No. 817,080. PATENTED APR. 3, 1906.

J. L. MAHONEY.

METHOD OF AND APPARATUS FOR MAKING STRIPED FABRIC FROM PLASTIC MATERIAL.

APPLICATION FILED JULY 29, 1905. 2 SHEETS—SHEET 1.

Fig. 1.

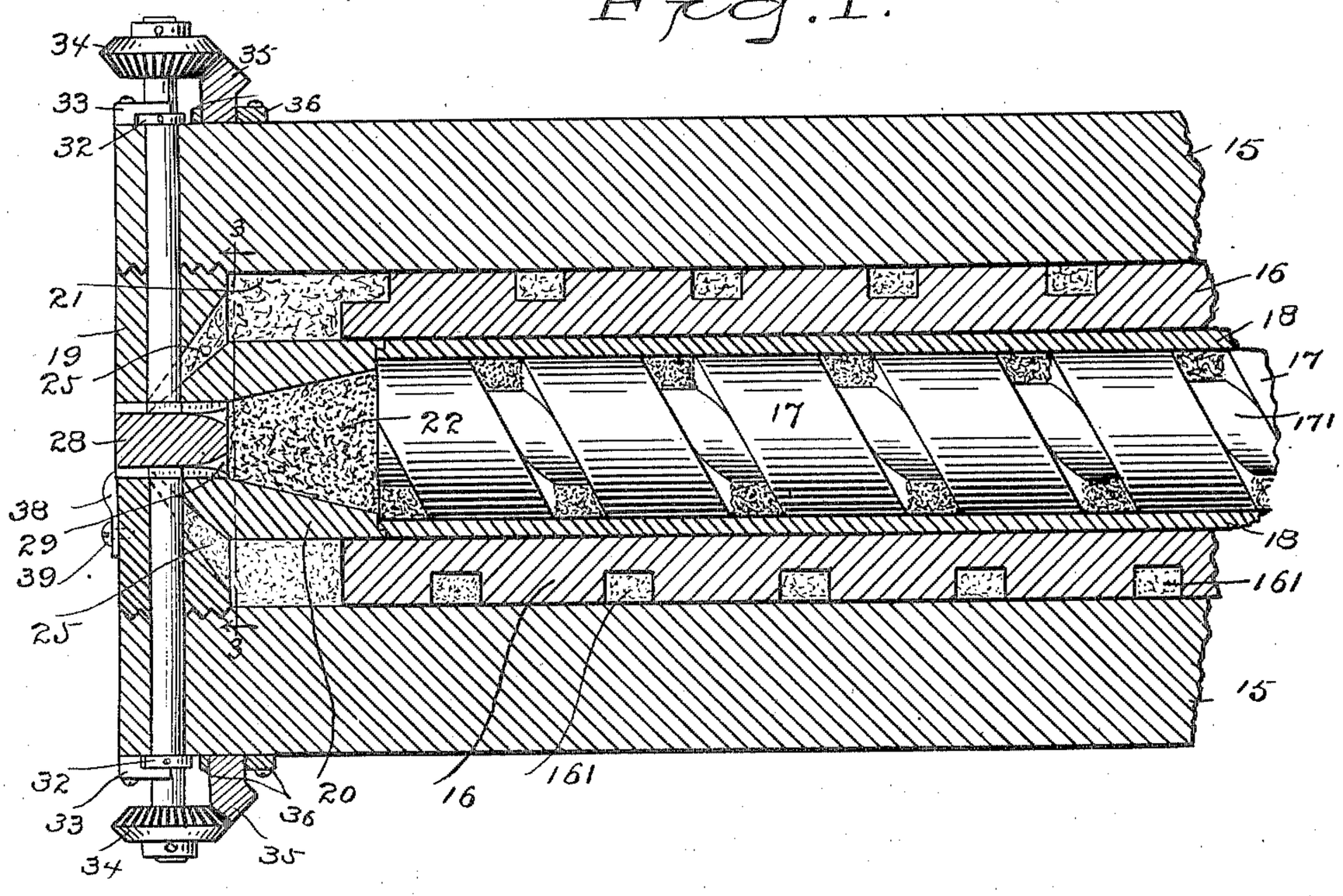


Fig. 2.

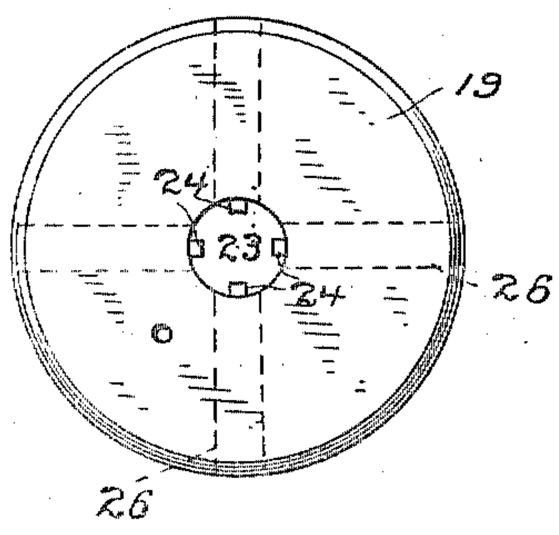


Fig. 3.

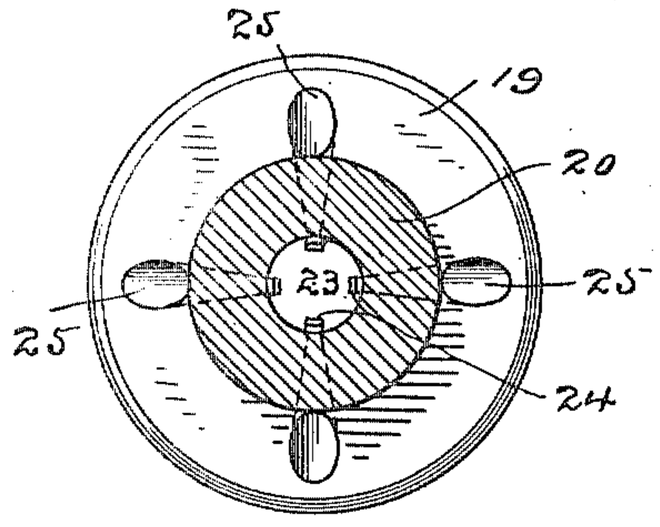


Fig. 4.

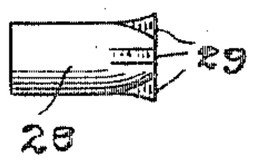
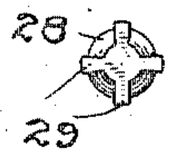


Fig. 5.



WITNESSES

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2 SHEETS—SHEET 2.

Fig. 6.

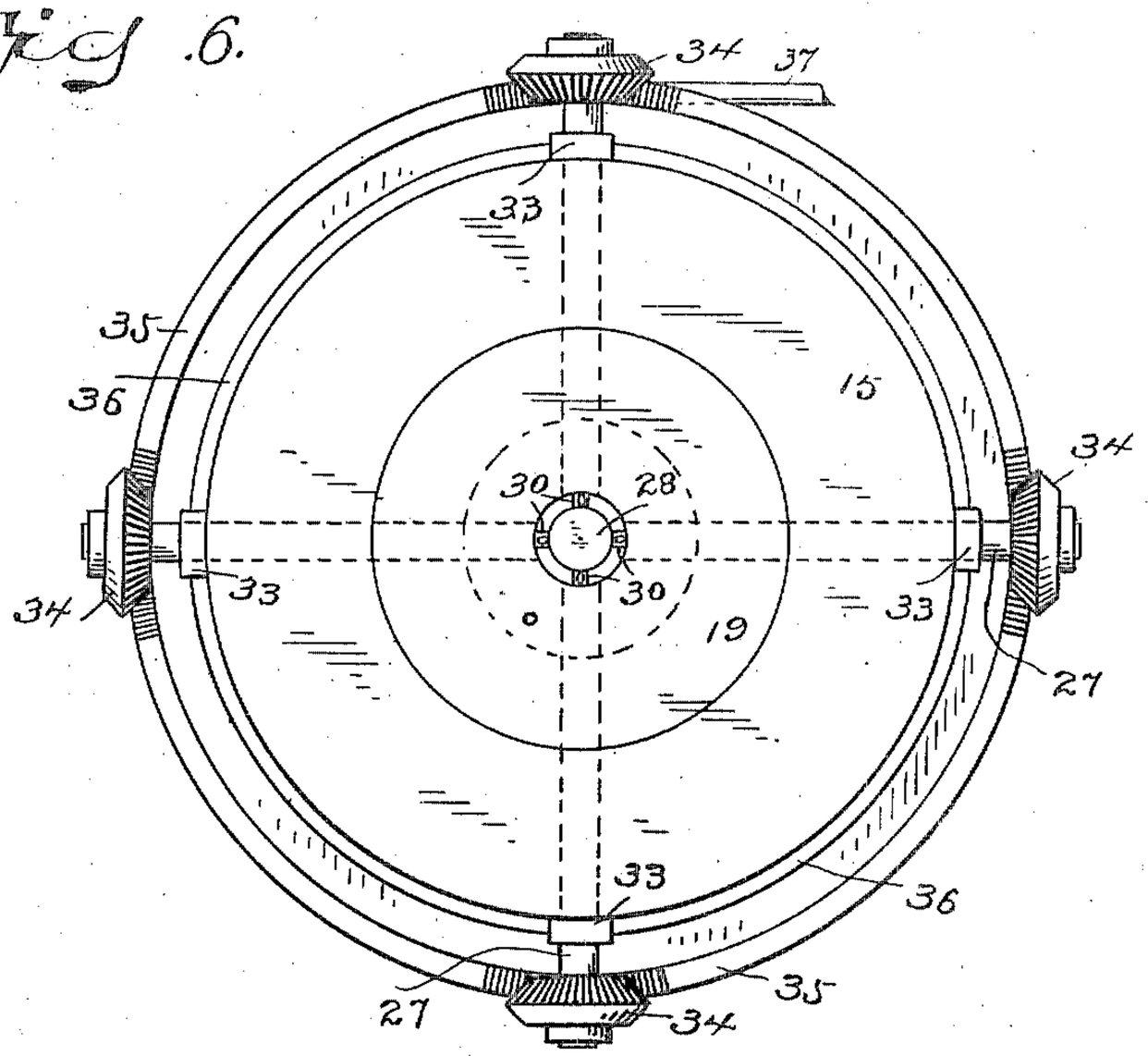


Fig. 7.

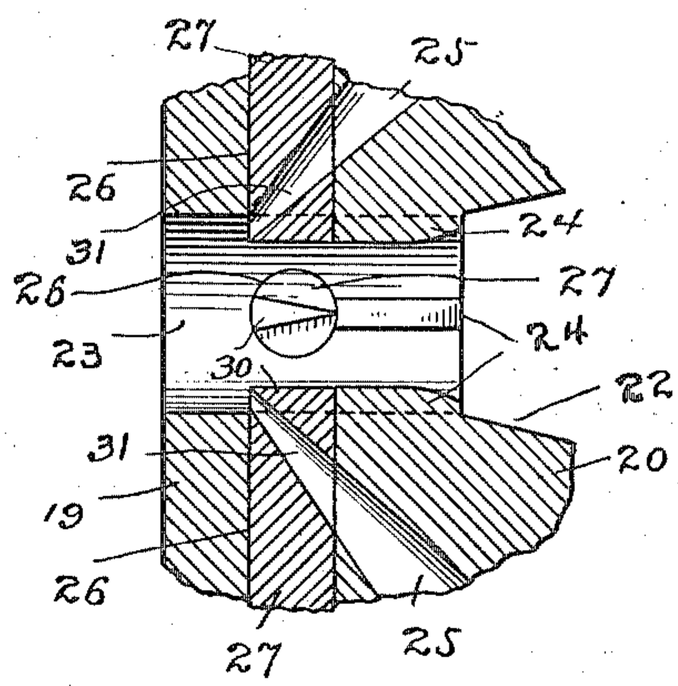


Fig. 8.

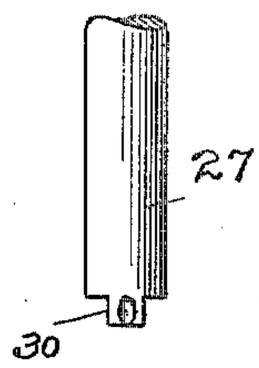
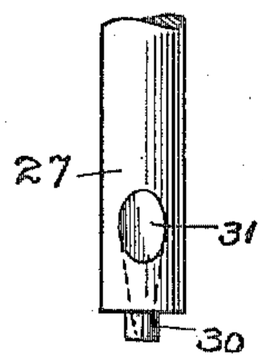


Fig. 9.



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UNITED STATES PATENT OFFICE.

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METHOD OF AND APPARATUS FOR MAKING STRIPED FABRIC FROM PLASTIC MATERIAL.

No. 817,080. Specification of Letters Patent. Patented April 3, 1906.

Application filed July 29, 1905. Serial No. 271,811.

To all whom it may concern:

Be it known that I, JEREMIAH L. MAHONEY, a citizen of the United States, residing at Naugatuck, county of New Haven, State of Connecticut, have invented a new and useful Method of and Apparatus for Making Striped Fabric from Plastic Material, of which the following is a specification.

This invention relates to the manufacture of sheet material in tubular or flat form from plastic material, such as rubber compounds, and has particular reference to the production of such sheets having ornamental stripes incorporated therein, which stripes may be straight or serpentine or of varying diameter to produce figures.

In carrying out my invention I first form a tube having contrasting stripes of the desired configuration and then slit the tube to enable it to be laid out in a flat sheet or strip, and such slitting may be performed automatically as the tube issues from the die or tube-forming end of the machine, or it may be done manually or otherwise by a suitable slitter after the tube has been completed, and preferably before vulcanization when the material employed is one requiring such treatment. The differently-colored compounds are simultaneously forced through separate openings in dies which are so shaped as to place or lay the material in alternate strips which then adhere together, some or all of the dies being preferably movable, so as to form stripes which are serpentine or wave more or less or are figured according to the wishes of the user.

To these ends the invention consists in the method and the apparatus or machine for carrying out the method, substantially as hereinafter described and claimed.

Of the accompanying drawings, Figure 1 represents a longitudinal section, broken away at one end, of an apparatus or machine embodying the novel mechanical features of my invention, the line of section being slightly one side of central. Fig. 2 represents an elevation of the die-holder. Fig. 3 represents a section on line 3 3 of Fig. 1. Figs. 4 and 5 represent, respectively, a side and end elevation of the plug-die. Fig. 6 represents an elevation from the left of Fig. 1. Fig. 7 represents a detail section similar to Fig. 1 on a larger scale, the plug-die being removed. Figs. 8 and 9 represent detail elevations from opposite sides of the stripe-forming dies.

Similar reference characters designate the same or similar parts throughout the several views.

The machine illustrated in the drawings comprises an outer cylindrical shell or casing 15, within which a sleeve or tubular feeder 16 is mounted, so that it may be oscillated or rotated by any suitable means. (Not shown.) Within the sleeve 16 is an inner screw-feeder 17, which is also adapted to be oscillated or rotated by any suitable means. Since the feeders 16 and 17 might be oscillated or rotated by hand, it is not necessary to illustrate mechanism for doing it. I have shown a tube 18 in Fig. 1 as a cylindrical partition between the two feeders, but such partition may be dispensed with, in which case the feeder 17 would be made larger or the bore of the feeder 16 smaller, so that the outer feeder would directly form the bearing for the inner feeder. In other words, the tube 18 might be integral with the feeder 16; but I prefer to employ it, as it takes up the wear between the two feeders and by being secured against rotation by any suitable means enables the feeders to operate properly when they are both rotated in the same direction. The feeders 16 and 17 are formed, respectively, with spiral grooves 161 and 171, into which the compounds (differently colored for the different feeders) are fed by any suitable means, such as hoppers, and the feeders are rotated in the proper direction to cause the compounds to be simultaneously forced toward the dies.

Removably secured in the end of the casing 15 is a die-carrier 19, said carrier being shown as externally threaded to fit an internally-threaded seat in the end of the casing. Said carrier is formed with a hub-shaped portion 20, extending into the end of the feeder 16, thus forming an annular chamber 21, which receives the compound from the feeder 16. Within the hub 20 is a chamber 22, which receives the compound from the feeder 17.

The die-holder is formed with a central hole or opening 23 and with ribs 24 projecting into said hole. (See Figs. 2 and 3.) Said ribs, however, do not extend the full length of the hole, but only along that portion nearest the chamber 22, as shown in Figs. 1 and

7. The die-holder is also formed with inclined and preferably tapered holes or conduits 25, leading from its inner face toward the hole 23, and with radial bores 26 for the stems 27 of the stripe-forming dies presently described.

Fitted into the hole 23 of the die-carrier is a plug-die 28, having ribs 29 equal in number to the ribs 24 of the die-carrier and fitting against them, as indicated in Fig. 1. The inner ends of the ribs 24 are preferably tapered or rounded, and the ribs 29 of the plug-die are shaped to fit the ribs 24, so that said plug-die will be held against ejection by the edge-to-edge contact of said ribs. Of course the plug-die when assembling the parts is inserted to position from the chamber 22 and will be held in position during operation by the pressure of the compound being forced by the feeder 17.

Each stem 27 is formed at its inner end with a stripe-forming die 30, comprising a rib tapered at one end, as shown in Fig. 7, and projecting into the hole 23, so as to just touch the surface of the plug-die. The dies 30 are in alinement with the ribs 24 and 29 and the compound from chamber 22 can escape only in the spaces bounded by the inner wall of the hole 23, the outer surface of the plug-die 28, and the sides of the ribs 24 and 29. The dies 30 form, in effect, continuations of the ribs 24, but, as presently described, are movable to produce a wavy effect.

Each stem 27 is formed with an aperture 31, preferably tapering and inclined in continuation of a hole 25 in the die-holder, as shown in Fig. 1, and conducts the compound from the annular chamber 21 to the annular space around the plug-die behind the dies 30. Therefore the compound from chamber 21, differently colored from that in chamber 22, fills in the spaces between the strips issuing from chamber 22 and forms stripes in the complete tube. Said stripes will be of a width corresponding to the ribs 24 and dies 30. As shown, they are relatively narrow. If wider, so as to practically equal the width of the spaces between the ribs, the term "stripes" would possibly not be as descriptive as "strips." As a matter of fact, the machine assembles strips of compound alternating in colors or shades, said strips adhering at their edges to form a complete tube, which may afterward be vulcanized as desired. Said strips adhere edgewise simply because of the nature of the compounds employed. In order that those portions of the apparatus which are referred to as "stripe-forming" dies may produce a wave-striped effect, they are mounted to oscillate on the axes of their stems 27. Said stems extend radially through suitable bores or bearings in the casing 15 and are provided with collars 32, held against the outer surface of the casing by turn-buttons 33 to prevent said stems from moving radially. Secured to the outer ends of the stems are bevel-pinions 34, meshing with a bevel-toothed ring 35, mounted to rotate on the casing between suitable flanges or annular guides 36. Said ring 35 may be oscillated by any suitable means, such as a pitman 37, connected to the ring and reciprocated by any moving part of the machine. As the ring is oscillated the stem 27 and the dies 30 are turned first one way and then the other, so as to swing the pointed ends of the dies 30 first to one side surface of the adjacent rib 24 (see Fig. 7) and then the other. The rear or wide end of each die 30 will therefore so swing or oscillate as to leave wavy spaces between the strips of compound passing the ribs 24 from the chamber 22, and at the same time the narrower strips of compound passing from chamber 21 through the apertures 25 and 31 will fill in said wavy spaces. The degree of serpentine effect can be varied by varying the amount of oscillation of the ring 35 or by leaving the dies 30 stationary in the position shown in Fig. 7 the stripes will be straight, and by alternately stopping and starting either feeder 16 or feeder 17 or by varying the speed of said feeders relatively to each other the stripes or strips may be made to vary in width and diamond or other shaped figures or enlargements may be formed in the stripes or strips.

When it is desired that the product shall be flat instead of tubular, it is only necessary to slit the tube and lay it out flat before vulcanizing. Such slitting may be performed in any desired manner. As a means for slitting the tube automatically as it is formed I may employ a knife such as indicated at 38 in Fig. 1, said knife being shown as secured by a screw 39 to the outer face of the die-holder and projecting across the space from which the tube issues.

I claim—

1. The method of making ornamental fabric from plastic material, which consists in simultaneously forming strips of material of different appearance and of substantially uniform thickness and assembling said strips edge to edge.

2. The method of making ornamental fabric from plastic material, which consists in simultaneously forming strips of material of substantially uniform thickness from differently colored or shaded compounds and automatically assembling said strips edge to edge.

3. The method of making ornamental fabric from plastic material, which consists in simultaneously forming strips of material of substantially uniform thickness from differently colored or shaded compounds and automatically assembling said strips edge to edge in tubular form.

4. The method of making ornamental fabric from plastic material, which consists in

simultaneously forming strips of material from differently colored or shaded compounds and automatically assembling said strips in tubular form, and then slitting said tube.

5. The method of making ornamental fabric from plastic material, which consists in simultaneously forming strips of material of substantially uniform thickness from differently colored or shaded compounds and with irregular edges, and then assembling said strips.

6. The method of making ornamental tubes from plastic compounds of contrasting appearance, consisting in forming a plurality of separated strips from one compound and simultaneously forming a plurality of strips from another compound and introducing them between the first-mentioned strips with their edges abutting each other.

7. The method of making ornamental tubes from plastic compounds of contrasting appearance, consisting in forming a plurality of separated strips of serpentine form from one compound and simultaneously forming a plurality of strips of serpentine form from another compound and introducing them between the first-mentioned strips.

8. The method of making ornamental fabric from plastic material, which consists in continuously molding a hollow tube of substantially uniform thickness and of alternating colors or shades.

9. The method of making ornamental fabric from plastic material, which consists in continuously molding the material in the form of a tube having serpentine stripes of a color or shade contrasting with the body of the tube.

10. An apparatus of the character described comprising die members having spaces of substantially uniform thickness for the continuous molding of plastic compounds into strip form, separated chambers for different compounds, and means for forcing the compound from one chamber through one set of die-spaces and the compound from the other chamber through another set of die-spaces, means being provided for assembling the strips edge to edge.

11. An apparatus of the character described having separated chambers for plastic compounds, die members having separated forming spaces or channels of substantially uniform thickness communicating with one of said chambers, means for conducting the compound from the other chamber to points to alternate the compounds with each other, and means for feeding the compounds to and through the chambers and forming-spaces.

12. An apparatus of the character described, comprising a casing, a central chamber and an annular chamber for plastic compounds, a die-carrier having forming-passages of substantially uniform thickness leading from said chambers, said passages converging to deliver both compounds in the form of a single tube, and means for feeding different compounds to and through the chambers and passages.

13. An apparatus of the character described, comprising a casing, a tubular feeder mounted to rotate therein, an inner feeder mounted to rotate within the tubular feeder, a die-holder having a hollow hub portion abutting the feeders, and a plug-die mounted in said holder, separated passages of substantially uniform thickness being formed through the holder and to the space around the plug-die.

14. An apparatus of the character described, comprising means for continuously forming and assembling strips of substantially uniform thickness and of different moldable compounds, and means whereby said strips are joined edge to edge in tubular form.

15. An apparatus of the character described, comprising means for continuously forming strips of different moldable material and assembling them to form a tube, and a knife extending across the space from which the tube exudes to slit said tube.

16. An apparatus of the character described, comprising a casing having a central chamber and an annular chamber, means for feeding different compounds to said chambers, a die-holder at one end of the casing and having a central opening, a plug-die within said opening, means for dividing the annular space around said die, oscillatory dies extending into said annular space, passage-ways being formed for a compound from the annular chamber through the oscillatory dies to the annular space, and means for actuating said oscillatory dies.

In testimony whereof I affix my signature in presence of two witnesses.

JEREMIAH L. MAHONEY.

Witnesses:
A. M. WOOSTER,
S. W. ATHERTON.