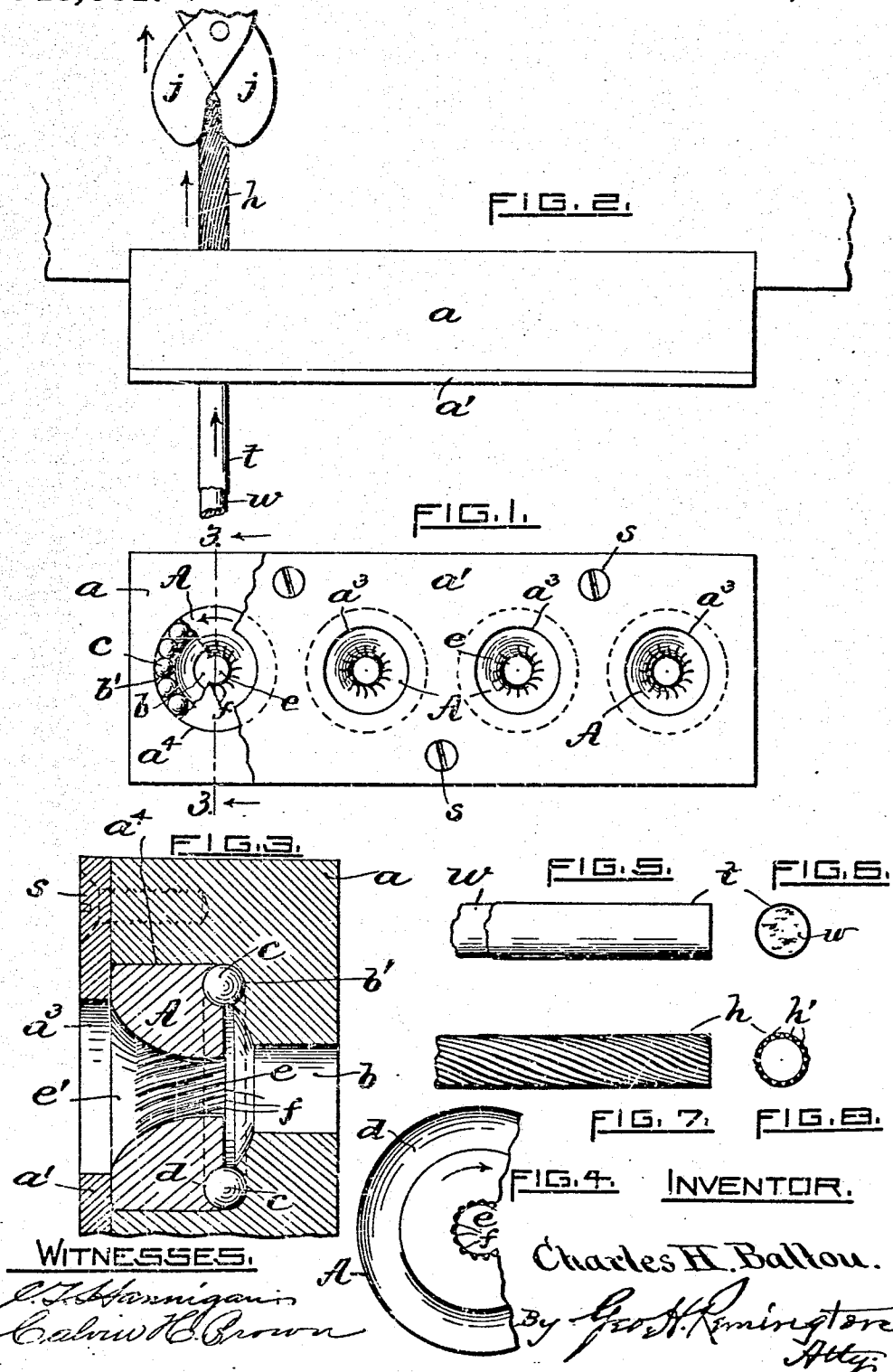


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DIE FOR HELICALLY FLUTING WIRE STOCK.
APPLICATION FILED JULY 22, 1908.

946,631.

Patented Jan. 18, 1910.



UNITED STATES PATENT OFFICE.

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DIE FOR HELICALLY FLUTING WIRE-STOCK.

949,631.

Specification of Letters Patent.

Patented Jan. 18, 1910.

Application filed July 22, 1908. Serial No. 444,751.

To all whom it may concern:

Be it known that I, CHARLES H. BALLOU, a citizen of the United States of America, and a resident of North Attleboro, in the county of Bristol and State of Massachusetts, have invented certain new and useful Improvements in Dies for Helically Fluting Wire-Stock, of which the following is a specification.

10 My present invention relates to means for mechanically and simultaneously producing a plurality or series of longitudinally extending helically or diagonally arranged parallel ribs and grooves in the peripheral surface of round wire stock; the latter preferably being quite thin and tubular, although solid wire may be employed.

The object I have in view is primarily to devise a die, or series of dies, capable of rapidly, accurately, and cheaply converting or transforming the plain outer surface of a length of wire into a helically corrugated surface having comparatively shallow alternating ribs and grooves; the resulting product constitutes ornamental wire stock adapted to be severed into short lengths or units and employed in the manufacture of articles of jewelry, as for example, chains, necklaces, bracelets, &c. Tubes thus ornamented, when having materially greater diameter than wire stock, may be used in the arts other than that of jewelry, such as shade-rods, outer sleeves for gas-tubing, &c.

I am well aware that it is a common practice to provide tubes and even solid wire stock with corrugations extending parallel with the longitudinal axis of the wire. In such case the die for producing the corrugations have the ribs and grooves thereof cut in the surface of the die opening exactly parallel with the longitudinal axis of the latter. In producing such corrugated wire the die itself is fixed or immovable, and the free or prepared forward end of the stock extends through the die so as to be seized or gripped by suitably actuated jaws which in retreating from the die draw the wire through the latter in a well-known way. I am also aware that an integral wire having straight corrugations or grooves, as just described, has been subsequently twisted so as to form a product having the appearance or imitation of a plurality of wires twisted together. Such former products and dies I hereby disclaim.

In the accompanying sheet of drawings,

Figure 1 represents a front elevation of a die-holder having a plurality of my improved dies revolubly mounted therein; a portion of the holder cap and one of the dies being broken away. Fig. 2 is a corresponding top plan view. In this figure the wire or stock is also represented in the act of being drawn through the first die, which action simultaneously converts the plain surface of the wire into a series of helically arranged ribs and grooves. Fig. 3 is a transverse section, in enlarged scale, taken on line 3 3 of Fig. 1. Fig. 4 is a back end elevation of the die member, a portion being broken away. Fig. 5 is a side view of a piece of thin plain tubular stock or wire having a "filler" of wood or soft metal therein. Fig. 6 is an end view of the same. Fig. 7 is a side view of the wire after being acted upon by my improved die, and Fig. 8 is a corresponding end view.

Again referring to the drawings, *a* designates the base or die-holder member adapted to be rigidly secured in place in any suitable manner. As drawn it is provided with a series of four of my improved dies *A*, later described. The holder is counterbored from its front face or side to freely receive the dies; each counterbore, *a'*, extends rearwardly a suitable depth and terminates in the annular bottom groove *b'* adapted to receive a series of antifriction balls *c*. The holder is also provided with a hole *b* extending therethrough and being concentric with the counterbore, as clearly shown in Fig. 3.

The die, *A*, is cylindrical and made of steel, hardened, and fitted to rotate freely in said counterbored portion of the holder. The bottom or inner face of the die has an annular groove *d*, forming a fellow member of the groove *b'*, for the balls *c*. The die is provided with the central transverse aperture *e*, constituting the die proper, terminating or merging into the outwardly flaring mouth portion *e'*. The said aperture *e* is in alinement with but somewhat smaller in diameter than the hole *b*. The former, *e*, is provided with circumferentially spaced parallel alternating shallow ribs and grooves *f* (see also Fig. 4) extending in a longitudinal direction at an angle or diagonally with the bore or axis of the die and terminating in the said mouth portion *e'*. See Fig. 3. The ribs and grooves of the die and the degree of their inclination with respect to the die's longitudinal axis are adapted

to impress or form their counterpart in the plain walls of the tube or stock, the pitch of the helix or screw of the several ribs and grooves at the same time being determined and gauged by and conforming to the said inclination of the corresponding members of the die.

The several dies *A* are maintained endwise in the normal position in the holder *a* by the removable cap member *a'* secured thereto by screws *s*. The cap has an opening *b*, therethrough concentric with each die, its diameter being somewhat smaller than that of the die, all as clearly shown.

It may be stated here that when seamless plain walled plain hollow wire, as *t*, Figs. 5 and 6, is to be transformed into wire having its wall corrugated with circumferentially disposed helical ribs and grooves I prefer to fill the bore of the tube with some soft easily fusible metal, or even wooden rods, as *w*, may be used, before the tube is subjected to the action of the dies, the said filling material being subsequently removed in any manner.

Assuming now that the die-carrying holder *a* is positioned with respect say to any well-known power driven device provided with gripping jaws, as *j*, at the back of the holder adapted to grip the front end of the wire *t* about to be acted upon: the latter, provided with the filler rod *w* and having its forward end portion reduced in diameter, is now freely inserted through the die and holder openings and gripped by the jaws *j*. As these gradually move away from the stationary die-carrying holder (see arrows Fig. 2) the said filled plain wire or stock *t* is forcibly drawn endwise in a non-revoluble manner through the die *A*. The die, however, rotates axially (see arrow Fig. 1) in conformity with and by the inclination of the ribs *f*, the latter at the same time forming the helical flutings or corrugations *h* (Fig. 8) in the stock's surface or wall and producing the finished wire *h*. It is of course understood that the filling *w* is removed from the wire in any suitable way. In producing the said product *h* I prefer to employ a plurality of the dies *A*, the openings *e* thereof varying successively in a gradually decreasing ratio or size in a well-known manner. That is to say, the passage of the stock through the first die produces the initial corrugations; upon passing it through the next die the corrugations are

more fully formed, the last die of the series completing the product. If desired the stock may be annealed from time to time during its transformation. The outer diameter of the finished wire is by reason of the drawing process slightly less than that of the plain stock, the difference, however, being scarcely measureable on the drawings.

It may be added that the spirality or inclination of the ribs and grooves *f* of the die with respect to its longitudinal axis can be made right or left as desirable. In the drawings, Fig. 3, they are represented as being left hand, thereby producing in the wire helical ribs and grooves or flutings having a right hand inclination. See Figs. 2 and 7.

I claim as my invention, and desire to secure by United States Letters Patent:—

1. The combination with a stationary holder having a hole extending transversely therethrough and counter-bored from the front end thereof, of a revoluble die-member mounted in the said counter-bored portion, said die having a central transverse hole terminating in an outwardly flaring mouth, the walls of the hole and mouth being provided with a series of helically arranged ribs and grooves, anti-friction balls disposed between and engaging the inner end of the die member and the adjacent end of the counterbore, and a plate secured to the holder having an aperture therethrough registering with the die's mouth.

2. The combination of a plurality of mounted independently revoluble annular dies, *A*, each having the wall of its bore or die part proper merging into an outwardly flaring mouth and provided with a series of parallel helically fluted ribs and grooves terminating in said mouth, the bore of the first die being slightly greater than that of the next die, and so on progressively in a decreasing order with respect to the number of dies, and means adapted when in use to seize the free end of the wire being acted upon and forcibly draw it (the wire) non-revolubly through the die, substantially as described.

Signed at Providence, R. I., this 21st day of July, 1903.

CHARLES H. BALLOU.

Witnesses:

GEO. H. REMINGTON,
CALVIN H. BROWN.