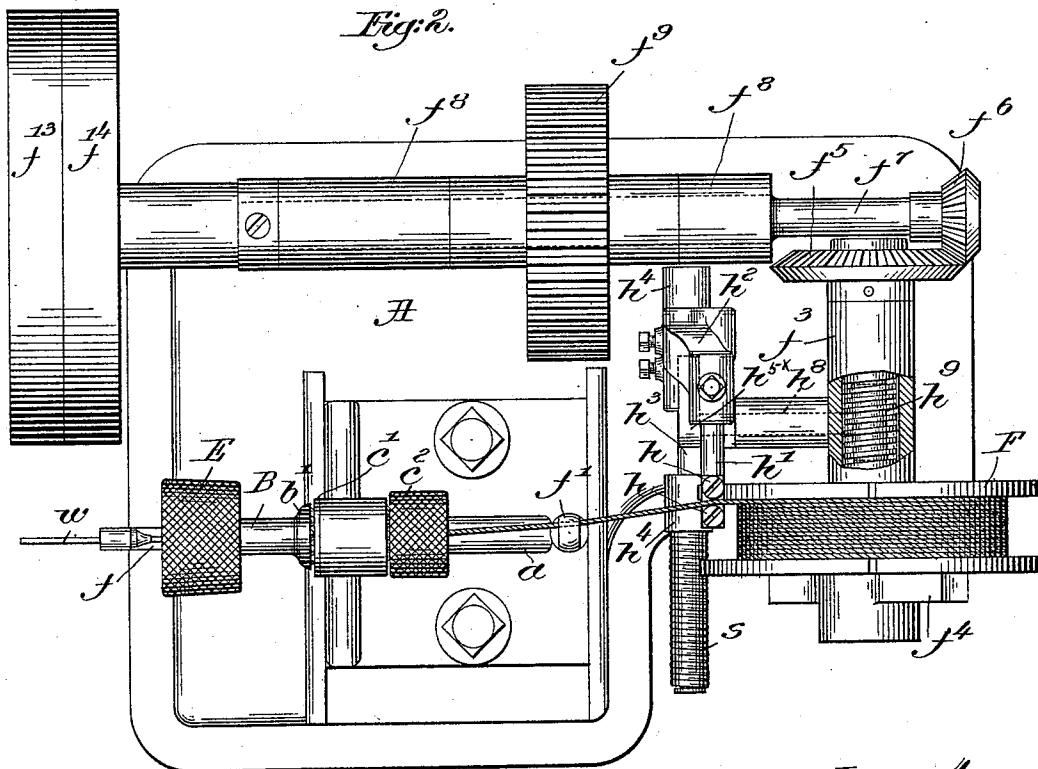
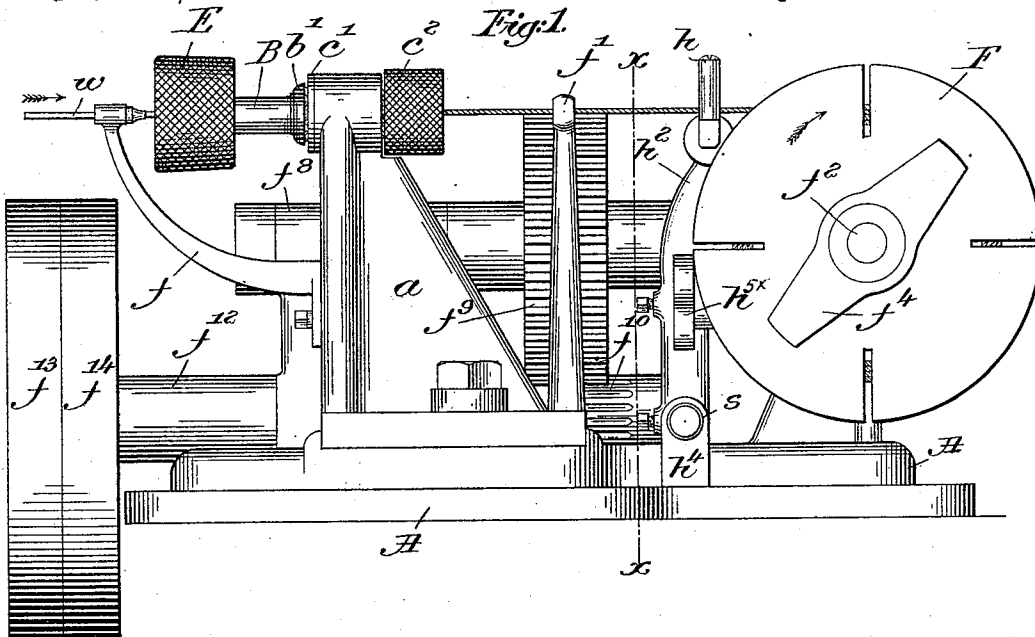


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MACHINE FOR SPIRALLY IMPRESSING WIRE OR THE LIKE.

No. 581,459.

Patented Apr. 27, 1897.



Witnesses.

Fred S. Grunleaf.

Thomas J. Grunwald.

Inventor.

Louis Goddu.

by Crosby Gregory,  
attys.

(No Model.)

2 Sheets—Sheet 2.

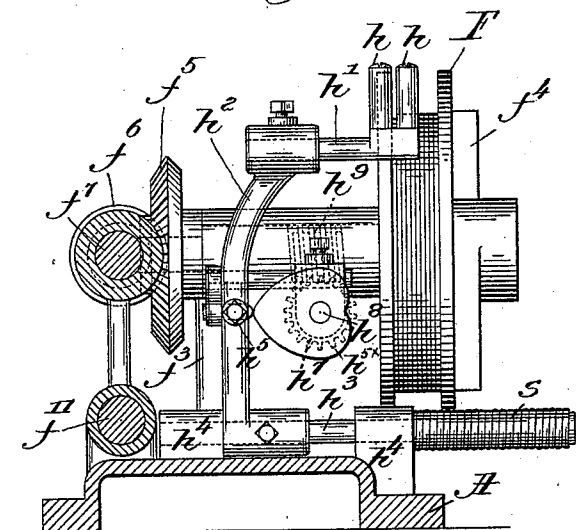
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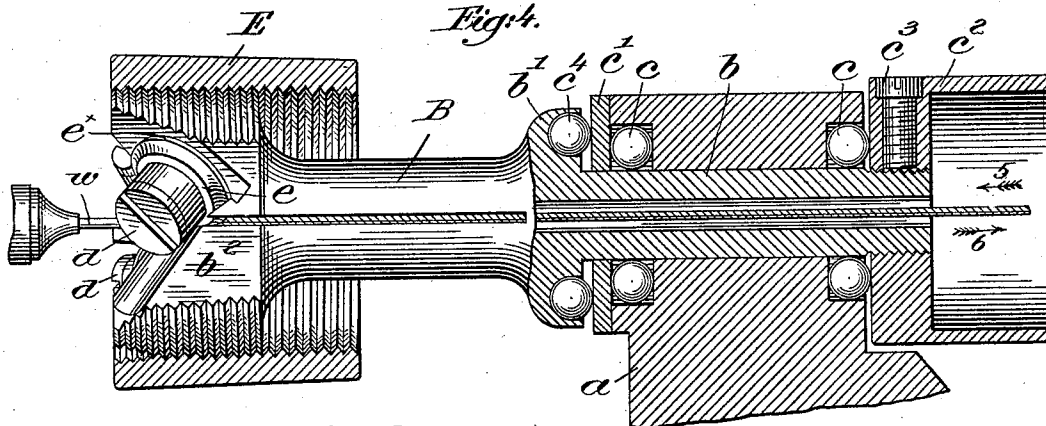
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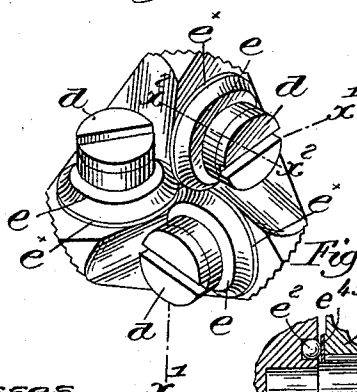
*Fig:3.*



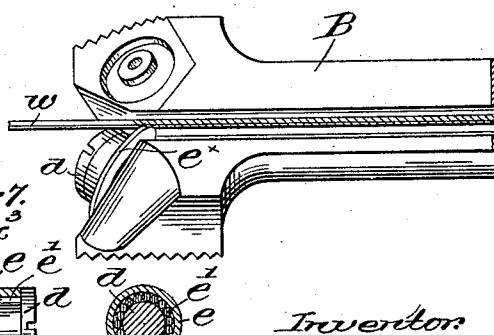
*Fig: 4.*



*Fig:5.*



*Fig:6.*



*Witnesses.*

Fred S. Gumbaf.

Thomas J. Grinnond;

Inventor:  
Louis Goddu.

*Louis Goddu.*

By Crosby Gregory, *attys.*

# UNITED STATES PATENT OFFICE.

LOUIS GODDU, OF WINCHESTER, MASSACHUSETTS, ASSIGNOR TO JAMES W. BROOKS, PRINCIPAL TRUSTEE, OF PETERSHAM, AND FRANK F. STANLEY, ASSOCIATE TRUSTEE, OF SWAMPSCOTT, MASSACHUSETTS.

## MACHINE FOR SPIRALLY IMPRESSING WIRE OR THE LIKE.

SPECIFICATION forming part of Letters Patent No. 581,459, dated April 27, 1897.

Application filed December 18, 1895. Serial No. 572,575. (No model.)

*To all whom it may concern:*

Be it known that I, LOUIS GODDU, of Winchester, county of Middlesex, State of Massachusetts, have invented an Improvement in  
5 Machines for Spirally Impressing Wire or the Like, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

10 This invention relates to machines for spirally impressing or spirally threading wire or other equivalent substantially cylindrical body. In machines for this purpose as heretofore constructed the cutter or cutters for  
15 forming the spiral impressions or threads have been mounted upon a rotatable carrier usually made hollow in order that the wire may be fed longitudinally along and in the direction of the axis of the carrier, means being provided not only to positively feed the  
20 wire, but also to positively rotate the carrier and its detached cutter or cutters to cause the latter to cut or impress a spiral groove or impression in or upon the wire. It has usually  
25 been considered essential in machines of this type that the rotating carrier with its attached cutters be positively geared to or connected with the wire-feeding devices in order that the two might always and under all  
30 conditions move in fixed relation with each other. Because of this connection or gearing of the two mechanisms (the cutting and feeding mechanisms) together, the rapidity with which the wire could be fed through the machine and  
35 the spiral threads or impressions formed thereupon have been limited by the limitations of the proper mechanisms. In my studies to simplify machines of this class and at the same time cheapen the product and produce the  
40 same with greater rapidity than heretofore I have found that by arranging the cutters or impression devices in certain angular positions with relation to the direction of feed of the wire and by mounting the carrier in such  
45 a manner that it may revolve with the greatest possible freedom it is possible to draw the wire positively through the machine and in contact with the cutters or impression devices and by such contact with the moving  
50 wire cause the devices to make the impres-

sion or cut into the wire and at the same time cause automatic rotation of the carrier and its attached cutters or impressing devices to direct the cuts or impressions in a spiral direction around the wire.

Herein broadly lies my present invention, and by means of it I am enabled to dispense with all connections or gearing between the wire drawing or feeding devices and the rotatable carrier heretofore considered necessary to thereby move the wire at a rate of speed much higher than could be practical with any sort of connecting mechanism employed. Again, where the wire feeding and cutting or impression devices are connected  
60 or geared together they must rotate at certain relative speeds, and if by reason of wear or poor adjustment the timing of the two mechanisms is not as it should be the result must inevitably be an imperfect and distorted product. If, also, there should be slip  
65 between the wire-feeding devices and the wire, it will be evident the thread-cutting devices will operate at a higher speed relative to the longitudinal feed of the wire than  
70 should be the case. By my invention, however, the rotation of the carrier, on which are mounted the cutters or impressing devices, is derived from and must therefore be automatically regulated by and to meet the varying  
75 speeds with which the wire is fed, so that it can never be out of time therewith—in other words, the rotation of the carrier and its attached tools or cutters and devices is automatically regulated and driven from and by  
80 the wire on which it acts, and not by some other device, which may or not move in fixed relation to the wire.

While my invention is not necessarily limited to any particular pitch of spiral, yet it  
85 is especially useful in the production of the long spirally grooved or threaded wire used in the manufacture of boots and shoes and commonly known as "cable screw-wire." It is particularly useful in connection with wire  
90 of this class which is driven, as distinguished from wire which is screwed, into the stock. For the best results, in order that the carrier may rotate with the utmost freedom, to be sensitive and responsive to all variations in  
100

the speed with which the wire is fed, I have found it desirable to mount the carrier in antifriction or ball bearings, and when rotatable cutters or impression devices are employed I find it desirable to also mount the same on ball or antifriction bearings.

The above, together with other features of my invention, will be hereinafter particularly described in the specification, and pointed out in the claims.

By pulling the wire between the rolls and compelling it to rotate the rolls the friction of the rolls is utilized to not only impress or cut a groove, but to make the said groove so as to leave a ragged helical fin on one side thereof, said fin being thrown up from and of larger diameter than the body of the wire, the fin aiding the fastening made from the wire to enter the stock, and it also acts to prevent the withdrawal of the fastening from the stock.

In the drawings, Figure 1 is a side elevation of a machine containing one embodiment of my invention; Fig. 2, a top or plan view of the machine shown in Fig. 1; Fig. 3, a vertical section on the dotted line  $x-x$ , Fig. 1, looking toward the right; Fig. 4, an enlarged detail, partially in section, of the carrier, its bearings, and the impressing devices rotatably mounted thereon; Fig. 5, a left-hand end view of the carrier with the impressing devices; Fig. 6, a longitudinal section on the irregular section-line  $x'-x'$ , Fig. 5; Fig. 7, a sectional detail showing the cutter or impressing device bearing, the section being taken on the dotted line  $x^2-x^2$ , Fig. 5; and Fig. 8, a cross-section on the dotted line  $x^3-x^3$ , Fig. 7.

Referring to the drawings in the embodiment of my invention there shown for illustration of the same, A is the frame or support, of suitable shape and construction to sustain the several working parts, said frame in the present instance being provided with an upright bracket or standard  $a$ , the head of which is adapted to receive the shank  $b$  of the freely-rotatable carrier B.

In the embodiment shown the head of the bracket  $a$  is counterbored at its opposite sides, surrounding the bearing for the shank  $b$  to receive the antifriction devices  $c$ , (shown as balls,) the same being confined in their track at one side of the bracket by the loose hardened-steel washer  $c'$ , and at the opposite side of the bracket by the milled nut  $c^2$ , screwed upon the threaded end of the shank  $b$  and provided, it may be, with a set-screw  $c^3$  to fix it in adjusted position on said shank.

The balls  $c$  provide lateral bearings for the rotating carrier B and are also adapted to receive any end thrust in the direction of the arrow 5, Fig. 4. The principal end thrust, however, in the operation of the machine is in a direction opposite to the arrow 5—viz., as indicated by the arrow 6—and to receive this end thrust I have provided the carrier B with a flange or lip  $b'$ , which is provided at

its face adjacent the loose washer  $c'$  with a ring-like groove or depression adapted to receive a series of antifriction devices  $c^4$ , (also shown as balls,) which roll between the said flange or lip and washer  $c'$ , referred to.

In the operation of the machine the loose washer  $c'$  may remain stationary and the two series of balls  $c$  and  $c^4$  roll thereon, or, as is usually the case, the said washer rotates freely under the action of the balls rolling upon its opposite surfaces, thus providing a freedom of action and ease of rotation which is very desirable, particularly as it provides for a proper movement should any of the balls from any cause be prevented from rolling.

The carrier B is made hollow longitudinally to receive the wire  $w$ , upon which the spiral impressions or threads are formed, the said wire being moved in a line substantially coinciding with the axis of rotation of the carrier. At its end opposite the milled nut  $c^2$  the carrier B is provided with an enlarged head  $b^2$ , constructed and adapted to hold one or more cutters or impression devices, which in the preferred construction are rotatably mounted upon the said carrier.

In the present embodiment of my invention the carrier-head  $b^2$  is provided at its ends with a plurality of bearing studs or screws  $d$ , which, as shown, are set askew with one another or with the axis of the carrier and receive upon them the freely-rotatable impressing or grooving devices  $e$ .

Referring particularly to the details Figs. 7 and 8, each impressing device  $e$  is shown as comprising a suitable hub between which and the stud or screws  $d$  I have arranged a series of antifriction devices  $e'$ , (shown as rollers,) so that the lateral bearing of the impressing device upon the stud is an antifriction-bearing. The carrier-head  $b^2$  is also provided with a ring-like groove surrounding the stud and which receives a series of antifriction devices  $e^2$ , (shown as balls,) which receive the end thrust of the impressing device while at work. In the preferred construction I interpose between the impressing device and the antifriction device  $e^2$  a loose washer  $e^4$ , as shown. In the embodiment of my invention shown, therefore, not only the carrier is mounted in antifriction or ball bearings, but the impressing devices or their equivalent cutters are likewise mounted upon ball or roller bearings upon the carrier, and I thereby obtain such a freedom of movement for the carrier and its impressing or cutting devices as enables the same to respond instantly to the movements of the wire traveling through the carrier whatever be the speed at which the wire is moved.

As herein shown, the carrier-head  $b^2$  and a portion of the carrier back of the head are divided or split, preferably in as many places as there are impressing devices, in order that a certain range of adjustment may be had to accommodate the head to wires of varying diameters and to provide ready means of ad-

justing the head and its impressing devices to wires of different diameter. I have made the said head conical in shape and provide it with an exterior thread to be engaged by the interiorly-threaded conical adjusting-sleeve E.

The natural resiliency or spring of the material of which the carrier-head is composed tends to spread the members of the head, while they are compressed for wires of smaller diameter by rotation of the conical sleeve E.

Referring now to Figs. 1 to 3, inclusive, the wire moving in the direction of the arrow 6, Fig. 4, and of the arrow, Fig. 1, before reaching the impressing devices, is preferably passed through a suitable guide  $f$ , and I also preferably provide a suitable guide  $f'$  at the opposite side of the bracket  $a$ , so that the wire is suitably guided before reaching and after leaving the impressing devices. As a means to receive the spirally impressed or threaded wire and also for the present embodiment of my invention to provide means for positively moving or drawing the wire past and in operative contact or in engagement with the impressing devices I have provided a reel F, (shown as removably mounted upon a shaft  $f^2$ , journaled in a suitable bearing in a bracket  $f^3$  on the frame A,) said reel being preferably clamped upon said shaft by means of a suitable hand-nut  $f^4$ , screwed upon the threaded end of the shaft, thus providing ready means for removing the reel when it is filled and substituting therefor an empty reel. At its end opposite the reel F the shaft  $f^2$  is shown as provided with a bevel-wheel  $f^5$ , in mesh with and driven by the beveled pinion  $f^6$ , fast on the rear end of a shaft  $f^7$ , mounted in suitable bearings  $f^8$  on the frame.

This shaft  $f^7$  is provided intermediate its bearing-surface  $f^8$  with a spur-wheel  $f^9$  in mesh with and driven by a spur-pin  $f^{10}$  on the driving-shaft  $f^{11}$ , mounted in suitable bearings  $f^{12}$ , also on the frame, and provided with suitable fast and loose pulleys  $f^{13}$   $f^{14}$  or other suitable driving devices.

The operation of the machine is as follows, viz: The end of the wire is first passed through the carrier-head and secured in suitable manner to the reel, and in doing this the members of the carrier-head may be temporarily opened to enable the wire to be easily drawn through. Afterward they are adjusted by means of the threaded sleeve E, to produce the desired spiral impressions in the wire. The machine is now set in operation and the rotation of the reel F in the direction of the arrow thereon, Fig. 1, acts to draw the wire  $w$  at the desired speed through the carrier and in contact with the impressing devices  $e$ , carried thereby. This contact of the wire with the impressing devices acts first to cause the impressing devices to make an impression in the surface of the wire, and because of the angular or askew positions of the impressing devices with relation to the line of travel of

the wire the carrier, with its attached impressing devices, is rotated about the axis of the wire to cause the impressions to be laid in a spiral direction around the traveling wire, one side of the groove having left on it a spiral projecting fin. The contact or engagement of the positively-drawn wire with the impressing devices acts not only to rotate the impressing devices about their own axes when they are made rotatable, but also acts through contact with the impressing devices to revolve the latter about the axis of the wire.

It will be evident that whatever be the speed with which the wire is drawn past the impressing devices the latter, because they contact directly with the wire, must always respond to any changes in speed and will of necessity travel around the wire in proportion to the speed of travel of the wire, so that the impressions will always lie in substantially true spirals around the axis of the wire.

It will be observed that the "carrier" (and by this term I mean simply proper means to support and carry the impressing devices) and also the impressing devices are entirely without means for imparting to the same a positive movement, so that such movement or movements is or are derived directly from or by reason of contact with the impressing devices with the wire.

Having in mind the novel manner in which, by my invention, the spiral impressions are formed in the wire, the necessity for absolute freedom of rotation of the carrier and its attached impressing devices will be apparent, for if there is not perfect freedom of rotation the carrier will not follow and respond to changes in the speed of and changes in the movements of the wire.

To swing the spirally-impressed wire evenly upon the reel, I have provided a pair of guide-rollers  $h$   $h$ , journaled upon the horizontal rod  $h'$ , adjustably mounted upon an arm  $h^2$ , rising from the horizontal sliding shaft  $h^3$ , mounted in suitable bearings  $h^4$  in the frame. A spring  $s$  on the shaft  $h^3$  tends to move the arm  $h^2$  constantly to the right with its roller or other stud  $h^5$  always in operative contact with the heart-shaped cam  $h^{5x}$  on the shaft  $h^8$ , journaled in the bracket  $f^3$  and provided with a worm-wheel  $h^7$ , (shown in dotted lines, Fig. 3,) in mesh with and driven by a worm  $h^9$ , cut in or mounted on the reel-shaft  $f^2$ , whereby rotation of the reel-shaft and its attached reel causes the guide  $h'$  to travel back and forth and lay the spirally-impressed wire evenly upon the reel. In the present instance the impressing devices  $e$  are provided with circumferential grooves  $e^x$ , (see Fig. 7,) but it should be distinctly understood that my invention is not limited to grooved or even rotatable impressing devices.

My invention is not limited to the particular embodiment herein shown, for it is evident the invention claimed may be embodied

in other constructions or mechanisms without departing from the spirit and scope of the invention.

5 Having described one embodiment of my invention, what I claim, and desire to secure by Letters Patent, is—

10 1. In a machine for spirally impressing wire and the like, the combination with a suitable frame, of a freely-revoluble carrier, spirally-  
arranged wire-impressing devices mounted in  
said carrier, and means to positively move the  
wire longitudinally in contact with said im-  
pressing devices and in substantially the line  
15 of the axis of the carrier, whereby the latter is enabled to readily and freely respond to the movements of the wire, substantially as described.

20 2. In a machine of the class described, the combination with a frame, of a freely-rotatable carrier mounted therein, one or more impressing devices arranged in an angular position upon the said carrier, a reel, and means unconnected to said carrier to positively rotate the same to draw the wire past and in operative contact with said impressing device or  
25 devices to be impressed thereby, and to cause rotation of the carrier, said rotation laying the impressions in a spiral direction around the wire, substantially as described.

30 3. In a machine of the class described, the combination with means for moving the wire, of a rotatable carrier entirely independent of said means provided with one or more wire-

driven spiral-impressing devices arranged in an angular position to the length of the wire, 35 and antifriction-bearings for the said carrier, whereby the latter is enabled to readily and freely respond to the movements of the wire, substantially as described.

4. In a machine of the class described, the 40 combination with a frame and means for moving the wire, of a rotatable carrier, rotated by the movement of said wire, one or more spirally-arranged wire-impressing devices rotatably mounted on the said carrier, and antifriction-bearings for the carrier and also for the  
45 spiral-impressing device or devices, whereby the latter is enabled to readily and freely respond to the movements of the wire, substantially as described. 50

5. In a machine of the class described, the combination with the frame and wire-moving devices, of a rotatable split carrier, spiral-impressing devices on the respective members of said carrier, and means to expand and 55 contract the said split carrier to adapt said impressing devices to wires of varying diameter, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of 60 two subscribing witnesses.

LOUIS GODDU.

Witnesses:

GEO. W. GREGORY,  
MARGARET A. DUNN.