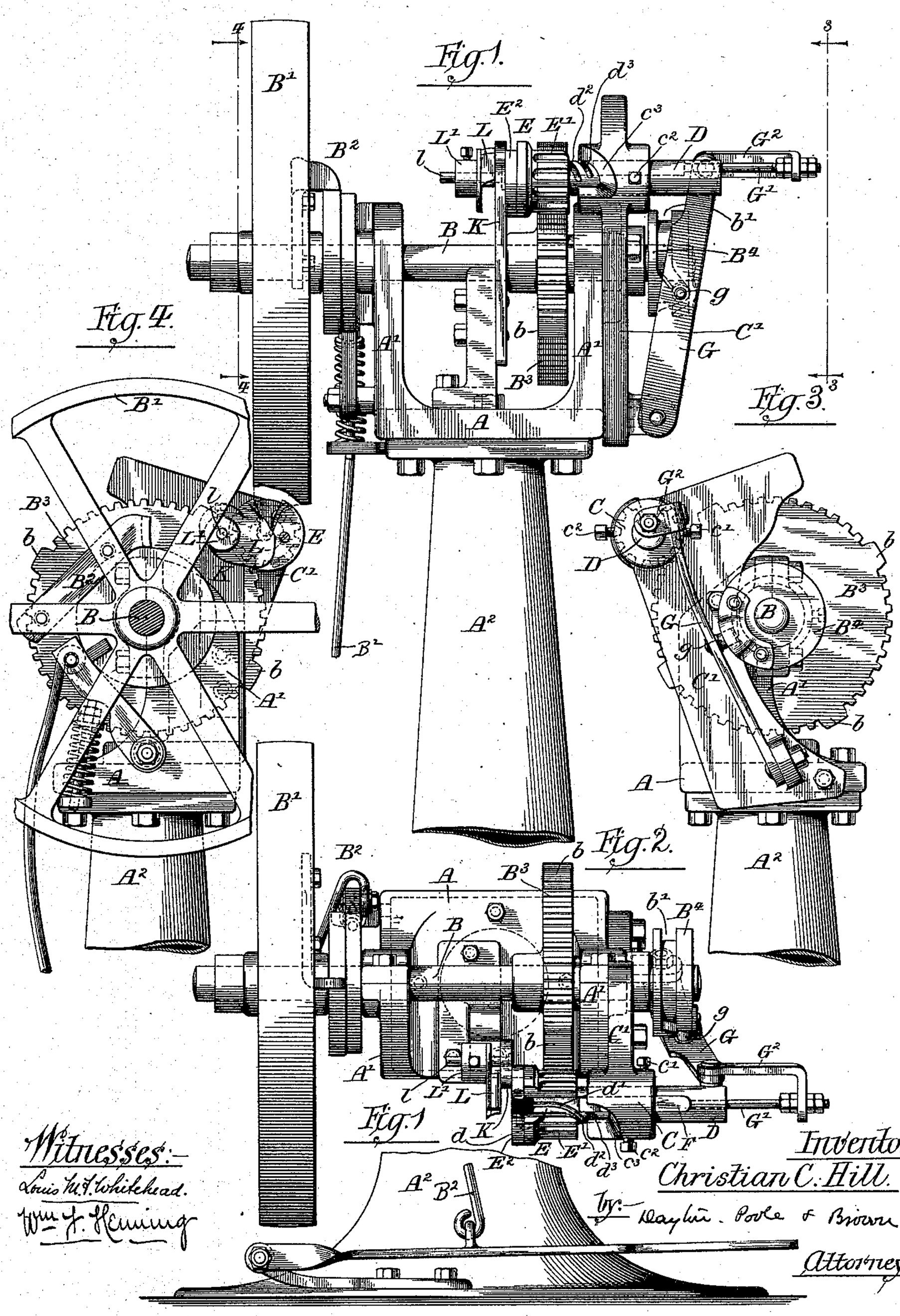
(No Model.) 2 Sheets—Sheet 1.

C. C. HILL.

MACHINE FOR FASTENING THE ENDS OF COILED WIRE SPRINGS.

No. 413,666. Patented Oct. 29, 1889.



Witnesses:—
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(No Model.) 2 Sheets—Sheet 2.

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Fig 10.

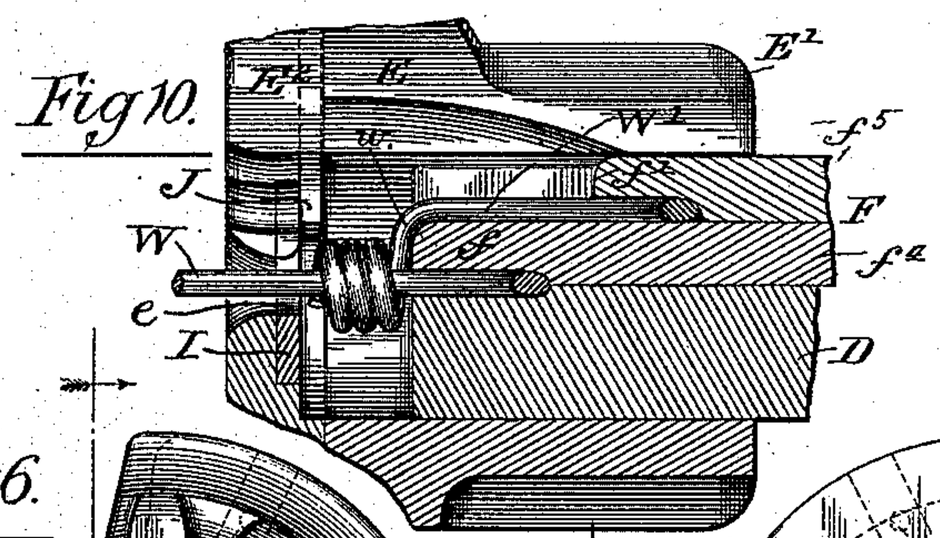


Fig 6.

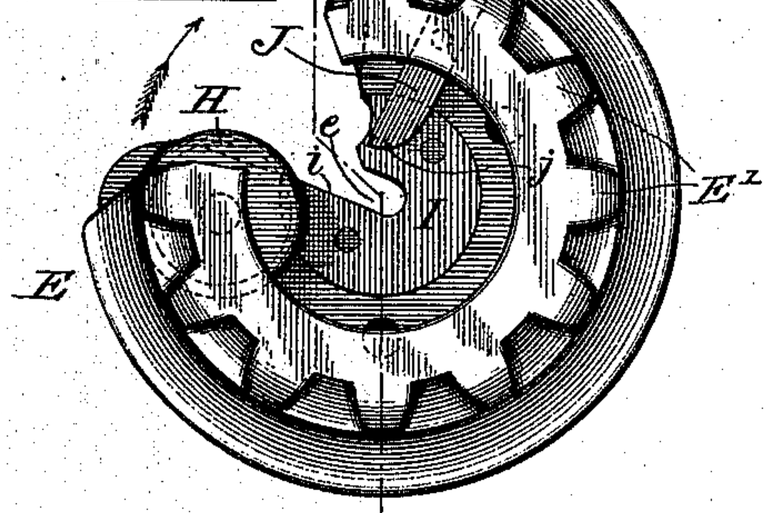


Fig 7.

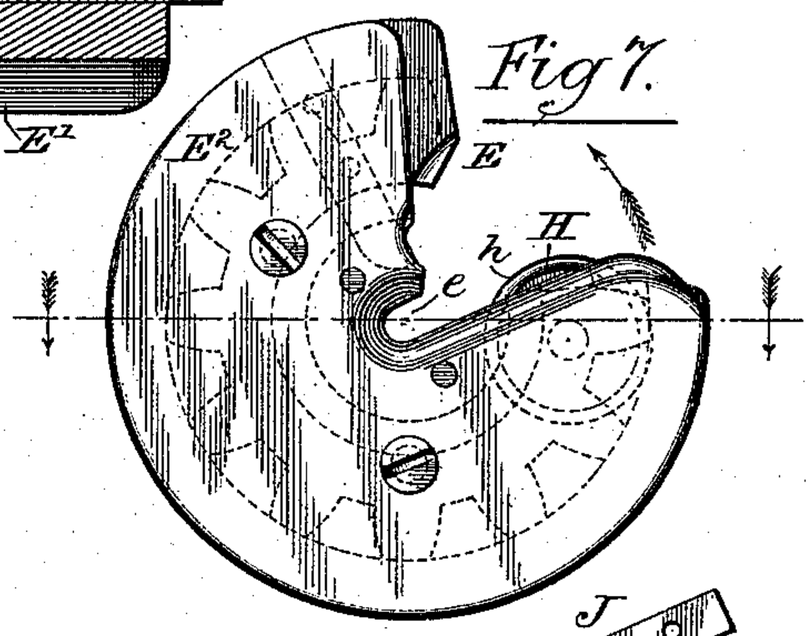


Fig 5

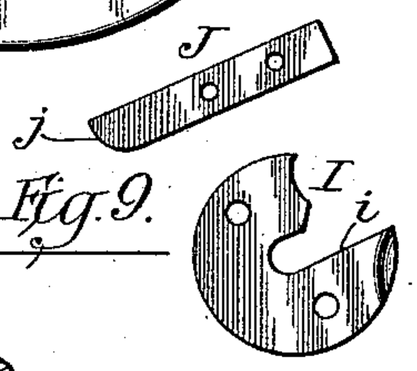


Fig 9.

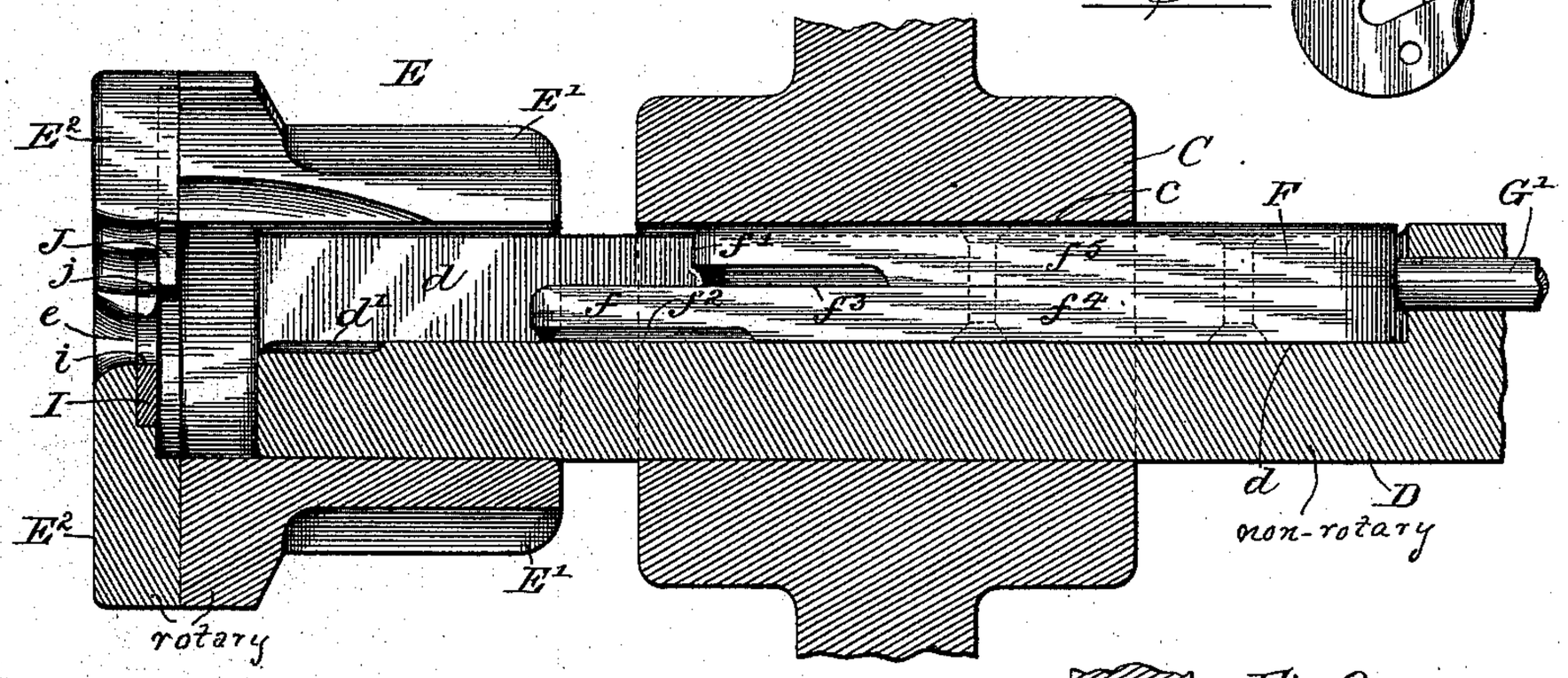
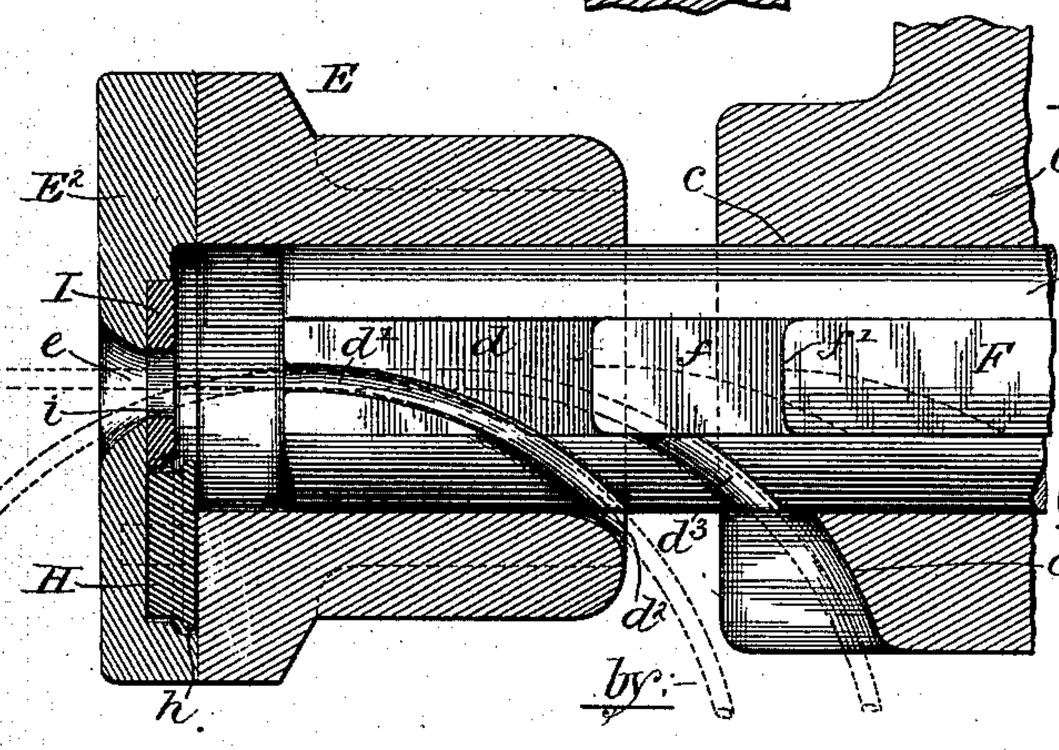


Fig 8.



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Inventor:-
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by:- Cª Baylis, Poole & Brown.
Attorneys.

UNITED STATES PATENT OFFICE.

CHRISTIAN C. HILL, OF CHICAGO, ILLINOIS, ASSIGNOR TO CHARLES L. AMES AND ABEL H. FROST, OF SAME PLACE.

MACHINE FOR FASTENING THE ENDS OF COILED-WIRE SPRINGS.

SPECIFICATION forming part of Letters Patent No. 413,666, dated October 29, 1889.

Application filed November 12, 1888. Serial No. 290,514. (No model.)

To all whom it may concern:

Be it known that I, CHRISTIAN C. HILL, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Machines for Fastening the Ends of Coiled-Wire Springs; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to a machine intended for use in the manufacture of spirally-coiled or conical bed-springs, for the purpose of twisting or wrapping the terminal of the coil around the wire of the coil adjacent thereto, so as to hold the said end of the wire and thereby finish the end of the spring.

The invention consists in the matters hereinafter described, and pointed out in the appended claims.

As illustrated in the accompanying drawings, Figure 1 is a front elevation of a machine embodying my invention. Fig. 2 is a plan view thereof. Fig. 3 is an end elevation thereof as viewed in the direction of the arrows on the dotted line 3 3 of Fig. 1. Fig. 4 is an end elevation at the opposite end of the machine as viewed in the direction of the arrows of line 4 4 of Fig. 1. Fig. 5 is a longitudinal vertical section through the twisting-head and spindle supporting the same. Fig. 6 is a detail view of the head removed from the supporting-spindle as seen from its inner face. Fig. 7 is a detail view of said twisting-head, showing its outer face. Fig. 8 is a detail plan section taken through the twisting-head, showing the spindle supporting the same in plan view. Fig. 9 illustrates a die-plate and wiper removed from the twisting-head. Fig. 10 is a detail vertical section through the twisting-head, illustrating the operation of the same in twisting the wire.

As illustrated in said drawings, A is a casting constituting the main frame of the machine and provided with two vertical arms A′ A′, affording bearings for the horizontal shaft B of the machine. Said frame is herein shown as bolted to the upper end of a tubular frame-standard A^2, supporting the machine from the floor; but the machine may be otherwise mounted or sustained, as may be found convenient or desirable. Said shaft B is provided with a belt-pulley B′, which is connected with the shaft by clutch mechanism, (indicated as a whole by B^2.) Said shaft B also carries a gear-wheel B^3, located between the frame-standards A′ A′, together with a cam-wheel B^4, which is mounted upon said shaft outside of the said standards.

C is a metal hub or bearing-block supported upon the machine-frame by means of a rigid bracket C′. Said hub or bearing-block is provided with a cylindric aperture *c*; Figs. 5 and 8, the central axis of which is horizontal and parallel with the shaft B.

D is a horizontal spindle inserted through the bearing-aperture *c* and rigidly secured therein. Set-screws *c′* c^2 are shown in the drawings as affording a convenient means of rigidly securing the said spindle with said bearing-aperture.

E is a revolving twisting-head, which is mounted in the inner end of the spindle B and is provided with circumferential gear-teeth E′, which intermesh with the teeth of the gear-wheel B^3. Said twisting-head has the form of a longitudinally-slotted hollow sleeve or cylinder adapted to fit over the end of the spindle B. The gear-wheel B^3 is provided with wide teeth or segments *b b*, which engage the slot of the twister-head as the latter is revolved by the wheel. The end of the twister-head remote from the bearing-hub C is closed by a disk or plate E^2, which is secured to the end of the sleeve, and is provided at one side with a V-shaped notch or opening, forming part of the slot in the head, and which terminates in its inner end in a narrow slot *e*, which extends inwardly to the center of the disk.

In order to afford the proper support for the parts immediately engaged in twisting the wire, the head E is herein shown as made larger in diameter at its end adjacent to the plate E^2 than in its part containing the gear-teeth E′. This construction is, however, not essential. The slot or opening of the twisting-head is for the purpose of allowing the insertion of the wires within the same, as will hereinafter more fully appear.

The spindle D supports and forms part of a wire-holder or device for sustaining the wires

while the latter are being acted upon by the twisting-head, said wire-holder being made as follows: Said spindle D, in its part adjacent to the bearing-hub C, is provided with a longitudinal guide-groove *d*, said groove being located in its upper surface and having a horizontal bottom surface at or near the center or axial line of the spindle. Within the said groove *d* is placed a longitudinally-arranged slide-bar F. Said bar F has a longitudinal reciprocatory motion within the groove *d*, which motion is imparted to the bar through the medium of the cam B^4, the devices for communicating motion from the said cam to the slide-bar, herein illustrated, consisting of an oscillated lever G, pivoted at its lower end to a lug upon the frame and is provided with a stud *g*, which engages a cam-slot *b'* in said cam. The upper end of the said lever G is, by means of a connecting-bar G^2, connected with a sliding rod G', which is attached to the rear or outer end of the slide-bar F, the end of the bar G^2 which is adjacent to the bar G' being bent at right angles and attached to said rod in the manner illustrated in Fig. 2.

In the lower or horizontal surface of the groove *d*, adjacent to the inner end of the spindle D, is formed a groove *d'*, Figs. 5 and 8, the end of which groove is in alignment, or nearly so, with the center or axial line of the twisting-head, as clearly shown in Fig. 8, and a curved notch d^2 is cut in the metal composing the spindle at one side of the groove *d*, said notch forming a continuation of and being in the same curved line with the groove *d'*. A second notch d^3 is also formed in the metal of the spindle at the side of the longitudinal groove *d*, said notch d^3 being located adjacent to the notch d^2, but having less depth than the latter notch. The grooves *d'* and d^2 are for the purpose of receiving the main wire of the spring, while the notch d^3 receives the end of the top or end coil of the same. The hub C is herein shown as extended somewhat past the ends of the notches d^2 d^3 and as cut away at c^3, Figs. 1 and 8, to allow the insertion of the wires in said notches.

The slide-bar F is notched or stepped at its end nearest the twisting-head, so as to form a projection or prong *f* at its lower part, which extends a considerable distance beyond the end surface *f'* of the upper part. The prong *f* is flat upon its top surface, and its lower surface is notched or cut away, so as to form a recess f^2 of sufficient vertical depth to allow the said prong *f* to pass over the wire placed in the groove *d'* in the bottom of the guide-groove *d*.

f^3 is a second recess formed in the bar F at the level of the top of the prong *f*, said recess f^3 being adapted to receive the wire composing the upper turn or ring of the spring when the slide-bar is thrust forward. In the particular construction shown said bar F is made of two parts f^4 f^5, arranged horizontally and rigidly attached to each other, this construction greatly facilitating the construction of the bar, inasmuch as the notch f^3 may be conveniently formed in the proper position by making a recess in the under surface of the top layer f^5, as clearly shown in the drawings, Fig. 5.

The purpose of the features of the construction above described in the spindle D and slide-bar F is to provide means for securely holding the wire of the spring being operated upon from movement during the action of the twisting-head upon said wire. The details of construction in the twisting or bending devices of the head will now be described.

H is a bending-roller mounted on the inner face of the plate E^2, adjacent to and slightly overlapping the notch in said plate, Figs. 6 and 7.

I is a bending plate or die secured to the inner surface of the said plate E^2, adjacent to the central slot *e* of the plate, said die being made of hardened steel and being used to take the wear which would otherwise come on the said plate E^2.

J is a wiper consisting of the radially-arranged bar secured to the plate E^2, extending inwardly toward the center thereof and terminating in a curved working edge or surface *j*, located adjacent to the said slot *e*. The roller H is provided with a circumferential flange *h*, adjacent to its inner face, its outer face being sunk within a circular depression in the face of the plate E^2, as clearly shown in the drawings, Figs. 6 and 8.

The twisting-head, when placed upon the spindle D, in readiness for operation, is so arranged as to form a space or chamber between the end of the spindle and the inner face of the head, thereby affording space in which to wrap the terminal of the spring-wire about the coil adjacent to it. The twisting-head may be held upon the spindle by any suitable means, that herein shown consisting of a rigid arm K, which is attached to the machine-frame and rests against the end face of the twister-head, near one edge of the latter. Said arm is preferably arranged to afford a slight endwise movement of the head upon the spindle, such endwise movement tending to facilitate the winding or twisting of the wire, inasmuch as it allows the parts which immediately engage the end of the wire which is coiled or bent about the continuous part or coil to adjust themselves to slight variations in the position of said end of the wire as the winding takes place.

L is a stop arranged opposite the slot of the twisting-head for determining the position of the end of the wire which protrudes from the head, and which is to be wrapped or coiled about the adjacent continuous wire or coil of the spring. Said stop is preferably made adjustable toward and from the twisting-head, and is for this purpose herein shown as attached to or formed upon a sleeve L', mounted

to slide longitudinally upon a guide-rod *l*, arranged parallel with the spindle D, and held in position thereon by set-screws, as shown.

In Fig. 10, which shows the connected wires in place within the twisting-head, W is the main or continuous wire forming the top coil, and W′ is the end portion of the top coil, which is coiled or twisted about the main wire W. The same parts are shown in dotted lines in plan view in Fig. 8.

The operation of the twisting-head in bending or twisting the free end or terminal wire about the continuous wire is as follows: The clutch device connecting the band-pulley with the driving-shaft is so arranged that said shaft can be stopped and the twisting-head arrested when the slot of said twisting-head is upward or opposite the guide-groove of the spindle D, so that the parts of the machine when the latter is not in action will stand in the position shown in Figs. 1, 2, and 5. Any form of clutch device may be used for this purpose. The one herein shown is of old and familiar form, and is not therefore described nor specially illustrated herein. At the time the machine is not in action and is in readiness to receive the wire the slide-bar F is retracted, as shown in Figs. 5 and 8, thereby leaving the groove *d′* exposed or uncovered.

In operating upon a spring the same is inserted in the wire-holding device as follows: The top coil W thereof is first inserted through the longitudinal slot of the head, and is allowed to rest in the groove *d′* at the bottom of the guide-groove *d*, said wire passing through the narrow radial slot *e* of the twisting-head, as clearly shown in dotted lines in Fig. 8. The free end or terminal part W′ of the top coil is then inserted laterally through the slot of the twisting-head, with the end thereof against the stop L, said part of the wire resting in the notch d^3, by which the wire is sustained above the bottom of the guide-groove *d* a sufficient distance to allow a prong *f* of the slide-bar F to pass beneath it. The extreme end of the part W′ of the wire will of course also pass through the slot *e* at a short distance above the wire W. The clutch device is then actuated, when the slide-bar F will advance and the twisting-head begin to turn. The said slide-bar is advanced until the prong reaches the end of the spindle before the twisting-head acts to any extent upon the wire, said slide-bar advancing over the groove *d′* and acting to clamp or hold the wire W therein, and at the same time bringing the prong *f* beneath the wire W′ and the notch f^3 into engagement with the said wire W′. The said wire W′ is held by the notch d^3 from backward or forward movement and by the said notch f^3 from vertical movement, so that said wire is held rigidly in place. The prong *f*, furthermore, comes beneath and supports said wire W′ at its part near the end of the spindle, and thereby aids in bending said wire, as will hereinafter more fully appear. The twisting-head is moved in the direction indicated by the arrow, Figs. 6 and 7, so as to carry the bending-roller H over the wire-holder and wire supported therein. In the beginning of the rotary movement of the head the surface of the edge *i* of the die-plate I, or the adjacent edge of the roller H, will first strike the free end of the wire W′ and bend the same downward at right angles, so as to bring it over or across the end of the prong *f*, Fig. 10, and across the wire W, and at the same time will bring the extreme end of the wire in engagement with the roller H. Said roller in the further movement of the head wraps or coils the said wire W′ spirally around the wire W. The wiper J follows in the path of the roller H and closes the wire W′ closely against the wire W, and also serves to bend inwardly the extreme end of the said wire W′ after the bending-roller has ceased to act upon the same. During the bending of the wire in the manner described said wires are both held in place by the slide F, said slide being at this time in its forward position, with the end of the prong *f* adjacent to the plate E^2, said prong resting over the main wire W, so as to clamp and hold the same firmly in the groove *d*. The prong *f* obviously holds the wire W′ separate from the wire W to a point close to where the twisting takes place, thereby forming an abrupt bend or shoulder *w* in said wire W′, in the manner illustrated in the drawings.

It will be understood that I do not limit myself to the precise details of construction herein described, but these may be changed in various ways without departing from the spirit of my invention.

I claim as my invention—

1. A machine for the purpose set forth, comprising a slotted twisting-head and a wire-holder for sustaining two wires, said wire-holder comprising a stationary part provided with a groove to receive one wire, and a slide-bar provided with a prong arranged to cover the groove and to form an anvil over which the other wire is bent during the fastening of the ends of the wires, substantially as described.

2. A machine for the purpose described, comprising a slotted twisting-head and a wire-holder for sustaining one wire in alignment with the axis of the head and a second wire adjacent to the first wire, said wire-holder consisting of a stationary part provided with a groove and a notch to receive the first wire and a notch to receive the second wire located above the groove, and a bar provided with a prong adapted to pass over the wire in said groove and beneath the wire held in the notch, substantially as described.

3. The combination, with a slotted twisting-head, of a wire-holder consisting of a stationary part provided with a groove and a notch to receive one wire and a notch located above said groove to receive another wire, and a slide-bar provided with a prong ar-

ranged to cover the wire in the groove and pass beneath the wire in the notch, and provided also with a notch or recess to receive the said second wire, substantially as described.

4. The combination, with a twisting-head and a wire-holder constructed to receive and hold a wire in line with the axis of the head and a second wire adjacent thereto, said twisting-head being provided with a bending-roller, and with a wiper, substantially as described.

5. The combination, with a slotted twisting-head, of a stationary spindle supporting the same, said spindle being provided with a longitudinal guide-groove, and a longitudinally-movable slide-bar mounted in said guide-groove, said spindle being provided with a groove and a notch to receive one wire and a notch to receive a second wire, and the slide-bar being provided with a prong arranged to cover the wire in said groove and to pass beneath the wire in the notch, substantially as described.

6. The combination, with a slotted twisting-head, of a stationary spindle supporting the same and provided with a wire-holder, said spindle being cylindric in its part engaged with the twisting-head, and a stationary arm bearing upon the outer face of the head to hold the same upon the spindle, substantially as described.

In testimony that I claim the foregoing as my invention I affix my signature in presence of two witnesses.

CHRISTIAN C. HILL.

Witnesses:
C. CLARENCE POOLE,
OSCAR M. DAYTON.