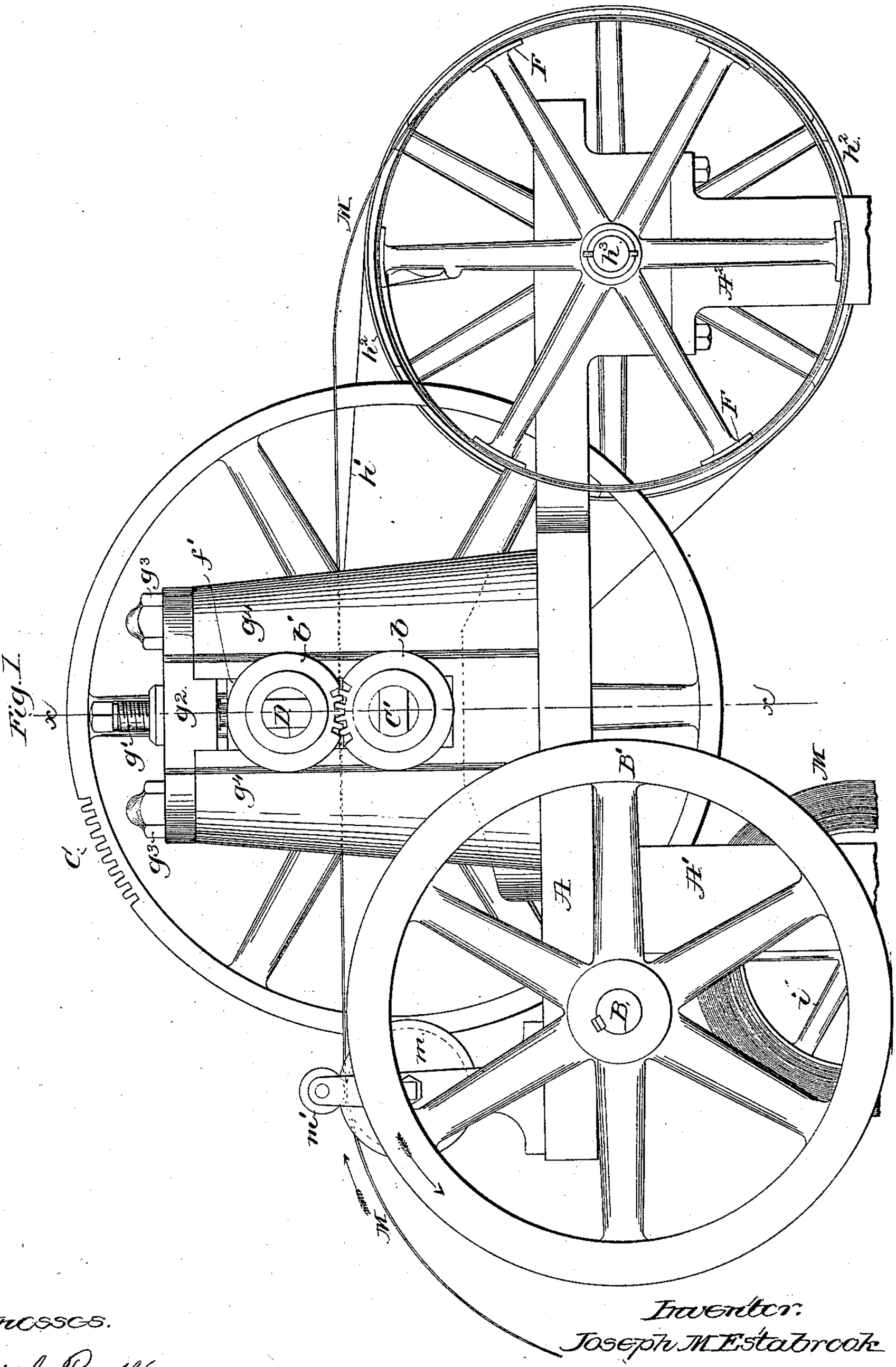
(No Model.) 4 Sheets—Sheet 1.

J. M. ESTABROOK.

MACHINE FOR FORMING WIRE FROM SHEET METAL.

No. 280,023. Patented June 26, 1883.



Witnesses.

Fred A. Powell.

John F. C. Brinkerhoff

Inventor:

Joseph M. Estabrook

by Crosby & Gregory Attys.

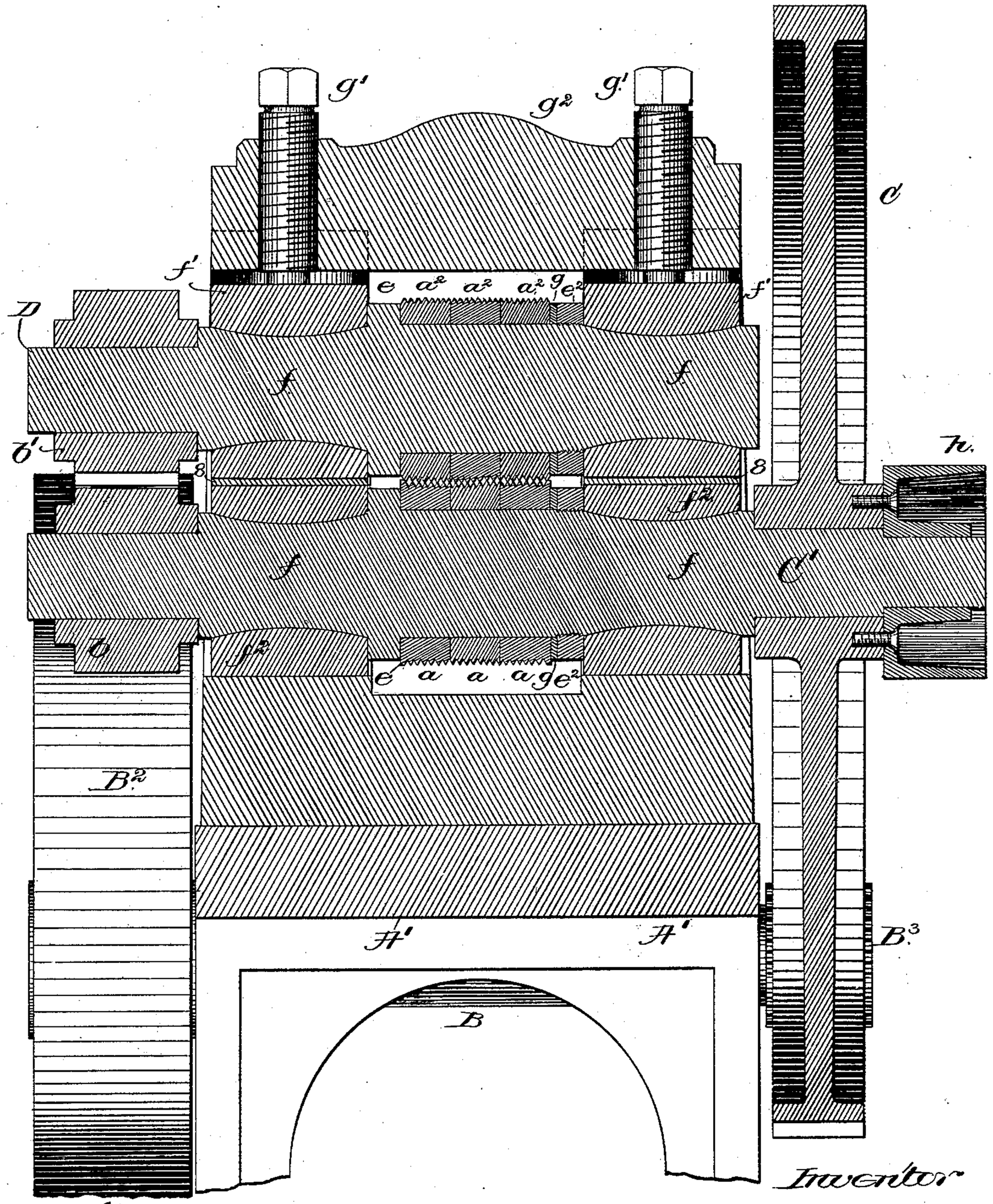
(No Model.) 4 Sheets—Sheet 2.

J. M. ESTABROOK.

MACHINE FOR FORMING WIRE FROM SHEET METAL.

No. 280,023. Patented June 26, 1883.

Fig. 2.



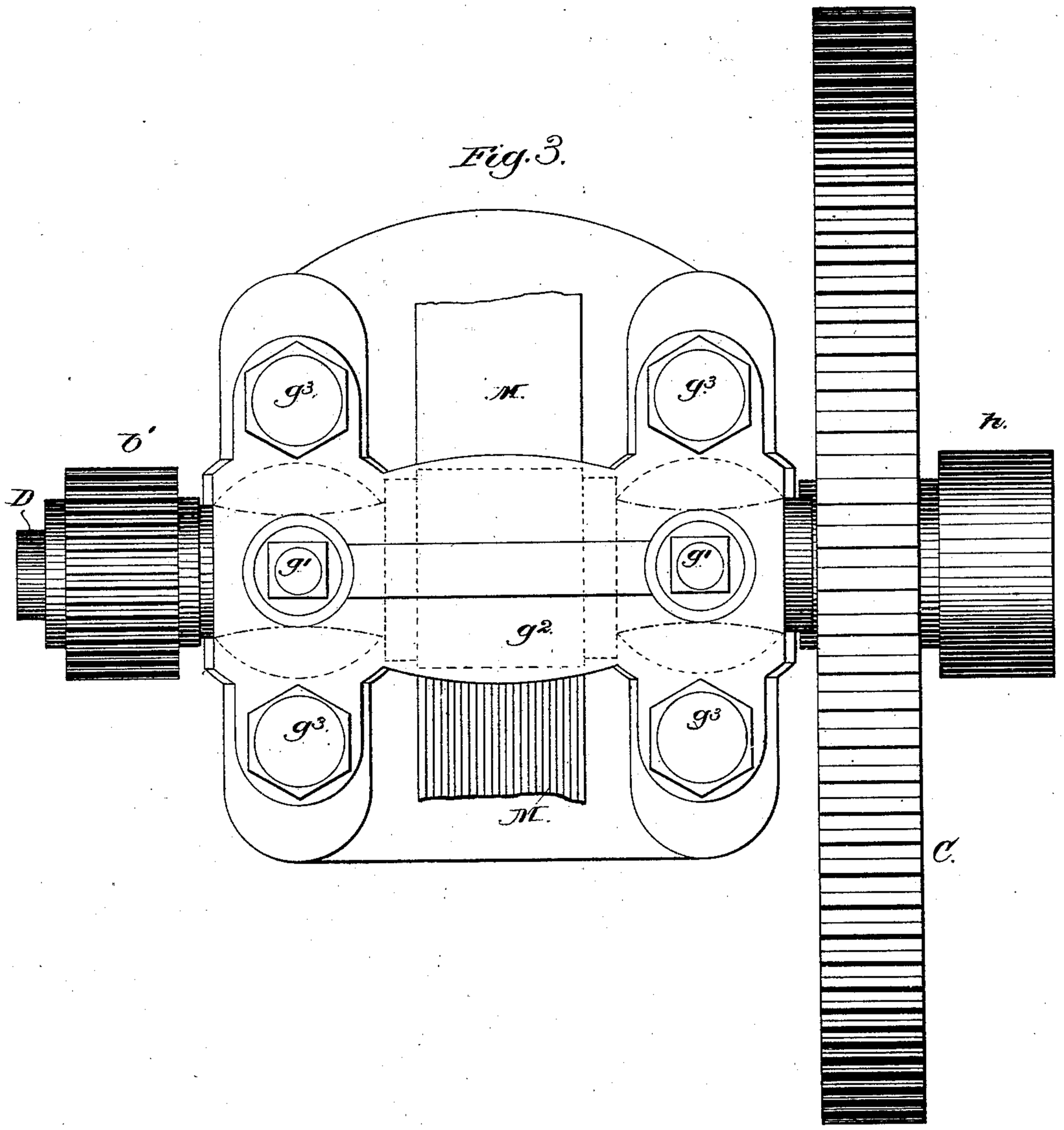
(No Model.) 4 Sheets—Sheet 3.

J. M. ESTABROOK.

MACHINE FOR FORMING WIRE FROM SHEET METAL.

No. 280,023. Patented June 26, 1883.

Fig. 3.



Witnesses.

Fred A. Powell.

John F. C. Steinkeler

Inventor

Joseph M. Estabrook

by Crosby & Gregory attys

(No Model.) 4 Sheets—Sheet 4.

J. M. ESTABROOK.

MACHINE FOR FORMING WIRE FROM SHEET METAL.

No. 280,023. Patented June 26, 1883.

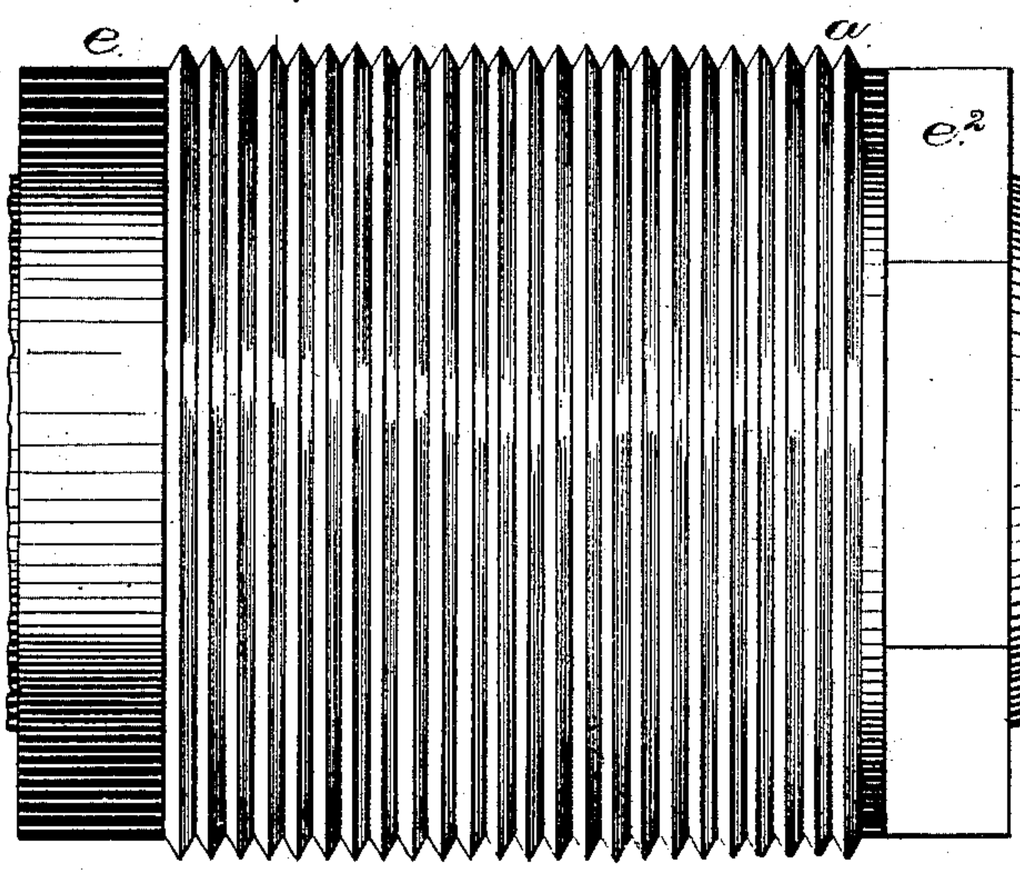


Fig. 4.

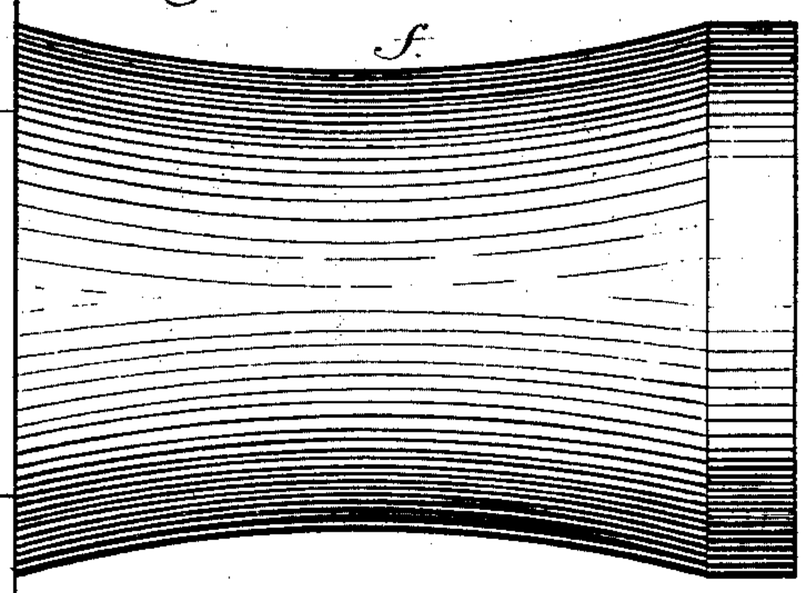


Fig. 6.

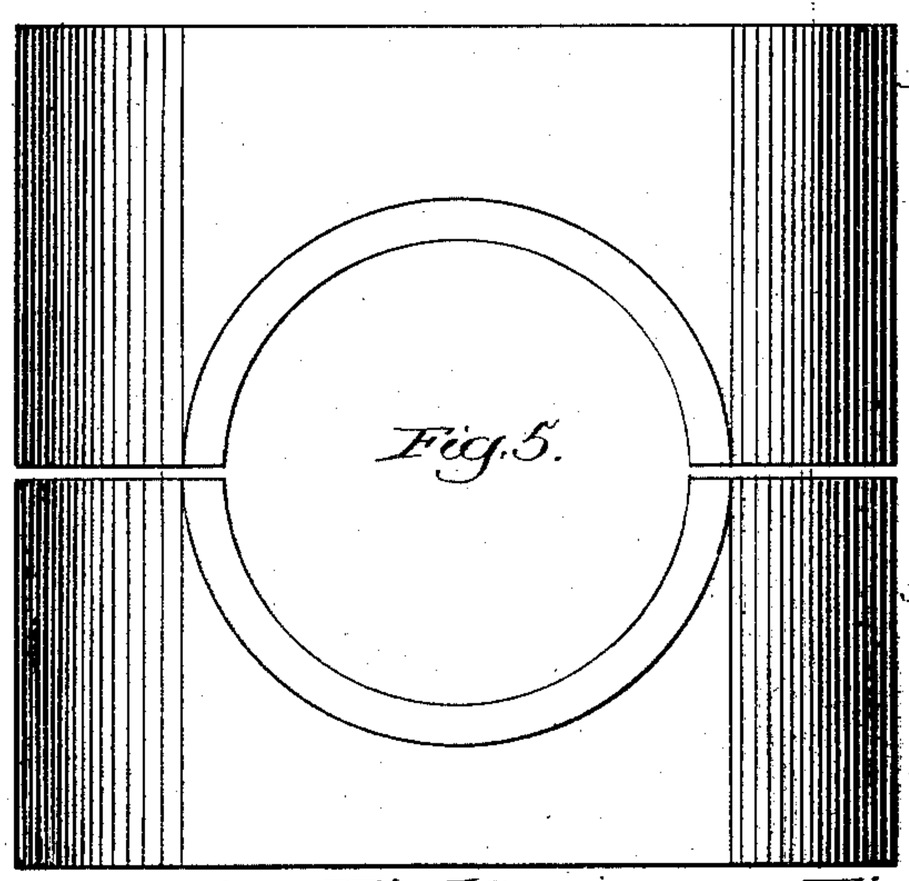


Fig. 5.

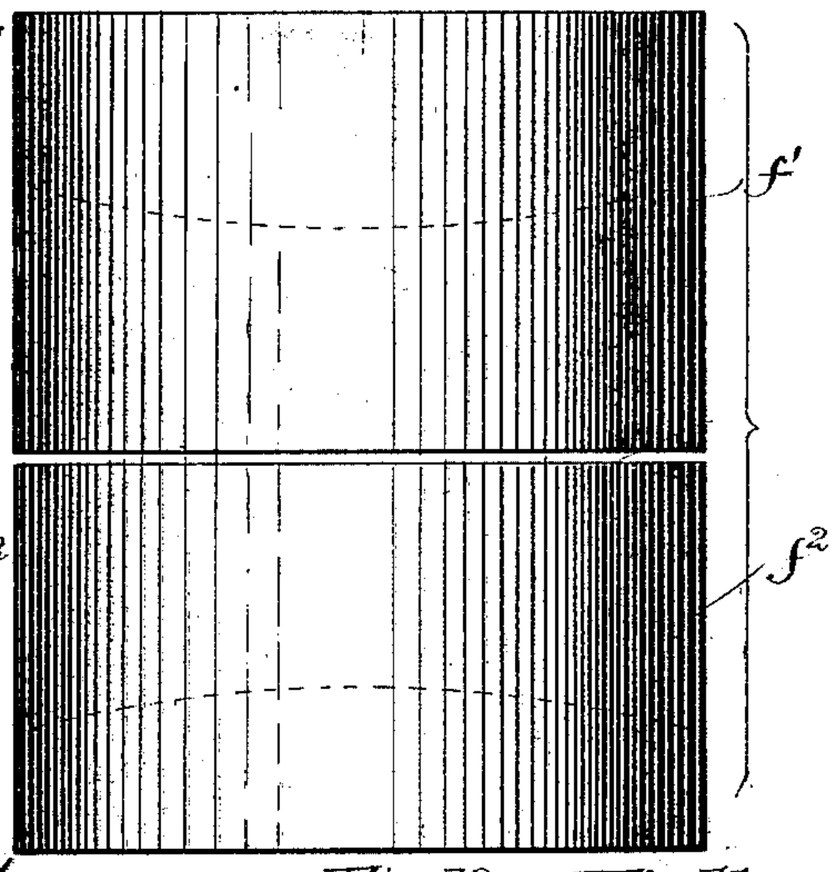


Fig. 9.

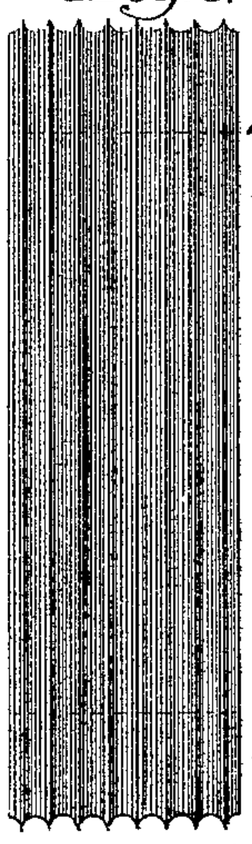


Fig. 10.

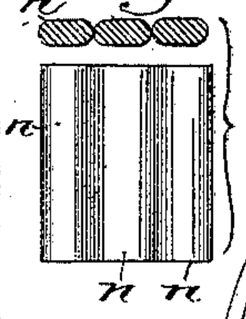


Fig. 7.

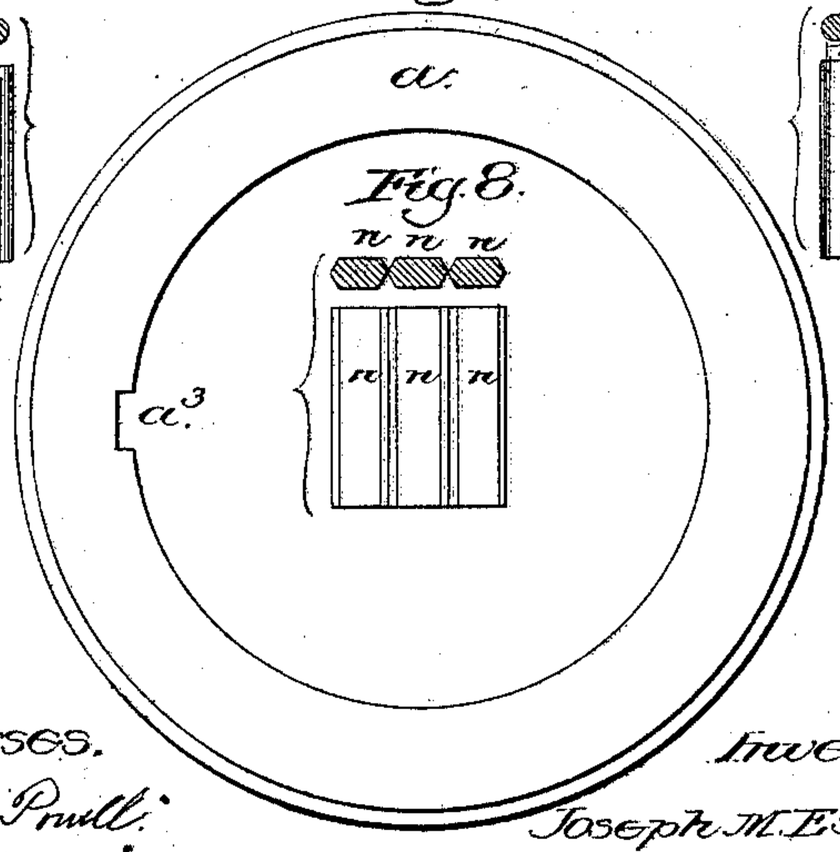


Fig. 8.

Fig. 12.

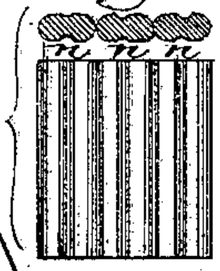
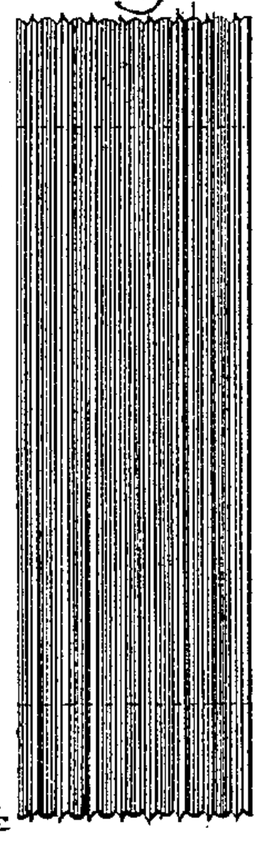


Fig. 11.



Witnesses.
Fred A. Poull.
John F. C. Prenkert

Inventor:
Joseph M. Estabrook
by Crosby & Gregory Atty's.

UNITED STATES PATENT OFFICE.

JOSEPH M. ESTABROOK, OF MILFORD, MASSACHUSETTS.

MACHINE FOR FORMING WIRE FROM SHEET METAL.

SPECIFICATION forming part of Letters Patent No. 280,023, dated June 26, 1883.

Application filed December 8, 1882. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH M. ESTABROOK, of Milford, county of Worcester, State of Massachusetts, have invented an Improvement in Machines for and Method of Forming Wire from Sheet Metal, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

My invention has for its object the formation from sheet metal of narrow strips or wires to be employed in the mechanic arts—as, for instance, in the manufacture of nails or fastenings for boots and shoes or wire for jewelry—the shape of the wire in cross-section depending upon its use and the shape of the roller-dies employed in its production.

This my improved machine contains one or more sets of die or shaping rollers arranged opposite each other on two rotating shafts, the said rollers being suitably grooved, cut, or shaped peripherically to form the metal sheet passed between them into wires corresponding in cross-section with the shape of the grooves. The die-rollers acting upon the sheet metal passed between them forms a number of strips or wires side by side and of the desired cross-section; but the said die-rollers do not fully sever from each other all the strips or wires so shaped, but leave them connected edge to edge by a very thin film of metal, which will easily break off when any one strip or wire is caught at its end and pulled or held while the adjacent strips or wires remain upon the reel upon which they are wound. By grooving the sheet metal nearly to its center by pressure from its opposite sides, and nearly but not fully severing the metal, each strip of wire acts to keep straight any other strip or wire adjacent to it. The sheet metal grooved between the die-rollers is wound upon a drum, and is subsequently taken and separated, one strip or wire at a time, as it is run into a machine in which the said wire is to be made into some article—as, for instance, nails.

One part of my invention consists in the die-rolls having a series of grooves and projecting edges, the latter to enter the sheet metal and indent it from its opposite sides to form narrow connected metal strips or wires, combined with a receiving-reel and with means to turn it to wind the sheet metal upon the said reel, as will be described; also, in the said die-rolls and receiving-reel, combined with a roll to support the metal strip while it is being fed between the die-rolls; also, in improvements in the journals and boxes for the die-rolls.

Figure 1 is a side elevation of a machine containing my invention. Fig. 2 is a vertical cross-section of Fig. 1 on the line *x x*, the section, however, showing the driving-belt on the main-belt pulley, the said belt being omitted from Fig. 1. Fig. 3 is a top or plan view of the principal parts of the machine above its main bed-plate. Fig. 4 is a detail, on a larger scale, showing a part of one of the die-rolls and one of its journals. Fig. 5 is an enlarged end view of one of the journal-boxes for the die-rolls; Fig. 6, a view of Fig. 5, looking at it from the right; Fig. 7, a side view of one of the die-rollers; Fig. 8, a plan and cross-section, on an enlarged scale, of a piece of sheet metal grooved to form three wires, they being in cross-section, such as the die-rolls in Fig. 2 will make. Fig. 9 is a modified form of die-roller. Fig. 10 shows in top view and cross-section, but enlarged, wires such as will be made by it. Fig. 11 represents another form of roller, and Fig. 12 is a plan and cross-section enlarged of the wires which it will produce.

The bed-plate A, suitably attached to and supported by uprights or legs $A' A^2$, has bearings for the main shaft B, on which at one end is the main belt-pulley B′, which is driven by the belt B^2. (See Fig. 2.) Shaft B, at its other end, is provided with a pinion, B^3, which engages the toothed gear C on the shaft C′, which carries the lower roller or rollers, *a*, of the set of die-rolls *a* a^2, the rollers a^2 being on the shaft D, which is rotated in unison with shaft C′ by the gearing *b b′*, connecting them. The rollers *a* and also a^2 have key-seats a^3, by which to assist in securing them upon their respective shafts C′ D, the said shafts each having a like annular shoulder, *e*, and being screw-threaded to receive upon it a nut, e^2, by and between which to clamp the die-rollers together laterally upon their carrying-shafts. The periphery of each die-roller will be grooved annularly to provide it with teeth to be forced into the sheet metal from each side almost to its center as the same is passed between the die-rollers, the said rollers

shaping the metal into a series of strips or wires having a cross-section depending upon the shape of the grooves and projections of the rolls, the strips of wire being not severed from the sheet until after it has been wound upon a drum or reel, F.

The die-rollers in Figs. 2, 3, and 4 will produce wires having a cross-section as shown in Fig. 8. If the die-rollers were grooved as in Fig. 9, the wires would be substantially as in Fig. 10, and if as in Fig. 11, such as shown at Fig. 12.

The journals or ends *f* of the shafts C′ and D are concaved, as shown, and fitted into plumber-boxes f' f^2, having their bearing-surfaces convexed in the direction of their length, as best shown in Fig. 2, to fit the concaved surfaces of the said journals, the collars *e* and nuts e^2, by placing a proper washer, *g*, between each nut and die-roller, coming up to the ends of the plumber-boxes. The plumber-boxes of both shafts are shown as placed upon each other, a suitable soft-metal or lead shim, 8, being herein interposed, as shown in Fig. 2, and the upper box of the series is acted upon by a screw, g', of the cap g^2, secured by screws g^3 upon the upright g^4, rising from the bed-plate A. With journals and boxes shaped as shown the wear may be taken up by means of the screws g', and end-thrust of the shaft is avoided in all adjustments of the boxes.

The shaft C′ at one end has a small pulley, *h*, which by band h' on the pulley h^2 drives the shaft h^3, which carries the reel F, upon which is wound the series of sheet-metal wires marked M, taken from the reel *i*, (see Fig. 1,) and passed between the die-rollers. In Fig. 1 part of the reel *i* and coil of sheet metal thereon is broken away to save space in the drawings.

The sheet metal to be made into narrow strips or wires is shown in Fig. 3 as it will appear before and after contact with the die-rolls, and between the reel *i* and rolls it will be passed over a grooved guide-roller, *m*, and under a pressure-roller m'. The metal sheet taken from the reel *i* is grooved at each side nearly to its center, or nearly severed, is elongated by the rolls, as the metal is in preferably as soft a state as possible, and is wound again upon the receiving-drum, and by not severing the narrow strips or wire *n n n* they are not distorted or curled, as would be the case if cut entirely off.

The wires shown in Fig. 8 are such as I have shown in a concurrent application for Letters Patent for the manufacture of shoe-nails.

Wires formed from soft sheet metal by roller-dies in the manner described are softer than if made by the process usually employed in the manufacture of round wire, and the method herein described also enables me to form the wires of any desired cross-section for the various uses to which the wire is to be put.

The plumber-boxes f' f^2 are in cross-section, as shown in dotted lines, Fig. 3, wherein it will be seen that two sides of the boxes are truly circular, while the two ends are straight or flat. In Fig. 5 one of the straight or flat sides is at the front and shown in white.

The adjacent faces of the uprights g^4 are bored out by means of a suitable tool, thus forming circular faces for the reception of the boxes, and avoiding the necessity of flanges thereon, as usual, to lap over the front and rear edges of the uprights g^4.

The lead shims give or yield to direct pressure when the shafts of the rolls are forced down to adjust them to the stock, and when the stock passes from between the rolls the latter have no tendency to come closer together, for the lead shims have in themselves no inherent force, as would be the case with a steel shim.

I do not broadly claim a pair of grooved and edged die-rollers to cut sheet metal into wires when said rollers actually sever each wire entirely from the strip of sheet metal, as my invention consists in rollers so constructed and arranged, as herein described, as to only indent or partly sever the strip, thus leaving the formed wires connected edge to edge by a film, to thereby permit the strips to be easily torn or separated from adjacent strips by hand or otherwise in the manner and to obtain the results hereinafter stated.

I claim—

1. The rotating die-rolls having a series of grooves and projecting edges shaped and arranged to enter the sheet metal and indent it from its opposite sides, as described, to form connected strips or wires, combined with the roll and means to rotate it to wind upon the reel the sheet metal after its passage between the die-rolls, substantially as and for the purposes set forth.

2. The roll *m* and pressure-roll m' to guide and support the sheet metal to be formed into strips or wires, and the reel to receive upon it the said sheet metal after it has been nearly severed into strips or wires, combined with the two die-rollers having a series of grooves and projections, the latter to be pressed into the sheet metal from both of its faces, to operate substantially as described.

3. The shafts C D of the die-rolls, provided with the concave journals *f*, collars *e*, and nuts e^2, combined with the convex plumber-boxes f' to engage said journals, collars, and nuts, substantially as shown and described.

4. The plumber-boxes f', having external convex surfaces, combined with the uprights g^4, the adjacent faces of which relatively to the plumber-boxes are concave, substantially as shown and described, to receive and retain such boxes without added flanges, as specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOSEPH M. ESTABROOK.

Witnesses:
G. W. GREGORY,
H. L. KINSLEY.