

THOMAS J. MAYALL.

Machine for Coiling Wire Spirally.

No. 126,315.

Patented April 30, 1872.

Fig. 1

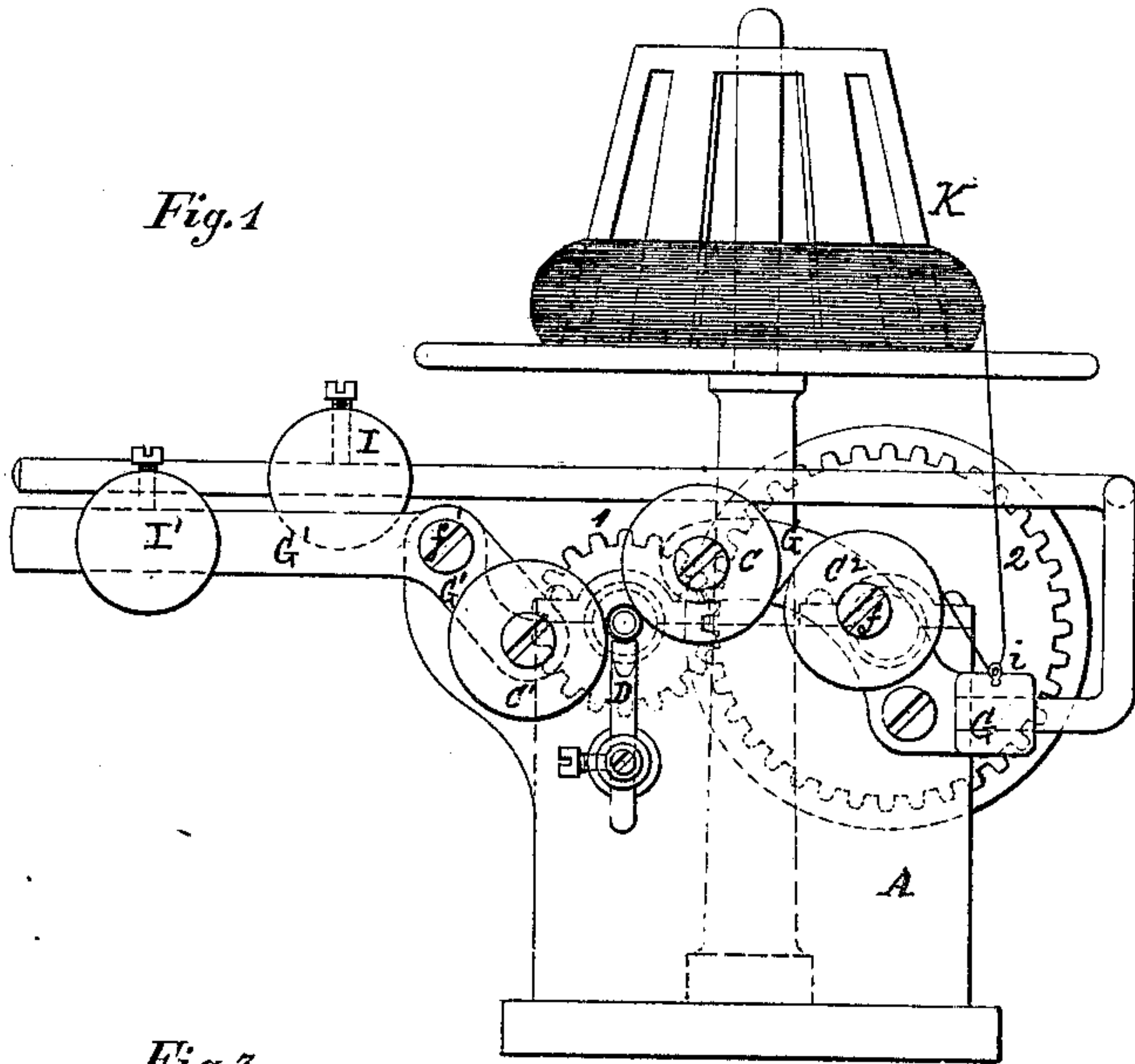


Fig. 3

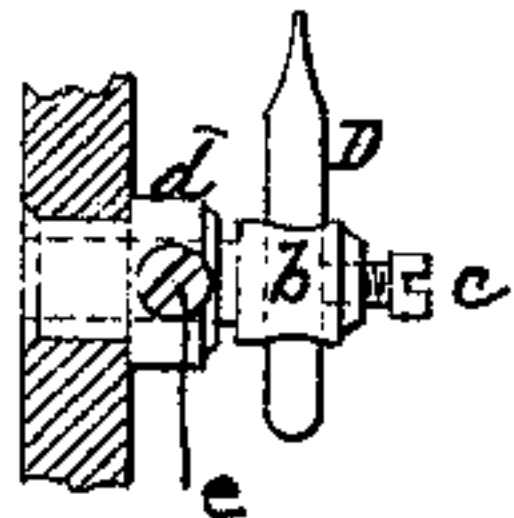
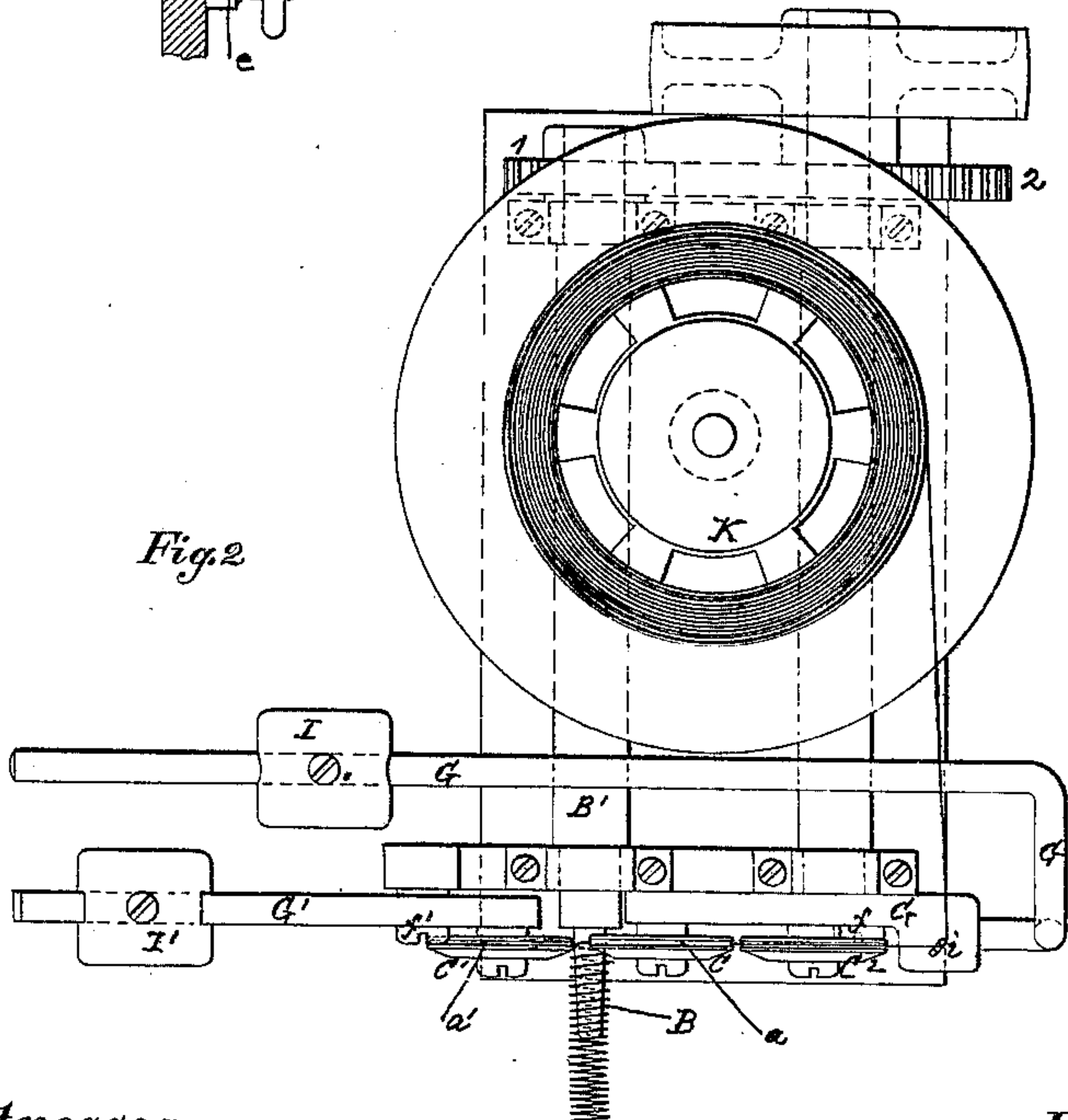


Fig. 2



Witnesses:

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# UNITED STATES PATENT OFFICE.

THOMAS J. MAYALL, OF BOSTON, MASSACHUSETTS.

## IMPROVEMENT IN MACHINES FOR COILING WIRE SPIRALLY.

Specification forming part of Letters Patent No. 126,315, dated April 30, 1872.

*To whom it may concern:*

Be it known that I, THOMAS J. MAYALL, of Boston, Suffolk county, Massachusetts, have invented certain new and useful Improvements in Machinery for Coiling Wire spirally, of which the following is a specification.

My invention relates to machinery for spirally coiling wire, to be used in various manufactures. The object of the invention is to produce a machine simple of construction, in which a spiral coil of wire of any length may be made, and also in which the pitch of the spiral can be varied, and any desired space be left between the folds of the coil. The invention may be stated, in general terms, to consist, first, in the combination, for the purpose of spirally coiling wire, of a coiling-mandrel, with peripherally-grooved pressure-rollers, arranged around or on opposite sides of the mandrel, and operating substantially in the manner hereinafter described; second, in the combination, with said grooved pressure-roller and coiling-mandrel, of a pitch-gauge or cast-off, arranged to engage with the wire after it leaves the last roller, and to spread each fold of the coil to the desired extent, or, in other words, to determine the pitch of the spiral.

The coiling-mandrel, which receives a positive movement of revolution upon its axis, should have its exterior so formed as to constitute a holding-surface to draw along the wire, and to this end I prefer to form in it an annular groove in the plane of the groove of the second pressure-roller when but two rollers are employed, which annular groove is roughened or scored in order to take hold of and draw along the wire, which runs in it from one roller to the other. The groove serves two purposes, as it both draws along and guides the wire.

The rollers are preferably so arranged that, supposing two rollers to be employed, they will be about diametrically on opposite sides of the mandrel, and in such position that the plane of the groove of the second roller will not coincide with that of the groove of the first roller, but will be a little further than the latter toward the front end of the mandrel, or that end from which the coil passes, this being necessary to the formation

of the spiral, and to prevent the folds of the coil from interfering when the pitch-gauge or spreader is not used. If, however, a pitch-gauge be employed, the rollers may be arranged in the same vertical plane.

The above and other features of my invention will be readily understood by reference to the accompanying drawing, in which Figure 1 is an elevation of my improved machine, on the side where the coiling mechanism is located. Fig. 2 is a plan of the same. Fig. 3 is a view of the spreader or cast-off detached.

The machinery is mounted in a frame, A, of ordinary or suitable construction. The principal parts of the machine consist of the coiling-mandrel B, grooved pressure-rollers C C', and pitch-gauge or cast-off D. I shall first describe the general arrangement and operation of these parts, and will afterward direct attention to certain features of construction, whereby the same may be more conveniently combined together and operated. The mandrel B projects beyond the frame A a suitable distance, and is fixed to the end of a shaft, B', which is rotated, by means of suitable gearing 1 2, by power from any convenient source. The mandrel is the only portion of the machine which need have a positive movement imparted to it. For convenience sake it is tapered slightly from the point where the spiral is formed to its front end, in order to interfere as little as possible with the coil. The caliber of the coil is determined by the diameter of the mandrel at the point where the spiral is formed, and to produce coils of various calibers it is well to have a series of interchangeable mandrels of different diameters, any one of which may be used on the shaft B', according to the caliber desired.

In the present machine, the mandrel being of comparatively small diameter, there are but two pressure or bending-rollers employed. They are arranged, one on each side of the mandrel, and nearly diametrically opposite one another. Around the periphery of each roller is a groove, *a* or *a'*, of sufficient depth to receive and retain the wire from which the coil is made. The rollers



are arranged in vertical planes about parallel with each other; but the plane of the groove in the roller C is somewhat in advance of or nearer to the outer end of the mandrel than that of the groove in roller C', as shown in Fig. 2, and for the purpose hereinbefore mentioned.

The wire to be operated on passes under the first roller C, being held in the groove therein; thence over the mandrel, against which it is held by the grooved roller C', and by the conjoined operation of the three devices—viz., the mandrel and the two rollers—the wire, as it is continuously fed along, is thus bent into a coil, the folds of which have a spiral formation, owing to the arrangement of the grooves *a a'* in different planes. The rollers press upon the mandrel with sufficient tightness to insure the proper bending of the wire, and the feed of the wire is caused by the mandrel, which has formed upon it a suitable holding-surface to draw along the wire. For the reasons above given, I prefer the roughened or scored annular groove in the mandrel for this purpose, said groove being arranged with relation to the rollers, as above described.

In order to cast off or move toward the end of the mandrel each fold of the coil, and also for the purpose of determining the pitch of the spiral, I use a cast-off or pitch-gauge, consisting of the rod D, flattened at its upper end, so as to have a suitably-sharp or thin edge, as seen in Fig. 3. This device is arranged under the mandrel, and so that its upper end may be in contact or in close proximity therewith, as seen in Fig. 2. Its edge is placed across the path of the wire, and by varying the angle at which the edge is placed to the path of the wire, the pitch of the spiral may be correspondingly varied. The wire, after it passes from between the roller C' and the mandrel, comes in contact with that portion of the upper end of the pitch-gauge nearest said roller, and, following the inclination of said gauge, is correspondingly spread or separated from the fold that follows it, the pitch of the spiral being thus determined. To allow the gauge to be easily adjusted, I mount its cylindrical stem in a cylindrical socket, *b*, in which said stem may be both turned to vary the angle of inclination or pitch of the gauge, and moved up or down to adjust the gauge to the mandrel, or to mandrels of different sizes, being held in any desired position by set-screw *c*. The socket *b* is also provided with a horizontal stem, fitting and adapted to slide in a socket, *d*, attached to the frame of the machine, whereby the gauge may be moved bodily nearer to or further from the end of the mandrel, for various purposes, either for more accurate adjustment, or for enabling the gauge to give an increased pitch. A set-screw, *e*, will

hold the stem of the socket *b* in any required position.

For the purpose of maintaining a proper pressure of the rollers upon the mandrel when in operation, and at the same time of making the said rollers self-adjusting to mandrels of different diameters, and capable of being lifted away from the mandrel to permit the insertion and putting in place of the wire prior to the commencement of the coil-forming operation, I mount said rollers on the ends of levers *G G'*, pivoted at *f f'* to the frame of the machine, and carrying on their longer arms weights *I I'*, by which the pressure of the rollers on the mandrel is maintained. The arrangement of the levers is such, as seen in the drawing, that they can be tilted to carry the rollers away from the mandrel for the purposes stated.

In order to better hold the wire upon the under side of the roller C, I employ a second roller, C<sup>2</sup>, on the lever *G*, over which the wire passes, extending thence through the eye *i* to the reel K, from which the supply of wire is drawn. This reel may be arranged on the frame of the machine, or in any locality convenient thereto. The course of the wire from the reel to and through the rollers is plainly indicated in the drawing.

By the machinery described, a continuous spiral coil of wire of any desired caliber and of any length may be made. The machine is of special value in making metallic spirals for lining India-rubber tubing, but may be used for other purposes.

In most cases, two pressure or bending-rollers will be sufficient. But in some instances—where, for instance, a mandrel of large diameter is used—three or more rollers may be employed.

What I claim, and desire to secure by Letters Patent, is—

1. The combination of the peripherally-grooved pressure or bending-rollers and the revolving coiling-mandrel, arranged and operating substantially as shown and set forth.

2. In combination with the revolving coiling-mandrel and peripherally-grooved pressure or bending roller, the cast-off or pitch-gauge, operating in connection with said parts, substantially as herein shown and described.

3. In combination with the revolving coiling-mandrel, the grooved pressure or bending roller, arranged, with relation to said mandrel, as described, and mounted upon weighted arms or levers, substantially in the manner shown and set forth, whereby said rollers are made self-adjusting to mandrels of different sizes, are caused to maintain proper pressure upon the mandrel when in operation, and may be lifted away from said mandrel whenever desired.

4. The combination of the pitch-gauge with devices substantially such as shown and described, whereby its adjustment with relation to the mandrel may be effected, for the purposes set forth.

5. The arrangement of the grooved bending-rollers in vertical planes at right angles with the axis of the coiling-mandrel, parallel but not coincident with one another, substan-

tially as and for the purposes herein shown and set forth.

In testimony whereof I have signed my name to this specification before two subscribing witnesses.

THOS. J. MAYALL.

Witnesses:

M. BAILEY,  
EDM. F. BROWN.