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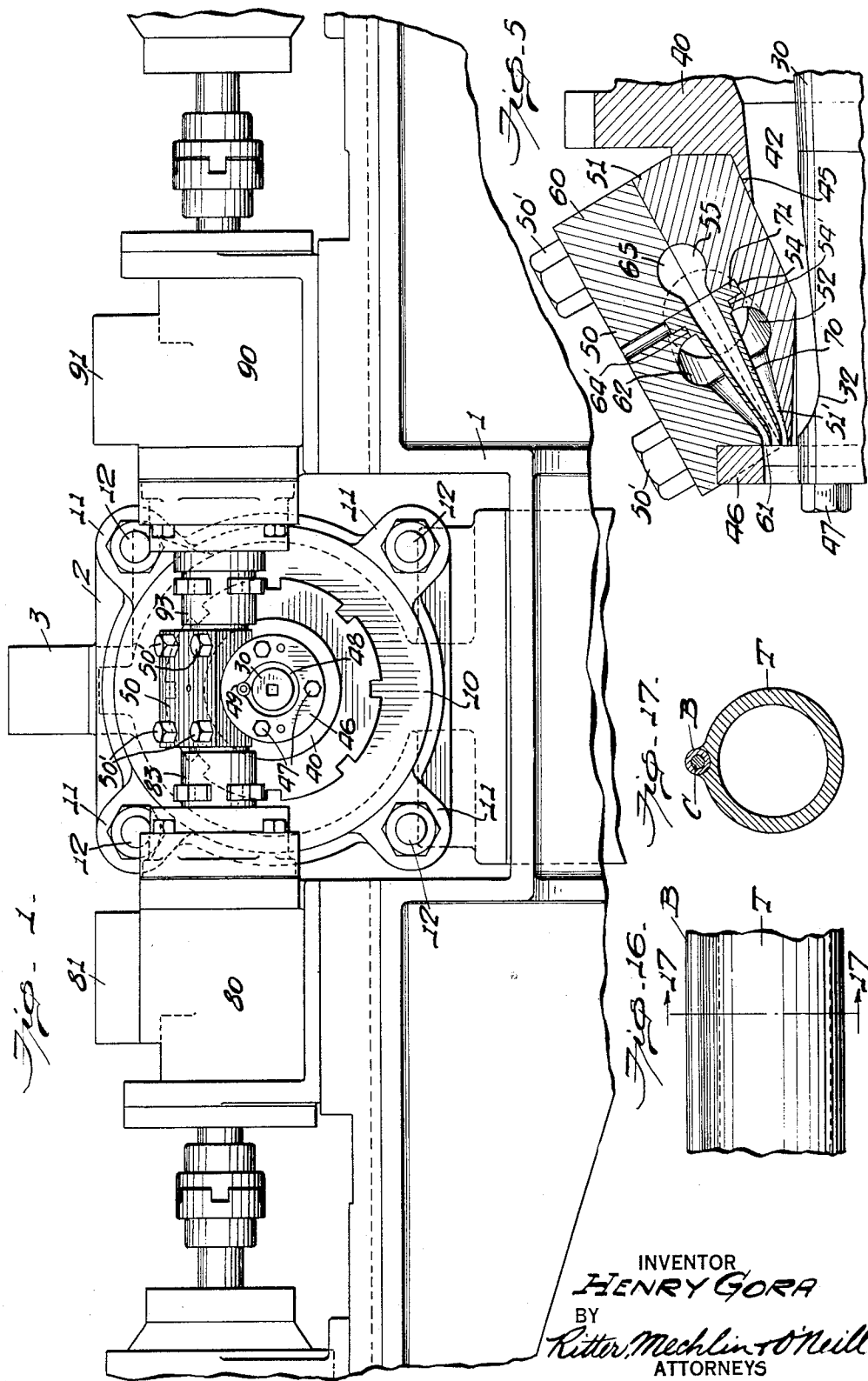
H. GORA

1,933,212

TUBING MACHINE

Filed Dec. 21, 1932

3 Sheets-Sheet 1



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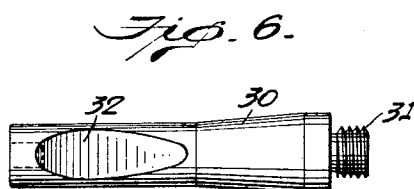
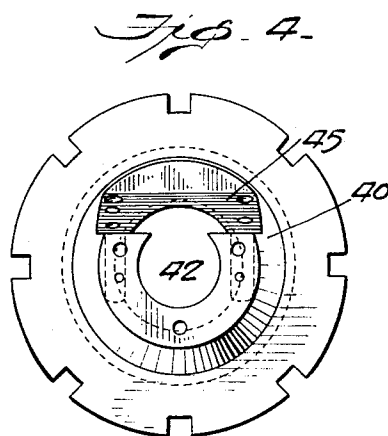
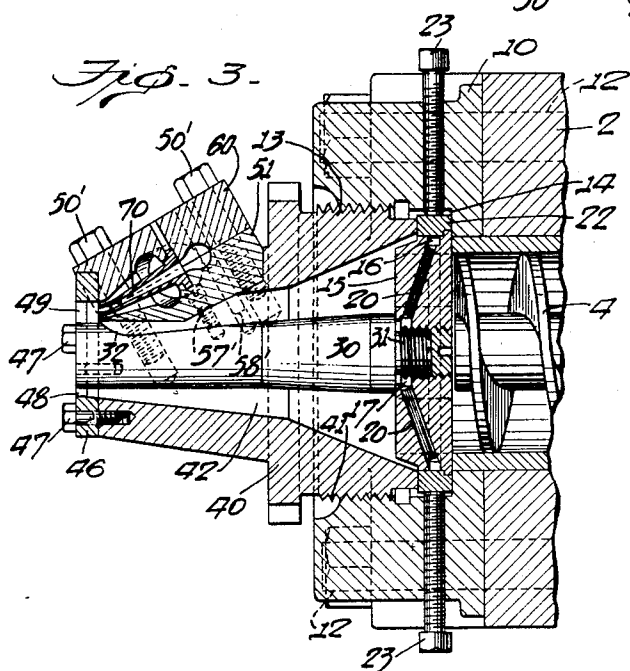
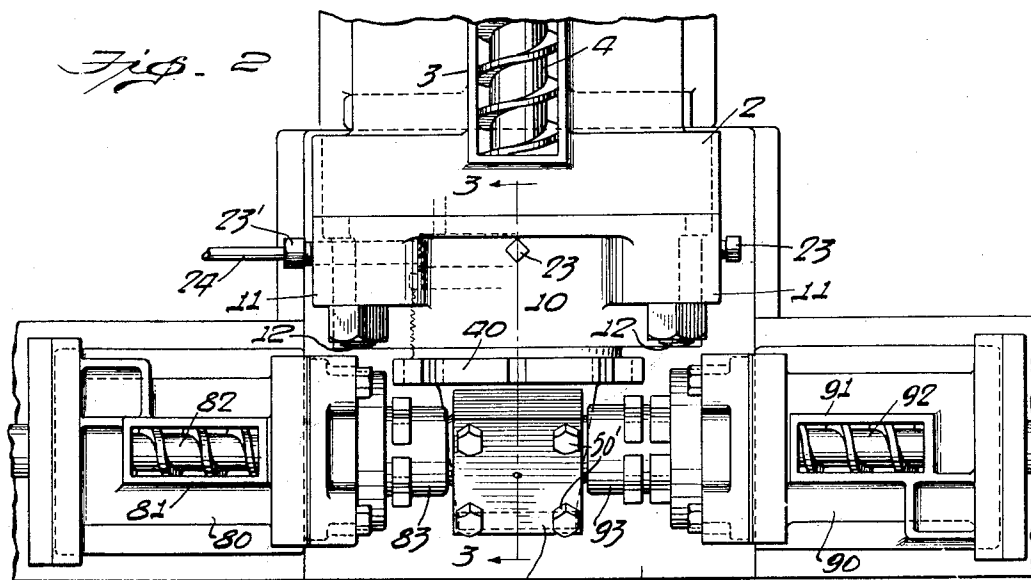
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3 Sheets-Sheet 2



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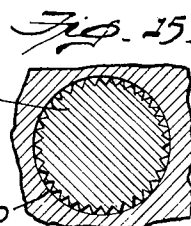
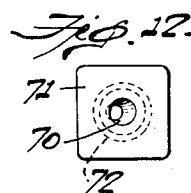
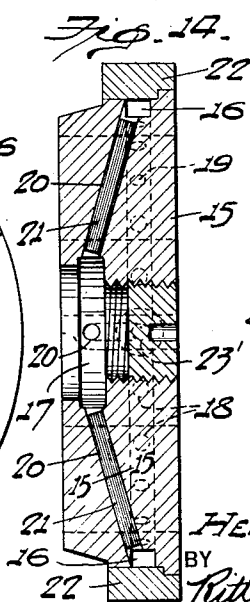
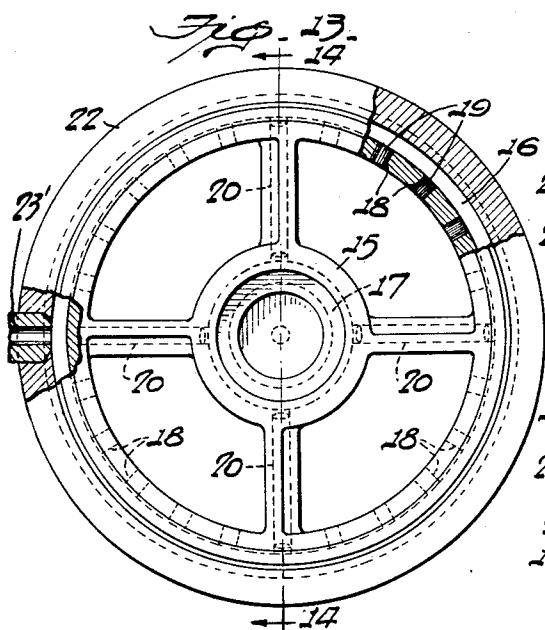
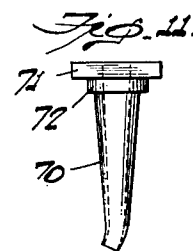
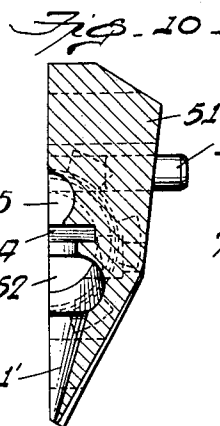
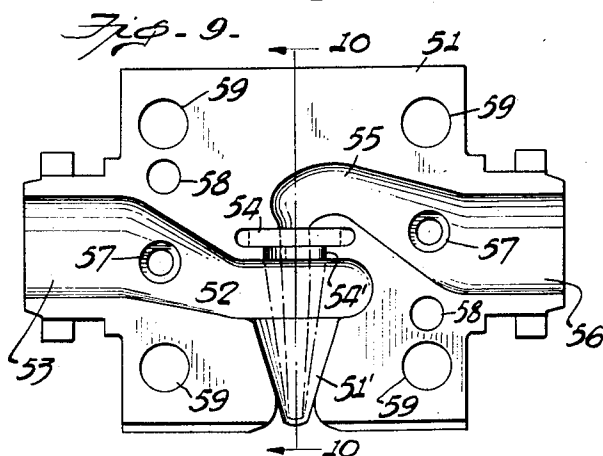
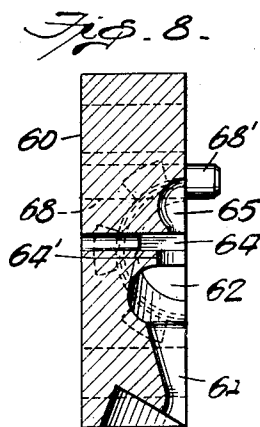
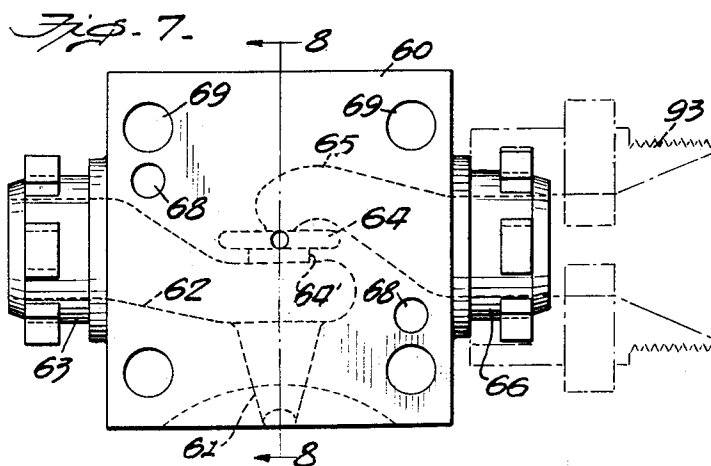
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H. GORA
TUBING MACHINE

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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

1,933,212

TUBING MACHINE

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Application December 21, 1932
Serial No. 648,299

8 Claims. (Cl. 18—14)

The invention relates to certain improvements in machines for forming tubes of rubber or similar plastic material subsequently to be cut into rings for sealing jars and the like, and more particularly the invention relates to a novel form of die head adapted to form tubing with an exterior longitudinal bead, the body of the tubing being of one color, the bead and the complementary portion of the body portion being of a different color with a center of a still different color, so that, when the rings are cut therefrom, they will present an annular body of one color with a tab or lip forming part of a target-like figure having a field of one color and a center of a diverse color.

The invention is illustrated in the accompanying drawings, in which:—

Fig. 1 is a partial front elevation of a machine for making parti-colored tubing.

Fig. 2 is a plan view.

Fig. 3 is an enlarged section on line 3—3 of Fig. 2.

Fig. 4 is a front elevation of the body of the die head.

Fig. 5 is an enlarged fragmentary section corresponding to that shown in Fig. 3.

Fig. 6 is a detail view of the mandrel.

Fig. 7 is a plan view of one-half of the block in which the auxiliary nozzles are formed.

Fig. 8 is a section on line 8—8 of Fig. 7.

Fig. 9 is a plan view of the other half of the block.

Fig. 10 is a section on line 10—10 of Fig. 9.

Fig. 11 is an elevation of the removable nozzle.

Fig. 12 is a plan view thereof.

Fig. 13 is a front elevation, partly in section, of the spindle supporting spider.

Fig. 14 is a section on line 14—14 of Fig. 13.

Fig. 15 is a detail showing the corrugated or grooved pin in an air exhaust channel or duct in the spider.

Fig. 16 is a side elevation of a section of the tubing.

Fig. 17 is a section on line 17—17 of Fig. 16, illustrating the type of lipped packing ring formed from the tubing.

Referring to the drawings, 1 indicates the general frame of an extrusion machine for forming rubber tubing, designed to support three separate units for receiving the rubber or other plastic material from which the tubing is formed and delivering the rubber or plastic material to a die head. The first unit comprises a casing 2, which operates a feed screw or scroll 4, which serves to feed the rubber or other plastic ma-

terial to the tube forming die head, the material being fed to the casing through a hopper-like opening 3. The other two units are disposed at right angles to the first unit and in alignment with each other. They comprise casing 80 and 90, respectively, provided with feed openings 81 and 91 and having feed screws 82 and 92, respectively, operating therein. This arrangement of the casings 2, 80 and 90 with their feed screws provides a simple and effective means for delivering plastic material of three different colors to the tube forming die head to be more particularly described hereinafter.

Secured to the vertical face of the casing 2 is a generally ring-shaped casting 10 having peripheral ears or lugs 11 to receive bolts 12 by means of which the casting is fastened to the casing 2, as more particularly shown in Figs. 1 and 2. The inner peripheral edge of the ring member 10 surrounds the tubular lining of the casing 2 in which the screw 4 operates and adjacent said peripheral edge the ring is counterbored to form a shoulder 14. The forward interior portion of the ring is threaded as at 13 for engagement with the body portion of the die head, which body portion is supported on the casing 2 by the ring section 10 aforesaid.

Mounted in the shouldered counterbore of the ring section 10 is a spider 15, which abuts the shoulder 14 and is adapted to support a mandrel 30, provided with a threaded boss 31 on one end adapted to engage the threaded opening in the hub of the spider. The spider is supported and adjusted in the ring 10 by means of radially disposed set screws 23, the inner ends of which are adapted to engage the periphery of a ring 22 engaging the periphery of the spider 15 serving as a cover for the peripheral channel 16 in the spider, which channel is connected to the interior space of the spider by means of multiple radial openings 18, which are substantially filled by plugs or pins 19 provided with a multiplicity of longitudinal channels or flutings, which permit the free passage of air, but effectively bar the entrance of the plastic material. Each spoke of the spider is also provided with a channel or duct 20, which opens into the counterbore 17 in the hub of the spider and into the peripheral channel 16, each of said channels 20 being provided with a ribbed or serrated pin or plug 21, which permits the free passage of air, but prevents the entrance of the plastic material. To establish communication between the channel 16 and a suitable air exhausting apparatus, one of the set screws 23 is provided with a longitudinal bore or channel

23' and the end of the bolt engages a counterbore in the ring 22 surrounding the spider, so that, when the hollow bolt is connected to an air pump or other suitable exhaust means by pipe 24, air will be withdrawn through the peripheral channel 16 and the multiple openings in the rim and spokes of the spider, as will be hereinafter explained. The main nozzle of the extrusion head comprises a body portion 40 having external screw threads 41 to engage the interior screw threads on the ring or collar 10, the inner end of the body portion 40 abutting the ring 22 surrounding the spider serving to lock the latter against longitudinal movement. The body portion 40 is provided with a tapered longitudinal bore 42 and the forward upper portion of said body portion is cut away to form a seat 45 adapted to receive the removable block carrying the auxiliary extrusion nozzles to be described hereinafter. To the forward end of the body portion 40 of the main nozzle is secured, by screws 47, a die plate 46, the opening in which is circular and of the same diameter as the tubing to be formed therein, the opening being extended at one side as a substantially semi-circular recess to constitute the bead forming element. The outer end of the mandrel 30 is concentric with the larger opening in the die plate 46 and forms with the inner peripheral edge of said die plate an annular opening 48 conforming to the cross section of the tube of plastic material, the bead portion of said tube being defined by the semi-circular recess 49, as hereinbefore indicated.

Mounted on the seat 45, formed on the forward part of the body portion 40 of the main nozzle, is a block 50, which carries two concentric auxiliary nozzles adapted to deliver two different colored supplies of rubber or other plastic material as an outer tube and an inner core, which constitutes the bead member of the complete tube, the bead forming portion being amalgamated with the body portion of the tube as the two portions are forced through the die plate under pressure. The block 50 and the nozzle carried thereby may be constructed in any appropriate manner, but is preferably formed of two sections 51 and 60, as indicated in Figs. 7 to 10. The lower block member 51 has its inner face fashioned to fit the seat 45, formed on the top of the body portion 40, as clearly indicated in Fig. 5. The forward portion of this block member is provided with a converging groove 51', which constitutes one-half of the outer auxiliary nozzle, said groove opening into a channel 52, which terminates in a half nipple portion 53. Formed in the same face of the block member 51 is a second groove 55, which terminates in a half nipple section 56 diametrically opposite the half nipple section 53. The inner end of the groove 55 is in axial alignment with the axis of the half nozzle section 51' and is transected by a recess 54 substantially rectangular in shape, the end of the groove or channel 55 having the form of a semi-circular seat 54'. Formed in the channels 52 and 55 are counterbored holes 57 adapted to receive screws 57' by means of which the lower block member is secured to the body portion of the main nozzle 40. Formed in the corners of the block member 51 are bolt holes 59. The member 51 is also provided with dowel receiving openings 58 adapted to receive dowel pins 58' to engage registering holes or sockets in the seat 45 on the main nozzle portion, said dowel openings 58 also being adapted to receive dowel pins carried by the upper half section 60 of the block 50.

The upper block section 60 is formed with a groove 61 constituting the coordinate part of the outer auxiliary nozzle of which the tapered groove 51' constitutes the other nozzle section. Formed on the inner face of the block section 60 are grooves 62 and 65 complementary to the grooves 52 and 55 in the lower block section, and also complementary nipple sections 63 and 66 which register with the half nipple sections 53 and 56 on the other block section. Also formed in the block section 60 are groove 64 and seat section 64' complementary to the elements 54 and 54' in block section 51. Said block section 60 is provided with bolt holes 69 registering with the corresponding bolt holes in the opposite block section and also with dowel receiving holes 68 registering with holes 58 in block section 51 adapted to receive dowel pins 68', which enter the holes 58 in the block section 51, when the parts are assembled.

Secured between the upper and lower block sections 51 and 60 is an inner auxiliary nozzle 70 having a substantially rectangular flange 71 on one end adapted to fit in the mating grooves 54 and 64 in the two block sections and an annular shoulder 72 fitting the coordinate seats 54' and 64', so that the nozzle 70 will be securely locked between the block sections with its inlet end in registry with the duct or channel formed by the coordinate grooves 55 and 65 and its discharge end concentric with the discharge end of the outer auxiliary nozzle formed by the tapered grooves 51' and 61. As more particularly shown in Figs. 1, 2 and 4, the two block sections 51 and 60 are secured together and both are fastened to the seat 45 formed on the body of the main nozzle, by bolts 50'.

The particular construction of the block carrying the auxiliary coaxial nozzles with their supply journals is designed to facilitate the adjustment, repair and cleaning of the parts.

As stated, the outer auxiliary nozzle is to deliver rubber or similar plastic material to form a tube-like section of one color and the inner concentric auxiliary nozzle is to deliver plastic material of another color, which forms the core of the outer tubular member and this composite rod-like body, when united with the plastic material forming the main tube, results in the construction shown in Figs. 16 and 17, to wit, a tube T having a body of one color, a bead united thereto and having an envelope B of contrasting color and a core C of a third color, so that, when the tube is cut transversely to form rings or annuli, each ring will consist of a main annular body section and a projecting tab or lip, the latter being defined by an outer annular field of one color and a core of a contrasting color, as more particularly shown in Fig. 17.

In order to supply the rubber or plastic material to constitute the core and outer envelope of the bead, the die head is connected with the two laterally disposed mechanisms for feeding the different colored rubbers to the concentric auxiliary nozzles. As shown, the coupling 83 constituting the discharge end of the extrusion machine, including the casing 80 and the feed screw 82, is connected to the coupling formed by the half nipples 53 and 63, so that the material from this part of the machine is delivered to the outer auxiliary nozzle. Similarly, the coupling 93 constituting the discharged end of the casing 90 through which the feed screw 92 operates is adapted to be connected with the coupling formed by the mating nipple sections

56 and 66 formed on the two sections of the block 50, so that the plastic material supplied to casing 90 will be delivered to the inner auxiliary nozzle 70. It will be understood, of course, that the feed screws 4, 82 and 92 will be properly synchronized to deliver correct proportions of the rubber or plastic material to the respective nozzles and that any suitable means may be employed for operating the feed screws. As a general rule, machines of this character are operated by electric motors and this particular application of power drive is indicated in Fig. 1, in which the feed devices on opposite sides of the die head are operated by separate electric motors and it will be understood that the feed mechanism for supplying the rubber or other plastic material to the main nozzle 40 may be similarly driven. As hereinbefore explained, the spider and its supporting ring are provided with means for withdrawing air from the die head, the purpose of this installation being to free the rubber being delivered to the die head of any entrained air, thereby avoiding the formation of blisters or air pockets in the fabric of the tubing. It will be noted that the openings or ducts 18 formed in the rim of the spider and the ducts or channels 20 formed in the spokes of the spider communicate with the interior of the main nozzle 40 and discharge into the annular passage 16, which is connected by the hollow bolt 23 and piping 24 with an air pump or other appropriate air exhausting apparatus, so that any air entrained in the plastic rubber delivered to the nozzle 40 will be withdrawn and the plastic rubber will be delivered to the die plate in a dense, uniform mass wholly devoid of air pockets, so that danger of forming blisters in the tubing, when the latter is being cured, is obviated. The plastic rubber is prevented from entering the air ducts formed in the spider by means of the plugs or pins 19 and 21 located in said ducts. The longitudinal grooves or corrugations in the surfaces of these plugs or pins are sufficient to permit the free passage of air, but will prevent the entrance of the plastic rubber therein.

In the normal operation of the machine, rubber of a selected color is fed to the hopper 3 and forced by the scroll or feed screw 4 past the spider 15 and into the bore of the main nozzle 40, which bore tapers toward its discharge end, so that the plastic material is subjected to relatively heavy compression between the walls of the nozzle 40 and the axially disposed mandrel 30, this portion of the plastic material being forced through the annular opening between the end of the mandrel and the inner peripheral edge of the die plate 46. At the same time, plastic rubber of a different color is delivered to feed hopper 81 and forced by feed screw 82 into the outer auxiliary concentric nozzle carried by the block 50, and rubber of a still different color delivered to feed hopper 91 is forced by feed screw 92 through the inner concentric nozzle 70, and, as the discharge ends of these nozzles are coaxial with the center of the recess 49 in the die plate, the two streams of rubber delivered by the inner and outer auxiliary nozzles will coalesce with each other and the outer enveloping stream

delivered by the outer auxiliary nozzle will coalesce with the body of rubber forced through the main nozzle 40, the several bodies of the plastic rubber being condensed and unified into the beaded tubular form, illustrated in Figs. 16 and 17, in their passage through the die plate.

What I claim is:

1. In a machine for forming extruded tubing, a die head comprising a main tapering nozzle, an axial mandrel therein, concentric auxiliary nozzles located laterally of the main nozzle having their discharge ends adjacent the discharge end of the main nozzle, and means for connecting each nozzle to a separate supply of plastic material.
2. A die head as described in claim 1, having a die plate provided with a circular opening in which the end of the mandrel is centered and a bead forming extension of said opening registering with the discharge ends of the concentric auxiliary nozzles.
3. A die head as described in claim 1, in which the inner and outer auxiliary nozzles are in the form of separate and separable units.
4. A die head as described in claim 1, in which the outer auxiliary nozzle is formed in a two piece block having an inlet duct communicating with said nozzle and an inner nozzle in a separate unit fixed within said block and communicating with a separate inlet duct in said block.
5. A die head for forming extruded tubing having an exterior longitudinal bead, comprising a body portion having a main axial discharge nozzle formed therein, a mandrel mounted axially in said nozzle, a block having concentric auxiliary nozzles and separate ducts communicating therewith formed therein, and means for securing said block to the body portion with the discharge ends of the concentric auxiliary nozzles adjacent the discharge end of the main nozzle.
6. A die head as described in claim 5, having a die plate provided with a circular opening in which the end of the mandrel is centered and the bead forming extension of said opening registering with the discharge ends of the concentric auxiliary nozzles.
7. In a die head for forming extruded tubing having an exterior longitudinal bead, comprising a ring support having an inner shoulder and a threaded throat, a spider engaging said shoulder, a main discharge nozzle having exterior screw threads engaging the threaded throat of the ring and an inner rim engaging the spider, a mandrel supported by said spider in axial alignment within the bore of said nozzle, concentric auxiliary nozzles located laterally of the main nozzle having their discharge ends adjacent the discharge end of the main nozzle, and means for connecting each nozzle to a separate supply of plastic material.
8. A die head as described in claim 7, having a die plate secured to the end of the main nozzle provided with a circular opening in which the end of the mandrel is centered and a bead forming extension of said opening registering with the discharge ends of the concentric auxiliary nozzles.

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