F. H. SLEEPER AND W. H. BLOUNT.

COIL FEEDING AND CUTTING MECHANISM.

APPLICATION FILED MAR. 10, 1917.

1,352,842. Patented Sept. 14, 1920.

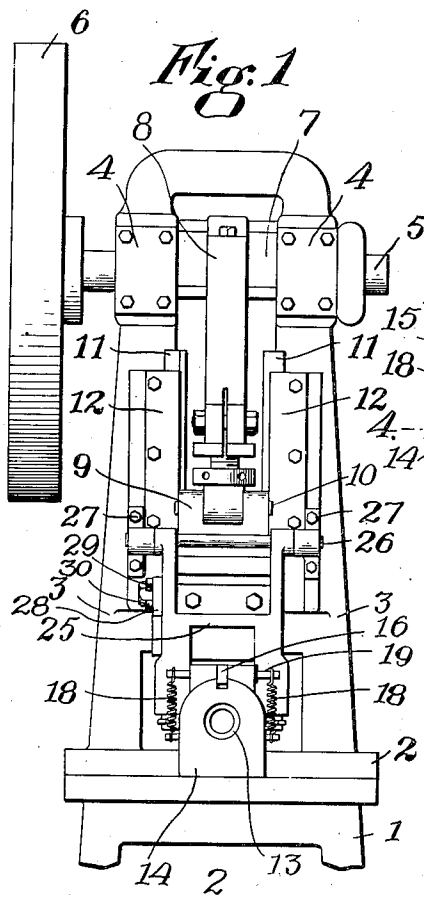


Fig. 1.

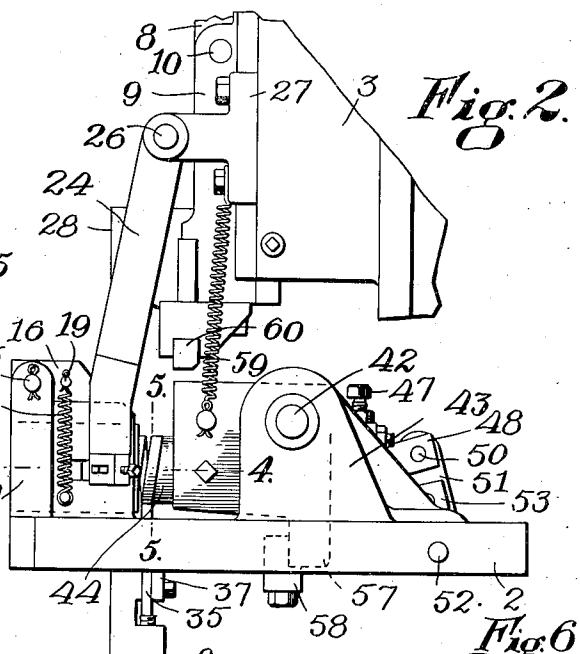


Fig. 2.

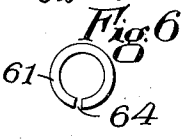


Fig. 6.

Fig. 3.

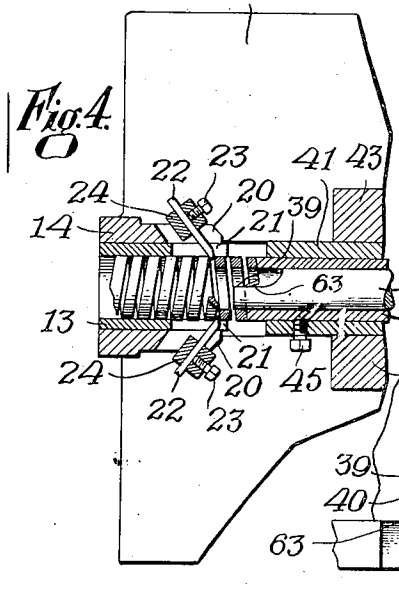


Fig. 4.

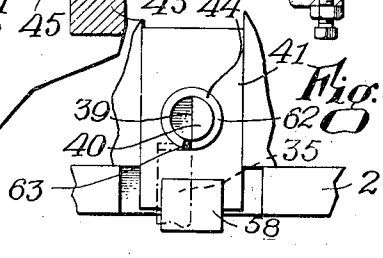


Fig. 5.

Inventor
Frank H. Sleeper
William H. Blount.
By Geo. H. Kennedy
Attorney

UNITED STATES PATENT OFFICE.

FRANK H. SLEEPER AND WILLIAM H. BLOUNT, OF WORCESTER, MASSACHUSETTS, ASSIGNORS TO SLEEPER & HARTLEY, INC., OF WORCESTER, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

COIL FEEDING AND CUTTING MECHANISM.

1,352,842. Specification of Letters Patent. Patented Sept. 14, 1920.

Application filed March 10, 1917. Serial No. 153,901.

To all whom it may concern:

Be it known that we, FRANK H. SLEEPER, a citizen of the Dominion of Canada, and WILLIAM H. BLOUNT, a citizen of the United States, both residing at Worcester, in the county of Worcester and Commonwealth of Massachusetts, have invented a new and useful Improvement in a Coil Feeding and Cutting Mechanism, of which the following, together with the accompanying drawings, is a specification.

The present invention relates to a coil feeding and cutting mechanism, more especially as regards a mechanism for automatically producing spring washers, or the like, by the severance of successive short lengths from a spirally wound coil of metal. The invention resides in the provision of a coil cutting mechanism of novel form, the latter acting in conjunction with a coil feeding mechanism adapted to advance the coil longitudinally a predetermined distance between each successive operation of the cutting mechanism; after each advancement, the coil cutting mechanism operates to sever a predetermined length of the spirally disposed material from the end of the coil, such a length, for the production of spring washers, being ordinarily a single convolution or turn of the coil, but obviously, our invention is not limited in this respect.

The mechanism by which the above and other objects are attained is fully set forth in the following description, reference being had in this connection to the accompanying drawings, in which—

Figure 1 is a front view of a machine constructed in accordance with our invention.

Fig. 2 is a side view, on a larger scale, than Fig. 1, illustrating the novel and essential parts of the machine.

Fig. 3 is a view, partly in longitudinal section, of the parts illustrated in Fig. 2, showing said parts in a different position.

Fig. 4 is a fragmentary sectional view on the line 4—4 of Fig. 2, and

Fig. 5 is a fragmentary sectional view on the line 5—5 of Fig. 2.

Fig. 6 is a plan view of a spring washer, of the type produced by the machine.

Like reference characters refer to like parts in the different figures.

The coil feeding and cutting mechanism embodying our invention may be suitably disposed on a support 1, the latter carrying a base or table 2 from which rises the spaced standards 3, 3 constituting the stationary framework of the machine. The standards 3, 3 at their upper ends provide bearings 4, 4 for a driving shaft 5, the latter carrying a belt pulley 6 for the rotation of the shaft from a suitable source of power, not shown. The shaft 5 has a crank or eccentric 7 which, through a connecting rod 8, imparts a reciprocating movement to a cross-head 9, the connecting rod and cross-head being pivotally connected by a pin 10, in the usual manner. The cross-head 9 is provided with extensions 11 which coöperate with guide-ways 12, carried by the standards 3 to constrain the reciprocation of the cross-head in a vertical path.

Below the reciprocating cross-head 9, the table or base 2 supports the coil feeding and cutting mechanisms of the machine, which are actuated by the movement of the cross-head, in the manner hereinafter described. The coil to be cut is held and guided in a bushing 13 of suitable size, it being understood that a plurality of such bushings are furnished in different sizes, to accommodate the machine to coils of different diameters. The bushing 13 is received in a suitably formed guiding block 14, arising from the base 2, the latter having pivoted thereto at 15 a bent lever 16, whose free end projects downwardly through a slot 17 in bushing 13, to lie in contact with the coil held in said bushing. Springs 18, 18 attached to a pin 19, carried by said lever 16, operate to yieldingly hold the free end of said lever against the surface of the coil, the lever thereby acting as a friction device to steady the coil during the feeding and cutting thereof.

The guiding block 14 and bushing 13 have registering longitudinal slots 20 and 21, respectively, on opposite sides thereof, for the movement of coil advancing fingers 22, 22, the latter being preferably of spring material, adapted to project slightly past the outer surface of the coil in engaging a convolution thereof, as shown in Fig. 4, to advance the coil toward the right in said figure, and being shaped at their ends to spring outwardly, and slide on the surface of the coil, when they are moved to the left in said figure. The fingers 22 are disposed at the proper angle to effect this result, as shown in Fig. 4, the lever 16 yielding sufficiently

to allow the movement of the coil to the right, Figs. 3 and 4, by means of said fingers, but adapted to resist any tendency to move in the opposite direction when said fingers are caused to scrape or slide backwardly over the surface of the coil. The fingers 22 are adjustably held by set screws 23 at the ends of arms 24, 24 of a swinging yoke 25, which is hung from a transverse pivotal shaft 26 journaled in bearings 27, 27 on the stationary standards 3, 3.

One arm 24 of said yoke has attached thereto a plate 28, by means of bolts 29 and 30, connecting said arm and plate and passing through curved slots 31, 31 of the latter, to permit of a slight adjustment of said plate, with respect to arm 24, for the purpose hereinafter described. Plate 28 extends rearwardly from the yoke 25, so as to lie alongside of the reciprocating cross-head 9, the edge of the latter carrying a pin or stud 32 which is received within a substantially vertical slot 33 of plate 28. The length of slot 33 is approximately the length of the stroke of cross-head 9, and at its upper end said slot is curved forwardly, as at 34, so that the pin 32, when moving upwardly, will, near the end of its upward movement, draw the plate 28 inwardly, thus rocking the yoke 25 about its pivot 26. The adjustment afforded by slots 31, 31, above described, permits the throw of yoke 24 to be varied, as desired, to suit different sizes of coils. In this fashion the fingers 22, carried by said yoke, are caused to move to the right, Figs. 2, 3 and 4, to advance the coil a predetermined distance, and immediately thereafter the pin 32, reversing its movement, rocks the yoke 25 to the left, the fingers 22 then passing, inoperatively, backward over the surface of the coil, as hereinbefore described, said feeding mechanism being retained in this retracted position during the continued descent of pin 32 throughout the vertical portion of slot 33, as shown in Fig. 3.

The cross-head 9, continuing its downward movement after the retraction of feeding fingers 22, in the manner above described, thereupon actuates a coil cutting mechanism, to sever from the end of the coil the predetermined length of material which has just previously been pushed forward by the feeding mechanism. The cutting mechanism consists of a stationary cutter 35, adjustably supported in a cutaway portion 36 of the base 2 by means of a clamp 37 and an adjusting screw 38, the cutting edge or corner of said cutter being disposed below the coil and in contact with the convolutions thereof as they are successively advanced by the feeding mechanism, as shown in Figs. 3 and 5. For coöperation with the cutter 35, we provide a movable cutting edge 39, the same being formed by a cylindrical arbor 40, which is cut away at its end, as shown in Fig. 4, substantially on a diameter thereof in line with the cutting edge of cutter 35. The arbor 40 is adapted to be inserted within the coil, and in such position to be forcibly swung downwardly, to sever the coil by coöperation of cutting edge 39 with the cutter 35, as shown in Fig. 5, and to this end said arbor is carried in a swinging block 41, which is pivoted on a shaft 42 extending between ears 43, 43 of base 2. Said arbor is surrounded by a bushing 44 which fits the cylindrical bore of block 41 and is held therein by a set screw 45, it being understood that other bushings of the same outside diameter are furnished, said bushings having different inside diameters to fit different sized arbors, for use with coils of different diameters. The arbor 40 is disposed for sliding movement within its bushing, coincident with the rocking movement of the block 41, to effect the cutting operation, and to this end said arbor has secured thereto at its rear projecting end a collar 46, by means of a set screw 47. A link 48, pivotally attached at 49 to said collar, is pivotally connected at 50 to a lever 51, which swings about a pin 52 carried by base 2. A link 53 is pivotally attached at 54 to lever 51, and at its other end has an elongated slot 55 for the reception of a pin 56 carried by an extension 57 of block 41. Said extension 57 is adapted to make contact with a limiting abutment 58 of base 2, when the swinging block 41 is returned to horizontal position, after each coil cutting operation, by means of springs 59.

The operation of the above described mechanism is as follows:—Assuming the parts to be in the position illustrated in Fig. 2, it will be seen that the cross-head 9 is at the upper limit of its movement, the yoke 25 having just been rocked to feed the coil to the right a predetermined distance, whereby the end of said coil surrounds the arbor 40 whose cutting edge 39 is in position over the cutter 35 to sever the coil at the proper point. The initial descent of the cross-head 9 causes the retraction of feeding fingers 22 as above described, said fingers remaining retracted in position to effect the next feeding operation, which takes place after the coil has been cut. As the cross-head 9 continues its descent, the abutment 60 thereon strikes forcibly against the top of block 41, rocking said block downwardly about its shaft 42, and thereby causing the cutting edge 39 of arbor 40 to sever the coil at the point where it lies directly over the stationary cutter 35. In this operation the parts move from the positions shown in Fig. 2 to those shown in Fig. 3; the initial rocking movement of block 41 causes pin 56 to move the length of slot 55, so that the arbor

40 does not move longitudinally until it has completely severed the coil. Thereafter, as the block 41 is further depressed, the pin 56, through link 53, rocks lever 51 to the right, as shown in Fig. 3, and this movement, through link 48, causes the arbor 40 to be retracted slightly, whereupon the severed portion or convolution of the coil, carried thereon, is forced off the same by the end of bushing 44 and drops by gravity, as shown at 61, Fig. 3, into a suitable receptacle, not shown. Thereafter, the upward movement of cross-head 9 allows the springs 59 to return the block 41 to the position shown in Fig. 2, the extension 57 being brought against abutment 58 at the end of this movement. At the start of this return movement, the pin 56 moves to the left end of slot 55 and thereafter through links 48 and 53 and lever 51, returns the arbor to normal position, with its cutting end projecting beyond the bushing 44, as shown in Figs. 2 and 4. Near the end of return movement of cross-head 9, as hereinbefore described, the coil is again fed forward over the projecting end of the arbor, ready to have another portion of the same cut off at the next cutting operation.

As clearly shown in Fig. 5, the bushing 44 which surrounds the arbor 40 has its projecting end of substantially scroll form, as shown at 62, to conform to the helical or spiral surface presented by the end of the coil. The end of scroll surface 62, at a point adjacent the stationary cutting device 35, drops off sharply to form an inclined cam surface 63 which is in the path of the free end of the coil, when the latter is moved forward previous to each cutting operation of the arbor 40. Each feeding movement of the coil brings the free end of the latter into engagement with cam surface 63, and said free end, moving inwardly on said cam surface, causes the entire coil to be rotated about its axis through a small angle in a clockwise direction, Fig. 5. Thus when the arbor 40 is thereafter rocked, as previously described, to cut the coil, the point of severance is slightly removed, angularly, from said free end. In this fashion, each convolution of the coil thus cut has its ends spaced slightly apart, as shown at 64, Fig. 6, thereby giving the desired formation for a spring washer. Obviously, if such a space 64 were not provided, the compression or flattening out of the washer when in use would be impossible, since its ends would be too close together.

We claim,

1. In a machine of the class described, a coil feeding mechanism comprising a stationary block, a bushing held in said block, said block and said bushing having longitudinal slots, reciprocating coil engaging devices projecting through said slots and adapted to move said coil, and means for applying frictional resistance to the movement of a coil held in said bushing.

2. In a machine of the class described, a stationary block for holding a coil, means for applying friction to a coil held therein, means for imparting a feeding movement to a coil, a movable block, an arbor held therein, means for moving said block to bring said arbor into axial alinement with a coil held in said stationary block, and means coöperating with said arbor to sever the end of said coil.

3. In a machine of the class described, a stationary block having an opening therethrough to receive a coil, means for imparting an intermittent feeding motion to a coil held in said stationary block, a movable block, an arbor held in said movable block and projecting therefrom, means for moving said arbor into axial alinement with the opening in said stationary block, and means coöperating with said arbor when the latter is moved out of axial alinement with said opening, to sever the end of said coil.

4. In a machine of the class described, a stationary block having a hole therethrough to receive a coil, a swinging block, an arbor carried in said swinging block and having an end projecting therefrom, means for imparting a swinging movement to said block to carry said arbor into axial alinement with the opening in said stationary block, means for imparting a longitudinal movement to a coil held in the stationary block to carry the end of the coil over the projecting end of said arbor, and means coöperating with said arbor when said second block is swung in the opposite direction, to sever the end of said coil.

5. In a machine of the class described, a stationary block having an opening therethrough to receive a coil, a swinging block, an arbor held therein having an end projecting therefrom, means for moving said swinging block to bring the arbor into axial alinement with the opening in said stationary block, means for imparting a longitudinal movement to a coil held in the stationary block to carry its end over the projecting end of the arbor, and means cooperating with said arbor for severing the coil.

6. In a machine of the class described, a stationary block having an opening therethrough to receive a coil, a swinging block, an arbor carried thereby having a cutting edge at one end, means for normally holding said arbor in axial alinement with the opening in said stationary block, means for feeding a coil to carry its end over the end of said arbor, a stationary cutter coöperating with the cutting edge of said arbor, and means for forcibly swinging said arbor to sever the coil.

7. In a machine of the class described, a stationary block having an opening therethrough to receive a coil, a swinging block, an arbor held in said swinging block and having one end projecting therefrom, means for holding said arbor normally in axial alinement with the opening in said stationary block, means adapted to coöperate with said arbor, when said second block is swung, to sever said coil, and means for imparting a longitudinal movement to the coil comprising a pair of pawls engaging the coil on diametrically opposite sides thereof, and means for applying a friction to the coil.

8. In a machine of the class described, a stationary block having an opening therethrough to receive the coil, a swinging block, an arbor held in said block provided at its end with a cutting edge, means for normally holding said arbor in axial alinement with the opening in said stationary block, means for imparting a longitudinal movement to the coil to carry it over the end of said arbor, a stationary cutter supported beneath the cutting edge of said arbor, means for forcibly swinging said arbor downward to sever the coil, and means for retracting the arbor to force the severed piece of coil off the arbor.

9. In a machine of the class described, means for supporting a coil, a swinging block, an arbor held therein, with its end projecting and provided with a cutting edge, means for feeding the coil to carry its end over the projecting end of the arbor, a stationary cutter coöperating with the cutting edge of the arbor, means for swinging the arbor toward said stationary cutter to sever the coil, and means for removing the severed piece of coil from the arbor.

10. In a machine of the class described, tubular means for supporting a coil by its outer periphery, an arbor, means for moving the end of the coil over the end of the arbor, means for swinging the arbor, and means cooperating with the arbor during its swinging movement to sever the coil.

11. In a machine of the class described, a support for a coil, a swinging arbor in axial alinement with the coil, means for moving the coil over the end of the arbor, means for severing the coil by swinging movement of the arbor, with a piece of the severed coil held on the arbor, means for withdrawing the arbor from the severed piece, and means for returning the arbor to its normal position.

12. In a machine of the class described, means for supporting a coil, means for supporting an arbor, with its axis in alinement with the axis of the coil, means for moving the coil over the end of the arbor, means for severing the coil by swinging movement of the arbor, with the severed piece held on the arbor, and means for retracting the arbor in its support to remove the severed piece from the arbor, and means for returning the arbor to its normal position.

13. In a machine of the class described, a support for a coil, an arbor normally held in axial alinement with the axis of the coil, a bushing surrounding said arbor having its end of scroll form constituting a cam surface, means for moving the coil over the end of the arbor, and against the cam shaped end of the bushing, whereby the coil is given a partial rotation around its axis by the contact of the coil with said cam shaped surface.

14. In a machine of the class described, a stationary block having an opening therethrough to receive a coil, a block for an arbor, an arbor held therein, means for moving the coil endwise over the end of said arbor, means for severing the coil, by swinging movement of the arbor, and means for removing the severed piece of the coil from the end of the arbor.

Dated this 7th day of March, 1917.

FRANK H. SLEEPER.
WILLIAM H. BLOUNT.

Witnesses:
A. H. WILMOUTH,
GEORGE D. HARTLEY.