2 Sheets—Sheet 1.

G. D. EDMANDS.

Tool for Manufacturing Spinning and Twister Rings.

No. 216,729. Patented June 24, 1879.

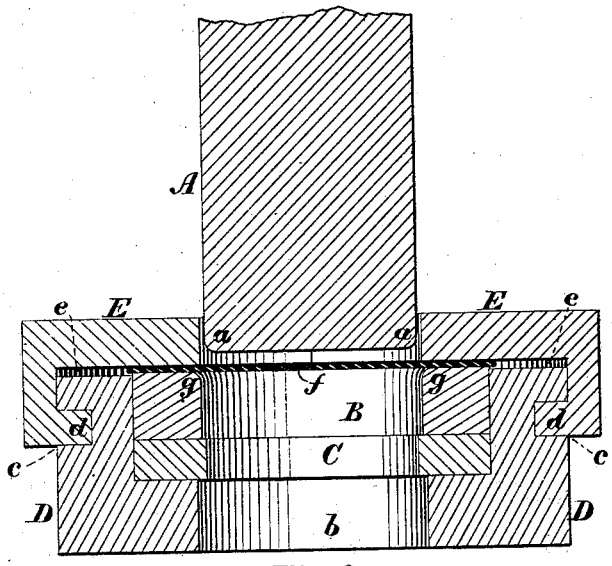

Fig.2.

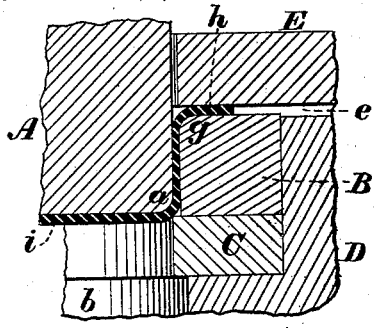

Fig.3.

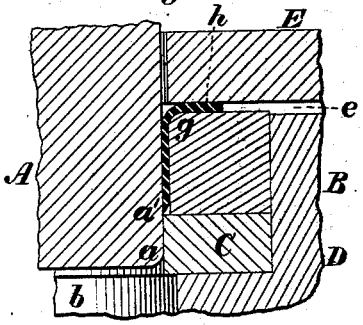

Fig.4.

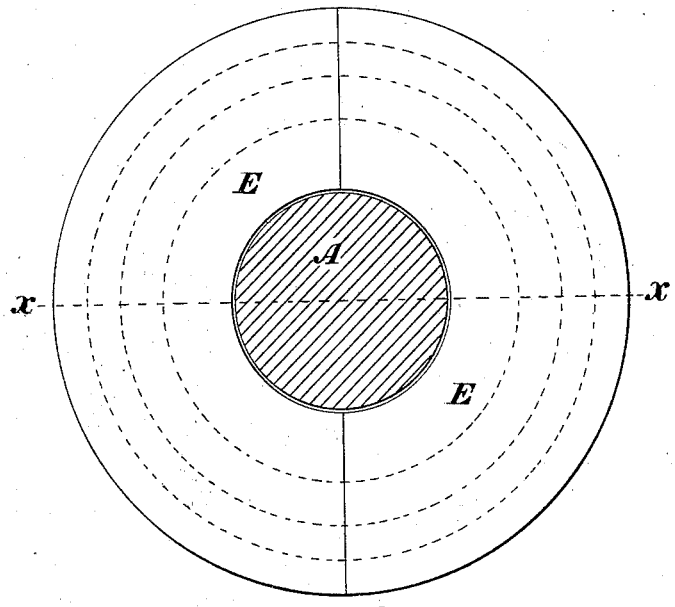

Fig.1.

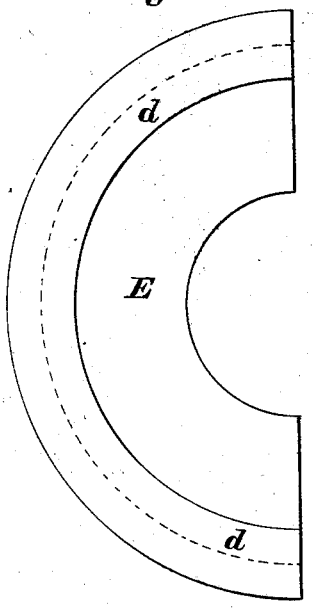

Fig.5.

Witnesses:
E. A. Hemmenway
C. H. Dodd.

Inventor:
George D. Edmands
by N. C. Lombard
Attorney.

G. D. EDMANDS.

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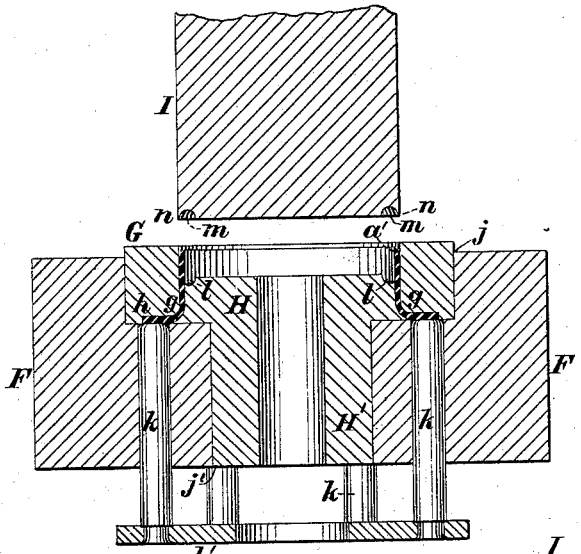

Fig.6.

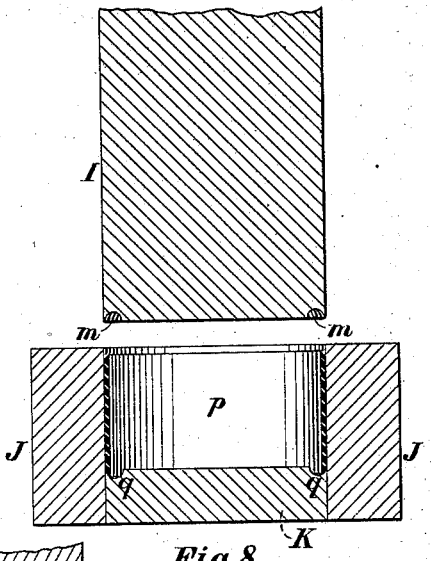

Fig.8.

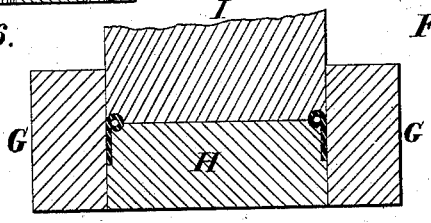

Fig.10.

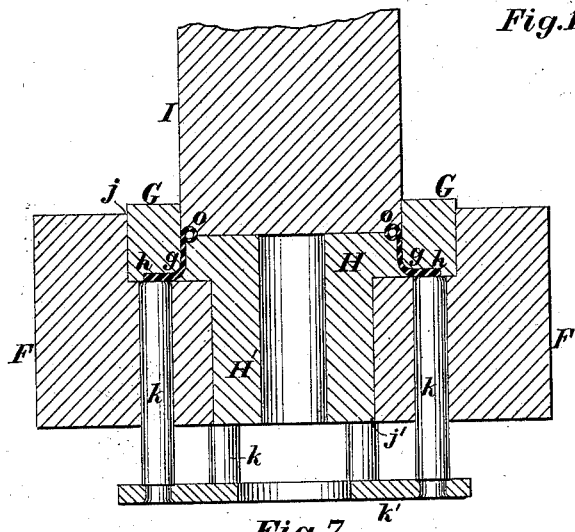

Fig.7.

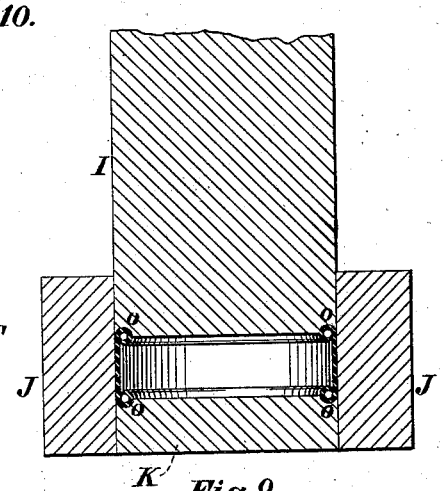

Fig.9.

Witnesses:
E. A. Hemmenway.
C. H. Dodd.

Inventor:
George D. Edmands
by N. C. Lombard
Attorney.

UNITED STATES PATENT OFFICE.

GEORGE D. EDMANDS, OF MILFORD, MASSACHUSETTS.

IMPROVEMENT IN TOOLS FOR MANUFACTURING SPINNING AND TWISTER RINGS.

Specification forming part of Letters Patent No. **216,729**, dated June 24, 1879; application filed February 10, 1879.

To all whom it may concern:

Be it known that I, GEORGE D. EDMANDS, of Milford, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Tools for the Manufacture of Spinning and Twister Rings, of which the following, taken in connection with the accompanying drawings, is a specification.

My invention relates to improved tools for manufacturing spinning and twister rings; and it consists in a novel construction and combination of molding or forming dies, by the use of which the blank or partially-formed ring produced by a previous operation may have formed upon one or both ends thereof a circular bead-like race or flange by turning the end of said blank or tube inward and downward, as will be more fully described hereinafter.

Figure 1 of the drawings is a plan of the female forming and cutting dies, with the male die cut in section, by which the cup is formed from the flat disk and the bottom is cut out. Fig. 2 is a vertical section on line *x x* on Fig. 1, showing the flat metal disk in position to be acted upon by the male die when it descends. Fig. 3 is a partial central vertical section, drawn to an enlarged scale, and showing the male die after it has descended and formed the disk into a cup, and in position to begin to cut out the bottom. Fig. 4 is a similar section, showing the male die in a still lower position after having punched out the bottom of the cup. Fig. 5 is an inverted plan of one portion of the holding-down guard or plate. Fig. 6 is a central vertical section of a holder and shaping-dies for forming my improved race on one end of a ring that has an outwardly-projecting flange formed upon its opposite end, with the blank placed in the holder, and the male forming-die in position before commencing to act thereon. Fig. 7 is a similar section of the same parts after the male die has descended and completed the operation of forming the race-flange. Fig. 8 is a central vertical section of a modification of the race-forming dies in position for commencing the operation adapted to form my improved race upon both ends of a plain tube. Fig. 9 is a similar section of the same tools after the reciprocating forming-die has descended and completed the operation of forming the races; and Fig. 10 is a central vertical section of another modification of the race-forming dies adapted to form my improved race upon one end of an unflanged tube.

A is the male forming and cutting die or punch; B, the female forming or shaping die; C, the female cutting-die; D, the female-die holder, and E E two semicircular holding-down plates, all combined and arranged relative to each other, as shown in Figs. 1 and 2.

The male die or punch A, in practice, is provided with a suitable shank or stem, (not shown,) by which it may be firmly attached to the reciprocating plunger or cross-head of any suitable press, and has its lower peripheral corner, *a*, rounded, as shown, for a purpose which will hereinafter appear.

The die-holder D has formed in its upper side a circular recess to receive the ring cutting and shaping dies C and B, and a smaller circular opening, *b*, extending through its center, for the passage of the disk of metal punched from the bottom of the cup, as will be hereinafter described.

The die-holder D also has formed in its outer periphery the circumferential groove *c*, to receive the semi-annular lip *d* of the semicircular holding-down plates E E, a space being left between the plates E E and the upper sides of the female forming-die B and die-holder D about equal to the thickness of the sheet-metal disk *f*, which is placed therein, as shown in Fig. 2.

The female cutting-die C is made in the form of a ring, with its inner periphery at right angles to its upper surface, and is placed in the bottom of the recess formed in the upper side of the holder D, and the female forming or shaping die B is placed upon the cutting-die C, and has its inner periphery made of a diameter equal to the diameter of the inner periphery of the cutting-die C plus twice the thickness that it is desired to make the cylindrical walls of the spinning-ring, and its upper inner corner, *g*, is rounded, as shown in Figs. 2, 3, and 4.

These tools are designed to perform the first two operations in the process of forming spinning-rings from a flat disk of sheet metal—

that is, forming a cup from said disk, and then punching out the bottom of said cup, thereby producing a tubular blank, from which, by an after operation, a completely-shaped spinning-ring may be formed of an improved pattern, which forms the subject-matter of another application for a patent of even date herewith, and their operation is as follows:

The disk *f*, of sheet metal, having previously been cut (by suitable dies, in a well-known manner) to a circular form of the desired diameter to form a ring with an outwardly-projecting flange, *h*, (see Figs. 3, 4, 6, and 7,) it is placed in position, as shown in Fig. 2, when the male die or punch A is made to descend to the position shown in Fig. 3, forcing the center of the disk *f* downward and drawing or stretching the metal thereof between the points *a* and *g*, and causing said metal to be drawn tightly over the corner *g* of the female forming-die B and around the rounded lower corner, *a*, of the male die or punch A, as shown in Fig. 3. When the die A has descended to the position shown in Fig. 3, the outer surface of the metal cup formed by such descent comes in contact with the inner upper corner of the female cutting-die directly beneath the periphery of the male die A, and where said metal cup is curved to fit the rounded corner of said male die.

The diameter of the male die A being made exactly the same as the inner diameter of the cutting-die, a further downward movement of the male die will punch the bottom *i* of the cup out on a line exactly coinciding with the periphery of the male die and the inner periphery of the cylindrical portion of the cup, leaving the outer corner of the open-ended tube thus produced rounded inward to a sharp edge coinciding with the circle of cut in punching out the bottom, as shown at *a'* in Fig. 4.

In Figs. 6 and 7 are shown my improved dies or tools for forming my improved race or traveler-guiding flange on the blank or partially-formed ring produced by means of the tools hereinbefore described, in which F is a die-holder provided with a circular recess, *j*, in its upper side, and a central opening, *j'*, extending through the same, concentric with said recess *j*, and also provided with a series of push-pins, *k k*, connected by a ring, *k'*, so that said pins may all be moved upward together, for the purpose of forcing out the completed ring and its inclosing-die. G is a steel ring, having its inner periphery and under side turned to exactly fit the outer surface of and inclose the blank or partially-formed ring *a' g h*, and its outer periphery made to fit closely the recess *j* in the die-holder F, said ring-die being made of a height somewhat greater than the extreme height of the blank *a' g h*, as shown in Fig. 6.

H is a supporting and shaping die, provided with a shank, H', to fit the opening *j'*, a shoulder to rest upon the bottom of the recess *j* of the die-holder F, and having its periphery shaped to fit the interior of the flanged end of the blank *a' g h*, but made of less height than said blank, and having formed upon the extreme outer edge of its upper surface an annular groove, *l*, the outline of which, when seen in cross-section, is a segment of a circle the outer portion of which forms an acute angle with the perpendicular outer surface of the die H.

I is the male die, to be provided with a shank or other suitable means for securing it to the reciprocating plunger or cross-head of a suitable press, (not shown,) and made of a diameter to accurately fit the opening through the ring-die G, and having formed in the extreme outer edge of its under surface an annular groove, *m*, semicircular in cross-section, and so arranged relative to the outer periphery of the die I that the outer wall of said groove forms an acute angle, *n*, with the outer perpendicular surface of said die, as shown in Figs. 6 and 7.

The blank or partially-formed ring *a' g h* being placed between the ring G, die H, and holder F, as shown in Fig. 6, and the die I being moved downward, it enters the opening in the die G, the acute-angled outer corner, *n*, passing between the inner surface of said die G and the outer rounded or beveled surface, *a'*, of the upper end of blank *a' g h*, causing said upper end of the blank to be turned inward and downward, following the curve of the walls of the groove *m* as the die I continues to descend till the sharpened end *a'* of said blank comes in contact with the inner surface of the cylindrical portion of said blank and the bead-like flange *o* is pressed between the annular grooves *l* and *m*, formed respectively in the dies H and I, as shown in Fig. 7.

The spinning-ring is now completely formed, and only requires to be tempered or hardened and polished in the usual manner to be ready for service. If it is desired to form a twister-ring or a reversible spinning-ring provided with my improved race or traveler-guiding flange upon each end thereof, I first draw a plain open-ended tube, *p*, of suitable length to form a ring of the desired height, bevel its two outer corners to an angle of about forty-five degrees, as shown in Fig. 8, place said tube *p* in the chamber of the female die or blank-holder J, in the bottom of which is placed a circular die or plate, K, the upper surface of which is provided with an annular groove, *q*, of exactly the same form and arranged in the same manner relative to the periphery of said die as the groove *m* on die I, before described, said die I being used in precisely the same manner in connection with these tools as in connection with the ring-die G and supporting-die H, before described, except that it has double the downward movement after it comes in contact with the upper end of the tube *p* that it had in forming the single race upon the ring previously described, such downward movement causing the upper end of the tube *p* to be turned inward and downward by its contact with and slipping around the curved walls of

the groove *m* in die I, while the lower end of the tube *p* is similarly turned inward and upward by being forced into and around the walls of the groove *q*, thus forming a bead-like inwardly-projecting flange, *o*, at each end of the ring, as shown in Fig. 9. In some cases I propose to apply power to both the die I and the die K, causing them to move toward each other at a uniform rate of speed, in which case the die I would move the same distance as in the case of forming the single flange heretofore described.

In Fig. 10 is shown a modification of the ring-die G and supporting-die H, (shown in Figs. 6 and 7,) for the purpose of forming a single race upon an unflanged tube, the operation of which will be obvious from the description already given.

I am aware that dies provided with annular grooves in their contiguous faces, semi-cylindrical or nearly so in cross-section, have been used for forming from sheet metal hollow rings having a cylindrical cross-section, as shown and described in Letters Patent No. 158,914, and I do not therefore claim, broadly, the use of dies provided with such semicircular annular grooves, irrespective of the location of said grooves, or of the other devices with which they work in combination; but

What I claim as new, and desire to secure by Letters Patent of the United States, is—

The combination of the ring-die G, supporting-die H, provided with the annular curved bottom groove, *l*, in the extreme outer edge of its upper face, and the die I, provided with the annular groove *m*, semicircular in cross-section, formed in the extreme outer edge of its lower face, with the outer wall of said groove forming an acute angle with the outer or cylindrical surface of said die, all arranged and adapted to operate substantially as and for the purposes described.

Executed at Boston, Massachusetts, this 30th day of January, A. D. 1879.

GEO. D. EDMANDS.

Witnesses:

N. C. LOMBARD,

E. A. HEMMENWAY.