

A. L. McHUGH.
COIL FORMING MACHINE.
APPLICATION FILED MAR. 27, 1907.

1,016,700.

Patented Feb. 6, 1912.

2 SHEETS—SHEET 1.

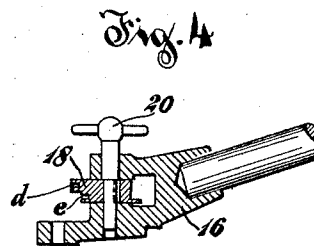
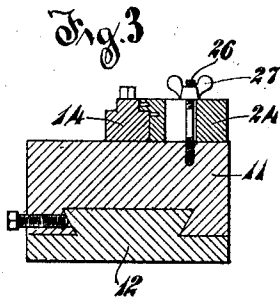
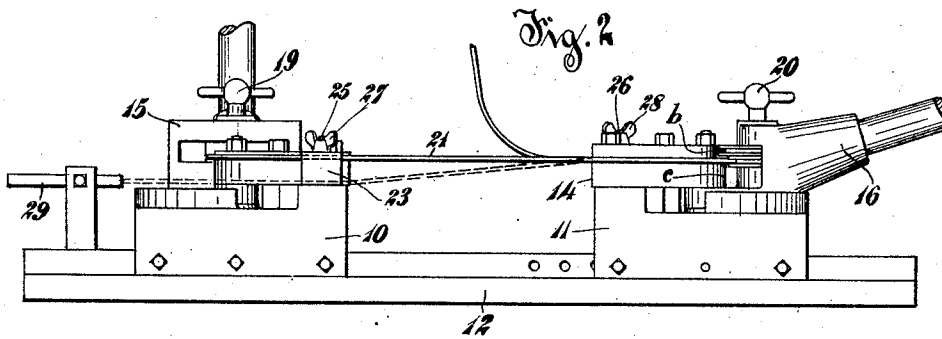
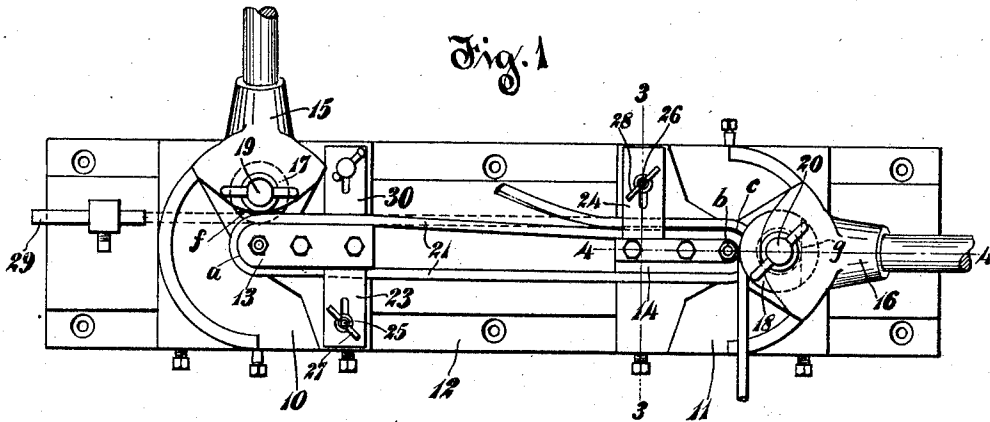
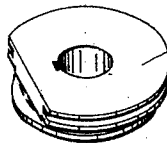


Fig. 5



Witnesses
Oscar Charman
Fred J. Husey

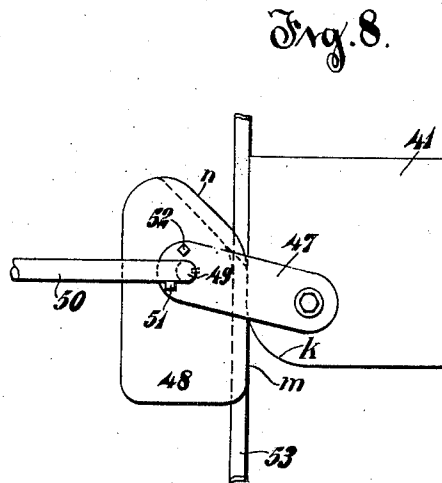
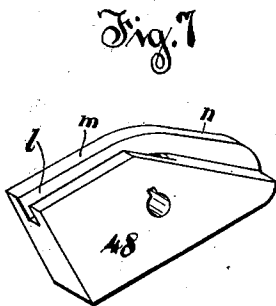
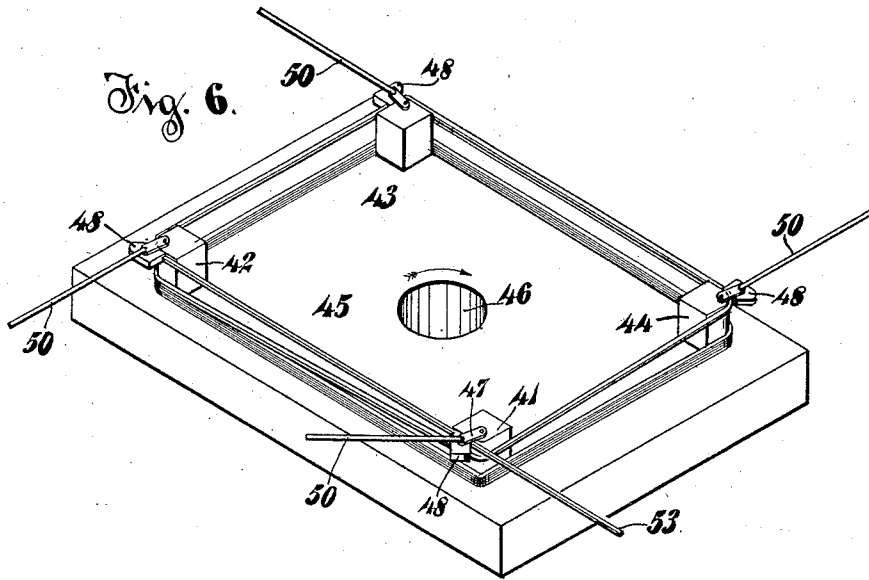
Inventor
Anthony L. McHugh
By
Chas. E. Lord
Attorney

A. L. McHUGH.
COIL FORMING MACHINE.
APPLICATION FILED MAR. 27, 1907.

1,016,700.

Patented Feb. 6, 1912.

2 SHEETS—SHEET 2.



Witnesses

Olive Sherman
Fred H. Kelsey

Inventor
Anthony L. McHugh
By
Chas. E. Lord
Attorney

UNITED STATES PATENT OFFICE.

ANTHONY L. McHUGH, OF CINCINNATI, OHIO, ASSIGNOR TO ALLIS-CHALMERS COMPANY, A CORPORATION OF NEW JERSEY, AND THE BULLOCK ELECTRIC MANUFACTURING COMPANY, A CORPORATION OF OHIO.

COIL-FORMING MACHINE.

1,016,700.

Specification of Letters Patent.

Patented Feb. 6, 1912.

Application filed March 27, 1907. Serial No. 364,842.

To all whom it may concern:

Be it known that I, ANTHONY L. McHUGH, a citizen of the United States, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Coil-Forming Machines, of which the following is a full, clear, and exact specification.

My invention relates to coil-forming machines and particularly to machines for bending metallic strip edgewise.

In the machines now used for bending metallic strip edgewise in which in the bending operation the guide for preventing buckling of the strip is pivoted to the bending block about which the strip is being bent, said guide must be moved bodily away from said bending block periodically in order to allow removal of the part of the coil which has just been formed and insertion of the portion of the strip next to be bent. This has generally been done by entirely removing the anti-buckling guide, a proceeding both laborious and time-consuming.

It is the object of my present invention to provide an arrangement whereby the strip may be inserted or removed without the necessity of moving the anti-buckling guide away from the bending block.

With this object in view my invention comprises the combination, in a machine for bending metallic strip edgewise, of a bending block, and an anti-buckling guide movable relatively to said bending block about one axis to bend the strip about the block, and independently movable about another axis to allow insertion and removal of the strip.

Other features of my invention will appear from the description and drawings and will be particularly pointed out in the claims.

Figure 1 is a plan view of a coil-forming machine embodying my invention; Fig. 2 is a front elevation of the machine shown in Fig. 1; Fig. 3 is a section on the line 3—3 of Fig. 1; Fig. 4 is a section of the anti-buckling guide on the line 4—4 of Fig. 1. Fig. 5 is an isometric view of the anti-buckling guide shown in Fig. 1; Fig. 6 is an isometric view of another form of coil-forming machine embodying my invention; Fig. 7 is an isometric view of the anti-buckling

guide used in Fig. 6; and Fig. 8 is an enlarged plan view of the bending block and anti-buckling guide of Fig. 6, together with a portion of the metallic strip.

In the arrangement shown in Fig. 1, standards 10 and 11 are adjustably mounted on a base 12 so that the distance between them may be varied. Bending blocks 13 and 14 are removably attached to the standards 10 and 11 respectively. The bending block 13 has a single semi-cylindrical bending surface *a*, while the bending block 14 has two concentric semi-cylindrical bending surfaces *b* and *c* of different radii. Arms 15 and 16 mounted on the standards 10 and 11 can swing about the axes of the bending surfaces *a* and *b* respectively. Rollers 17 and 18 are mounted in the arms 15 and 16 respectively, the roller 17 having a single groove, while the roller 18 has two grooves *d* and *e*. The outer edges of the flanges of the roller 17 touch or nearly touch the bending surface *a*, rolling on said surface as the arm 15 is turned on its pivot, while the outer edges of the flanges of the grooves *d* and *e* touch or nearly touch the bending surfaces *b* and *c* respectively, the roller 18 rolling on said surfaces as the arm 16 is turned on its pivot. The rollers 17 and 18 are fixed on pins 19 and 20 respectively so that said rollers can be turned about their axes to bring cutaway portions *f* and *g* of their respective flanges adjacent to the bending blocks 13 and 14 to allow removal or insertion of the metallic strip 21 to be bent. The lower flanges of the rollers are left intact.

The grooved rollers 17 and 18 form guides for preventing buckling of the strip as it is being bent. Grooved members 23 and 24 prevent the strip from bulging away from the bending blocks 13 and 14 as the strip is being bent, these members being provided with slots through which pins 25 and 26 screwed into the supports 10 and 11 extend. The members 23 and 24 may be firmly fastened in place by thumb screws 27 and 28 respectively. An adjustable bar 29 is provided for properly locating the end of the strip 21 for the first turn, while the strip is held from slipping by a clamp 30.

With the arms 15 and 16 swung counter-clockwise as far as possible, the end of the strip 21 is placed abutting the rod 29 as shown in dotted lines and is clamped in po-

sition by the clamp 30. The member 24 is slid outwardly and the roller 18 so turned that the cut-away part *g* is adjacent to the bending block. The strip 21 is now laid
5 against the lower intact flange of the groove *e*, and the member 24 moved in and fastened so that the strip 21 is in its lower groove. By now turning the pin 20, the roller 18 is turned to bring the strip entirely
10 into the groove *e*, and then, by swinging the arm 16 in a clockwise direction, the strip 21 is bent around the surface *c*, in this operation remaining continuously in the groove *e* of the roller 18.

15 With the cutaway part of the upper flange of the roller 17 adjacent to the bending block 13, and the member 23 moved outwardly, the strip 21 is laid down against the lower intact flange of the roller 17, and
20 the member 23 moved inwardly to bring the flanges of its groove on each side of the strip. The clamp 30 is now released and the part of the strip which passes through said clamp is bent upwardly out of the way,
25 as shown in full lines in Fig. 2. After first turning the roller 17 to bring the uncut-away portions of its upper flange adjacent to the bending block 13, the arm 15 is swung in a clockwise direction to bend the strip
30 about the bending surface *a*. In this operation, the strip remains continuously in the groove of the roller 17. The member 24 is now moved outwardly and the arm 16 swung back counter-clockwise to its limit,
35 and the cutaway portion *g* of the flange of the roller 18 again brought adjacent to the bending block 14. The strip 21 is now put in place for the upper groove of the member 24 and the groove *d* of the roller 18, and
40 said member and roller properly moved to hold the strip in this position. By again moving the arm 16 in a clockwise direction the strip is bent around the surface *b*, finishing the coil. By sliding the members 23
45 and 24 outward and turning the rollers 17 and 18 so that the cutaway portions of their flanges are adjacent to the bending blocks 13 and 14, the finished coil may be removed and another coil formed in the manner indicated above.
50

As here shown, the coil formed of the strip 21 is very simple, having but one turn at one end and two turns at the other. By providing the proper number of bending
55 surfaces *a*, *b* and *c* and the proper number of flanges in the rollers 17 and 18, any desired number of turns of the coil may be used. The different bends of these turns may be either the same size, as those formed
60 around the surfaces *a* and *c*, or of different sizes, as those formed around the surfaces *b* and *c*.

In the modifications shown in Figs. 6, 7 and 8 the bending blocks 41, 42, 43 and 44
65 are attached to a table 45 at the center of

which is a hole 46 in which fits a shaft, on which the table can turn in the direction of the arrow. Each of the bending blocks 41, 42, 43 and 44 has a bending surface in the
70 form of a quarter of a cylinder, the other corners of these blocks being of any desired shape. Links 47 are pivoted to turn about the axis of these cylinders while anti-buckling guides 48 are fixed on pins 49 in the
75 outer ends of said respective links. An operating arm 50 is attached to each pin 49 to turn said pin and its associated guide 48 about the axis of said pin between limits set by stops 51 and 52 on the link 47. Each of
80 the guides 48 is provided with a groove *l* in its edges *m* and *n*, the lower flange of the groove on the edge *n* being cut away as best shown in Fig. 7. The two edges *m* and *n* of the upper flange of the groove *l* are
85 joined by a surface formed on a cylinder the axis of which is the axis of the pin 49.

The strip 53 to be bent is supplied from any desired source and is fed under one of the anti-buckling guides 48. By swinging
90 this guide as far as possible clockwise, the cutaway portion of the lower flange of its groove *l* is brought adjacent to its associated bending block, say 41, to allow the strip 53 to move upwardly into said groove. By
95 now swinging the arm 50 counter-clockwise until it strikes the stop 51, the anti-buckling guide 48 is so moved that the uncutaway portion of the lower flange of the groove *l* is brought underneath the strip 53. By holding
100 the arm 50 in this position, that is, against the stop 51, and causing the table 45 to rotate in the direction of the arrow, the strip 53 is bent about the surface *k* of the bending block. This same operation may be
105 repeated for the other bending blocks as they come around, each of the guides 28 being turned by its operating handle 50 to bring the cut away portion of the lower flange of its groove *l* adjacent to the bending block
110 to allow the finished corner of the coil to drop down upon the table 45 and a new portion of the strip 53 to be inserted for bending.

Many modifications may be made in the precise arrangements here shown and described, and all such which do not involve a departure from the spirit and scope of my invention I aim to cover in the following
115 claims.

What I claim as new is:—

1. In a machine for forming edgewise wound coils of metallic strip, the combination of a rotatable frame, a plurality of bending blocks carried by said frame, and a
120 grooved anti-buckling guide carried by each bending block, each guide having a limited movement relative to said bending block and an independent movement about an axis within itself.

2. In a machine for forming edgewise
125

wound coils of metallic strip, the combination of a rotatable table, a plurality of bending blocks carried by said table and having bending surfaces the elements of which are
 5 straight lines parallel to the axis of rotation of the table, and an anti-buckling guide carried by each bending block, said guide being grooved to receive the metallic strip, being movable at right angles to the elements of the bending surfaces of the bending
 10 blocks to produce bending of the strip, and being independently movable about an axis within itself to allow insertion and removal of the strip.

15 3. In a machine for forming edgewise wound coils of metallic strip, the combination of a rotatable table, a plurality of bending blocks carried by said table, said bending blocks having substantially cylindrical
 20 bending surfaces, and an anti-buckling guide associated with each bending block and movable about the axis of the bending surface of said block to produce bending of the strip, said guides being rectangularly grooved to
 25 prevent buckling of the strip and each having a portion of one flange of its groove cut away and being movable about an axis within itself to bring the cut-away portion of its flange in suitable position to allow insertion and re-
 30 moval of the strip.

4. In a machine for forming edgewise wound coils of metallic strip, the combination of a rotatable table, a plurality of bending blocks mounted on said table, said bending
 35 blocks having cylindrical bending surfaces, and an anti-buckling guide associated with each bending block and grooved to fit the strip, a part of the flange of such groove being cut away, each of said guides being
 40 movable about the axis of the bending surface of the cooperating bending block to produce bending of the strip and movable in the same plane otherwise than about such axis to bring the cut-away portion of the flange into
 45 suitable position to allow insertion and removal of the strip.

5. In a machine for forming edgewise wound coils of metallic strip, the combination of a rotatable table, a plurality of bending blocks carried thereby, the bending surfaces of said bending blocks being parts of
 50 cylinders, and an anti-buckling bending guide associated with each bending block and grooved to fit the strip, each of said guides being movable about the axis of the bending surface of the cooperating bending block to produce bending of the strip and
 55 independently movable about another axis to allow insertion and removal of the strip.

60 6. In a machine for bending metallic strip edgewise, the combination of a plurality of bending blocks, and anti-buckling guides grooved to receive such strip edgewise and fitting closely to the bending blocks, said
 65 guides being movable relatively to said re-

spective bending blocks and independently movable about axes within themselves to allow or prevent insertion or removal of the strip in their different positions.

7. In a machine for bending metallic strip
 70 edgewise, the combination of a plurality of bending blocks about which the strip is to be bent, and rectangularly grooved guides fitting closely to the bending blocks and each having one of the flanges of its groove
 75 partly cut away, said guides being movable about the respective bending blocks, and independently movable about axes within themselves to bring the place where the flanges of their grooves is cut away adja-
 80 cent to the bending blocks.

8. In a machine for forming edgewise wound coils of metallic strip, the combination of a frame, a plurality of bending
 85 blocks mounted thereon, the bending surfaces of said blocks being parts of cylinders, and an anti-buckling bending guide carried by and fitting closely to each bending block and grooved to fit the strip, each of said guides being movable about the axis
 90 of the bending surface of the cooperating block to produce bending of the strip and movable in the same plane otherwise than about such axis to allow insertion and removal of the strip.
 95

9. In a machine for forming edgewise wound coils of metallic strip, the combination of a frame, a plurality of bending
 100 blocks mounted on the frame, the bending surfaces of said blocks being parts of cylinders, and an anti-buckling bending guide carried by and fitting closely to each bending block and grooved to fit the strip, said guides being respectively movable about the
 105 axes of the bending surfaces of their cooperating bending blocks to produce bending of the strip and otherwise movable to allow insertion and removal of the strip, and said guides with their respectively cooperating bending blocks being ar-
 110 ranged to operate on the strip successively to produce a full turn of 360° after which one of the guides with its cooperating bending block operates to start a second turn.

10. In a machine for forming edgewise
 115 wound coils of metallic strip, the combination of a frame, a plurality of bending blocks mounted thereon, the bending surfaces of said blocks being parts of cylinders, and anti-buckling bending guides
 120 carried by and fitting closely to the respective bending blocks and arranged with their respectively cooperating bending blocks to operate on the strip successively through more than a complete succession, each of said
 125 bending guides being movable about the axis of the bending surface of the cooperating bending block to produce bending of the strip and otherwise movable to allow insertion and removal of the strip.
 130

11. In a machine for forming edgewise
wound coils of metallic strip, the combina-
tion of a frame, a plurality of bending
blocks mounted thereon, the bending sur-
5 faces of said blocks being parts of cylinders,
and anti-buckling bending guides carried
by and fitting closely to the respective bend-
ing blocks and arranged with their respec-
tively coöperating bending blocks to operate
10 on the strip successively through more than a
complete succession, a complete succession
producing a total bending of 360° , each of

said guides being movable about the axis
of the bending surface of the coöperating
bending block to produce bending of the 15
strip and otherwise movable to allow inser-
tion and removal of the strip.

In testimony whereof I affix my signa-
ture, in the presence of two witnesses.

ANTHONY L. McHUGH.

Witnesses:

GEO. B. SCHLEY,
FRED J. KINSEY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."