May 10, 1927. 1,627,604

J. A. HITTLE

SPRING WINDING MACHINE

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Fig. 1.

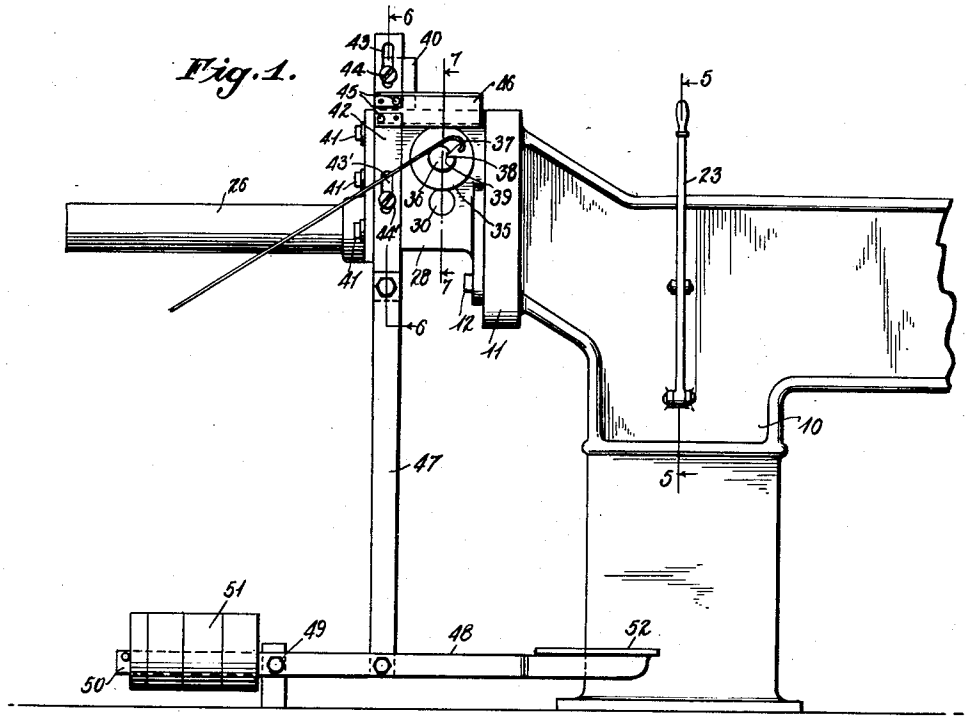


Fig. 2.

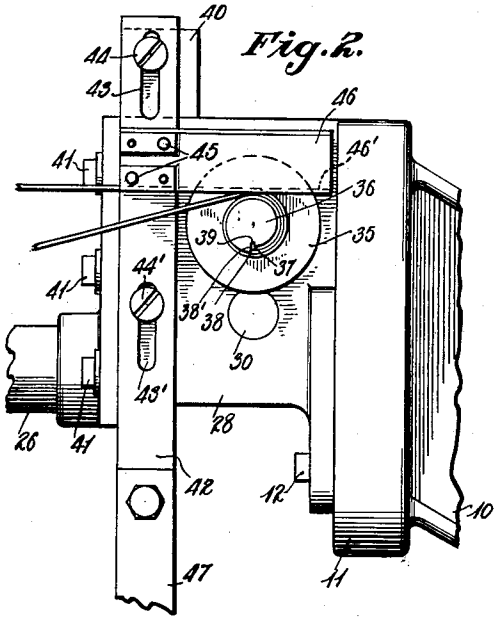
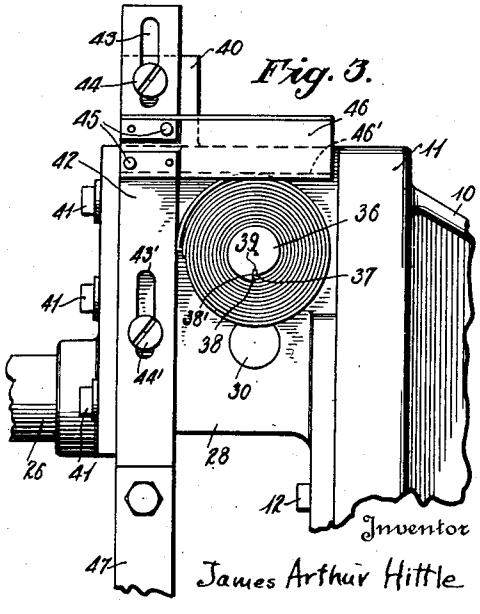


Fig. 3.



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Fig. 4.

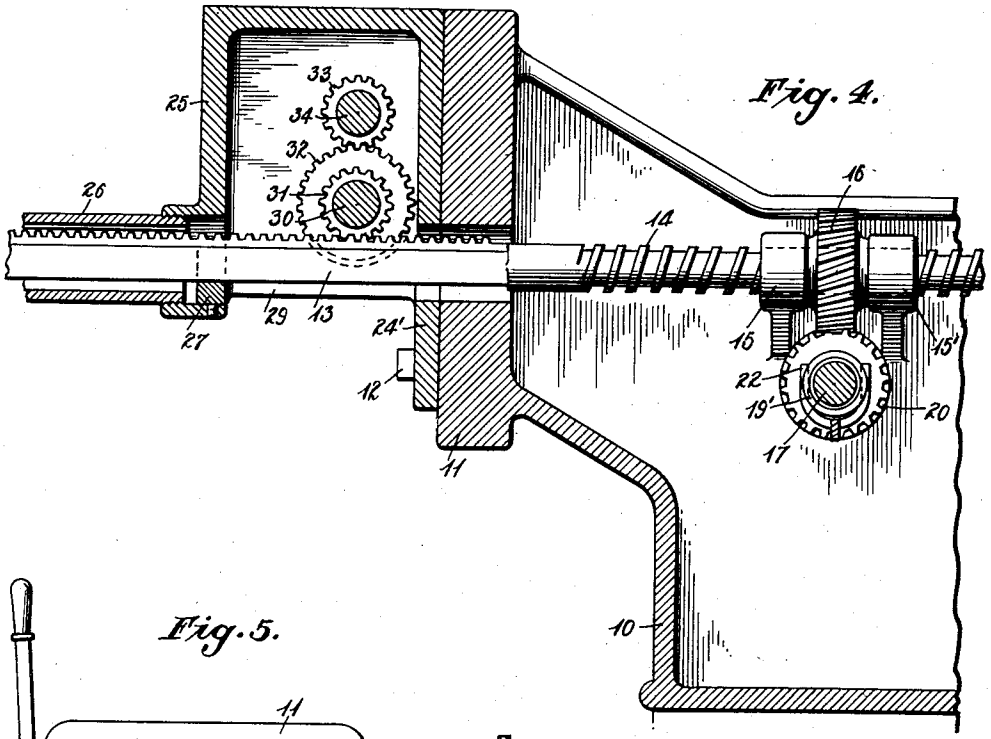


Fig. 5.

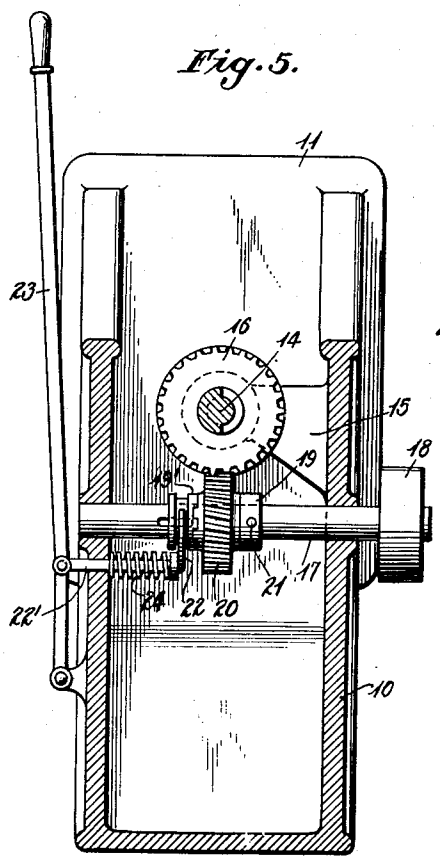


Fig. 6.

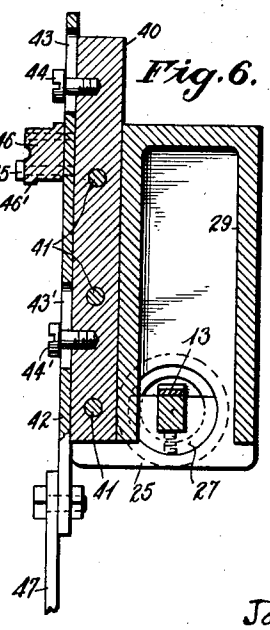
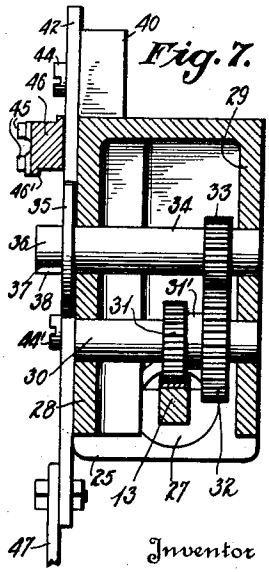


Fig. 7.



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Fig. 8.

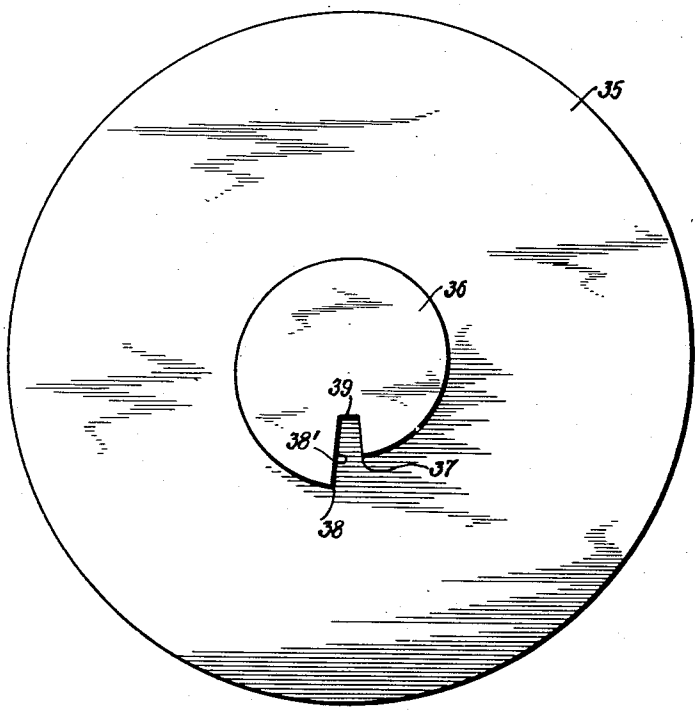


Fig. 9.

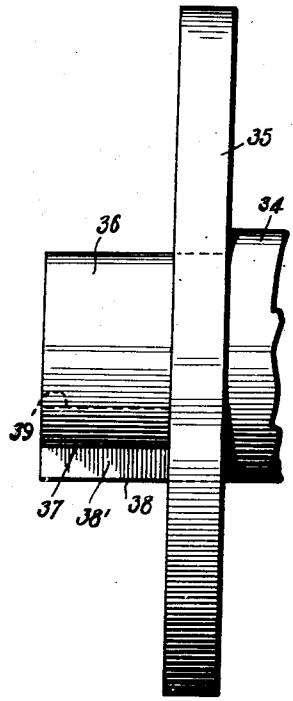


Fig. 10.

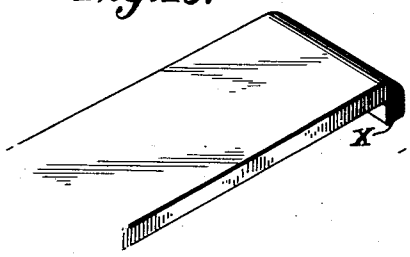
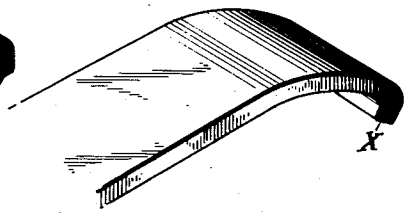


Fig. 11.



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UNITED STATES PATENT OFFICE.

JAMES ARTHUR HITTLE, OF INDIANAPOLIS, INDIANA, ASSIGNOR TO ROBERT H. HASSLER, OF INDIANAPOLIS, INDIANA.

SPRING-WINDING MACHINE.

Application filed January 7, 1926. Serial No. 79,907.

My invention relates to winding machines which, in the modification to be hereinafter described, are particularly adapted for winding helical coils of heavy material in the manufacture of springs. The machine to be particularly described is simple in construction, speedy and accurate in operation and can be tended by comparatively unskilled labor. These points will be obvious from the following description, read in conjunction with the annexed drawings, in which

Fig. 1 is a side elevation of the working end of my improved machine,

Fig. 2 is an enlarged view of the winding head showing the initial winding stage,

Fig. 3 is a view similar to Fig. 2 showing the coil fully wound,

Fig. 4 is a vertical longitudinal section of Fig. 1,

Figs. 5, 6 and 7 are sections on the respective lines designated in Fig. 1,

Fig. 8 is a face view of an element,

Fig. 9 is a side view of same, while

Figs. 10 and 11 illustrate preliminary steps in the production of a coil in accordance with my invention.

The supporting frame 10 for my improved mechanism is of any suitable form. I have illustrated a vertical pedestal supporting a hollow longitudinal section which in turn has a vertical face 11 to which the winding head is securely attached, as by bolts 12, Figs. 1 to 3. In order to supply driving power to the winding head I show a reciprocable rack 13, driven in any suitable manner, and it will be seen that the supporting frame and reciprocable element may be easily adapted from a standard broaching machine, as I have indeed done in actual practice.

As shown in Fig. 4, rack 13 has a screw spindle 14 at its rear end supported in two smooth-bored stanchions 15 and 15′ fixed to an inner wall of the frame. Intermediate these stanchions, and prevented thereby from axial movement, is a worm wheel 16 having a threaded bore engaging the threads of spindle 14. Journaled transversely in the frame beneath the worm wheel 16 is a shaft 17, one end of which projects from the frame and has rigidly secured thereto a pulley 18 which is driven from any suitable reversible source of power. Mounted on shaft 17 between two clutch collars 19 and 19′ is a worm wheel 20 engaging worm wheel 16. The collar 19 is secured to the shaft as by a set screw 21, while collar 19′ is splined on the shaft and is movable into and out of clutching position by means of a fork 22 engaging in a peripheral groove thereof. The fork 22 is connected by an arm 22′, extending through the frame, to an operating lever 23, and is normally held in retracted position by a tension spring 24. It is thus evident that by rotating the pulley 18 in either direction and manipulating the lever, 23, rack 13 may be reciprocated.

The winding head consistis of a box-like structure having a rear wall 24 adapted to be secured to the face 11 of the frame as by bolts 12. Both the rear wall 24 and front wall 25 have apertures alined with the aperture in face 11 through which the rack 13 passes. For safety purposes a sleeve 26 is screwed in the front wall aperture, the sleeve being sufficiently long to prevent the projection of rack 13 therefrom at its farthest outer position. The rack is of rectangular cross-section and to prevent its turning about its longitudinal axis and to support its outer end, a V-shaped bearing block 27 is fixed in the relation shown in Figs. 4 and 6.

Journaled in side walls 28 and 29 of the winding head is a shaft 30 to which is fixed a spur gear 31 meshing with rack 13, and a larger spur gear 32 meshing with a spur gear 33 fixed on shaft 34 also journaled in side walls 28 and 29. Gears 31 and 32 may be conveniently made integral with a common sleeve 31′.

Integral with shaft 34 and positioned on the outside of wall 28 is a circular face plate 35 having at its center a winding mandrel or arbor in the form of a helical boss 36. If the spring is to be made of flat strip metal, for instance, the mandrel stands from the face plate to an extent substantially equal to the width of the strip, while the radial distance between the initial and terminal points 37 and 38 of the helical curve is somewhat greater than the thickness of the strip. A transverse radial notch 39, somewhat wider than the thickness of the strip intervenes between points 37 and 38.

A vertical extension member is set into side wall 28 at the outer edge of the latter and held in place by means of screws 41, Figs. 1 to 3, 6 and 7. A slide 42 attached, through longitudinal slots 43, 43′ to the extension member by means of cap screws 44,

44'. Fixed to the upper end of slide 42 by means of screws 45 is a horizontal arm 46 extending over mandrel 36, this arm having sufficient clearance with face plate 35 to permit its free movement in front of the latter.

A link 47 is pivoted to the lower end of slide 42 and to a foot lever 48, which latter is pivotally supported as at 49. The end 50 of said lever projecting beyond point 49 is provided with suitable weights 51 to hold slide 42 normally in its upper position.

In operation, one extreme end of the strip to be coiled is first given a square bend, as in Fig. 10, the portion x being no longer than notch 39 is deep. To aid in starting the operation, I prefer to give the strip x further curved bend as in Fig. 11. The portion x is now inserted in notch 39, as in Fig. 1, whereupon, by applying foot pressure, or some constant mechanical pressure, to the end 52 of lever 48, arm 46 is brought to bear on the strip. The power now being applied to pulley 18 and the clutch thrown in, the mandrel is rotated in the direction of the arrow Fig. 1 until the position is reached as shown in Fig. 2. The operation is now halted for a moment and arm 46 raised while a flexible spacing element, such as a leather strap, is placed on the metal strip with its end against shoulder 38' of the mandrel, Figs. 2 and 8. The thickness of these two superposed elements is substantially equivalent to the radial distance between point 37 and point 38. It is to be understood that the spacing element need only be used where a clearance is desired between the convolutions of the coil, and the thickness of the strap and dependent radial distance between points 37 and 38 determine this clearance.

Arm 46 is now lowered again and the rotation of the mandrel resumed until the end of the strip is reached, Fig. 3. It will be noted that arm 46 is provided with a shoulder 46' for guiding the strip as it is fed.

Upon releasing lever 48, the coil may now be slipped from the mandrel in an axial direction, and by reversing the power, rack 13 is returned to initial position. It will be noted that to speed up the whole operation I have interposed a multiplying gearing between the rack and the mandrel.

While I have described one embodiment of my invention with some particularity, it is to be understood that I intend my invention to be construed from the following claims:

I claim:

1. In a machine of the type described, a winding mandrel comprising a boss adapted for rotation about the transverse axis, means on said boss for engaging a strip to be wound, means for rotating said boss, a member adapted to exert pressure on said strip transversely to the axis of said boss, means for normally holding said member in operative position, and means for bringing said member into pressure exerting relation to said strip.

2. In a machine of the type described, a winding mandrel comprising a boss adapted for rotation about a transverse axis, means on said boss for engaging a strip to be wound, means for rotating said boss, a member adapted to exert pressure on said strip transversely to the axis of said boss, and means on said member for guiding said strip.

3. In a machine of the character described, a winding mandrel comprising a boss adapted for rotation, means on said boss for engaging a strip to be wound, a flexible spacing strip superposed on said strip to be wound, and means for rotating said mandrel.

4. In a machine of the type described, a winding mandrel comprising a helical boss adapted for rotation about a transverse axis, means on said boss for engaging a strip to be wound, means for rotating said boss, and a gravity actuated weight mounted immediately above said boss adapted to exert a pressure on said strip transversely to the axis thereof causing said strip to wind upon itself during the winding operation.

5. In a machine of the type described, a winding mandrel comprising a helical boss adapted for rotation about a transverse axis, said boss having a shoulder connecting the initial and terminal points of its generating helix and means at the base of said shoulder for engaging a strip to be wound, means for rotating said boss, a member adapted to exert pressure on said strip transversely to the axis of said boss, means for normally holding said member in inoperative position, and means for bringing said member into pressure-exerting relation to said strip.

6. In a machine of the type described, a winding mandrel comprising a helical boss adapted for rotation about a transverse axis, said boss having a shoulder connecting the initial and terminal points of its generating helix and means at the base of said shoulder for engaging a strip to be wound, means for rotating said boss, a member adapted to exert pressure on said strip transversely to the axis of said boss, and means on said member for guiding said strip.

7. In a machine of the type described, a winding mandrel comprising a helical boss adapted for rotation, said boss having a shoulder connecting the initial and terminal points of its generating helix and having means at the base of said shoulder for engaging a strip to be wound, a flexible spacing strip superposed on said strip to be wound, the height of said shoulder being substantially equal to the combined thickness of said strips, and means for rotating said mandrel.

8. In a machine of the type described, a winding mandrel comprising a helical boss

adapted for rotation about its axis, said boss having a shoulder connecting the initial and terminal points of its generating helix and having an axially-extending groove at the base of said shoulder, a strip to be wound having an angular lip for engaging said groove, flexible spacing strip superposed on said strip to be wound, the height of said shoulder being substantially equal to the combined thickness of said strips, means for exerting pressure in a direction transverse to the axis of said mandrel on the strip to be wound, and means for rotating said mandrel.

In witness whereof, I have hereunto set my hand at Indianapolis, Indiana, this 8th day of December, A. D., one thousand nine hundred and twenty-five.

JAMES ARTHUR HITTLE.