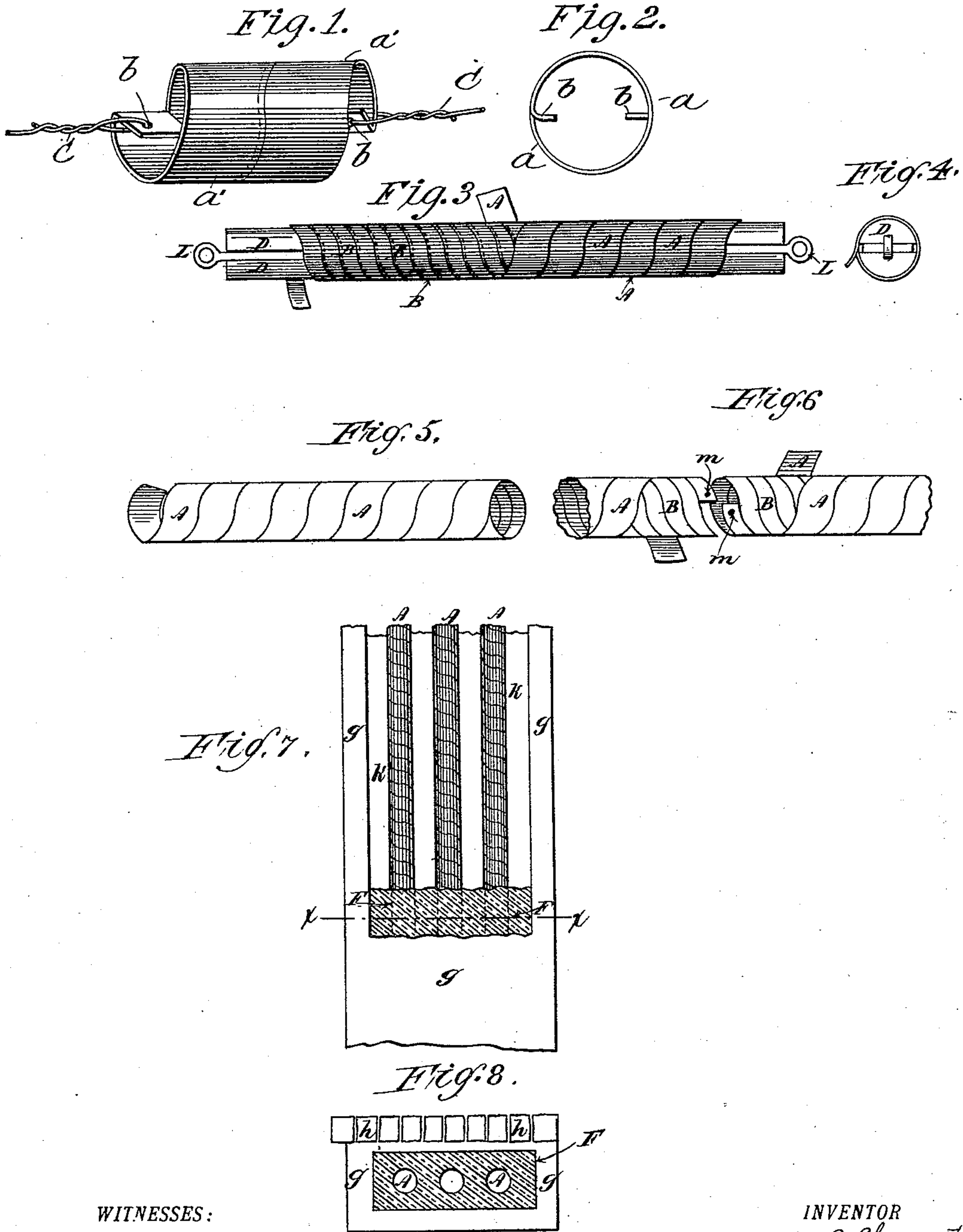
(No Model.)

A. C. CHENOWETH.

METHOD OF LAYING ELECTRIC CONDUITS.

No. 454,938.

Patented June 30, 1891.



WITNESSES:

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## METHOD OF LAYING ELECTRIC CONDUITS.

SPECIFICATION forming part of Letters Patent No. 454,938, dated June 30, 1891.

Application filed June 30, 1887. Serial No. 243,053. (No model.)

*To all whom it may concern:*

Be it known that I, ALEXANDER C. CHENOWETH, of the city, county, and State of New York, have invented a new and useful Improvement in Methods of and Means for Constructing, Shaping, and Molding Electrical and other Conduits, Pipes, or Conductors, of which the following is a full, exact, and clear description, reference being had to the accompanying drawings, in which—

Figure 1 is a perspective view of a short length of my spiral centering; Fig. 2, an end view of Fig. 1. Fig. 3 is a side elevation of a portion of my said spiral centering, showing one method of constructing same about a core, and also showing a portion of same uncovered and another portion of it as it may be sometimes covered, all as hereinafter described. Fig. 4 is an end view of Fig. 3, showing core in position within centering. Fig. 5 is a perspective view of a portion of my centering provided with additional covering. Fig. 6 is a perspective view of two portions of my centering, showing the method of approximating the parts in order to connect them for the purpose of making continuous lengths of said centering. Fig. 7 is a top view of three lengths of said centering in position for the construction of underground conduits. Fig. 8 is a sectional view of Fig. 7, taken on the line  $xx$ .

The object of my invention is to provide a method and means whereby conduits, tubings, or pipes for electrical or other conductors or purposes may be conveniently and economically constructed, molded, or shaped for use under the surface of streets or in other positions. I attain these objects by the use, as hereinafter described, of my novel spiral molding or shaping cores or centerings. These centerings should be constructed of metal or any other material possessing the requisite strength, elasticity, and rigidity. The centerings may be produced in any convenient way, preferably by spirally rolling or winding a ribbon or strip of the constituting material around a properly-shaped temporary central core or mandrel D D of the required diameter (see Fig. 3;) but these centerings could, however, of course be constructed in many other ways, as will readily

suggest themselves to any skilled mechanic. The shape and size of the cross-section of the ribbon or strip of material constituting my centerings will of course vary according to requirements, and will depend upon the special use for which they are designed.

Where the centerings are produced by winding spirally about a mandrel or core, I prefer the form illustrated by D D in Figs. 3 and 4. Such mandrel or core may be constructed of any suitable material and in any of the numerous well-known ways. It may be made of one piece, or, as I find more useful, may be constructed in two longitudinal halves or sections D D, between which, preliminary to winding, I place wedge-pieces L L, which latter, on being removed after the winding is accomplished, permit the halves of the core to collapse toward each other, whereby their extraction from the centering is facilitated.

Where the centerings are to be used to mold materials so plastic as to flow before setting, it is in my experience preferable to cause the ribbons or strips of constituting material to overlap each other slightly, as shown by the dotted lines B B in said Fig. 3; but this is not always indispensable, particularly in those cases where the molded materials are so rigid and cohesive as not to drop or crowd through the crevices or other openings between the spirals. After the winding has been accomplished and if the centerings are to be used in a straight line, it is useful in some cases to slightly solder or otherwise lightly secure to each other the overlapping or adjacent edges of the spirals sufficiently to prevent unwinding when the mandrel or core is withdrawn. In some cases I also find it useful to strengthen my spiral centerings by externally wrapping them with paper, cloth, or other material tending to retain them in position, to protect them, and to cover interstices which may occur between the spirals. One form of application of such external strengthening, protecting, and retaining wrapper is illustrated by A A in Figs. 3, 5, and 6, in which case the external wrapper A A is wound upon the exterior of the centering in a spiral direction opposite to that in which is wound the inner or stronger spiral B B.

I also find it useful in some cases to coat



the exterior of my said centerings by smearing them with clay or other suitable material designed to prevent adhesion to the centering of the material to be molded or shaped thereby and to prevent undue corrugation or indentation of the latter.

It is also of advantage, where it is desired to provide the conduits with a non-conducting lining, to cover the centerings with a casing or coating of asphaltum or other suitable non-conducting material. This may be applied to the exterior of the centerings in a plastic condition and constituted so as to set or harden around them after application, and in such cases, also, it is useful, preliminary to applying the non-conductor, to cover the surface of the centerings with lime, plaster, or other non-adhesive material, so as to prevent undue adhesion of such non-conducting casing or conduit-lining. Perforations *b b*, Fig. 1, and *m m*, Fig. 6, may now be made through the ends of the centerings, by means of which connections *c c*, as shown in Fig. 1, consisting of wire or other suitable material, may be secured; but of course such connections with my centerings might be made in any other obvious way, and are sometimes not at all required—as, for instance, in cases where the centering itself is sufficiently long to extend through the entire length of the conduit or pipe which it is used to shape. The centerings having been thus completed, the mandrel or core *D D* may be withdrawn, either immediately or as soon as the centerings have been surrounded by the plastic material to be molded or shaped thereby into a duct, and before such plastic material has been left a sufficient length of time to set.

Since the issue to me of a previous patent, No. 366,457, dated July 12, 1887, describing the use of cores inclosed in spirally-wrapped casing, preferably of rope or wire, I have discovered that centerings or cores of spirally-arranged material, as herein described, if constructed out of substances having sufficient rigidity, elasticity, and strength are qualified to perform new functions entirely different from the merely anti-frictional ones subserved by my said spirally-wrapped casings used in combination with cores, as described in my said previous patent, and that, for instance, the unassisted resistance of my spiral centerings against inward pressure or tendency to collapse of the materials to be shaped or molded thereby is so effective that the use of the mandrels or cores may be entirely dispensed with, except for the purpose, if desired, of constructing the spiral centerings as aforesaid, and, if required, of thereafter keeping them in distended proper shape until in use or surrounded by the plastic materials. By means of my present invention it becomes, therefore, possible to manufacture or mold continuous underground conduits upon the very locality in which they are to be afterward used, and to do this continuously and without delaying the withdrawal of the core

until after the concrete or other material to be shaped has had a sufficient length of time to set.

The method of constructing underground conduits—such as conduits for electrical conductors or sewage—by the use of my said centerings is as follows: The centerings are produced in the manner described and in any convenient lengths. A trench or excavation of the required depth and width is then dug in the ground, within which the spiral centerings are placed and temporarily supported in the desired position by any convenient means, as shown, for instance, in Figs. 7 and 8, where *A A A* represent the centerings and *g g* the surrounding earth. Next, each length of centering is united to the preceding length by bringing their respective ends into as complete abutting contact as possible, as shown, for instance, in Fig. 6, where two lengths are shown in the act of being approached toward each other in the required position for making such contact, and the continuity of the centering is then effected by uniting the ends of the strip by means of wire or other suitable connections secured in the holes *m m* or in any other obvious manner. It is also useful in many cases to cover the connecting-joints in any convenient manner, so as to render them impervious to the materials out of which the body of the conduit is to be made, should the latter be so soft as to flow. Next, the excavation or ditch about the centerings should be carefully filled with concrete, asphaltum *F F*, or any other desired material, while latter is in a soft, plastic, or yielding condition, the material selected in this case, however, being of such constitution as to harden or otherwise retain its permanent form after being applied about the centering shaped thereby. Such plastic or yielding material is then carefully tamped or approached to the centering on all sides. Should it be required to economize the plastic materials, any desired thickness of them may be applied around the centerings and retained in position by filling in the remaining spaces in the case of a ditch, with earth or other cheaper material, or by externally confining the plastic materials by any other material or outer mold-surface of any kind. After the concrete or asphaltum, if such is used, has set, or the desired shape has been given to any other yielding material molded, the centering can be readily withdrawn, the nature of the spiral permitting of its being elongated and diminished in diameter under traction, so as to part contact with and pass readily through the conduits or pipes; and it is adapted to serve also at the same time, if required, as a connection or means by the aid of which electrical conductors, wires, or any other contents of conduit can be drawn into the latter.

In many cases it may be found desirable to retain the mandrel or core *D D* within each centering in turn until the latter has been laid in final position, for the reason that the



centerings when empty of the cores and when constructed of light materials may be readily indented or distorted by careless handling on the part of workmen; but while the centerings are filled with the wooden or other cores no injury is done by a blow or any undistributed pressure directly upon the centering and before the latter has been protected by the application of the plastic materials to be molded. When the wooden cores are thus retained, the process of constructing the conduit will be to construct the centering about a mandrel or core, as aforesaid. Next carry the combined core and centering to the trench or other position in which the conduit is to be constructed and the centering finally established in position for molding. Next support the combined core and centering in the desired position. Next unite, as in the manner already described, one end of the centering to the adjoining end of the next previous length thereof already laid. Next apply the plastic material, as aforesaid, and after the centering has been thus protected by its covering of plastic material, and before the latter has been left a sufficient length of time to set, the step of withdrawing the wooden core from the centering may be accomplished, thus leaving the centering to perform, without the assistance of the core, the function of molding or holding in place the plastic materials while they are setting and until after they have hardened into permanent form.

Although in my present application for Letters Patent I make no claim covering the process of constructing a conduit in the manner last described, in which the wooden core is retained within the spiral centering until after the application of the plastic materials, and is withdrawn before the latter have had time to set, I do not by such omission abandon my claims to the invention of this specific process; but I have made a separate application for Letters Patent covering the same, which application is now pending and designated in the Patent Office by the Serial No. 384,176, and filed March 7, 1891.

In withdrawing the centering where coated or covered with asphaltum or other non-conducting material, as before described, the latter is left behind, if desired, and thus becomes an interior lining for the conduit, and in this way, if required, a continuous conduit may be constructed lined with a non-conductor of electricity, which said conduit with its lining may be contained in and supported by material such as concrete, which is a comparatively good non-conductor of electricity.

In cases where the centering has been wrapped or covered with paper or other materials, for the purpose of protecting it, strengthening it, or adding to its imperviousness, as aforesaid, these materials may either be left behind in the conduit, as in the case of the non-conducting lining just described, or if made to adhere to the centering they may be withdrawn therewith, since the mate-

rials mentioned tear readily and follow the centering, as the spirals separate and elongate under traction while being withdrawn, as aforesaid.

In conclusion, it may be observed that my centerings, owing to their spiral character, can be readily bent for the purpose of producing curves or bends in conduits or pipes, and can be thus bent with substantially inappreciable loss of roundness of cross-section in the pipe or conduit, which is molded or shaped thereon, and consequently with but small loss of strength or resisting-power in the centerings themselves. In such cases, however, where flowing or plastic material is molded around a curved spiral centering, as distinguished from material whose particles are more cohesive, it will be useful to cover the openings between the spirals necessarily presented at the convexity of the curve, and these can be covered by paper, cloth, or other material, as in the case of making tight the joints between lengths of centering above described.

What I claim as new, and desire to secure by Letters Patent, is the following, viz:

1. The method herein described of forming continuous conduits, consisting in the preparation of a centering of the required shape and size by spirally winding a properly-shaped core with the material out of which said centering is constructed, withdrawing the core, then sustaining the centering in position without its core, surrounding the centering with material out of which the conduit is to be constructed while said material is in a plastic condition, and after the latter has hardened or set finally withdrawing said centering, substantially as described.

2. The method herein described of forming continuous conduits, consisting in sustaining in the required position a centering of spirally-arranged material, surrounding said centering with the material out of which the conduit is to be constructed while said material is in a plastic condition, sustaining said plastic material in the required position while hardening or setting by leaving said centering within the same, and finally and after said plastic materials have hardened withdrawing said centering, substantially as described.

3. The method herein described of forming continuous conduits, consisting in the preparation of a centering of the required shape and size by spirally winding a properly-shaped core with the material out of which said centering is constructed, winding in a reverse spiral about said core and centering a strip of retaining material, supporting said centering so wound in the desired position, surrounding the same with the material designed for the conduit in a plastic condition, and after the latter has hardened or set withdrawing the centering, substantially as described.

4. The method described of forming continuous conduits, consisting in the preparation



of a centering of the required shape and size by spirally winding a properly-shaped core with the material out of which said centering is constructed, then covering said centering with a casing of non-conducting material, then withdrawing the core, then supporting said centering without core and so covered in the desired position, surrounding the same with the material designed to constitute the body of the conduit while in a plastic condition, and after said material has set or become hard withdrawing said centering without said non-conducting covering, substantially as described.

5. A centering for use in the making of continuous conduits, consisting of a spirally-wound strip having connection or connections reaching through the conduit so as to become elongated and diminished in diameter when pulled out through conduit by means of said connection, substantially as described.

6. The method described of constructing electrical conduits and at the same time providing them with non-conducting linings, consisting in surrounding a properly-prepared spiral centering with such lining, supporting the same in the required position, then surrounding the same with plastic material forming the body of the conduit, and after the latter has hardened withdrawing the spiral centering, leaving the non-conducting lining in place, substantially as described.

7. The method herein described of forming continuous conduits, consisting in sustaining

in the required position a coreless spiral or spirally-divisible centering, surrounding said centering with material out of which said conduit is to be constructed while said material is in a plastic condition, and after the latter has hardened or set finally withdrawing said centering, substantially as described.

8. The method herein described of forming conduits, consisting in the preparation of a spiral centering of the required shape and size, wrapping said centering with retaining and protecting material, supporting the said centering so wrapped in the desired position, surrounding same with the plastic material designed to constitute the body of the conduit, and after such plastic material has set or been permanently shaped by the centering withdrawing the latter, substantially as described.

9. The method herein described of forming conduits, consisting in sustaining in the required position a centering of spirally-arranged material, surrounding said centering with the material out of which the walls of the conduit are to be constructed, molding or shaping said material by pressing the same against said centering, and after said material has been thus permanently shaped or molded withdrawing said centering, substantially as described.

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Witnesses:

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