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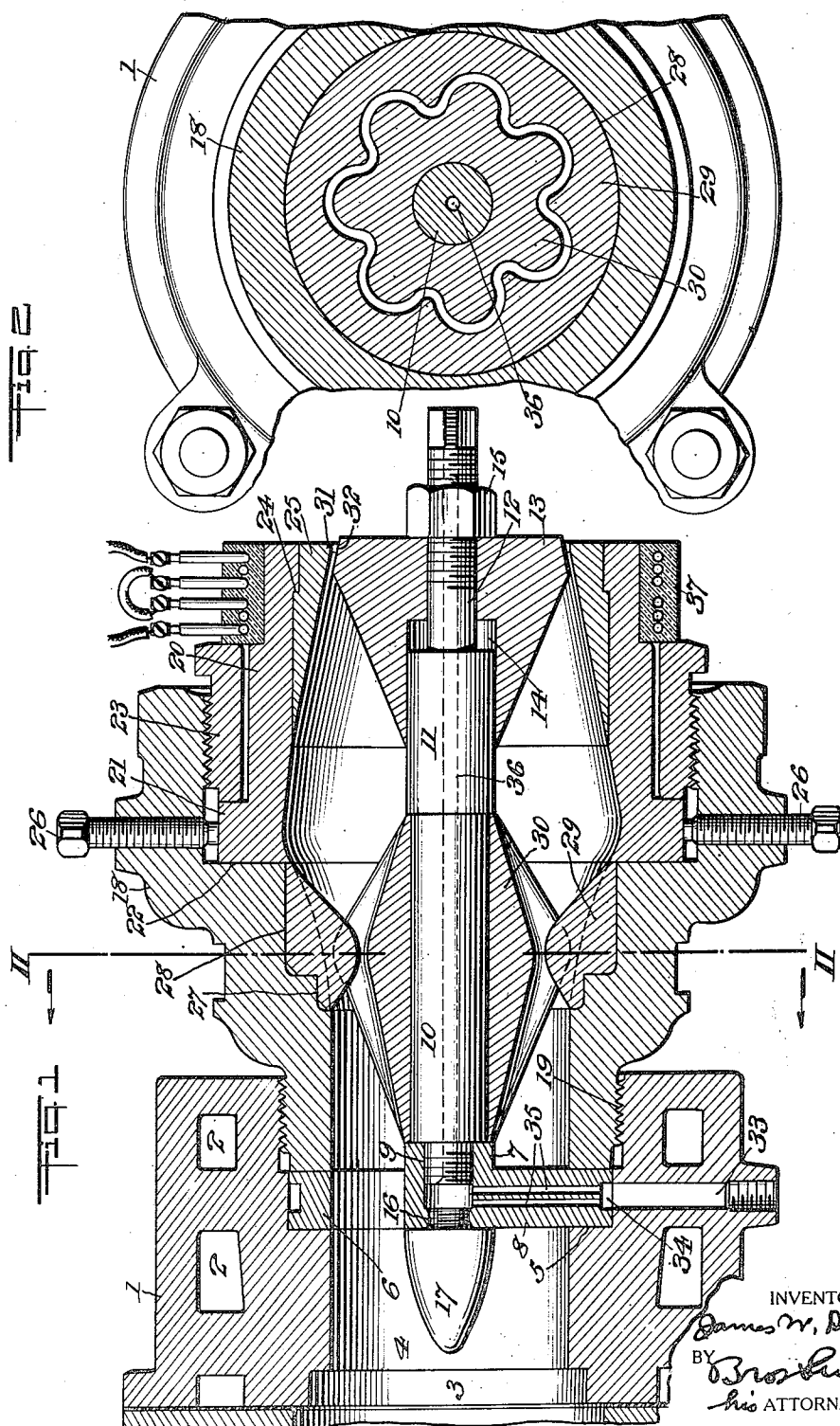
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1,768,671

TUBING MACHINE

Filed Sept. 1, 1927

2 Sheets-Sheet 1



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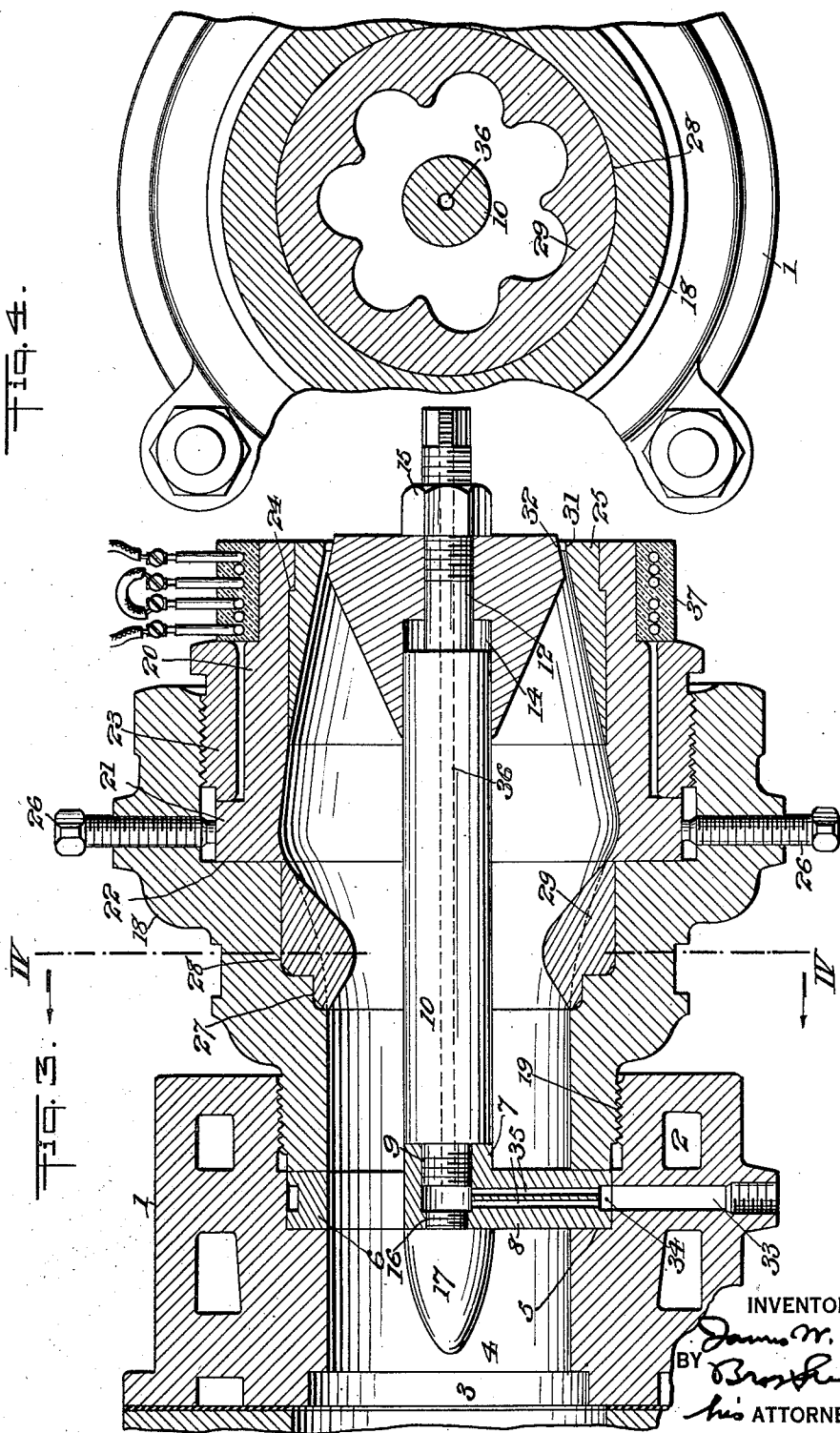
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FIG. 4.



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TUBING MACHINE

Application filed September 1, 1927. Serial No. 216,929.

This invention relates to improvements in tubing machines and, more particularly, to the construction of the discharge portion of such machines.

It has for an object to provide a core and die structure whereby the flow of the material being extruded is regulated so as to promote the quality and uniformity of the product, and whereby the separations occasioned by the spokes of the core bridge are healed and obliterated, so as to eliminate weaknesses or imperfections in the product resulting therefrom.

Another object consists in providing certain improvements in the form, construction and arrangement of the several parts, whereby the above named and other objects may effectively be attained.

Practical embodiments of the invention are represented in the drawings in which

Fig. 1 represents a longitudinal section through the discharge portion of a tubing machine embodying my invention;

Fig. 2 represents a detail section taken in the plane of the line II—II of Fig. 1 looking in the direction of the arrows;

Fig. 3 represents a view similar to Fig. 1 but showing a modified form; and

Fig. 4 represents a detail section taken in the plane of the line IV—IV of Fig. 3 looking in the direction of the arrows.

Referring to the form shown in Figs. 1 and 2, the front member of the tubing machine head is denoted by 1, and it has the usual channels 2 for permitting the circulation of a temperature controlling medium, as is well understood in the art.

The said front member is formed with a bore 3 in which the screw or plodder (not shown) operates in the usual manner.

The said bore 3 is reduced in diameter, as indicated at 4, and it is, forward of this reduced portion, enlarged so as to provide a shoulder 5 against which the core bridge is seated, as clearly shown in Fig. 1.

The said core bridge includes a peripheral member of rim 6, a central member or hub 7, and radially disposed spokes 8, connecting the rim and hub.

The hub 7 is bored and threaded, as indi-

cated at 9, so as to receive the threaded end of a core 10 for removably securing the latter in the hub and thereby causing the core to be supported in position by the core bridge.

The cord 10 has an intermediate portion 11 which is enlarged in diameter, and its forward end is reduced in diameter, as indicated at 12, which reduced end slidably receives a cone shaped inner die member 13 that has a recess 14 formed therein of such size and shape as to slidably fit the enlarged intermediate portion 11 of the core.

The reduced end 12 of the core is threaded and mates with a nut 15 for adjusting the die member 13 on the core.

The hub 7 is also bored and threaded at its rear end, as indicated at 16, so as to receive the threaded stem of a tapered extension 17 that is thus supported by the core bridge and projects rearwardly into the reduced portion 4 of the bore in the front member 1 of the machine.

The core bridge and core are firmly held in position in the tubing machine by an element 18 that is threaded into the front member 1, as indicated at 19, and abuts the outer face of the rim 6 of the core bridge.

The outer portion of the die includes a part 20 that has a flange 21 formed thereon and faced to abut the shoulder 22 on the element 18. A ring nut 23, which is threaded into the element 18, holds the part 20 of the die in place.

The bore of the part 20 is shouldered, as indicated at 24, to receive, with a tight fit, a ring 25 that forms the portion of the outer die member which immediately cooperates with the inner die member 13. It will be clear that the said elements 13 and 25 are normally held in their most forward position by the movement of the material being extruded.

Set screws 26 are threaded into the element 18, in radial disposition, and abut the flange 21 on the part 20 so as to provide means for exactly centering the latter with respect to the element 18 and to the core and the inner die member 13.

The bore of the element 18 is enlarged at 27, and further enlarged at 28, so as to re-

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ceive an annulus 29 which has its exterior correspondingly shaped. The inner circumference of the annulus 29 is flared towards its front and rear edges, when viewed in longitudinal section, so as to constitute oppositely

5 lying faces one of which is longer than the other, as clearly shown in Fig. 1. It is scalloped or corrugated, when viewed in cross section, as will be seen by reference to Fig. 2.
 10 Mounted on the core 10, with its ends abutting the hub 7 of the bridge and the enlarged intermediate portion 11 of the core, is a bulging sleeve 30. This sleeve is tapered toward its opposite ends, when regarded in longitudinal
 15 section, in a manner analogous to the flare on the annulus 29, but the tapered portions on the sleeve are somewhat longer than the corresponding parts on the annulus. In cross section, the sleeve 30 is corrugated in
 20 substantially the same form as the annulus 29, as will be seen by reference to Fig. 2; and examination of the last named figure will also demonstrate that the annulus 29 and sleeve 30 are complementarily disposed so as to
 25 leave a narrow sinuous channel between their most closely adjacent portions. The said channel, of course, increases in width both forwardly and rearwardly of the said most closely adjacent parts of these two elements.
 30 Forwardly of the annulus 29, the bore of the outer die part 20 expands in diameter slightly and then gradually contracts until it merges into a cylindrical portion 31 at the mouth of the die. This cylindrical portion
 35 coacts with a taper portion 32 on the inner die member 13, so that the longitudinal adjustment of the latter on the reduced portion 12 of the core, by means of the nut 15, will vary the width of the opening between the
 40 inner die member 13 and the ring 25, and thereby determine the thickness of the product extruded from the machine.

A port 33 is formed in the front member 1 of the machine head, and it communicates
 45 with an annular groove 34 formed in the rim 6 of the core bridge, which groove opens into ducts 35 in the spokes 8 of the said bridge. The said ducts debouch into the hollow hub 7 and the latter communicates with an axial
 50 channel 36 formed in the core 10. The arrangement just described enables the introduction of some non-adhesive powder, such as talc, into the interior of the product being extruded, the said powder being forced into
 55 the port 33 and being ejected from the forward end of the core 10 into the interior of the tube as formed.

A suitable heating unit, preferably an electrical one, denoted by 37, may be seated upon
 60 the exterior of the outer die part 20 in order to maintain that part of the machine at a proper temperature for the extruding operation.

The form shown in Figs. 3 and 4 is the
 65 same as the form shown in Figs. 1 and 2,

except that the core 10 does not have a relatively enlarged intermediate portion corresponding to the portion 11 in Figs. 1 and 2; and the bulging sleeve 30 is omitted.

In operation, the material to be extruded, 70 generally a rubber compound, is urged forwardly from the machine head by the usual screw or plodder. It first encounters the tapering extension 17 which latter opens the material mass centrally so as to facilitate its
 75 passage around the hub 7 of the core bridge and the core. The force of the screw squeezes the material through the openings between the spokes 8 of the core bridge and the latter, of course, separate the mass into
 80 streams or ribbons of material which must be brought together so as to constitute an annular formation as extruded from the machine. The shape of the space between the annulus 29 and bulging sleeve 30 is so
 85 formed as to cause a resistance to the flow of the material as it passes from the core bridge toward the said parts because the space becomes more constricted as it approaches the
 90 most closely adjacent portions of the annulus and sleeve; while, at the same time, opportunity is provided for lateral or circular expansion of the mass of material by reason of the sinuous or corrugated shape of
 95 the space between the annulus and sleeve. This sinuous form establishes, naturally, greater circumferential length than would a true circle. The combination of this resistance to longitudinal or forward movement of the mass at this juncture and facilitation
 100 of lateral or circumferential movement of the material, promotes a healing or welding of the lines of separation occasioned by the spokes of the core bridge so that, by the
 105 time the material passes the most closely adjacent portions of the annulus 29 and sleeve 30 it is substantially homogeneous throughout its corrugated tubular formation.

As the material passes beyond the most closely adjacent portions of the annulus 29
 110 and sleeve 30, opportunity is provided for lateral expansion so that the mass will be substantially circular in cross section by the time it reaches the widest portion of the bore in the outer die part 20. The tapering
 115 shape of the ring 25, cooperating with the conical shape of the inner die member 13 again establishes resistance to the forward movement of the material and closely compacts it so that, when it finally passes out
 120 or is extruded between the surfaces 31 and 32 of the ring 25 and inner die member 13, respectively, a substantially perfect tubular structure is formed.

It will be observed that the circumferential length of the sinuous opening between the
 125 most closely adjacent portions of the annulus 29 and sleeve 30 is substantially the same as the circumferential length of the widest portion of the bore of the outer die part 20, so
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that there is no lateral strain upon the outer surface of the material after it leaves the elements 29 and 30, and the forwardly tapering bore within the outer die member has the effect of compacting the outer circumference of the material which is already in good condition as respects uniformity of texture by reason of the operation of the annulus and sleeve, 29 and 30.

The operation of the form shown in Figs. 3 and 4 is the same as the operation of the form shown in Figs. 1 and 2, except that, as the sleeve 30 is omitted, the action at the point of location of the annulus 29 is less severe.

It will be understood that various changes may be resorted to in the form, construction, and arrangement of the several parts, without departing from the spirit and scope of my invention; hence, I do not intend to be limited to the details herein shown and described except as they may be included in the claims.

What I claim is:

1. In a tubing machine, a core having a portion which is corrugated in cross-section and oppositely tapered in longitudinal section.

2. In a tubing machine, a core having a portion which is corrugated in cross-section and oppositely tapered in longitudinal section and another portion adjacent thereto and in alinement therewith which is circular in cross-section.

3. In a tubing machine, a core having a portion which is corrugated in cross-section and tapered in longitudinal section, another portion which is circular in cross-section, and a third portion which is circular in cross-section and conical in longitudinal section.

4. In a tubing machine, a core and a surrounding die member, complementary portions of said core and die member being transversely corrugated and longitudinally tapered and flared, respectively, in opposite directions.

5. In a tubing machine, a core and a surrounding die member, complementary portions of said core and die member being transversely corrugated and longitudinally tapered and flared, respectively, in opposite directions, the taper on the core portion being greater in length than the flare on the surrounding die portion.

6. A tubing machine head having a bore provided with a cylindrical portion, a transversely corrugated portion and a circular tapering portion.

7. A tubing machine head having a bore provided with a cylindrical portion, a transversely corrugated portion and a circular tapering portion, the corrugated portion being intermediate the other said portions.

8. A tubing machine head having a bore provided with a cylindrical portion, a trans-

versely corrugated portion and a circular tapering portion, the corrugated portion being intermediate the other said portions and the corrugated portion having faces flaring oppositely in longitudinal section.

9. A tubing machine head having a bore provided with a cylindrical portion, a transversely corrugated portion and a circular tapering portion, the corrugated portion being intermediate the other said portions and the corrugated portion having faces flaring oppositely in longitudinal section, one of said faces being longer than the other.

In testimony, that I claim the foregoing as my invention, I have signed my name this 29th day of August, 1927.

JAMES W. DEVINE.