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METHOD OF FORMING DIE CASTINGS ON
MOUNTINGS OR CARRIER MEMBERS
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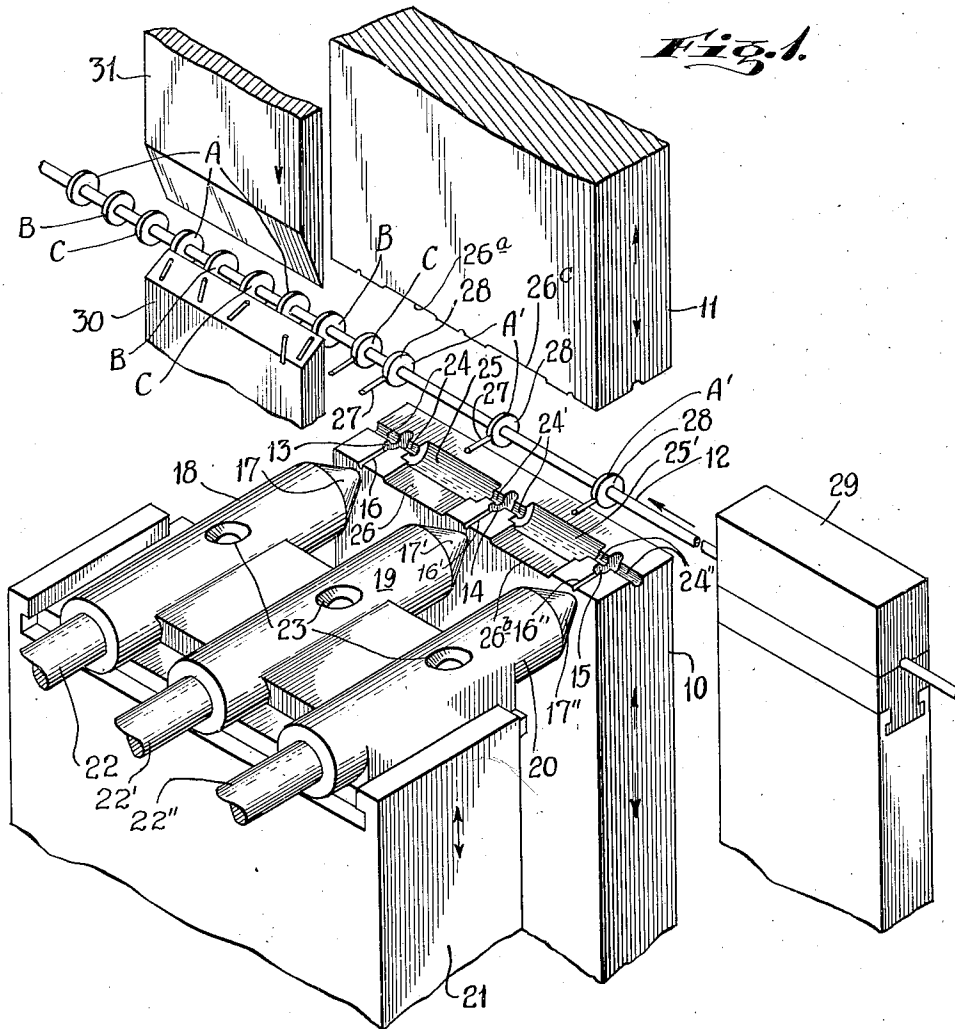


Fig. 2.

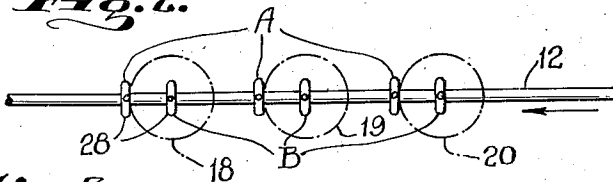
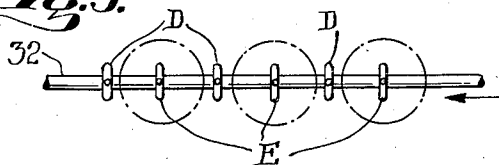


Fig. 3.



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METHOD OF FORMING DIE CASTINGS ON
MOUNTINGS OR CARRIER MEMBERS

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This invention relates to the formation of die castings wherein the castings are formed upon a mounting or carrier member of any type or kind, such for example, as a wire or cable. More particularly, the invention deals with a method which comprises forming, in one casting operation at widely spaced intervals on the mounting member, a multiplicity of castings and successively repeating the casting operations in intermittent feed of the mounting member, to form castings disposed between part of said widely spaced first castings, repeating the casting operations until a predetermined group or series of castings are formed on the mounting member in a predetermined spaced relationship to each other, and then in feeding the mounting member a great distance to begin a repetition of the aforesaid cycle of casting operations and arranging the last casting of a group or series, in the last named extensive feed of the mounting member, in a predetermined spaced relationship to the adjacent casting of the next group to be formed thereon. Still more particularly, the invention deals with a method of forming insulators on a cable in the production of what is known as coaxial cable, in such manner as to speed up the production of the cable by forming three or more cast insulators on the cable in each casting operation of a machine, and by the use of three injector nozzles. The novel features of the invention will be best understood from the following description when taken together with the accompanying drawing, in which certain embodiments of the invention are disclosed, and in which the separate parts are designated by suitable reference characters in each of the views; and in which:

Fig. 1 is a perspective view of the die and injector cylinder portion of a casting machine diagrammatically illustrating the formation of plastic insulator castings on a wire or cable.

Fig. 2 is a detailed view of the wire or cable, showing the castings on the cable after two casting operations of the machine; and

Fig. 3 is a view similar to Fig. 2, showing another method of procedure which can be employed.

In the formation of various types and kinds of die castings, and particularly plastic castings, it has been difficult to obtain speedy production, particularly from the standpoint of the time required to heat the plastic material which minimizes the speed of production of die castings. In producing certain types and kinds of castings, for example, insulators arranged upon a wire or

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conductor in producing coaxial cable, the speed of production has been minimized when single castings are formed one at a time on the cable.

To overcome these difficulties, I have provided a new method of producing castings of the kind described, wherein a plurality of castings are formed at widely spaced intervals on the mounting member or carrier, and by performing this operation two, three or more times, in intermittent feed of the mounting or carrier member, a predetermined group of castings will be formed on the mounting or carrier member in spaced relationship to each other. Thereafter the mounting or carrier member is fed a great distance to arrange another group of the castings thereon with the end castings of one group spaced a predetermined distance from the end casting of an adjacent group.

In illustrating one adaptation of my invention, I have diagrammatically shown in Fig. 1 of the drawing, such parts of a casting machine as will clearly illustrate one method of procedure. In this figure, 10 and 11 represent a pair of dies movable toward and from each other and into engagement with an elongated mounting or carrier member 12, which in the present illustration may be said to be the conductor wire or cable of a coaxial cable. The impression surface of one die, the die 10, only is shown, it being understood that the companion die will have similar impressions thereon. These impressions comprise spaced similar cavities 13, 14 and 15. Opening into all of these cavities are gate passages 16, 16' and 16'', with which is adapted to register the discharge nozzles 17, 17' and 17'' of three cylinders 18, 19 and 20, suitably supported on a block 21 to move with and relatively to the die 10. The purpose of this movement is to bring the discharge nozzles 17, 17' and 17'' of the cylinders in registering alignment with the gate passages 16, 16' and 16'' when the dies are closed preparatory to the injection stroke of the plungers 22, 22' and 22'' of said cylinders, and to then move downwardly with the die 10 to dispose the ends of the nozzles 17, 17' and 17'' on the surfaces of the dies 10 to seal the ends of the nozzles, preventing the discharge of plastic material therefrom. The cylinders have openings 23 for the admission of the plastic powder or grains which are introduced into the heated discharge end of the cylinders preparatory to discharge of the heated material from the nozzles, as previously stated. Plastic casting machines of the general type and kind under consideration are

known in the art, and from this standpoint, no further specific description will be given.

Adjacent the cavities 13, 14 and 15, the dies have impressions 24, 24' and 24'' for the reception of the cable 12, and between the cavities 13, 14 and 15, the dies have recesses 25 and 25' for the reception of preformed castings as the cable 12 is intermittently moved for the three stages here illustrated in forming a successive series of three castings. The dies are also recessed, as at 26, 26a, 26b and 26c in order to receive the gates 27 of the castings 28. A suitable feeder 29 is employed to feed the cable 12 intermittently through the machine, and at 30 and 31 is shown a pair of trimming tools for trimming the gates 27 from the castings, the operation being performed on any desired number of the castings simultaneously. These tools will operate when the casting operation is being performed and the mounting or carrier member 12 is at rest.

In order to clearly illustrate the method, the formation of the first series of three castings is designated by the reference characters A and A' in two positions in Fig. 1, and in one position in Fig. 2. In Figs. 1 and 2, the formation of the second series of castings is designated by the reference character "B," whereas the last series is designated by the reference character "C," in Fig. 1 only. In other words, at the left of Fig. 1 is shown a completed group of castings comprising the three series "A, B and C." This group will have all of the castings arranged in equally spaced relationship to each other along the cable 12. It will also be noted that the last casting "C" of this group is also equally spaced with respect to the first casting of the next series "A" that has been formed, and in Fig. 1, the cable 12 is ready to be moved to the left, with the dies open sufficiently to bring the cable 12 into position between the dies to receive the next series "B" of castings. The result of this operation is illustrated in Fig. 2 of the drawing, in which figure the series "A" and the series "B" have been formed on the cable 12. Having completed the series "B," the dies will again open, the cable 12 will be again fed to the left, bringing the next sections of the cable into position with respect to the cavities 13, 14 and 15 to receive the third series "C" which are not shown in Fig. 2, but which are illustrated at the left of Fig. 1 and which would be positioned between the wide spacing of the "A" and "B" castings as they appear on the cable 12 in Fig. 2 of the drawing.

From the foregoing, it will be apparent that after three successive casting operations of the machine, a group of castings comprising nine castings will then be formed on the cable. Upon completion of this operation, the cable is then fed to the left a great distance to position the cable substantially as shown in Fig. 1, preparatory to the reception of the next series "A" of castings thereon. In other words, with the last casting "C" of the first group disposed outwardly of the dies and beyond the impression 13. In this way, a very fast production of insulators on a cable is made possible.

In Fig. 3 of the drawing, I have diagrammatically illustrated another adaptation of the invention wherein the desired result is accomplished in forming two series of casting operations rather than three. In Fig. 3, 32 represents a cable or other mounting member or carrier, and "D" represents the first series of insulator castings on said member, whereas "E" represents the second series disposed centrally between the first series

"D." In this method of procedure, after completing the second series of castings, the cable 32 is fed to bring the same into position to receive another first series "D" with a proper spaced relationship of the end castings of each group with respect to each other, the same as illustrated in Fig. 1 of the drawing.

In the production of products of the kind under consideration, it will also be apparent that by providing suitable spacing between the cylinders 18, 19 and 20, and arranging a pair of cavities at each of the stations now designated by the single cavities 13, 14 and 15, two castings can be simultaneously formed at each station on the mounting member and in one intermittent feed of the mounting member, any series of two castings would be formed with the last two of each of the last series equally spaced from the two castings of the first series. To illustrate this more clearly, consider Fig. 2 of the drawing and let us assume that a sufficient spacing prevails between adjacent castings "B" and "A" to receive two castings at the station "C" rather than the single castings. The two additional castings would be spaced apart the same as the "A and B" castings and would also be spaced from the "A and B" castings a distance equal to the spacing between each pair of castings. In this particular method of procedure, the cylinders 18, 19 and 20 would be located centrally between each pair of "A and B" castings, the single cylinder supplying material to the pair of castings registering therewith. It will, of course, be apparent that in this arrangement, the cylinders 18, 19 and 20 will be spaced apart to compensate for the wider spacing between the pairs of castings which would be required. In other words, following the principle of Fig. 3, instead of forming three single castings, in each operation, three pairs of castings or six castings will be formed in each casting operation, and this will further speed the ultimate production of the insulated coaxial cable. The terms "wide spaced intervals," "widely spaced" and "wide spacing" as these terms are used herein with respect to the spacing of the castings on the carrier member means a spacing equal to the spacing between die cavities. One operation of the casting machine or one cycle thereof includes the closing of the dies over the carrier member, injection of the casting material into the dies, separation of the dies and movement of the carrier member forward to provide for the next series of castings.

It will also be understood that I am not limited to the number of cylinders employed, nor the spacing of these cylinders with respect to each other, and thus a completed group of castings may be formed by any number of successive casting operations. Here it will be further apparent that in some instances, after each casting operation the mounting member would be fed a distance to receive an entirely new section of the member. For example, if the wide spacing between the castings "A" in Fig. 1 is what would be desired on the finished product, then the cable 12 would be moved sufficiently to receive another group of "A" castings with the second group spaced from the first group. It must be here kept in mind that the illustration in the accompanying drawing is simply to show one adaptation and use of the invention. The method herein disclosed is adaptable for use in forming series of castings simultaneously upon mounting or carrier members of any type or kind and in forming, at each casting station, of a series one or more independent

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castings, in producing on the resulting mounting or carrier member any desired continuous arrangement or grouping. In some instances, a very wide spacing of the mounting member will be provided in the feed thereof to space the groups of the castings one from the other, particularly when it is desirable to sever the mounting member between said groups. It will also be apparent that in some instances, it may be desirable to vary the spacing of predetermined castings on the mounting or carrier member.

By performing the trimming operation on the castings, it will be apparent that the finished insulators will be provided on the cable, thus in the production of what is known as coaxial cable, it will also be possible to apply the outer wrapping or sheathing to the insulator in completing the production of the coaxial cable, thus dispensing with an independent handle which would otherwise be required to perform the said trimming and wrapping operations.

In the present illustration of the invention, each of the cavities 13, 14 and 15 are of similar contour to form similar castings which is desirable in the particular product being produced. However, in other instances, all of these cavities may be of different contours, or several cavities may be of one contour and another or others of a different contour. For example, let us assume that a bead chain were being produced and it was desirable to vary the contour of the different castings or beads formed thereon. This could be readily accomplished by changing the contours of the cavities. Of course, throughout the length of a chain there would be repetitions, depending entirely upon the number of cavities or groups of cavities that are employed. In this connection, it will also be apparent that different colored casting materials may be employed in the different cylinders, to modify the appearance of a resulting product where all of the castings are the same size and by a combination of colors employed in the different castings in each series. Here again, the number of colors and the variations will depend upon the number of cylinders and arrangement of colors therein.

My method lends itself to the formation of castings at any spaced relationship with respect to each other on a mounting member. Particularly from the standpoint that the spacing of the discharge cylinders does not control the ultimate spacing of adjacent castings on the mounting member. It will be understood that each cylinder requires a certain amount of space for the storage and heating of the plastic material adjacent the discharge nozzle thereof, thus adjacent cylinders cannot be arranged in close proximity to each other to care for spacing of adjacent castings on the mounting member. However, it will be understood that if the cylinder, for example, were on one inch centers, by feeding the mounting member fractions of an inch for the reception of successive castings, the castings may be arranged and spaced on the mounting member at half an inch, quarter of an inch or even eighth of an inch centers.

Having fully described my invention, what I claim as new and desire to secure by Letters Patent is:

1. The method of producing coaxial cable having insulator members thereon at spaced unit distances from each other and in which a plurality of spaced injection cylinders are employed to cast the members, which comprises: casting a first series of members simultaneously on a

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strand, each member of said series being spaced from each other a distance equal to a plurality of said unit distances; moving the strand with said series thereon from its first position to a second position a unit distance removed from said first position; casting a second series of members simultaneously on the strand in its second position; and alternately continuing to move the strand a unit distance after each casting step and to cast a series of members thereon until the strand length between adjacent members of the first cast series is occupied by members each of which is spaced a unit distance apart from the next adjacent member, said unit distance being independent of the diameter of the injection cylinders.

2. The method of forming spaced die castings on a carrier in which a plurality of spaced injection cylinders are employed, which comprises simultaneously forming a series of castings on said carrier as it rests between relatively movable dies, each of said castings being separated by intervals defined by the spacing of cavities in said dies, shifting the carrier to bring new sections thereof in alignment with said cavities, simultaneously forming a succeeding series of castings on the carrier in which at least one casting of the succeeding series is spaced intermediate two castings of the first series, and alternately repeating the shafting and forming operations to form a completed group of castings on said carrier, then shifting the carrier to position the same between the dies in such manner as to begin another group of castings in predetermined relationship with respect to the first group, the spacing of the castings being independent of the diameter of the injection cylinders.

3. The method of forming closely arranged and spaced castings along an elongated mounting member, which comprises simultaneously casting one series of castings at widely spaced intervals along the mounting member in widely spaced cavities of relatively movable dies, providing spaces between the cavities of the dies for reception of castings formed on said member, separating the dies after forming the first series of castings, then moving the mounting member with the castings thereon a distance less than the spacing between adjacent castings and with part of the castings disposed in the spaces between the die cavities, then closing the dies, then simultaneously casting a second series of castings on the mounting member to produce castings arranged in closer proximity to each other than the spacing between adjacent castings of the first series, again opening the dies and moving the mounting member a distance similar to the first movement of said mounting member and with parts of the first and second series of castings in the spaces between the die cavities, again closing the dies, and forming a third series of castings arranged on the mounting member between the first and second series of castings thereon.

4. The method of forming closely arranged and spaced castings along an elongated mounting member, which comprises simultaneously casting one series of castings at widely spaced cavities of relatively movable dies, providing spaces between the cavities of the dies for reception of castings formed on said member, separating the dies after forming the first series of castings, then moving the mounting member with the castings thereon a distance less than the spacing between adjacent castings and with part of the casting disposed in the spaces between the die cavities, then closing the dies, and then simul-

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taneously casting a second series of castings on the mounting member to produce castings arranged in closer proximity to each other than the spacing between adjacent castings of the first series.

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