July 25, 1933. A. PICECE ET AL 1,919,254

DIE FOR PRODUCING SPIRALLY CORRUGATED TUBING

Filed July 18, 1928

Fig. 1.

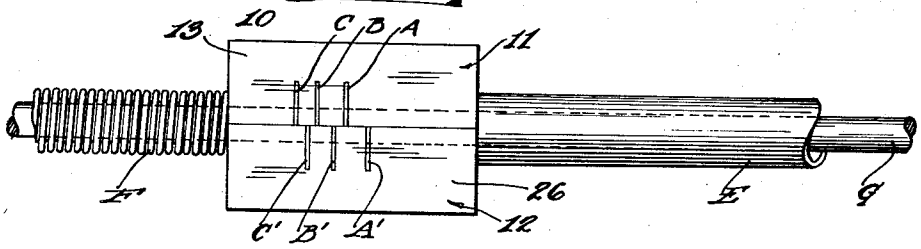



Fig. 2.

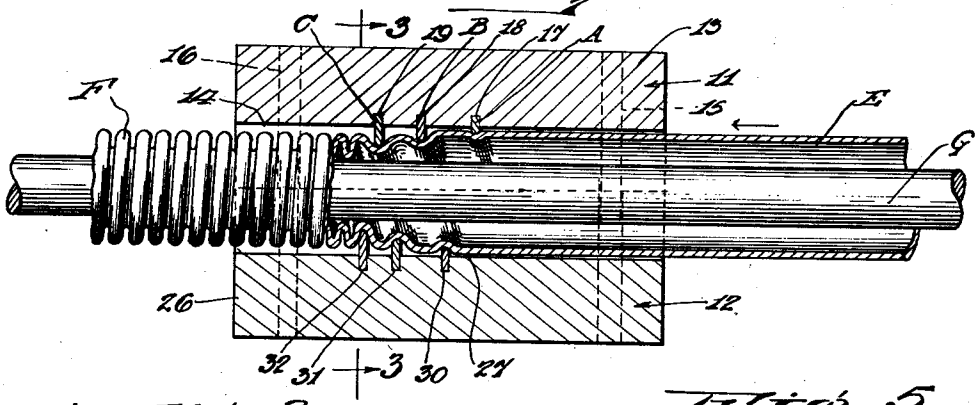



Fig. 3.

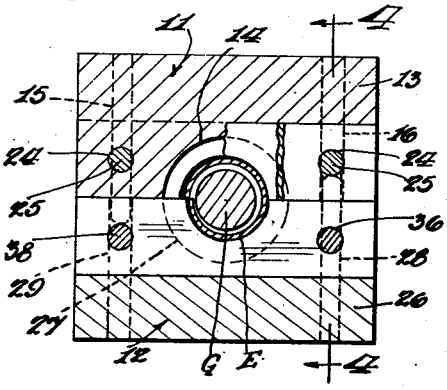



Fig. 5.

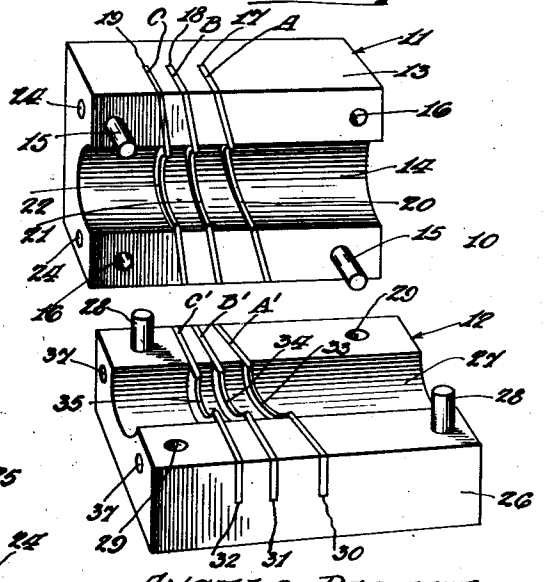
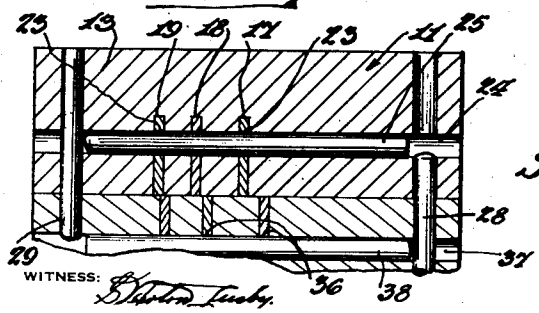



Fig. 4.




WITNESS:

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# UNITED STATES PATENT OFFICE

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## DIE FOR PRODUCING SPIRALLY CORRUGATED TUBING

Application filed July 18, 1928. Serial No. 293,727.

This invention relates to improvements in dies for forming flexible metal hose from seamless tubing.

The primary object of the invention resides in a die for helically corrugating metal tubing to render the same flexible, and which embodies a pair of die sections having die plates which co-act to provide a continuous screw whose diameter and pitch gradually decrease toward the finish end.

Another object is to provide a flexible metal hose die which embodies a pair of die sections, each having removable die plates which may be replaced when worn or damaged, which is a saving of time and labor over the present construction of dies which requires the replacement of an entirely new die.

A further object of the invention is the provision of a die of the above kind in which the die plates are removably secured in the die blocks by removable pins which may be quickly removed and replaced when making a replacement.

With these and other objects in view, the invention resides in certain novel construction and combination and arrangement of parts, the essential features of which are hereinafter fully described, are particularly pointed out in the appended claims, and are illustrated in the accompanying drawing in which:—

Fig. 1 is a side elevation of our die in use,

Fig. 2 is an enlarged vertical longitudinal sectional view therethrough,

Fig. 3 is a vertical transverse sectional view on the line 3—3 of Fig. 2,

Fig. 4 is a fragmentary vertical sectional view on the line 4—4 of Fig. 3, and

Fig. 5 is a perspective view of the co-acting die sections in separated condition.

Referring to the drawing by reference characters, the numeral 10 designates our improved flexible metal hose die in its entirety which includes a pair of co-acting die sections 11 and 12.

The die section 11 comprises a rectangular block or body 13 having a semicircular recess 14 in one of the side faces thereof while removable pins 15 extend through the block at diagonally opposite corners thereof. The faces adjacent the other two corners are provided with sockets 16. Seated in spaced diagonal slots 17, 18 and 19 cut inwardly from the recessed face of the block are die plates A, B and C having arcuate or semicircular teeth 20, 21 and 22 extending inwardly beyond the inner walls of the recess 14. The plates A, B and C are arranged at an angle with respect to the longitudinal axis of the block, with the plate A at the greatest angle, plate B at a lesser angle, and plate C at an angle less than the angle of plate B. The projection of the arcuate teeth increases from the plate A to the plate C for a purpose which will be more apparent as the description proceeds. The plates A, B and C have alined openings 23 therein for register with longitudinal bores 24 in the block, while key pins 25 extend into the bores and through the alined openings to lock the plates in their respective seats.

The die section 12 is similar in construction to the die section 11 and comprises a block or body 26 having a semicircular recess 27 in one of its side faces for register with the recess 14 of the die section 11 to provide an annular bore when the die sections are in an assembled position. Removable pins 28 extend through the block at diagonally opposite corners for reception in the sockets 16 of the die section 11, while sockets 29 are provided in the other corners for receiving the pins 15 of the said die section 11. The pins and sockets tend to aline the die sections when in assembled position. Seated in spaced diagonal slots 30, 31 and 32 cut inwardly from the recessed face of the block are die plates A′, B′ and C′ having arcuate or semicircular teeth 33, 34 and 35 respectively extending inwardly beyond the walls of the recess 27. The plates A′, B′ and C′ are arranged at an angle with respect to the longitudinal axis of the block, with the plate A′ at the greatest angle, plate B′ at a lesser angle, and plate C′ at an angle less than the angle of plate B′, or just slightly more than at right angle with respect to the longitudinal axis of the block. The projection of the teeth 33, 34 and 35 increases from the plate A′ to the plate C′ whereby the same coact with the teeth of the plates A, B and C of the die section 11 to pro-

vide a continuous thread whose pitch lessens from one end to the other, and whose convolutions gradually become smaller in diameter toward the finishing end of the die. The plates A′, B′ and C′ have alined openings 36 therein for register with longitudinal bores 37 in the block, while key pins 38 extend into the bores and through the alined openings to lock the plates in their respective seats. The pins 15 and 28 cross or extend into the bores in which the key pins 25 and 38 are received to prevent accidental loss of said key pins.

In Figs. 1 and 2 of the drawing, we have illustrated our improved die in assembled position for use, wherein a straight seamless metal tube E is being transformed into a helical corrugated flexible tube or hose F, the convolutions of which are formed by inserting the end of the tube E into the bore of the die and imparting rotation to the die which feeds the tube therethrough. A mandrel G extends through the tube for guiding the same as it passes through the die.

The restricted end of the die thread constitutes the outlet end of the same, and as the metal tube E is inserted into the larger inlet end of the thread, the same forms a crimp or fold in the tube, the walls of which are gradually brought together as the tube is fed from the inlet end to the outlet end.

It is appreciated that dies have heretofore been constructed for corrugating seamless tubes, but our invention aims to provide a die for this purpose which may be repaired when the die threads become worn or damaged. By knocking out the key pins 25 and 38 after the die sections have been separated and the pins 15 and 28 removed, the die plates may be quickly removed and replaced. This effects a saving in both time and labor, and consequently is less expensive to maintain in perfect working order.

While we have described what we deem to be the most desirable embodiment of our invention, it is obvious that many of the details may be varied without in any way departing from the spirit of our invention, and we therefore do not limit ourselves to the exact details of construction herein set forth nor to anything less than the whole of our invention limited only by the appended claims.

What is claimed as new is:—

1. A device of the character described, comprising a die member formed of two parts having complementary recesses, means for positioning and holding said parts so as to aline them properly, said parts being provided with die plates disposed at different angles, the working edge of said die plates forming a continuous die thread so that the device may be placed on a tube and rotated while the tube is held stationary to form corrugated tubing.

2. A device of the character described, comprising a die member having a pair of mating die sections, each die section including a block having a longitudinal recess in one face thereof, die plates having thread portions extending inwardly from the walls of said recesses, said die sections being assembled to bring the recesses in their respective blocks and the die thread portions into alinement and have the die thread portions form a continuous thread extending from the inner walls thereof, the device being adapted to be placed on a tube and rotated while the tube is held stationary to form a corrugated tube.

3. A device of the character described, comprising a hollow die having a pair of mating blocks and a mandrel passing therethrough, said die being provided with a plurality of grooves, metallic strips in said grooves and extending toward said mandrel and spaced therefrom, said strips projecting from the surface of said die by progressively increasing amounts and said grooves being positioned at different angles, the device being adapted to be placed on a tube and rotated while the tube is held stationary to form a corrugated flexible tube.

4. A device of the character described adapted to be placed on a tube and rotated while the tube is held stationary to form corrugated flexible tubing, comprising a pair of mating die sections, each die section comprising a body provided with a plurality of slots, die plates seated in said slots and extending inwardly from the walls of each section, alined openings provided in said die sections, and interfitting elements adapted to be inserted in said openings to properly aline said die sections so that the working edges of said die plates form a continuous die thread extending inwardly therefrom.

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