2 Sheets—Sheet 1.

R. A. CARTER.

MACHINE FOR ROLLING METALLIC RINGS AND CYLINDERS.

No. 189,188. Patented April 3, 1877.

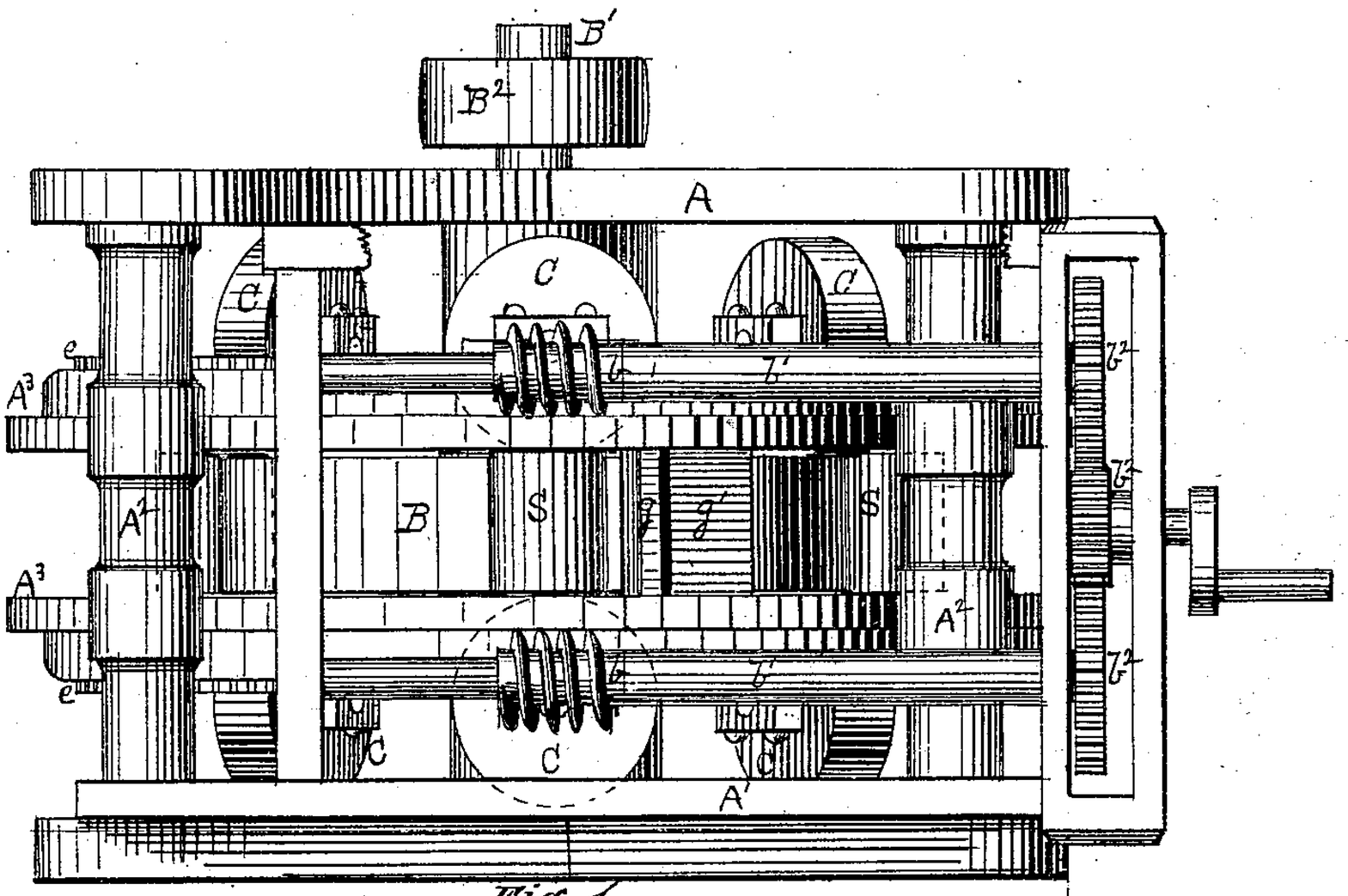

Fig. 1.

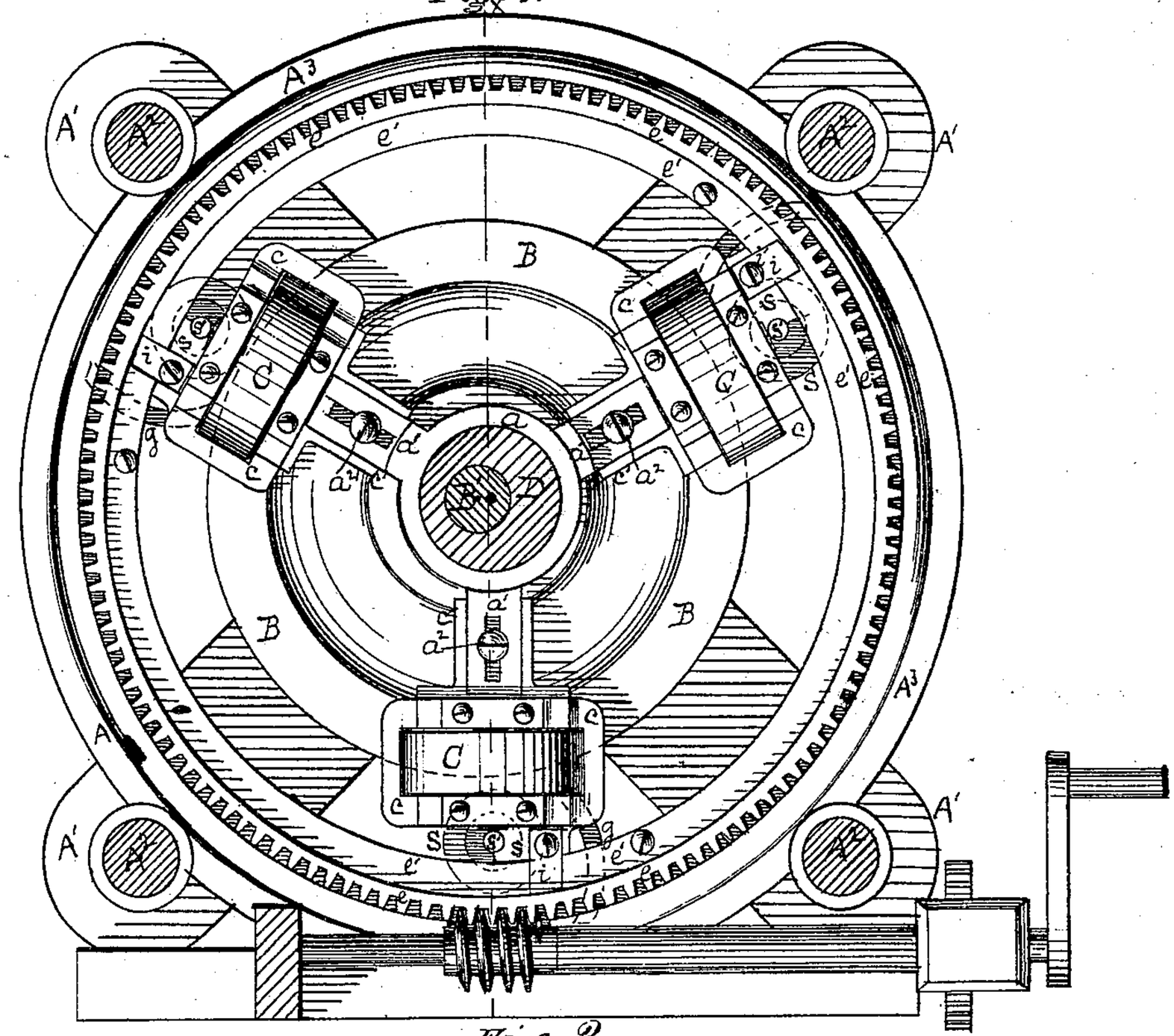

Fig. 2.

Witnesses Francis L. Clark
Claudius L. Parker.

Inventor Robert A. Carter,
By Attorney George A. Christy

2 Sheets—Sheet 2.

R. A. CARTER.

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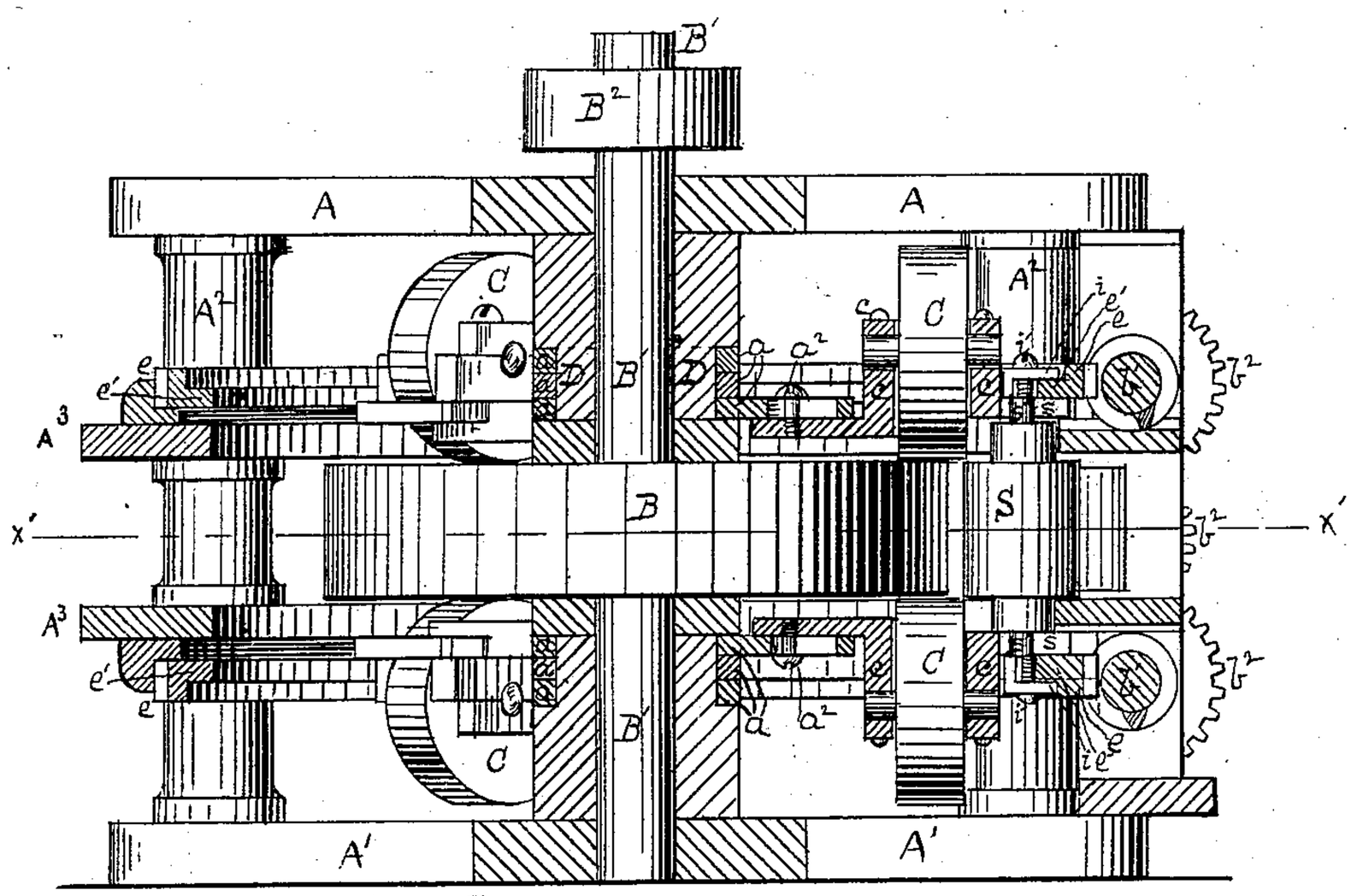

Fig. 3.

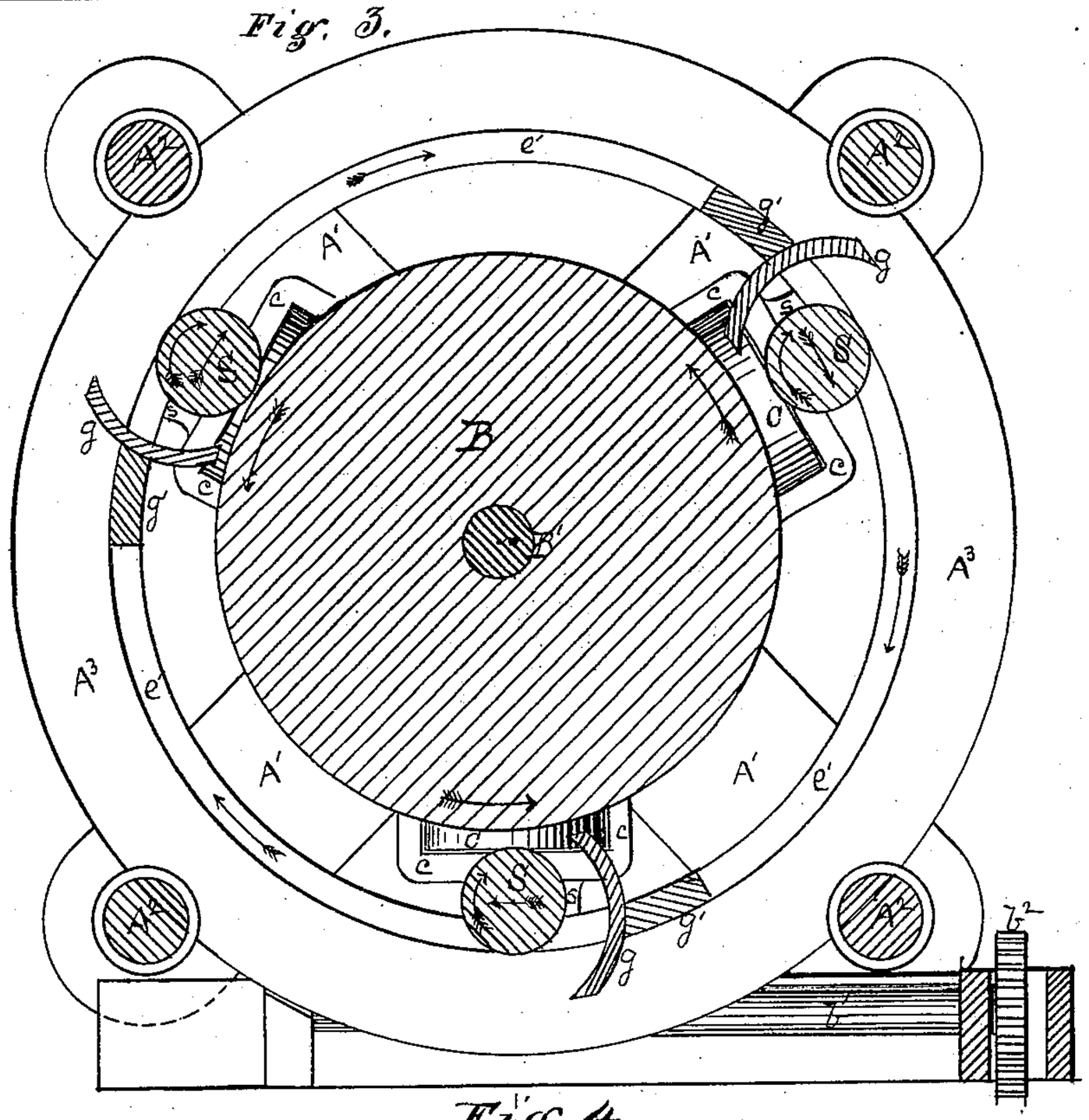

Fig. 4.

Witnesses Francis E. Case
Claudius Parker

Inventor Robert A. Carter,
by Attorney George H. Christy

UNITED STATES PATENT OFFICE.

ROBERT A. CARTER, OF PITTSBURG, PENNSYLVANIA.

IMPROVEMENT IN MACHINES FOR ROLLING METALLIC RINGS AND CYLINDERS.

Specification forming part of Letters Patent No. **189,188**, dated April 3, 1877; application filed November 4, 1876.

To all whom it may concern:

Be it known that I, ROBERT A. CARTER, of Pittsburg, county of Allegheny, State of Pennsylvania, have invented or discovered a new and useful Improvement in Machine for Rolling Metallic Rings and Cylinders; and I do hereby declare the following to be a full, clear, concise, and exact description thereof, reference being had to the accompanying drawing, making a part of this specification, in which—like letters indicating like parts—

Figure 1, Sheet 1, is a side elevation of my improved machine on the driving side. Fig. 2 is a sectional plan view, representing a horizontal section just below the top part of the frame. Fig. 3, Sheet 2, is a vertical sectional view through *x x* of Fig. 2, but showing an edge view of the central revolving drum; and Fig. 4 is a horizontal sectional view through *x' x'* of Fig. 3.

My improved machine is designed, primarily, for the rolling of hoops from circular or annular blanks, so as to produce an unjointed hoop, the blanks being either bent and welded on the machine, or previously bent and welded. It is also applicable, with such modifications as are hereinafter suggested, and such as will come within the knowledge of the skilled mechanic, to the rolling of short tubular articles—such as pipe-sockets, stove-pipes, &c.—from circular or annular blanks, so that the finished article shall be produced without joint or seam.

The top and bottom frames A A^1 are of any suitable construction, and are connected by posts A^2, the general structure thereof being somewhat similar to that employed in squeezer frames or housings. The main shaft B^1 passes vertically through the center of the machine, and power to rotate it is communicated through a band-wheel, B^2, or in other suitable way. On this shaft, about midway between the top and bottom frames A A^1, I affix securely a revolving drum, B, having a periphery similar to that of a metal-roll, and adapted to like uses, and at least equal in vertical height to the breadth of the hoop-strap to be made, or to the length of the tubular article to be rolled thereon. Immediately above and below the drum B I arrange loosely on the shaft B^1 an eccentric, D, and fix such eccentrics in position by connecting them to the top and bottom frames, or otherwise so that they shall be incapable of rotation. As shown in the drawings, each eccentric has three eccentric yokes, *a*, though for most, if not all, purposes a single yoke on each eccentric will suffice. Radially from such yoke or yokes, both above and below, are arms a^1, each pair above and below being in the same vertical plane. By a slot and tightening-screw joint, as at a^2, or by other equivalent adjustment, I connect to each arm a^1 the arm c' of a frame, *c*, which frame is rectangularly shaped, and provided with suitable bearings to carry an edging and guide roll, C. Projecting radially out from the outside of each frame *c*, and rigidly attached thereto, or made as a part thereof, is a plate, *s*, the forward edge of which, in the direction of its motion, is made so as to furnish a bearing-seat for a journal, *s'*, of the vertical rolls S, as shown in Figs. 2 and 3. The lower ends of these rolls S rest on the lower plates *s*, and their rolling faces or peripheries are equal in length to the vertical height of the periphery of the drum B, and are arranged parallel thereto. The rollers C, above and below the drum B, are arranged as shown in Fig. 2, so that they shall at one end lap onto the edge of the drum-periphery, at the other end onto the ends of the peripheries of the vertical rolls S, so as to act as a guide to both, and between the drum B and rolls S shall act as edging-rolls in case there should be a tendency in the metal to spread beyond what is desired; and they also act as guiding-rolls to the hoop which is being rolled, where there is a tendency in it to run up or down out of the vertical rolls or rolling-surfaces. Each plate *s* extends out far enough to lap onto one face of an annular flange, *e'*, which projects inwardly from a gear-wheel, *e*.

By means of a clip, *i*, and clamping-screw *i'*, which passes through clip *i* and into the plate *s*, I provide for clamping the plate *s* to the gear-wheel *e*, so that a rigid connection is secured from the yokes *a*, through the arms a^1 *c'*, frames *c*, and plates *s*, to the gear-wheel *e*. There are two of these flanged gear-wheels *e*,

one above and one below the level of the drum ends, so that a uniform motion and power can be communicated to each end of the rolls S. These gear-wheels are arranged concentric with the yokes *a*, so that as the yokes, while revolving, are shifted in or out by the eccentric D, the gear-wheels *e* will be correspondingly shifted, as well as the intermediate rolls C S, the rolls S being thus caused to approach to or recede from the drum, and the rolls C, while lapping onto both, also covering the space between them; and these rolls C S may also be adjusted to or from the center of the machine, according to the thickness of the article to be rolled between S and B, by loosening the screw i' and the joint at a^2, setting the intermediate devices in or out, and then tightening the joint and clamp at the proper point of adjustment. Any suitable annular framework A^3 may be employed to support and carry the gear-wheels *e*. Power is communicated to them, to cause them to rotate, by worm-gear *b* on shafts b^1, driven by gearing b^2 from any suitable motive power.

Back of each roll S stands a concave-faced guide, *g*, supported or held in place by a post, *g'*, which extends from one gear-wheel, *e*, to the other. The motions of the machine are indicated by arrows in Fig. 4.

As the journals of the rolls S bear only on the side from which power is applied, it is obvious that when the machine is running they will retain their places; but when the machine is not in motion, they may be readily removed and replaced. At a point on the machine where the distance between a roll, S, and drum B is at or near a maximum, I place on the roll an annular ring, properly heated, and having the proper amount and disposition of material for making the hoop or other article desired. The machine is then set in motion and other similar blanks are placed on the other rolls S as they successively come around.

The throw imparted to the rolls S by the yokes *a* turning on the eccentric D is such as to cause the rolls S, as they move around the drum B, to approach it gradually, and while doing so to reduce and draw the blank, gradually enlarging its diameter, and reducing its thickness until it has been brought to the size and shape desired. Each roll S, at the point where the rolling of the hoop is complete, is thrown or drops forward out of its bearings, or is removed, the hoop taken off, and, when the point of greatest distance between roll and drum is reached, a new blank is placed on the roll, the roll replaced in its bearings, and the work goes on.

By the use of annular blanks which are longer in the direction of their axes, tubular articles, like stove-pipe, may be rolled without joint or seam, the rolls C then performing the function of edging-rolls, when the length of the article rolled equals the vertical height of the drum-face.

In rolling hoops a slight incline or taper may be given to the rolling-face of the drum B, and the rolls S be set at a corresponding incline.

I propose by the use of this machine not only to roll out seamless rings and tubes from annular blanks, as described, but also to bend and weld such annular blanks from straight heated blanks of the proper size and length. For this purpose the straight blanks are fed in between the rolls S and drum B at such point along their maximum distance apart that they will take the proper bite on the blank, and pass it through.

The tendency of the smaller roll S will be to bend or curve the blank around itself. Should the blank not bend around with the proper radius of curvature its motion in that direction will be facilitated by its end striking against the curved guide *g*, immediately in rear of such roll S, so as to be thereby deflected still more toward the roll, and by virtue of such deflection be caused to pass around it, and the two ends of the blank coming together and passing between the roll S and drum B, they will be welded and the annular blank formed. The rolling operation then goes on, as previously described. By this operation pipe-sockets can be economically and rapidly made; and in this last use of the machine, and other like uses, the faces of the drum, or of the rolls S, or of both, may have grooves, or tongues and grooves, of the proper width and depth, such as are employed for the like purposes in metal rolls, and then the rolls C may be dispensed with, except as the use of them, or of kindred devices, may be desired to steady or guide the drum or rolls S, or both, while in operation.

The number of rolls S may be varied at pleasure, though to secure the best results there should be two or more arranged on opposite sides of the drum, or at uniform distances apart, or nearly so. It is not essential that the central drum should have any motion other than that which it receives from frictional contact. One important element of utility which I claim is, that by the use of this machine I can work up into useful products worn-out, broken, or damaged pipe, such as accumulates in large quantities in the oil regions, by cutting it up into rings of the desired length, and working up such rings or sections as are still sound.

Among other modifications the eccentricity desired may be made in the drum, and the latter then remaining stationary or fixed in position, the rolls S may be caused to rotate around it by any desired arrangement of gearing with like useful result.

In order to work the iron dry, which I consider best, the usual appliances should be added for introducing water through the main shaft inside the drum, made hollow for that purpose.

I claim herein as my invention—

1. The combination of a central drum, having a rolling-periphery, and a series of two or more drawing and reducing rolls, S, arranged radially around the drum, and eccentrically thereto, so as to be operative in the manufacture of seamless rings and tubes, substantially as set forth.

2. The combination of a central drum, B, a series of two or more vertical rolls, S, and a corresponding series of rolls, C, substantially as set forth.

3. The eccentrically-arranged vertical and edging rolls S C, mounted in a single frame, and simultaneously adjustable toward or from their center of motion, substantially as and for the purpose set forth.

4. The combination of drum B, eccentrics D, yokes *a*, radially-adjustable frames *c*, and edging and reducing rolls S C, substantially as described.

5. The combination of drum, eccentrically-operating edging and reducing rolls C S, and gear-wheels *e*, substantially as set forth.

In testimony whereof I have hereunto set my hand.

ROBERT A. CARTER.

Witnesses:

J. J. McCORMICK,

CLAUDIUS L. PARKER.