No. 744,671. PATENTED NOV. 17, 1903.

E. L. AIKEN.

COIL FORMING APPARATUS.

APPLICATION FILED JAN. 17, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

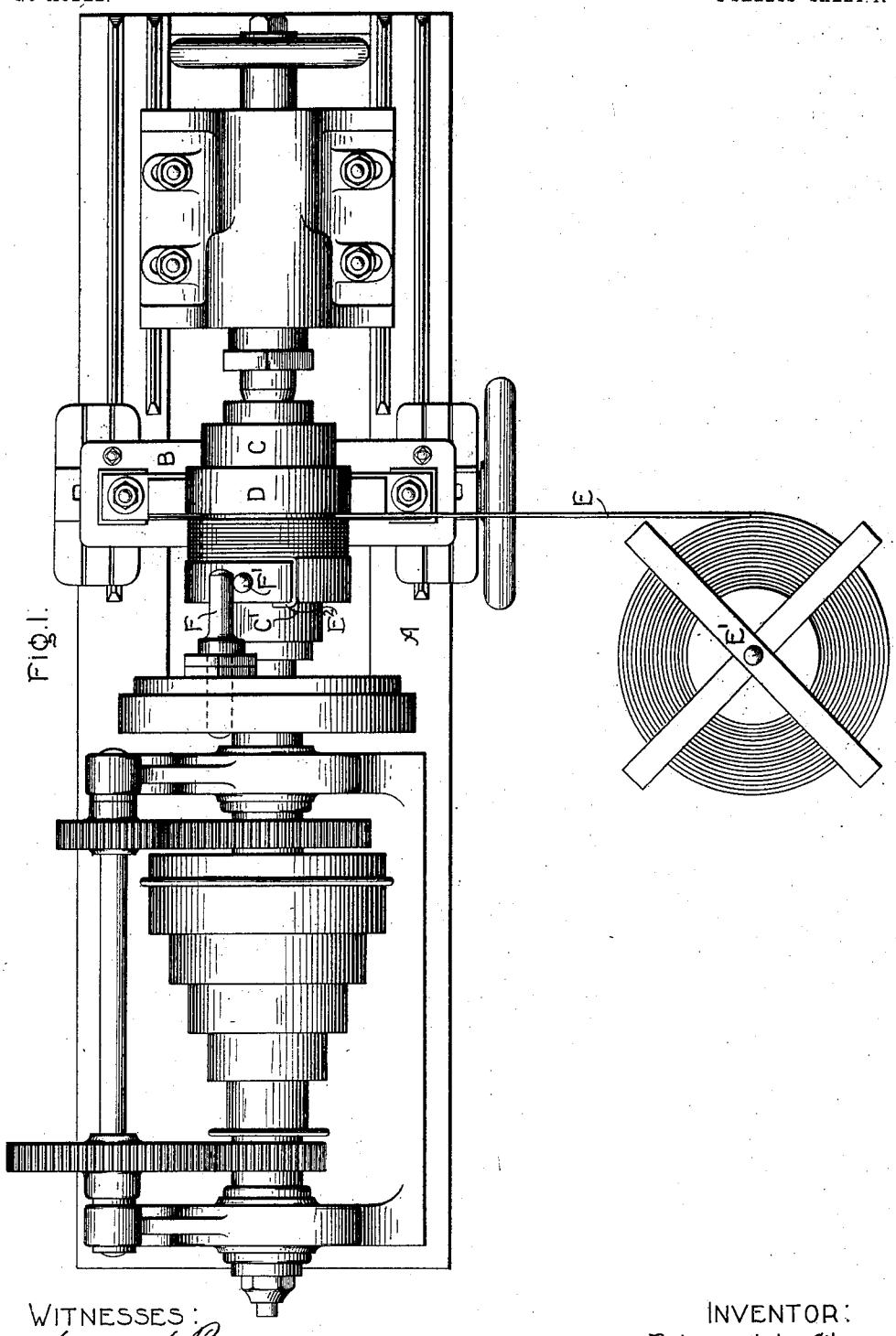

Fig. 1.

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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 2.

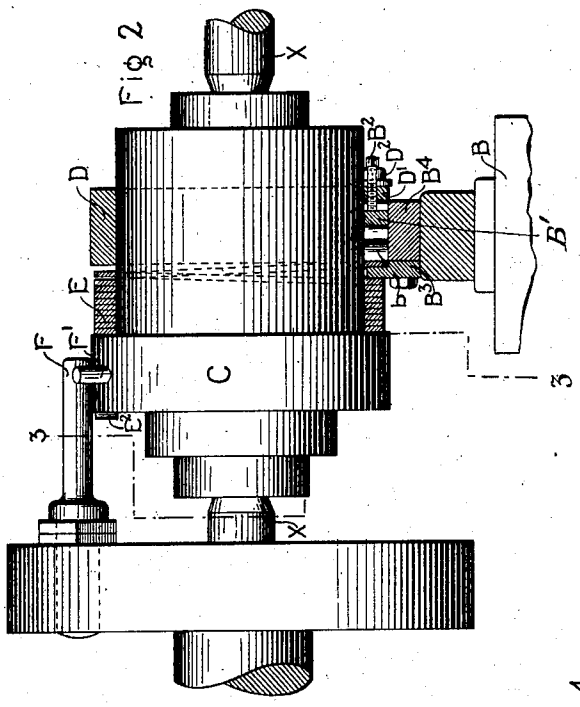


Fig. 4.

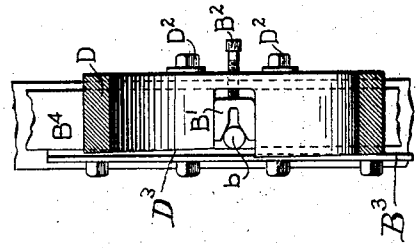
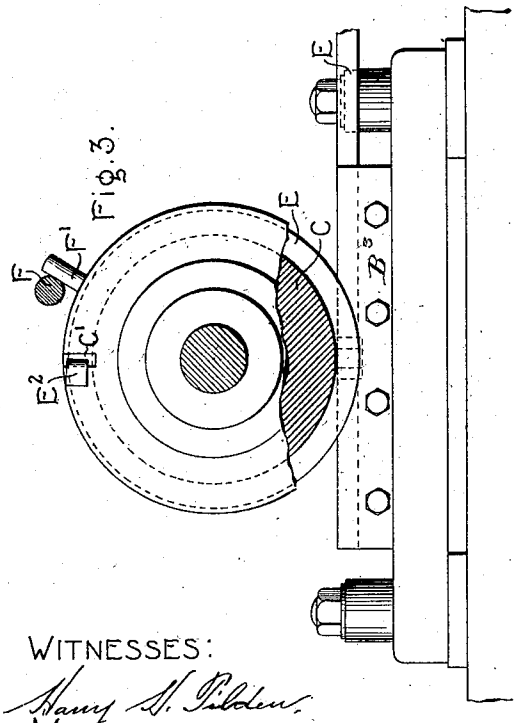


Fig. 3.



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No. 744,671. Patented November 17, 1903.

UNITED STATES PATENT OFFICE.

EDWARD L. AIKEN, OF WARREN, PENNSYLVANIA, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

COIL-FORMING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 744,671, dated November 17, 1903.

Original application filed December 5, 1898, Serial No. 698,243. Divided and this application filed January 17, 1903. Serial No. 139,373. (No model.)

To all whom it may concern:

Be it known that I, EDWARD L. AIKEN, a citizen of the United States, residing at Warren, county of Warren, State of Pennsylvania, have invented certain new and useful Improvements in Coil-Forming Apparatus, (being a division of my application, Serial No. 698,243, filed December 5, 1898,) of which the following is a specification.

My invention relates to apparatus for forming coils from ribbon or flat metal strips, and has for its object to provide an inexpensive device for winding flat strips of metal into coils without forging and without causing them to buckle or to assume positions other than at substantially right angles to the axis.

The invention will be more readily understood by reference to the accompanying drawings, forming a part of this specification, in which—

Figure 1 represents an engine-lathe of ordinary construction with a coil in process of winding thereon. Fig. 2 is a side elevation, partly in section, of a part of the device shown in Fig. 1, here drawn upon an enlarged scale. Fig. 3 is an end elevation, partly in section, of the parts shown in Fig. 2, taken on the line 3 3. Fig. 4 is a plan, partly in section, of the arrangement shown in Figs. 2 and 3 for confining the strip while it is being wound.

In Fig. 1, A is the bed of the lathe, boring-mill, or other rotating mechanical structure. Of course any one of these devices may be used, as convenience may dictate, the essential feature being that it shall have sufficient power to turn the mandrel against the tension of the conductor being wound. B is the usual slide-rest, which may be fed by hand, if desired, but is ordinarily pushed along the slideways by the pressure of the work against the guide carried by the slide-rest. C is the mandrel, the construction of which will be best understood from Fig. 2. The other parts of the lathe are not referred to specifically by letter, inasmuch as their construction is well known and readily apparent. E is the conductor or metal strip, which is to be wound from the reel E′.

As shown in Fig. 2, C is a mandrel, which rotates between the centers X X by any suitable means, such as the pins F F′, connected with the face-plate of the lathe and the mandrel, respectively. As shown in Fig. 1, the face of the enlarged shoulder of the mandrel C is shaped as a helicoid. In the figure also is shown a slot C′ in the shoulder, into which the bent end E^2 of the strip E is inserted to secure that end to the mandrel.

In Figs. 2 and 4, D is a non-rotatable ring secured to move with the slide-rest B, having a working fit with the mandrel C and adapted to slide longitudinally thereof, whereby said ring occupies positions successively farther removed from the shoulder of the mandrel C, so that the increasing coil of the strip E on the mandrel C is clamped between the shoulder of the mandrel and the ring D to assist in preventing buckling of the strip.

The ring D is secured to the slide-rest B in the following manner: As shown in Fig. 2, the base-block B^4 is carried by the slide-rest, which block extends at a tangent to the surface of the mandrel C and forms a joint with the ring D, the ring being cut away for a portion of its width along the line of a chord-tangent to the inner circumference of the ring, thus forming a flat surface, which rests on the block B^4. The entire width of the ring D is not, however, cut away in this manner, but only as far as the right-hand edge of the block B^4, as shown by the inner dotted line in Fig. 4, thus leaving a depending arc or lip D′, Fig. 2, which extends along the side of the block B^4. The ring D is secured to the block B^4 by bolts D^2, Figs. 2 and 4, which pass through the lip D′ into the part B^4. Other bolts (not shown) may pass up through the block B^4 and into the ring D at the lower flat cut-away surface thereof.

The ring D is formed with a helicoidal face D^3, opposing the similarly-shaped face of the shoulder of the mandrel C, and the strip E passes between these two surfaces and is wound on the mandrel.

The block B^4 and the ring D are cut away, as shown in Figs. 2 and 4, to provide a space for the block B′, which is adjusted by means of a screw B^2 passing through the lip D′ of the ring to force a rod or roller *b*, which acts as an antifriction device, against the strip E,

which passes between the roller *b* and the guide B^3, bolted to the block B^4. The strip-coil on the mandrel presses against the guide B^3 and is securely held from buckling between the end of the wound coil and said guide B^3. The rod or roller *b* or its equivalent is a very important feature of the machine, as without some such means it would be practically impossible to initially bend a strip so thin without buckling or crimping.

Referring to Figs. 3 and 4, the operation may be described as follows: The strip E enters from the right between the ring D and the guide B^3 and passes beneath the innermost projection of the helicoidal surface of the ring which overhangs the strip and the guide B^3, as shown in Fig. 4. The strip then passes in contact with the roller and is forced by the helicoidal surface of the ring to assume the form of a helix surrounding the mandrel C.

The slide-rest B, which carries the part B^4 and the ring D, is free to slide parallel to the axis of the mandrel C under the pressure of the strip E as it is being coiled.

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

1. In a machine for winding strips of metal on edge, the combination with a rotatable mandrel adapted to have the end of the strip attached to it, of a slide-rest adapted to move parallel with the axis of the mandrel, and means rigidly mounted on the slide-rest for guiding the strip and supporting it on both sides to prevent it from buckling as it is drawn on the mandrel.

2. In a machine for winding strips of metal on edge, the combination with a rotatable mandrel adapted to have the end of the strip attached to it, of a slide-rest adapted to move parallel with the axis of the mandrel, a ring surrounding the mandrel and secured to the slide-rest, a friction device at the point where the strip commences to bend, and a guide carried by the slide-rest to form a space between itself and the friction device.

3. In a machine for winding strips of metal on edge, the combination of a rotatable mandrel adapted to have the end of the strip attached to it, a slide-rest adapted to move parallel with the axis of the mandrel, a guide carried by the slide-rest against which guide bears the part of the coil which has been wound, a friction device carried by the slide-rest at the point where the strip begins to bend, between which friction device and said guide the strip passes to the mandrel, whereby said strip in its passage to the mandrel is positively supported on both sides at the point at which it is bent.

4. In a machine for winding strips of metal on edge, the combination with a rotatable mandrel having a shoulder which is formed with a helicoidal surface, of a slide-rest adapted to move parallel to the axis of the mandrel, and a ring having a helicoidal surface mounted about said mandrel, secured to said slide-rest and adapted to normally hold the portion of the coil which has been wound on the mandrel between itself and the shoulder of the mandrel, and to be forced along by the increasing coil with the slide-rest to which it is secured.

5. In a machine for winding strips of metal on edge, the combination with a mandrel having a shoulder which is formed with a helicoidal surface, of a slide-rest adapted to move parallel with the axis of the mandrel, a ring having a helicoidal surface mounted about said mandrel and secured to said slide-rest to form a space between the ring and slide-rest, a friction device in said space, and a guide on the slide-rest adapted to coöperate with the friction device.

6. In a machine for winding strips of a metal on edge, the combination with a rotatable mandrel, of a slide-rest movable longitudinally thereof, and a ring mounted about the mandrel and having a flat portion resting on the slide-rest, to which it is secured.

7. In a machine for winding strips of metal on edge, the combination with a rotatable mandrel, of a slide-rest movable longitudinally thereof, and a ring mounted about the mandrel and having a depending lip through which it is secured to the slide-rest.

8. In a machine for winding strips of metal on edge, the combination with a rotatable mandrel, of a slide-rest movable longitudinally thereof, a guide and friction device carried by said slide-rest, and a non-rotatable ring mounted about the mandrel and formed with a helicoidal surface, a portion of which projects over the space between the guide and ring.

In witness whereof I have hereunto set my hand this 12th day of January, 1903.

EDWARD L. AIKEN.

Witnesses:
J. G. SMITH,
M. M. MILLER.