Dec. 30, 1924. 1,520,840

T. E. MURRAY

APPARATUS AND METHOD FOR MOLDING CONDUITS AND THE LIKE

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Fig. 1.

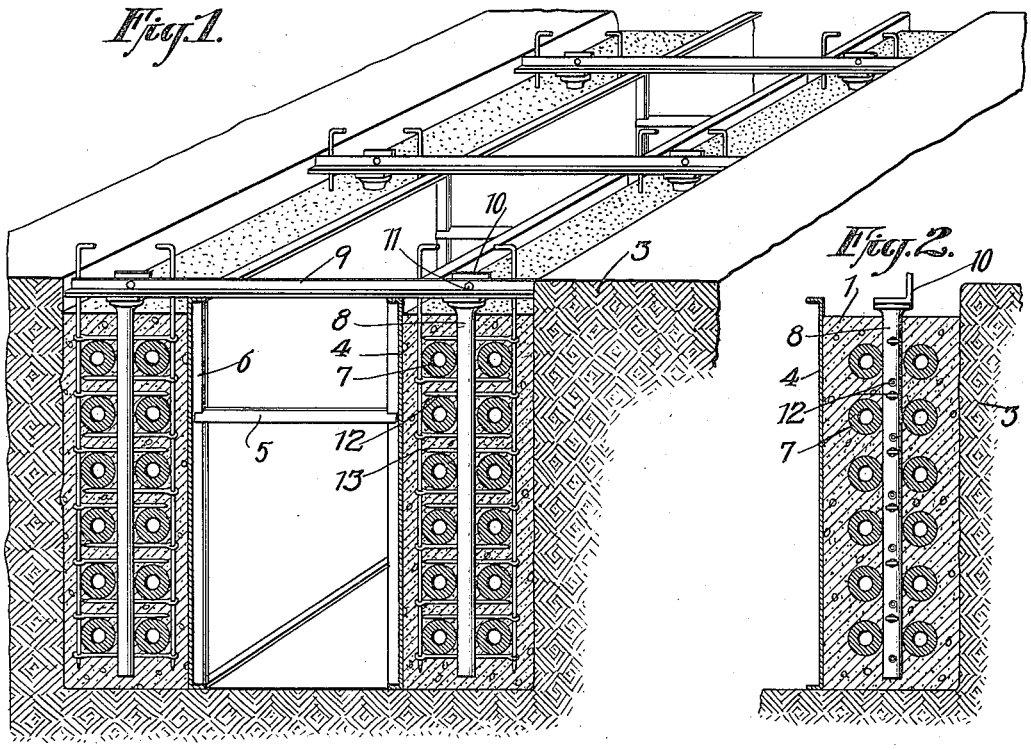

Fig. 2.

Fig. 3.

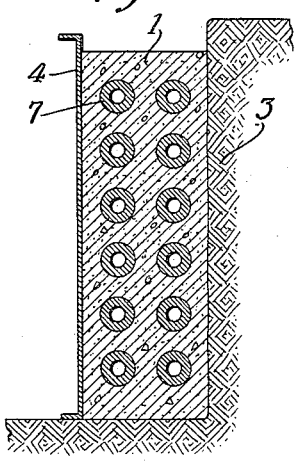

Fig. 4.

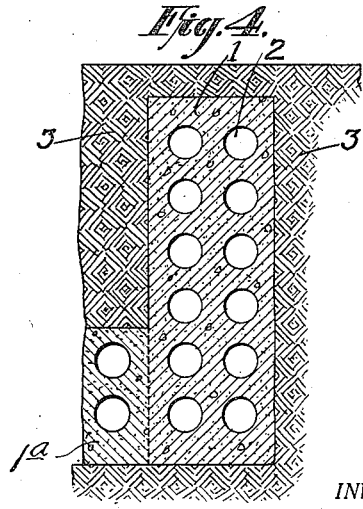

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Fig. 5.

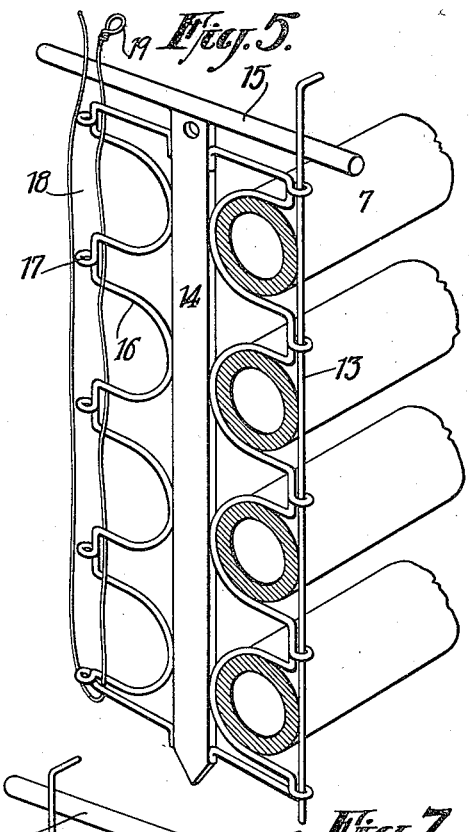

Fig. 6.

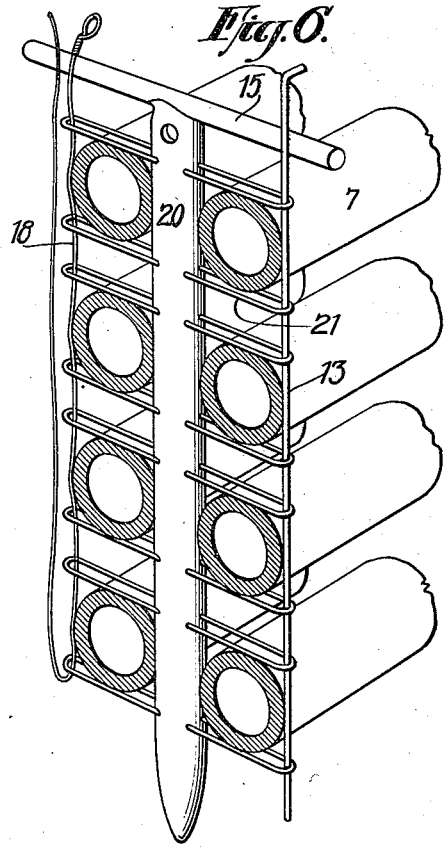

Fig. 7.

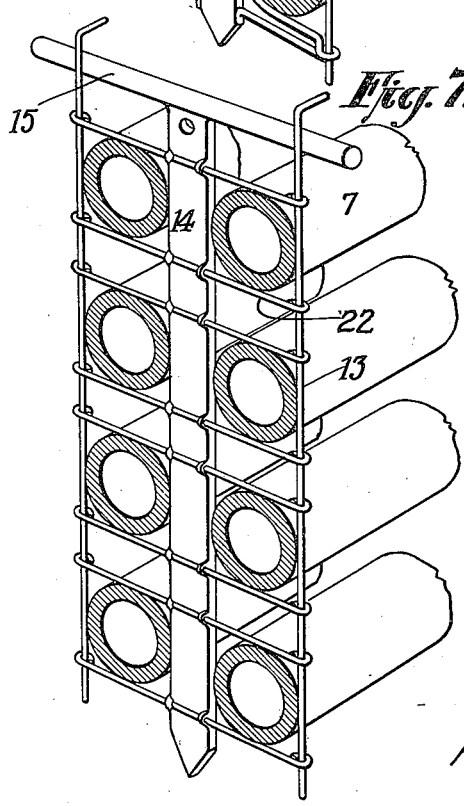

Fig. 8.

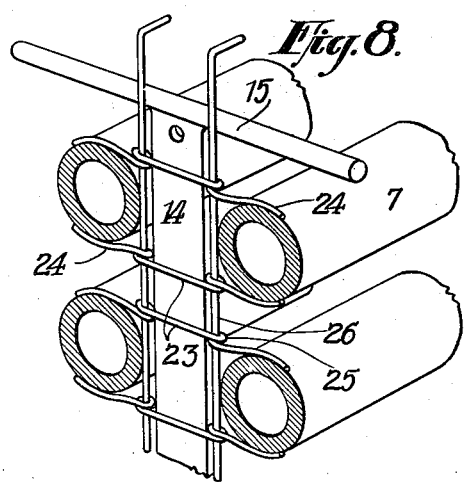

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Fig. 9.

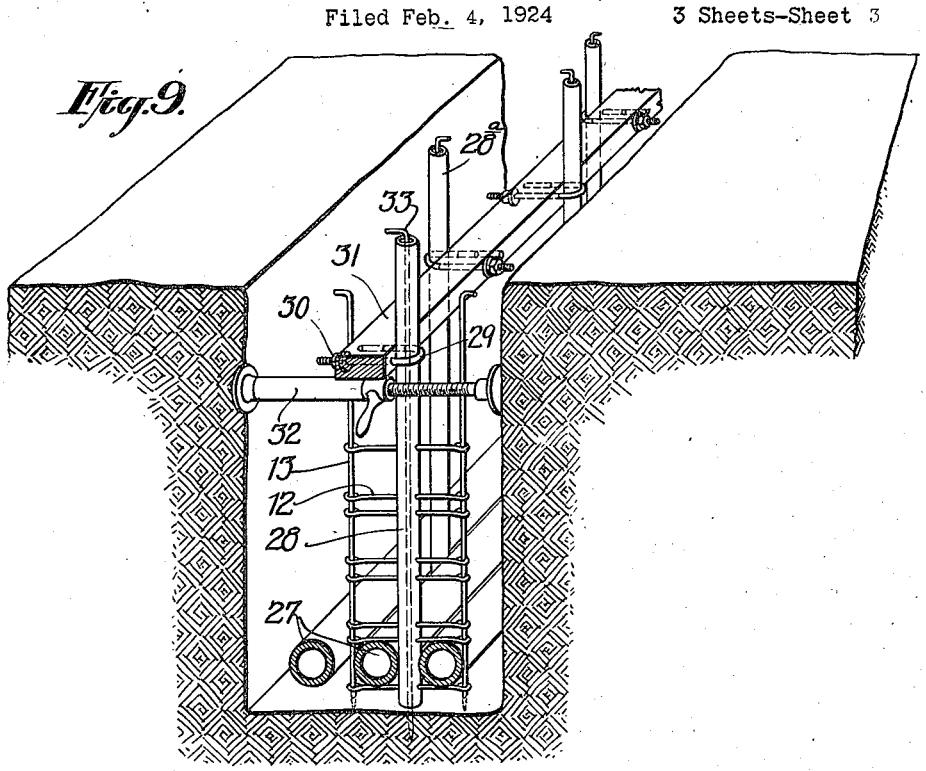
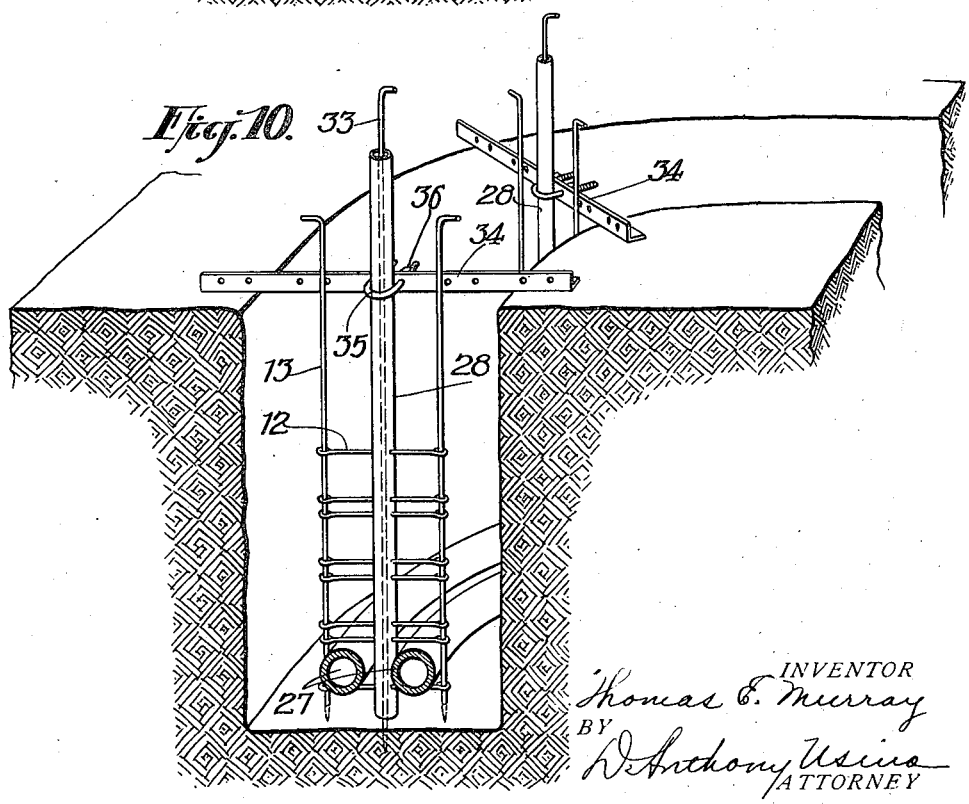


Fig. 10.



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Patented Dec. 30, 1924. 1,520,840

UNITED STATES PATENT OFFICE.

THOMAS E. MURRAY, OF BROOKLYN, NEW YORK,

APPARATUS AND METHOD FOR MOLDING CONDUITS AND THE LIKE.

Application filed February 4, 1924. Serial No. 690,412.

To all whom it may concern:

Be it known that I, THOMAS E. MURRAY, a citizen of the United States, and a resident of the borough of Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Apparatus and Methods for Molding Conduits and the like, of which the following is a specification.

The invention is particularly applicable to the laying of concrete structures carrying a number of ducts generally of a few inches in diameter for electric cables. It is applicable also to other plastic materials than concrete and to the forming of structures with openings of various sizes and shapes and for various uses. It is particularly useful in the laying of such conduits underground, though applicable also to structures built above ground. The accompanying drawings illustrate embodiments of the invention.

Fig. 1 is a perspective view, with an end in vertical section, showing one stage in the forming of conduits underground;

Figs. 2, 3 and 4 are vertical sections illustrating successive stages in the operation;

Figs. 5, 6, 7 and 8 are perspective views illustrating modified forms of the apparatus;

Figs. 9 and 10 are perspective views of still other forms.

Referring to the embodiments of the invention illustrated, a conduit, in which term I include the entire concrete structure, is shown at 1, Fig. 4, with a number of longitudinally extending ducts 2 formed therein. The ducts illustrated are circular but they may be of other shapes in cross-section. The conduit 1 of Fig. 4 has six pairs of parallel ducts in vertical arrangement. Fig. 1 illustrates the building of a pair of such ducts at opposite sides of an excavation. Generally these will be connected at the bottom by a third conduit (1^a, Fig. 4) extending horizontally and which may be formed by the same method.

The necessary excavation being made in the earth 3, mold boards 4 are set up with braces 5 between them engaging stiffeners 6, leaving spaces between the mold boards and the sides of the excavation for the concrete which is cast or poured in from the top.

The ducts are formed by casting the concrete around cores 7. These are preferably rubber cores which after the concrete has sufficiently hardened are removed by pulling them out endwise as described in certain previous applications for patent which I have filed (particularly Nos. 670,423 and 679,521). Various other styles of core may be used, however, and they may be removable or may be permanent, serving as linings for the ducts. The present invention is directed particularly to the holding of such cores properly spaced during the casting of the concrete.

A post 8, preferably circular to facilitate the turning of it in the wet concrete, is suspended from an overhead cross-beam 9 resting on the edges of the mold boards; each post being provided at the top with an angle or flange 10 which is fastened by means of a removable pin 11 to an upright flange of the cross-beam 9. The post has holes extending horizontally through it at properly spaced intervals, and through these holes are passed pins 12. The pins have eyes at one end and are arranged in alternate positions with the eyes at opposite sides. Rods 13 pass down through the eyes of the pins 12 at the opposite sides, being loose in the eyes so that they may be easily inserted and withdrawn. The cores 7 are carried in the enclosures formed by the structure thus assembled. The posts 8 serve as lateral spacers for the cores. The pins 12 support the weight of the cores and also support them against upward movement under pressure from the wet concrete; the supporting structures described being arranged along the length of the cores at sufficient intervals to prevent the sagging thereof to an objectionable extent. The concrete being poured to the desired level, the supporting structure described may be removed as stated hereinafter, while the concrete is sufficiently plastic to fill the voids caused by such removal; or additional grout being poured in the voids thus left. Where the cores are to be withdrawn it is necessary to withdraw the entire supporting structure described, in order to avoid chances of contacts and short circuits with the cables. But where the cores used are the usual permanent linings of non-conducting fibre or the like the supporting

structure may be left in the concrete or may be partly withdrawn. For example, the rods 13 may be withdrawn to save them for further use, leaving the central post and the horizontal pins in place.

After the casting of the concrete and while it is still soft, say in about one half hour, the rods 13 are pulled out. The cross-beam 9 is disconnected from the central post and the latter is turned approximately ninety degrees about a vertical axis. This will bring the horizontal pins clear of the cores. The post is then pulled out, carrying the pins with it through the soft concrete. The pins, of course, must be of sufficiently stiff material. For example, in forming four inch ducts the central post may be of two inches diameter and the pins 12 and rods 13 of stiff wire three-eighths of an inch in diameter. A handle may be fastened to the top of the post for turning and lifting it, or the cross-beam 9 may be used for this purpose.

The positioning means for the cores may be modified as in Fig. 5 for example. Here the central post is a flat bar 14 with a handle 15 fixed on its upper end and with a wire 16 welded to its edges as intervals with horizontal portions serving to hold the cores 7 against upward and downward pressures and with eyes formed of loops 17 at the outer ends of the horizontal portions receiving and holding the vertical rods 13 which hold the cores in position against outward lateral movement. In this figure I have shown also a substitute for the rods 13 in the form of a flexible wire or cable 18 which may be passed back and forth through the bends of the wire 16 and brought up at the other end to pull it taut; and which, after the concrete is poured, can be withdrawn by pulling up the looped end 19.

According to Fig. 6 a round post 20 is used with horizontal loops of wire 21 passing through it and at their outer ends serving to engage the rod 13 or the flexible wire or cable 18. In Fig. 7 a flat bar 14, similar to that of Fig. 5, is shown with separate single cross wires 22 welded to one face of the post and having eyes at their opposite ends to receive the rods 13 or the like.

The method of withdrawal of the parts shown in Figs. 5, 6 and 7 is the same as for Fig. 1. The central post in these figures, however, is pointed at the end and is intended to be thrust into the ground to the desired depth, instead of being supported from overhead; being provided with a handle 15 at the upper end for pulling it out. I have designed these particularly for smaller ducts spaced closer together and fewer in a conduit; but the same designs may be used for ducts of various sizes, spacing and numbers. It will be understood also that the invention may be applied to the building of a single vertical line of ducts, with the horizontal members projecting at only one side of the post which carries them; or to a single horizontal course of ducts; or indeed to the forming of a single duct; eliminating in each case so much of the positioning apparatus as is not required.

The apparatus of Fig. 8 is designed to eliminate the separate side rods 13. It shows also the use of additional spacing means between the cores. A central post 14 similar to that of Fig. 5 is used. It carries, welded or otherwise fastened to it, horizontal wires 23 the outer ends 24 of which are curved alternately up and down so as to embrace the cores 7 and prevent their displacement laterally outward as well as up and down. The width of the central post 14 is less than the desired spacing between the ducts. Immediately beyond the side edges of the post 14 the wires 23 are bent to form loops 25 which serve as guides to hold spacing rods 26 which pass down through them and which bear against the cores 7 to hold the latter out to the desired spacing.

The apparatus of Fig. 9 is illustrated in connection with a conduit having three ducts in each horizontal course. The cores 27 are assumed to be permanent linings of paper or similar material but removable cores can be equally well used. A hollow central spacing post 28 is used being supported near its upper end by means of a clamp 29 fastened by a nut 30. A number of such clamps are arranged on a bar 31 which rests on jacks 32 or other convenient parts of the structure. Each post carries cross rods or pins 12 with eyes through which pass the retaining rods 13. The point of support of the central post 28 being at its upper end there is a chance of its swaying while the concrete is being cast. To prevent this a pointed rod 33 is passed down through the hollow post and into the ground below. The pins 12 pass transversely through the hollow post also. But they and the stay-rod 33 are so small that both can be easily accommodated within the post.

The arrangement described takes care of two ducts in a course. To provide for three there are similar structures arranged alternately on opposite sides of the overhead bar 31. For example, the first post 28 is indicated at the right of the bar. The next one 28^a is mounted on the left. It will carry pins 12, retaining rods 13 and a stay-rod 33 down through its center; these parts being omitted from the figure for the sake of clearness. Thus the central core 27 will be supported at twice as many points as the two outside cores.

The strains tending to throw the cores and the supporting structure therefor laterally out of line are greatest at the bottom. The spike or stay-rod 33 stays the parts at the

bottom being driven into the earth. The stiff overhead structure shown serves to maintain an accurate location of the central spacing posts and connecting parts.

Where the conduit branches off into a smaller trench without false-work or other supporting structure therein the scheme of Fig. 10 may be used. Angle irons 34 are laid across the trench at intervals with sufficient bearing at the sides to carry the weight. The vertical flange has openings for receiving a looped clamping rod 35 the ends of which are threaded and provided with fastening nuts 36. The central post 28 carrying the cross wires 12 is fastened firmly to the supporting bars 34 with its lower end near the bottom of the trench and is then stayed by passing the long spike or stay-rod 33 through it and into the ground.

This scheme is particularly useful, even though it may be on large trenches supplied with other supporting material, where the conduit is to go around a curve. The bars 34 are freely adjustable to the curvature of the trench. And after a spacing post 28 has been clamped to a bar 34 the latter may be moved in any horizontal direction to get exactly the right position. This may be done after the cores 27 are embraced in the frame work of rods 12 and 13, or before.

Though I have described with great particularity of detail certain embodiments of my invention, yet it is not to be understood therefrom that the invention is restricted to the particular embodiments disclosed. Various modifications thereof in detail and in the arrangement of the parts and in the order of the steps of the process may be made by those skilled in the art without departing from the invention as defined in the following claims.

What I claim is:—

1. The method of forming a structure of plastic material with an opening therein which consists in holding a core in place by removable positioning means outside of the core, casting the plastic material about said core and positioning means and withdrawing the latter.

2. The method of forming a structure of plastic material with an opening therein which consists in holding a core in place by removable positioning means, casting the plastic material about said core and positioning means, withdrawing the latter while the material is still plastic and withdrawing the core when the plastic material has hardened.

3. The method of forming a structure of plastic material with ducts therein at different levels which consists in holding cores for said ducts at their respective levels by removable positioning means, casting the plastic material about the cores and positioning means and withdrawing the latter.

4. The method of forming a structure of plastic material with ducts therein at different levels which consists in holding cores for said ducts at their respective levels by removable positioning means, casting the plastic material about the cores and positioning means, withdrawing the latter while the material is still plastic and withdrawing the cores when the material has hardened.

5. The method of forming a structure of plastic material with an opening therein which consists in holding a core in place by removable positioning means extending horizontally, casting the plastic material about the core and said positioning means and moving the latter through the plastic material horizontally out of line with the core and vertically out of the material.

6. The method of forming a structure of plastic material with an opening therein which consists in holding a core in place by removable positioning means extending vertically alongside of it, casting the plastic material about the core and said positioning means, and withdrawing the latter in a vertical direction out of the material.

7. An apparatus of the class described including in combination an overhead structure and a core-positioning means adapted to be suspended therefrom to position the core during the casting of the plastic material and adapted to be withdrawn from the plastic material.

8. An apparatus of the class described including vertical and horizontal members for positioning horizontal cores during the casting of plastic material around them, said horizontal members movable laterally through the plastic material to positions out of line with the cores and the vertical and horizontal members being movable in a vertical direction through and out of the plastic material.

9. An apparatus of the class described including vertical and horizontal members for positioning horizontal cores during the casting of plastic material around them, said horizontal members movable laterally through the plastic material to positions out of line with the cores and the vertical and horizontal members being movable in vertical direction through and out of the plastic material, in combination with secondary vertical members arranged to prevent lateral displacement of the cores and to be separately withdrawn.

10. An apparatus of the class described including a vertical post, lateral arms carried thereby and a second vertical member engaged by said arms and thereby held against lateral displacement, said second vertical member being separately removable from the plastic material and said vertical post being removable with said lateral arms.

11. An apparatus of the class described including in combination horizontally removable cores and core-positioning means comprising vertical and horizontal members, said horizontal members movable laterally through the plastic material to positions out of line with the cores and the vertical and horizontal members being movable in a vertical direction through and out of the plastic material.

In witness whereof, I have hereunto signed my name.

THOMAS E. MURRAY.