No. 661,696. Patented Nov. 13, 1900.

H. F. HOLTMANN.

APPARATUS FOR FORMING IRREGULAR SPIRALS.

(Application filed Dec. 4, 1899.)

(No Model.) 2 Sheets—Sheet 1.

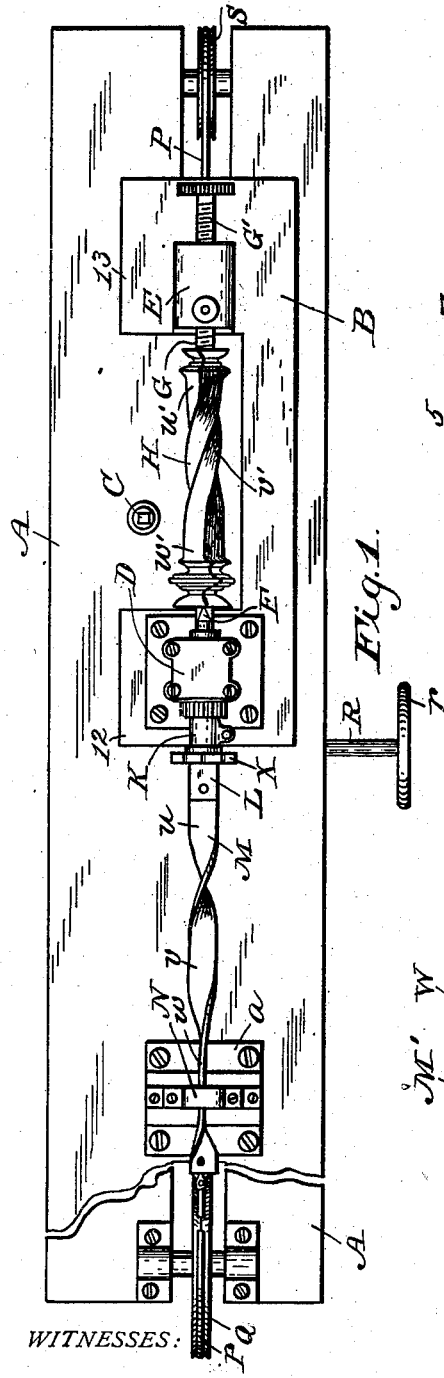

Fig. 1.

Fig. 3.

Fig. 2.

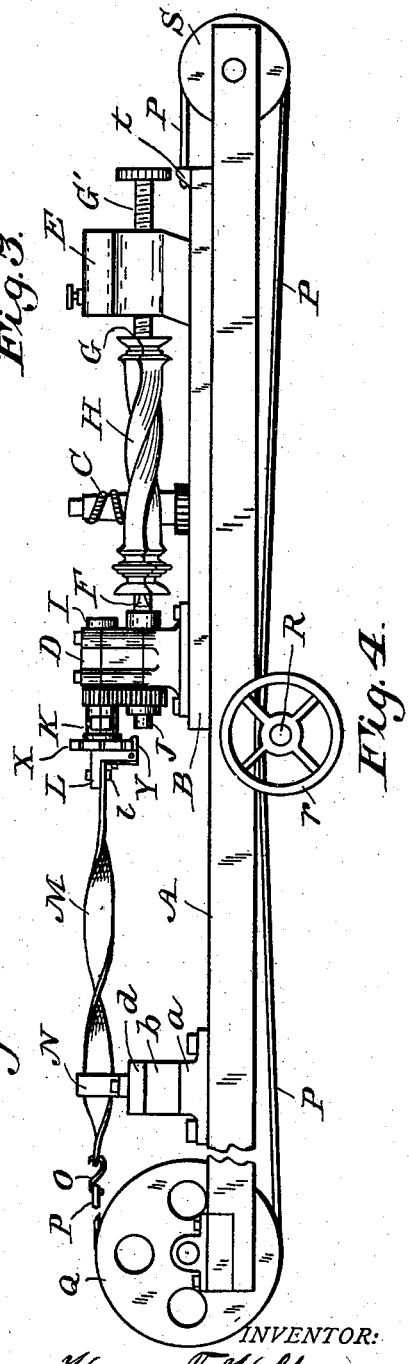

Fig. 4.

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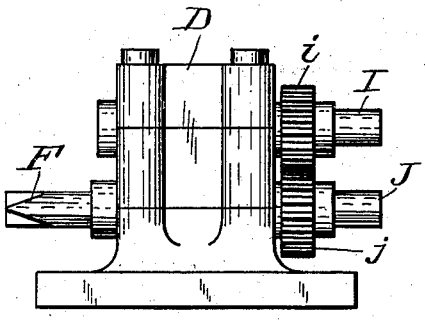

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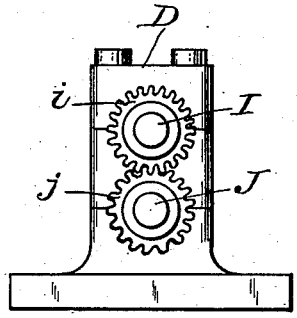

Fig. 6.

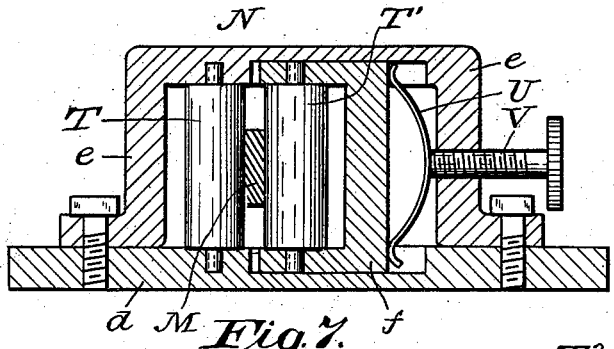

Fig. 7.

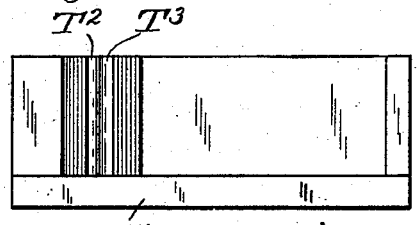

Fig. 8.

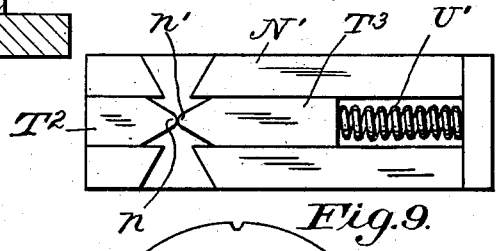

Fig. 9.

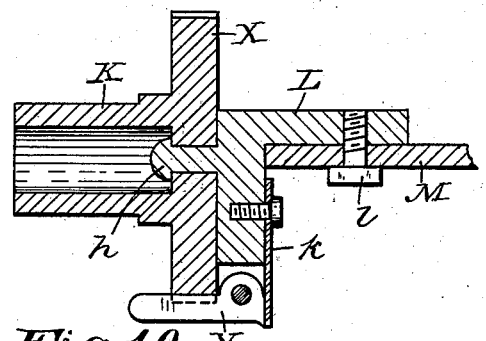

Fig. 10.

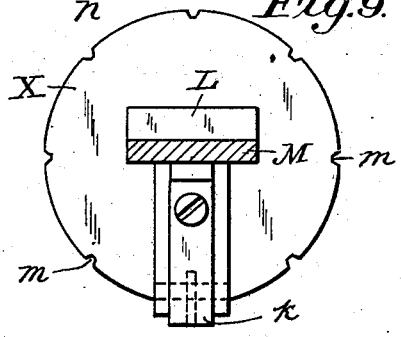

Fig. 11.

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UNITED STATES PATENT OFFICE.

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APPARATUS FOR FORMING IRREGULAR SPIRALS.

SPECIFICATION forming part of Letters Patent No. 661,696, dated November 13, 1900.

Application filed December 4, 1899. Serial No. 739,168. (No model.)

To all whom it may concern:

Be it known that I, HENRY F. HOLTMANN, a citizen of the United States, residing at Indianapolis, in the county of Marion and State of Indiana, have invented certain new and useful Apparatus for Forming Irregular Spirals; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

My invention relates to an improved machine or apparatus for forming wooden bars into columns having the appearance of being twisted into irregular or serpentine shapes; and the object is to provide a guide-bar and a guide-head and also other coacting means whereby such columns or shafts may be formed and so that the patterns may be cheaply varied, and more particularly to provide for forming irregular or serpentine spirals, reversed spirals, and straight plane faces running into spiral curves.

The objects are attained in my invention, which, furthermore, is adapted for forming the well-known regular or uniformly-continuous spirals in a cheap artistic manner, both right-hand and left-hand twists from one pattern of guide-bar.

The invention consists, essentially, of a new and novel form of guide-bar having a rectangular form transversely and structurally twisted, whereby the blank is caused to rotate irregularly as it is fed across the cutter-head and of a guide-head adapted to operate with the guide-bar to cause the same to rotate; and the invention consists in the parts and combination and arrangement of parts described hereinafter and pointed out in the claims.

Referring to the drawings, Figure 1 represents a top plan view of apparatus constructed in accordance with my invention and showing a finished column in the centers and a guide-bar in operative position; Fig. 2, an elevation of a fragment of a guide-bar having a reverse twist and illustrating the relative position of the guide-head; Fig. 3, a specimen of a peculiar form which my apparatus is adapted to produce; Fig. 4, a front elevation of the apparatus illustrated in Fig. 1; Figs. 5 and 6, elevations of the head-stock; Fig. 7, a central vertical sectional view of the guide-head; Fig. 8, an elevation, and Fig. 9 a plan, of a modification in the form of guide-head; and Figs. 10 and 11, detail views of the swiveled quartering-head for the guide-bar.

In the drawings similar letters and numerals of reference designate corresponding parts in the several views.

In carrying out my invention in the most advantageous manner I employ a suitable table A, upon which the work is supported horizontally, as in a lathe, while the cutter-head C has a vertical or vertically-inclined axis, so that the cut is taken along with the grain of the wood to the best advantage. The cutter-head is most effective when provided with circular saws set on the spindle in oblique-angled planes of suitable degrees. The machinery, of any suitable type, may be placed below the table for operating the cutter-head, which is situate above the top of the table, which has a plane upper face.

A base B, having its body portion recessed at one side, so as to clear the cutter-head, is formed and is adapted to rest and to also slide upon the top of the table both longitudinally and laterally, as may be required to place the work in contact with the cutter-head. A head-stock D is bolted to the end 12 of the base, and to the opposite end 13 thereof a tail-stock E is bolted, the latter being preferably adjustable upon the base, so as to accommodate various lengths of pieces to be worked upon. The tail-stock has a screw G', having a dead-center G, and may be shifted to a higher position in the stock, if desired. The head-stock D is provided with two parallel rotating spindles I and J, identically formed and journaled in the stock, so as to have no longitudinal motion. Each spindle is adapted to receive a chucking-center F at the ends toward the tail-stock, and at their opposite ends each is adapted to receive a quartering or segmental chuck K, having a face-plate X, at the periphery of which are a series of notches *m*, and a bracket L is fitted against the face-plate and swiveled thereto by means of a journaled stud *h*. The bracket extends from the face of the plate at a right

angle and has a screw-bolt *l*, by which to attach the guide-bar M or M′ or similarly-formed bar. A latch Y is pivoted to the bracket and is normally forced into a notch *m* by a spring *k*. Adjacently to the quartering chuck each spindle I and J is provided with connecting toothed wheels *i* and *j*, respectively, so that the guide-bar may be connected to either spindle for forming either a right-hand or a left-hand spiral upon the blank.

The guide-bar M or M′ is rectangular and preferably oblong in transverse section and has a small perforation in each end to receive the clamping-bolt or a hook O when a feed-cable P is employed. The bar is not machine-finished and therefore is cheaply provided. I employ suitable metal in its construction, preferably merchant bar steel or iron, and in the operation I heat the bar uniformly to a suitable degree and twist it by the use of simple tools well known in the art of the metal-worker to any desired form, after which it is given a generally straight alinement, without, however, removing the twisted configuration or contour, and then allowed to cool, when it is ready for use, the ends having been perforated, as stated, and at any time the bar may be reheated and its twists modified to any desired extent and made ready for reuse in a few moments and with comparatively small expense. The principal advantages of this bar are that the twists or spirals may be of any length, may vary in degree, and may have straight portions interspersed with the spirals, and especially it is particularly adapted to have a straight portion *u* at one end, by which a straight portion, as *u′*, is formed on the face of the column H, running gracefully into a twist *v′* in conformity to the twist *v* of the bar M and then running gracefully into a straight face W′, corresponding to the portion *w* of the bar. A similarly-twisted bar would form a piece Z, similar to that illustrated in Fig. 3, having a straight-faced or slightly-twisted portion *y* at one end and a like portion *y′* at the opposite end of the irregularly-twisted portion 5, a pattern being employed to follow in moving the work to and from the cutter-head, as is well known. Similar guide-bars M′, as shown in Fig. 2, may be easily formed and employed, having a twisted portion 2, a straight or normal portion 3, and a portion 4, twisted in reverse direction to the part 2. In this figure is illustrated the adaptability of the rollers W W′ of the guide-head to control the guide-bar rotatively when peculiarly formed, as described. The guide-bar may obviously be of any desired thickness and relative width; but one of its great advantages lies in the fact that it is equally effective when composed of a cheap grade of metal, such as hoop or band iron, the torsional strain put upon it in practice being insufficient to render such construction objectionable, while the bar has enough elasticity to permit of the base B being moved laterally, and such movement is also permitted by reason of the knife-edge-like bearings of the guide-rollers against the sides of the guide-bar.

The guide-head N is rigidly secured to the table A and may be variously formed in detail, a suitable construction comprising a base *d*, to which is bolted an arch-frame *e*, in which a roller T, having a vertical axis, is journaled and a sliding frame *f*, in which a like roller T′ is journaled parallel to the other roller, the adjustability of one roller being provided in order to accommodate any uneven portions of the surface of the guide-bar and also to permit the bars to pass freely in case any of the twists are abnormally abrupt. The sliding frame and its roller are forced toward the opposing roller by means of a screw V and an interposed cushion-spring U or its equivalent, as elastic rubber. While the rollers described may be desirable and preferable, they are not an essential feature, and I may employ a head N′, somewhat similar to that shown in Figs. 8 and 9, provided with opposing bars T^2 and T^3, each having the opposing ends *n* and *n′*, respectively, in the form of a blunt V-chisel, one of the bars being slidable and having a spring U′ bearing against it, the bearing contact with the bar in this case being similar to that of the rollers—broad transversely of the bar, but extremely narrow in the direction of the length of the bar—which is the object sought and which substantially is essential in rendering my novel form of guide-bar operatively feasible in its most economical form and manner of construction.

In order to feed the blank to be operated upon across the cutter-head and to draw the guide-bar through its head, I may provide a suitable device, such as that shown, in which a pulley Q is journaled at one end of the table A and a similar pulley S is journaled at the opposite end of the table. A shaft R, having a wheel *r*, is journaled also to the table, and about this is wound a cable P, running over the pulleys and having one end attached to a binder *t* at one end of the base B and at the opposite end provided with a hook O, engaging the end of the guide-bar. In the smaller sizes of the apparatus the feeding mechanism may be dispensed with, being readily manipulated by hand.

When designed for forming spirals in contour the reverse of the guide-bar, the latter may be connected with the upper spindle I, as shown in Fig. 4, while the blank is placed in the lower positions, and when the bar is connected to the spindle J the filling-block *b* may be removed from the guide-head and the base *d* attached directly to the main base *a*. In Fig. 4 the guide-bar shown is designed to rather show its operative position and not as to conform to the twist of the column H, the view more particularly illustrating the bar and blank rotating in reversed directions. In Fig. 1 it may be assumed that the bar and blank are both in their upper positions in their bearings and rotating in the same direction.

It is obvious that the perforations at the ends of the guide-bar may be dispensed with and other means of attachment employed, such as clamping devices, and also I may employ any suitable form of quartering device within the scope of my invention. It will also be apparent that the cross-sectional area of the guide-bar may vary slightly from the rectangular contour, as the corners may be chamfered, or I may employ the well-known I-section of bar without detracting essentially from the utility of my invention.

The operation of my apparatus will be readily understood from the foregoing description in detail, the manner of forming or turning spirals generally being well understood in the art. Suffice it to mention that the guide-bar is quite portable and subject to a wide range of work and, with the guide-head, may be employed in connection with various machines in common use. It will be understood that a suitable pattern for governing the diameter and offsets in the piece to be finished is usually attached to the table A and that the base B, together with the head and tail stocks and the guide-bar, are moved along in front of the cutter-head, while the guide-head is fixed, the longitudinal movement of the guide-bar through the guide-head causing the guide-bar and the blank to rotate in conformity to the twist of the guide-bar and to also prevent rotation at the proper time to produce longitudinally-straight cuts.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. A machine for forming spirals, including a guide-bar distorted from or twisted on an axis other than the longitudinal center of dimension thereof, a guide-head for the bar, and a base whereon a blank may be carried capable of sliding laterally and longitudinally and operatively connected to the guide-bar.

2. A machine for forming spirals, including a laterally-flexible elastic guide-bar, a guide-head for the bar, and a base whereon a blank may be carried capable of sliding laterally and longitudinally and operatively connected to the guide-bar.

3. A machine for forming spirals, including a guide-bar adapted to be distorted from a uniform degree of pitch and re-formed to conform to predetermined variable patterns to be produced, a guide-head adapted to receive such bar slidingly, and a base whereon a blank to be worked upon may be carried capable of sliding laterally and longitudinally and operatively connected to such guide-bar.

4. A machine including a guide-bar, for forming irregular spirals, characterized by its capability of being either wholly or in part distorted so as to have varying degrees of pitch or spirality interspersed with non-spiral portions, a guide-head adapted to permit such bar to be drawn therethrough, and a sliding base whereby the work may be carried operatively connected to such bar.

5. A guide-bar for forming spirals, consisting of a thin oblong metallic bar substantially rectangular in cross-section and adapted to be distorted axially at any desired portions while other portions have parallel plane faces remaining, whereby forms may be produced having differing degrees of spiral pitch interspersed with plane faces.

6. A guide-bar for forming spirals, consisting of a thin oblong metallic bar substantially rectangular in cross-section and capable of being distorted axially at any desired portions while other portions retain parallel plane faces, whereby forms having different degrees of spiral pitch interspersed with plane faces may be produced, and a guide-head for the bar having elastic contact therewith.

7. In a spiral-forming machine, the combination with a sliding base having the head and tail stocks and the rotating spindle, of a laterally-flexible elastic guide-bar having irregular twists or axial distortions and operatively connected to the spindle, and a guide-head having elastically-controlled bearings for the bar whereby compensation is provided for the passage of such irregular distortions, said head being secured independently of the sliding base.

8. In a spiral-forming machine, the combination with the irregular distorted guide-bar connected with devices for carrying a blank to be worked upon, of the guide-head including a pair of vertically-disposed narrow bearings one of which is elastically forced toward the opposing bearing, and adapted to permit said bar to be drawn therethrough.

9. In a spiral-forming machine, the combination of the table, the base sliding laterally and longitudinally, the head and tail stocks, the rotating spindle, the quartering chuck, the guide-bar having irregular axial twists or distortions and elastically flexible laterally, and the guide-head adapted to permit the passage of such irregularly-distorted bar therethrough, said head having an elastic bearing with said bar, substantially as set forth.

10. In a spiral-forming machine, the combination of the table, the sliding base, the cutter-head having a vertical axis, the tail-stock, the head-stock having a pair of spindles rotating in two parallel lines, the toothed wheels connecting such two spindles, the quartering chuck, the twisted laterally-elastic guide-bar attached to said chuck and so constructed as to be capable of being re-formed to varying degrees of twist and distortion, and the guide-head having the elastically-controlled bearing whereby such distorted bar may be received under lateral pressure, substantially as set forth.

11. In a spiral-forming machine, the combination of the table, the sliding base, the cutter-head having a vertical axis, the tail-stock, the head-stock having the multiple spindles mounted in separate axial lines, the connecting gear-wheels, the quartering chuck attachable to either of said spindles independently,

the guide-bar attached to the quartering chuck and adapted to be distorted and redistorted from its longitudinal center of dimension, the guide-head having a non-elastic bearing and an opposing elastic bearing, and the adjusting-screw for the elastic bearing, substantially as set forth.

12. In a spiral-forming machine, the combination of the table, the sliding base, the cutter-head having a vertical axis, the tail-stock, the head-stock having the multiple spindles mounted in separate axial lines, the connecting gear-wheels attached to said spindles, the quartering chuck attached to one of said spindles, the guide-bar attached to said chuck and adapted to elastically bend laterally, the adjustably-elastic guide-head, the pulleys mounted at the ends of said table, the hand-wheel and drum mounted below said table, and the cable coiled about said drum and having one end thereof attached to said guide-bar and the opposite end thereof connected to said sliding base, substantially as set forth.

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

HENRY F. HOLTMANN.

Witnesses:
WM. H. PAYNE,
E. T. SILVIUS.