S. H. BROWNING.

COIL SHAPING MACHINE.

APPLICATION FILED MAR. 25, 1918.

1,297,998.

Patented Mar. 25, 1919.

3 SHEETS—SHEET 1.

Fig. 1.

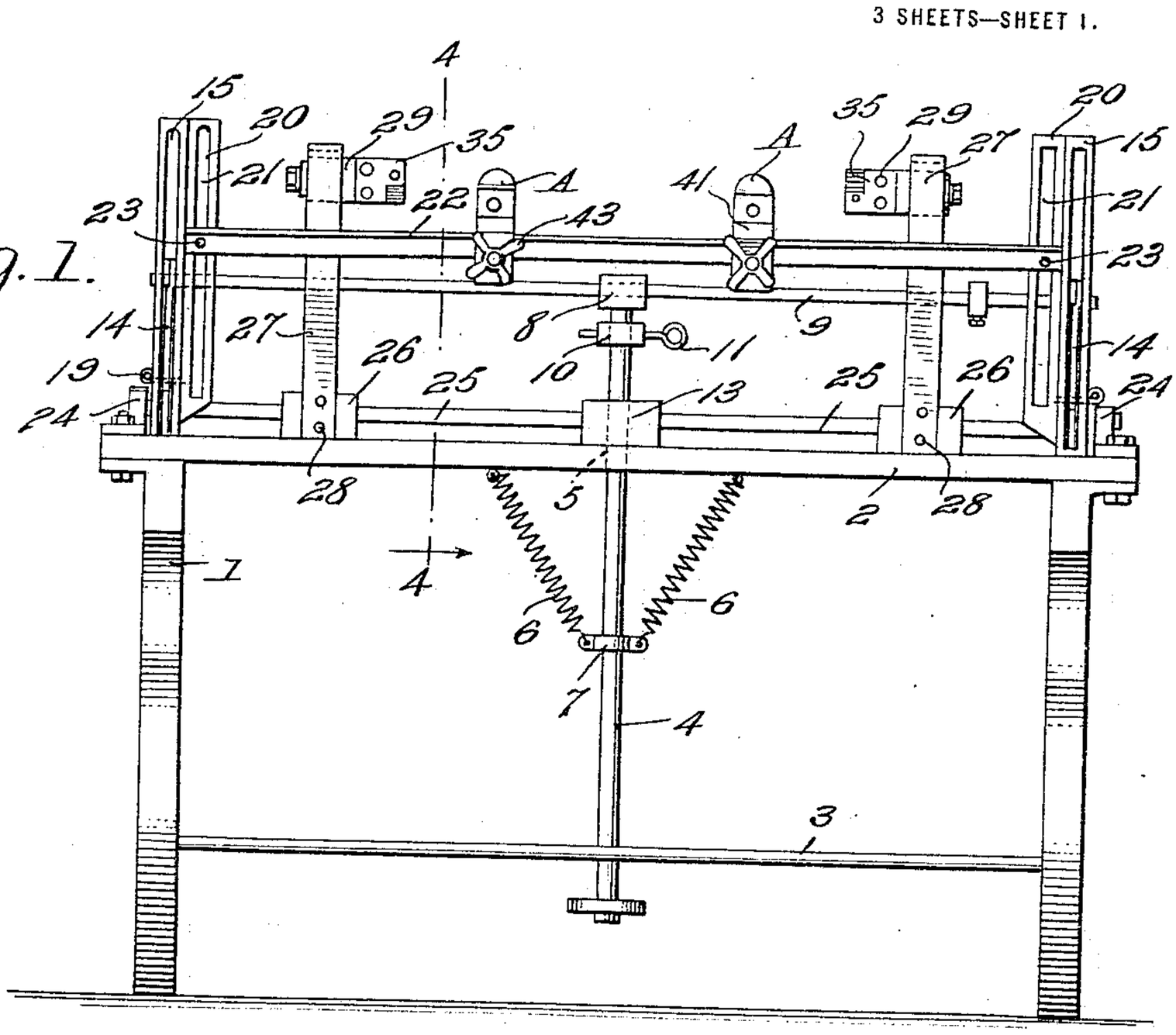
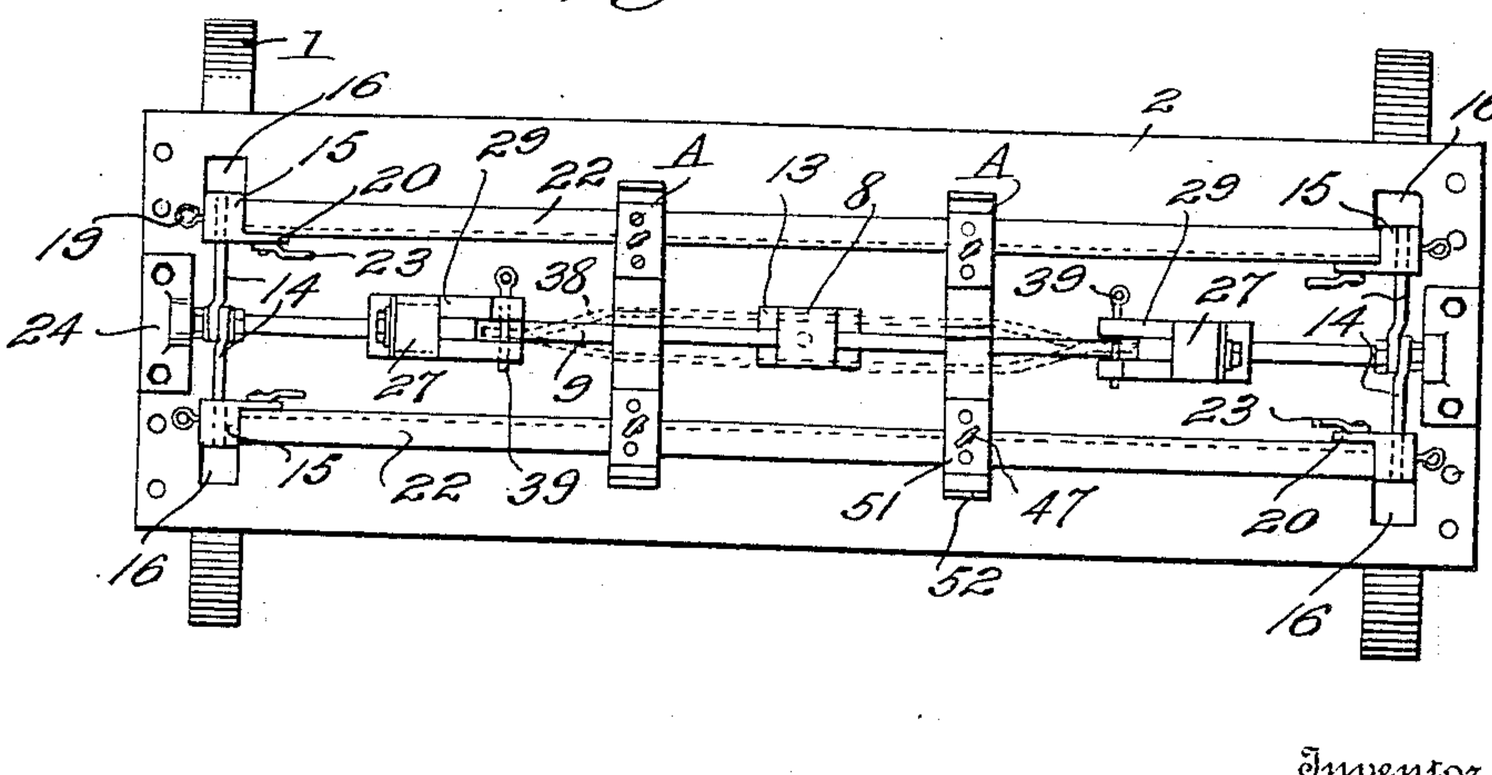


Fig. 2.



Witness
W. S. McCorkell.

Inventor
Samuel H. Browning

By C. C. Shepherd

Attorney

S. H. BROWNING.

COIL SHAPING MACHINE.

APPLICATION FILED MAR. 25, 1918.

1,297,998.

Patented Mar. 25, 1919.

3 SHEETS—SHEET 2.

Fig. 3.

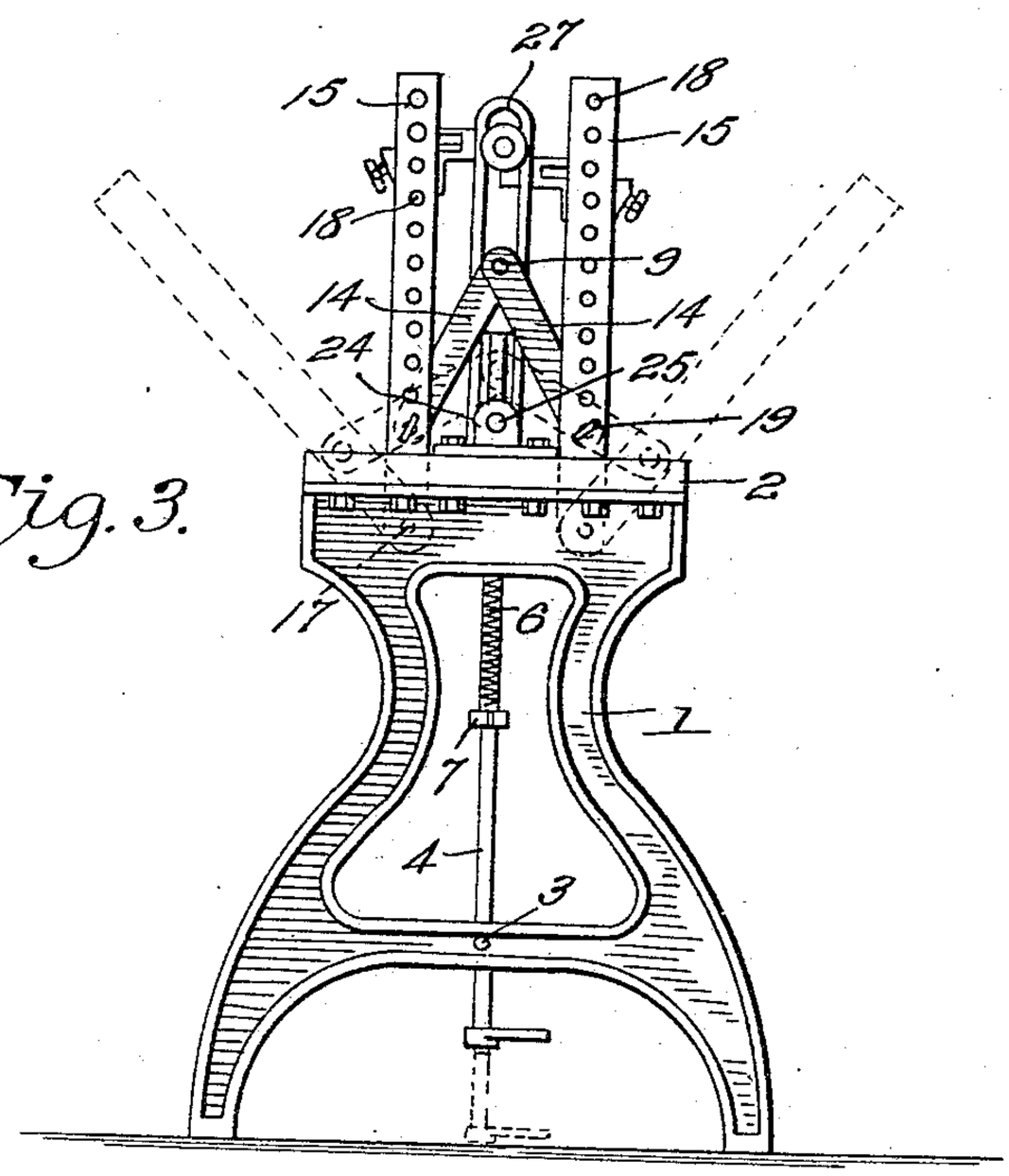


Fig. 11.

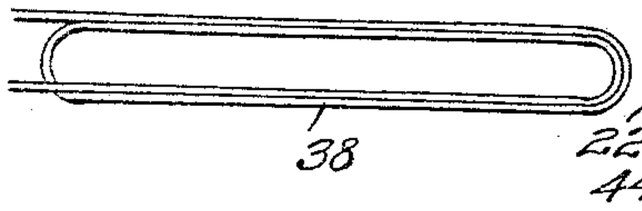


Fig. 12.

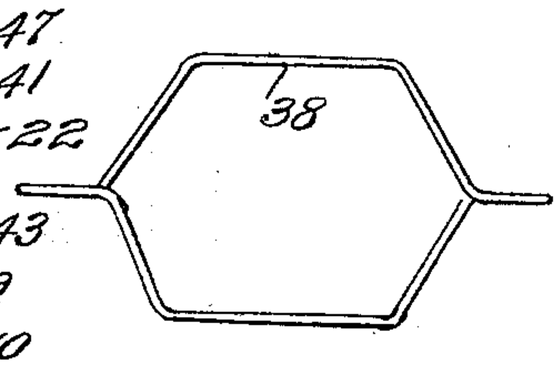
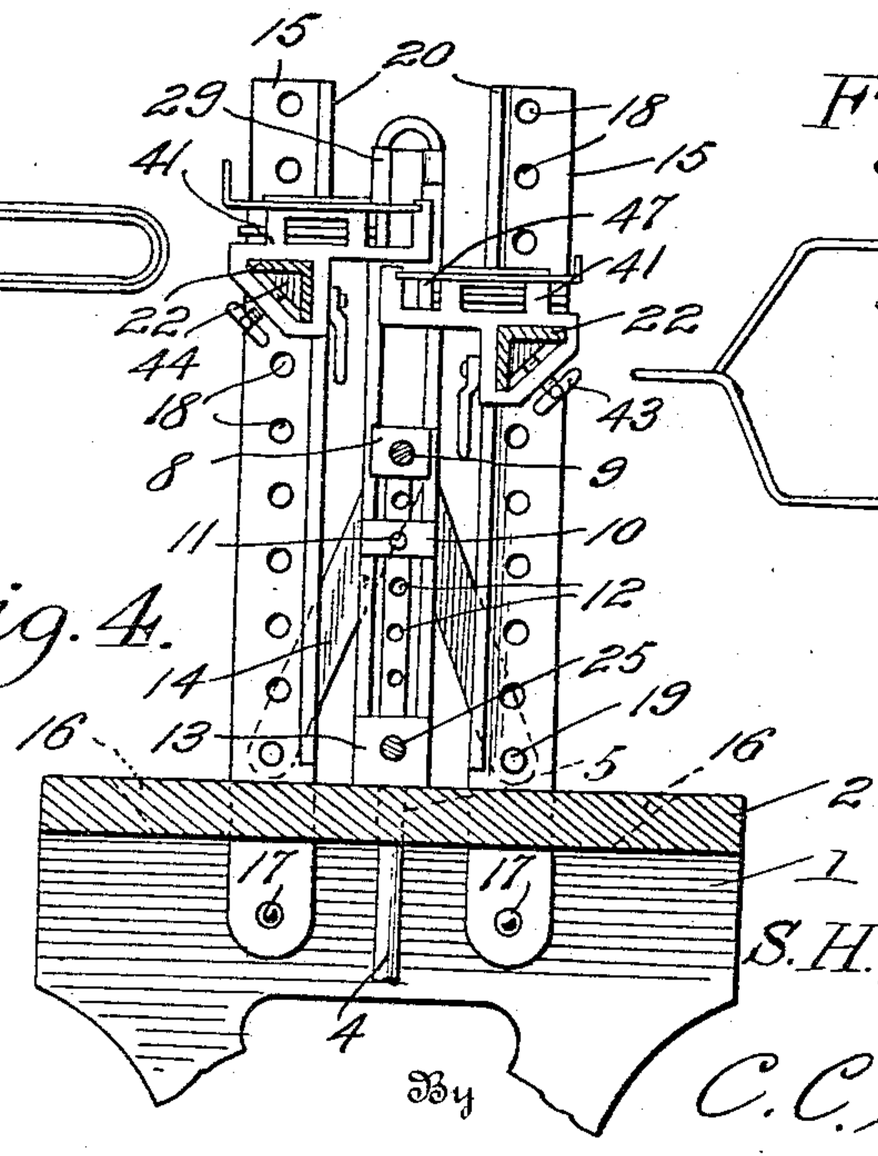


Fig. 4.



Witness

W. S. McAbee.

Inventor

S. H. Browning,

By C. C. Shepherd

Attorney

S. H. BROWNING.

COIL SHAPING MACHINE.

APPLICATION FILED MAR. 25, 1918.

1,297,998.

Patented Mar. 25, 1919.

3 SHEETS—SHEET 3.

Fig. 5.

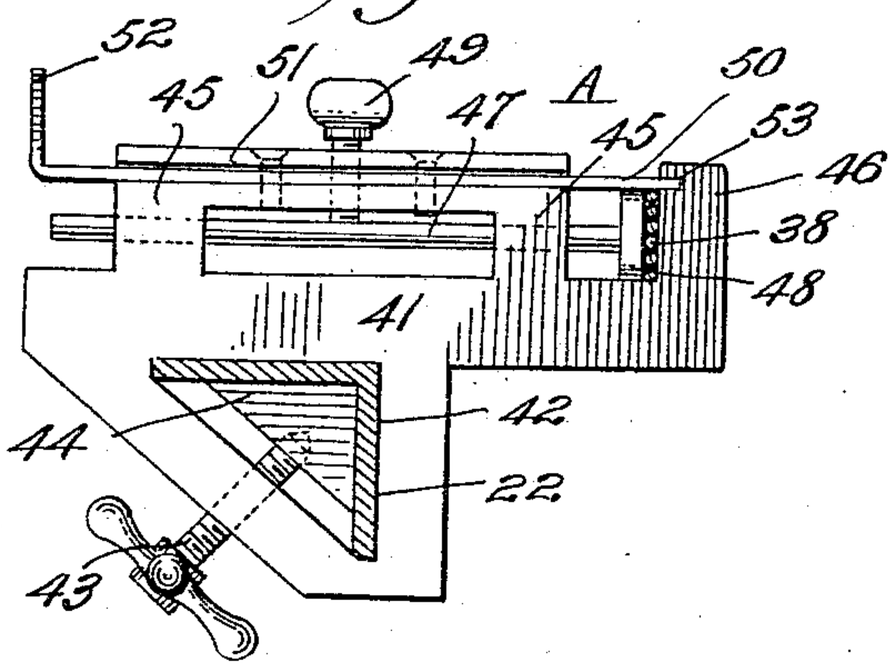


Fig. 9.

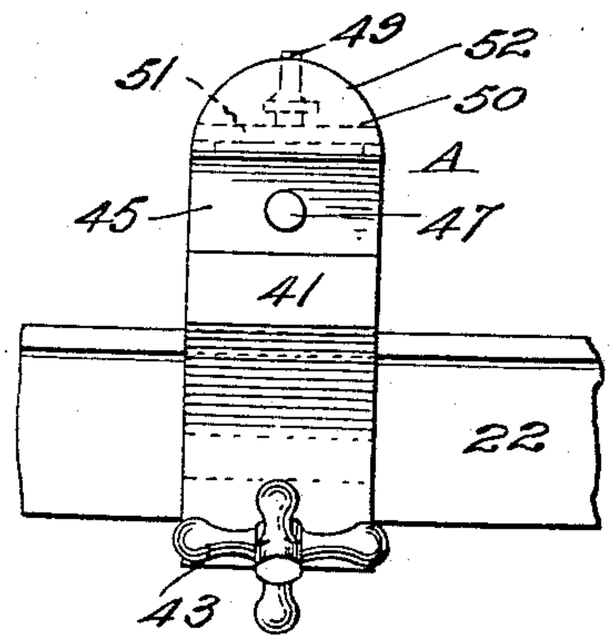


Fig. 6.

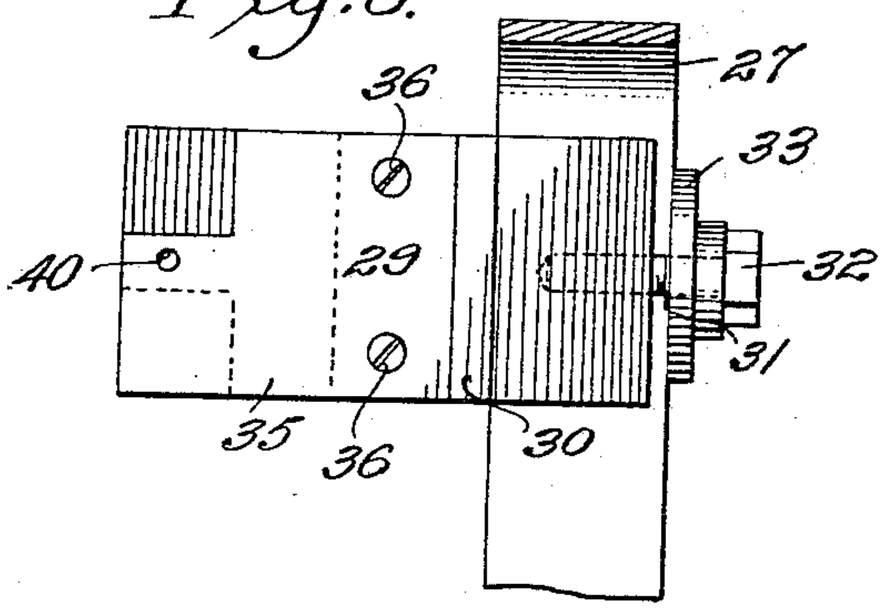


Fig. 7.

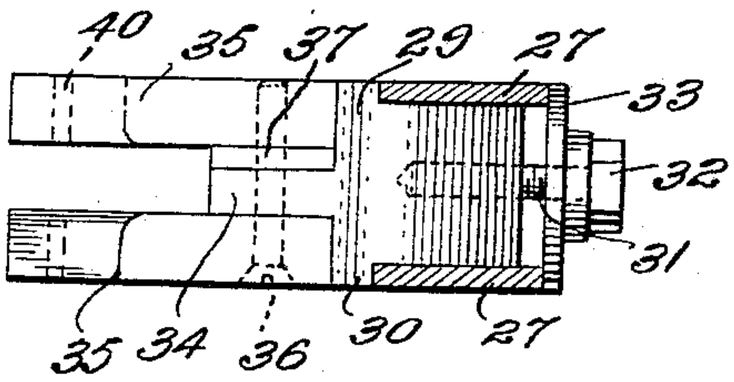


Fig. 8.

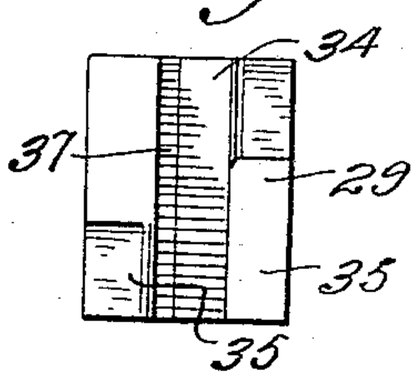
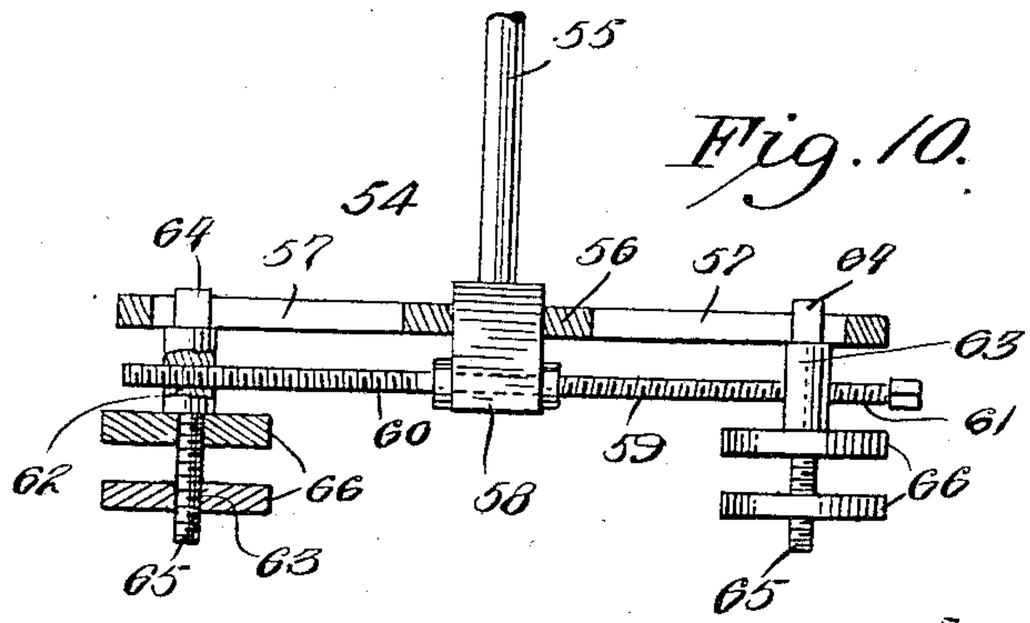


Fig. 10.



Witness

W. S. McClowell

Inventor

Samuel H. Browning.

By C. C. Shepherd

Attorney

UNITED STATES PATENT OFFICE.

SAMUEL H. BROWNING, OF COLUMBUS, OHIO.

COIL-SHAPING MACHINE.

1,297,998. Specification of Letters Patent. Patented Mar. 25, 1919.

Application filed March 25, 1918. Serial No. 224,469.

To all whom it may concern:

Be it known that I, SAMUEL H. BROWNING, a citizen of the United States, residing at Columbus, in the county of Franklin and State of Ohio, have invented certain new and useful Improvements in Coil-Shaping Machines, of which the following is a specification.

This invention relates to improvements in coil shaping machines, and has for its primary object to provide improved means for twisting or bending electric conductors into such formations or shapes as to facilitate their application to motor armatures, so as to permit the latter to be securely and efficiently wound in a convenient and expeditious manner.

Another object of the invention is to render the various elements of the machine adjustable, whereby wire may be twisted to assume loop resembling contours of diversified dimensions, so that the same will be readily applicable to armatures of varying proportions.

Further objects reside in a machine of the above character possessing simple and reliable features of construction, convenient to operate and adjust and efficient in operation and durability.

With these and other objects in view, as will appear as the description proceeds, the invention accordingly consists in the novel features of construction, combination of elements and arrangement of parts hereinafter fully described and having the scope thereof indicated in the appended claims.

In the following description and in the accompanying drawings, there has been set forth an embodiment of the invention which is now considered to be one of its preferred forms, however, it will be understood that the invention is not limited in scope to the details of construction as will be set forth, but such changes may be made therein, and equivalent structures substituted, as practice may deem necessary.

In the drawings:

Figure 1 is a front elevation of a wire twisting machine constructed in accordance with the principles of the invention.

Fig. 2 is a top plan view thereof.

Fig. 3 is an end elevation.

Fig. 4 is a transverse vertical sectional view taken along the line 4—4 of Fig. 1.

Fig. 5 is an enlarged transverse section taken through one of the wire gripping members.

Fig. 6 is a side elevation of one of the end gripping members.

Fig. 7 is a top plan view of the structure shown in Fig. 6.

Fig. 8 is an end elevation thereof.

Fig. 9 is a detail front elevation of the structure shown in Fig. 5.

Fig. 10 is a detail view of the mechanism for initially shaping the coils prior to their insertion into the twisting mechanism, and

Figs. 11 and 12 are diagrammatic views showing the general appearance of the coils before and after their insertion in and removal from the twisting mechanism.

Similar characters of reference denote corresponding parts throughout the several views of the drawing.

In the preferred embodiment of the invention, the latter consists of a metal frame or bed 1, including a plurality of spaced vertical leg sections, and secured in any preferred manner to the upper edges of said side sections is a table 2, the latter being extended to bridge the gap formed between the side sections and to provide a firmly united bed structure. Cross rods 3 serve to further brace the bed structure and are situated adjacent to the lower ends of the side sections. Positioned centrally of the bed 1 and extending vertically of the machine is an operating shaft 4, which latter extends through a vertical opening 5 provided in the central portion of the table 2. The lower end of the shaft is equipped with an operating pedal which latter is employed for manually effecting the vertical movements of said shaft, for a purpose to be hereinafter explained. The shaft is normally maintained in an elevated position through the medium of a plurality of coiled springs 6, which have their upper ends secured to the under side of the table 2, and the lower ends fastened to a clamp 7, which is rigidly

carried by the central portion of said shaft. By virtue of this construction, it will be manifest that the normal tendency of the springs 6 is to maintain the shaft 4 in its elevated position.

The upper end of the shaft 4 is equipped with a block 8, through which passes a longitudinally extending rod 9, whereby the movements of said shaft will be directly imparted to said rod 9. The vertical movements of the operating shaft are controlled by providing the upper end of the shaft, immediately below the block 8, with an adjustable collar 10, which collar is formed with alined openings for the reception of a removable pin 11, said latter being adapted to also engage with any one of a plurality of vertically disposed openings 12 formed in the upper end of the shaft 4, and it will be seen that by removing the pin 11, the collar 10 may be vertically adjusted with regard to said shaft, and may be maintained in any one of a desired number of positions by simply passing the pin 11 through the alined openings of the collar and shaft. Thus when the shaft is depressed, by foot pressure upon the pedal 5, said collar will contact with the block 13, positioned upon the upper surface of the table 2 and through which the shaft 4 passes, and this block 13, by virtue of its disposition will check or arrest the downward movement of said collar 10 and consequently the connected shaft 4.

The outer ends of the rod 9 are connected with a plurality of downwardly diverging links 14, which links have their lower ends adjustably connected with a plurality of spaced rocking members 15, which latter are situated upon opposite ends of the frame 1 and are adapted to oscillate within slots 16 provided in opposed ends of the table 2, the lower extremities of said rocking members being pivoted as at 17 to the inner faces of the side sections forming the frame 1. Thus upon depressing the rod 9, through the agency of the vertically movable shaft 4, said rocking members will be caused to oscillate or spread apart to assume the dotted line positions shown in Fig. 3, this being accomplished by connecting said members with said rod 9 through the medium of the links 14. The throw or movement of the rocking members is susceptible to adjustment, this being performed by providing said members with a plurality of vertically alined openings 18, and said openings are adapted to receive pins or bolts 19, which are utilized to connecting the lower ends of said links to the rocking members. Thus it will be manifest that by raising the points of connection existing between said links and members, that the throw of the latter will be correspondingly decreased, and that by lowering these points of connection, or in other words, by adjusting the same toward the pivots 17 of said rocking members, that the movement of the latter will be correspondingly increased. If desired, slots may be formed in said members in lieu of the spaced openings 18.

Integrally formed with the rocking members are a plurality of inwardly projecting, vertically disposed flanges 20, in which are provided vertically extending slots 21, and adapted to be secured to said flanges are a plurality of horizontally extending and transversely spaced angle iron bars 22. Said bars are adjustably secured to the flanges 20 through the medium of bolts and nuts 23, which pass through the slots 21 and through the openings formed in the ends of said bars, whereby upon the tightening of the nuts 23, said bars will be frictionally clamped in secured relation with the flanges 20, as will be clearly understood. Through the use of the slots 21, said bars 22 may be vertically adjusted to assume different positions throughout the height of said flanges.

Carried by the block 13 and by fixed bearings 24, formed upon the ends of the table 2 are a plurality of longitudinally alined guide rods 25, which rods are adapted to carry a plurality of sleeves 26 preferably square in cross section, said sleeves being so positioned with relation to the upper surface of the table 2 that it is impossible to rotate the same about the rods 25, and further, said sleeves are located between the block 13 and the bearings 24 so as to be capable of being reciprocated longitudinally of said table. Each of these sleeves carry an inverted U-shaped metallic strap 27, which latter have their lower ends secured as at 28 to the sleeves 26, whereby said straps and sleeves form a unitary structure. Adjustably carried in the upper ends of the straps 27 are a plurality of inwardly extending, slidable members 29. These members are formed with outwardly projecting, guide shoulders 30, which are adapted to frictionally engage with the inner edges of the straps 27. Each of the members 29 is formed with a threaded bore for the reception of a clamping bolt 31, which latter is provided with an enlarged head 32 adapted to engage with a washer 33. Thus it will be manifest that by loosening the bolt 31, the member 29 associated therewith may be vertically adjusted within one of the straps 27 to assume a desired vertical position, and then by tightening the bolt 31 into firm frictional engagement with said washer 33, said member 29 will have the shoulders 30 thereof drawn into firm frictional relation with the sides or edges of the strap 27, and will thus be maintained in a securely adjusted position. The members 29 are further provided with in-

wardly projecting ears 34, and to which are adapted to be secured a pair of opposed wire gripping plates 35, the latter being secured to said ears through the agency of screws or similar securing elements 36. The relative distance between the inner faces of the gripping plates 35 may be controlled by inserting or removing a spacing block 37, which is usually positioned between the ears 34 and one of the side plates 35, and it will be obvious that through the use of the block 37, or through similar blocks of larger or smaller proportions, that the plates 35 may be drawn into firm engagement with the ends of wires 38 which are placed into the machine for twisting purposes. The plates are employed to receive the looped ends of the wires 38, and the latter are retained within said plates through the manner of frictionally drawing the latter together and through the medium of a plurality of removable pins 39, which pass through alined openings 40 formed in the plates 35. Thus in operation, the wire is first bent into substantially loop shaped formation, and the ends thereof are secured between the plates 35, so that the said wire will be securely retained by the machine.

It is then the purpose of this machine to spread or bend the wire into such formation as to render the latter in such condition as to be conveniently applied to the armature of a motor. To this end use is made of a plurality of longitudinally and transversely spaced intermediate wire gripping members A, which latter in this instance are slidably carried upon the angle bars 22, and are positioned intermediately of the plates 35. Each of the members A consists of a frame 41, which is formed with a socketed portion 42 shaped to receive the bars 22, and of such construction as to permit the frames 41 to be reciprocated over said bars. Manipulating bolts or screws 43 are threaded into the frames 41, and have their inner ends swiveled within blocks 44, shaped to fit the angular under-sides of the bars 22. Thus it will be seen that by rotating the screws 43, the blocks 44 thereof will be forced into frictional relation with the bars 22, so as to maintain said frames in a stationary position upon said bars.

The upper surfaces of the frames 41 are provided with upstanding ribs 45 and 46, which ribs 45 are bored to receive a sliding plunger 47, the inner end of the latter carrying a head 48 which is adapted to frictionally engage with the portions of the wires 38 passing through said frames 41 and to force the latter into frictional engagement with the outer rib 46, whereby said wires will be securely retained within said frames. Each of the plungers 47 is retained in frictional engagement with said wires through the medium of a set screw 49, the latter being adapted to firmly engage with the plunger 47 so as to control the movement of the latter. The wires are further prevented from rising upwardly in the frame by virtue of a sliding plate 50, mounted upon each of the frames 41, and adapted to reciprocate within guides provided between the ribs 45 and a recessed plate 51, the latter being secured to said ribs 45 through the medium of screws or other suitable fastening means. The end of each plate 50 is provided with an upturned manipulating portion 52, whereby said latter plate may be freely reciprocated so as to cover the wires 38. The end of each plate 50 is adapted to enter a recess 53, formed in the outer rib 46, thus rendering it impossible for the wires located between said rib 46 and the head 48 to work loose from engagement with the frames.

Having described the structural features of the invention, the operation of the latter is as follows:

Coiled wire taken off of a winding machine is so placed upon the twisting machine embodying the invention that the ends of said wire will be held and retained by the plates 35, the latter of course being longitudinally adjusted upon the guide rod 25 to conform to the length of the loop of said wire. Then the medial portions of said wire loop are clamped between the opposed pairs of frames 41, through the medium of a sliding plunger 47. When the wire is thus securely retained within the machine, the shaft 4 is manually depressed by treading upon the pedal 5 whereby the rocking members 15 will be spread apart to assume the dotted line positions shown in Fig. 3. This as will be obvious oscillates the frames 41, so that wire retained therein will be stretched apart to substantially conform to the shape of an armature with which the wire is adapted to be associated. After the wire has been suitably stretched to assume a desired contour, the same is released from the machine before the shaft 4 is allowed to assume its upright or elevated position. This can be accomplished by loosening the set screws 49 so as to permit of the retraction of the plungers 47, and the plates 50 are also drawn back so that the medial portions of the wire loop may be removed from engagement with the frames 41. Then by loosening the plates 35, and by removing the pins 39, the ends of said wire loops may be removed from engagement with the structure 27, thus permitting the bent wire to be removed from the machine. Then by releasing the shaft 4, the parts of the machine may automatically assume their normal positions and will then be in condition for the reception of a second loop to be bent.

From the foregoing description taken in

connection with the accompanying drawings, it will be seen that there is provided a relatively simple and practical machine for quickly and efficiently twisting or bending electrical conductors to assume a desired formation, and by rendering practically every part of the machine adjustable, loops of different sizes and characteristics may be formed upon the single machine herein set forth.

Before the wire 38 is placed in position upon the shaping machine thus described, the same is previously bent to assume the contour shown in Fig. 11. This is accomplished through the provision of the loop forming mechanism 54, this mechanism being preferably carried in any suitable manner upon the frame 1, and embraces a motor driven shaft 55, mounted in suitable bearings for rotation. The end of this shaft is provided with a perpendicularly disposed part 56, which is formed with a plurality of slots 57, as is clearly shown in Fig. 10. Rotatably mounted within the enlarged head 58, carried upon the end of the shaft 55, is an adjusting screw 59, which has its respective ends provided with right and left threads 60 and 61, respectively. These threads engage within similarly threaded bores 62, formed in adjustable wire retaining structures 63, which latter are provided with reduced ends 64 situated to lie within the slots 57, whereby upon the rotation of the feed screw 59, said structures may be adjusted laterally, that is toward or away from each other. The structures are also provided with threaded spindles 65, which are adapted to receive a plurality of internally threaded plates 66, which plates are employed for retaining and guying the wire 38 as the latter is fed from a reel structure (not shown). It will be apparent that upon the rotation of the shafts 55, the structures 63 will be caused to rotate about the shaft center, so that the wire 38 carried thereby will be caused to assume the looped contour disclosed in Fig. 11. To remove this looped wire from engagement with the wire retaining structures, the outer of the plates 66 is removed from engagement with the spindle 65, which permits the wire to be readily removed from engagement with said plates without affecting its contour. This preliminary treatment of the wire renders the same applicable for insertion into the shaping mechanism, whence the same may be bent to assume the shape shown in Fig. 12, thus rendered applicable for convenient association with a motor armature.

What is claimed is:

1. A coil shaping machine of the class described, comprising a bed structure, a longitudinally extending guide element carried by said structure, end loop receiving members slidably carried by said guide rod, vertically adjustable blocks carried by said members and capable of receiving the ends of wire loops positioned for spreading within said machine, pivoted arms carried by the ends of said structure, means for effecting the oscillation of said arms, vertically adjustable bars carried by said arms and loop gripping elements longitudinally adjustable upon said bars and capable of gripping and retaining portions of said wire loops situated intermediately of said blocks, whereby upon the oscillation of said arms said loops will be spread to assume desired contours.

2. In a coil shaping machine of the class described, a bed structure, oscillatory arms carried by said structure, vertically and longitudinally adjustable loop gripping elements carried by said arms, manually operated means for effecting the oscillation of said arms, said means including a plurality of links having their lower ends connected for vertical adjustment with said arms, a longitudinally extending rod connected with the meeting ends of said links, a vertically positioned shaft having the upper end thereof connected with said rod, a foot pedal carried by the lower end of said shaft, whereby upon the downward movement of said shaft said arms will be synchronously oscillated, springs for returning said shaft to its normal elevated position, and an adjustable stop collar carried by the upper end of said shaft and operable to limit the degree of oscillation of said arms.

3. In coil shaping mechanism of the class described, including a bed structure, a longitudinally extending guide rod carried by said bed structure, spaced blocks slidably mounted upon said guide rod, vertically extending **U** shaped straps having the ends thereof connected with said blocks, a loop receiving structure carried by said straps, said structure including a body portion shaped to be received by said straps, means for clamping said body portion in vertically adjusted positions within said straps, a plurality of opposed loop gripping plates carried by said body portion, means for varying the distance between the adjacent faces of said plates, and a loop retaining pin adapted to be situated within alined openings formed in said plates.

4. In coil shaping mechanism of the class described, including a bed structure, sets of pivoted arms carried by the ends of said structure, manually operated means for effecting the oscillation of said arms, vertically adjustable bars carried by said arms and extending longitudinally of said bed structure, pairs of longitudinally and transversely spaced loop gripping elements carried by said bars, means for clamping said elements in longitudinally adjusted posi-

tions upon said bars, an adjustable plunger carried by each of said elements and adapted to frictionally engage with wire loops passing through said elements in order to retain said loops in secured relation therewith, means for retaining said plunger in frictional engagement with said loops, and a sliding plate carried by each of said elements and located immediately above said plunger to further lock said loops within each of said elements.

In testimony whereof I affix my signature in presence of two witnesses.

SAMUEL H. BROWNING.

Witnesses:
C. W. COLE,
I. A. MILLAR.