(No Model.) 2 Sheets—Sheet 1.

E. D. MACKINTOSH.

LATHE FOR TURNING SPIRALS.

No. 312,736. Patented Feb. 24, 1885.

Fig. 1.

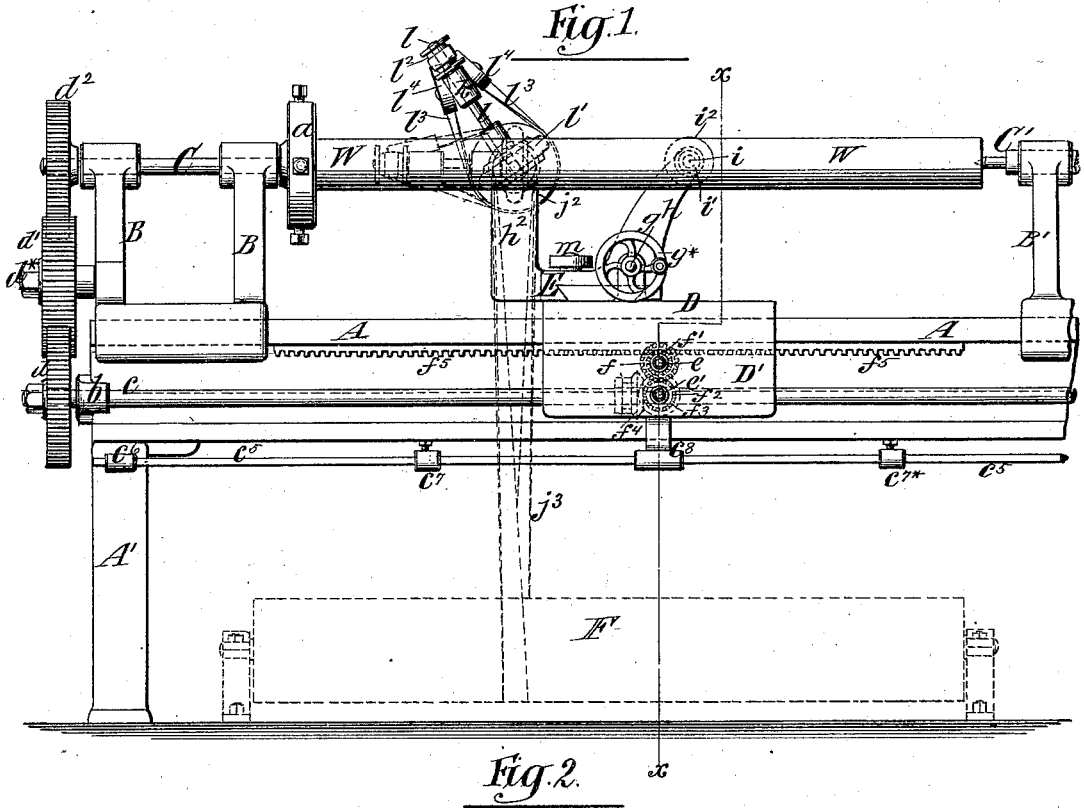
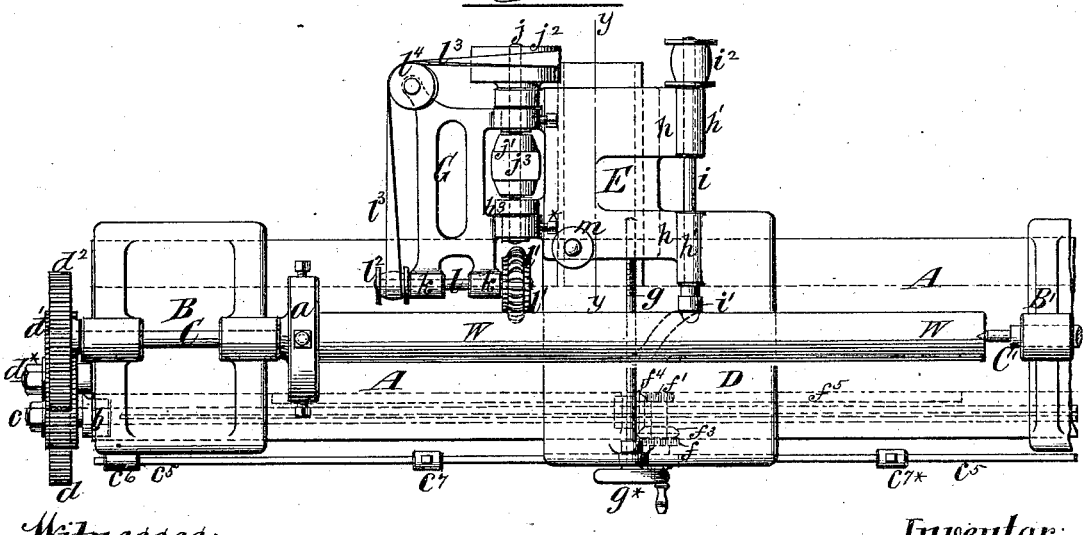


Fig. 2.



Witnesses:-
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Emil Schwartz

Inventor:-
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Brown & Hall

(No Model.) 2 Sheets—Sheet 2.

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Fig. 4.

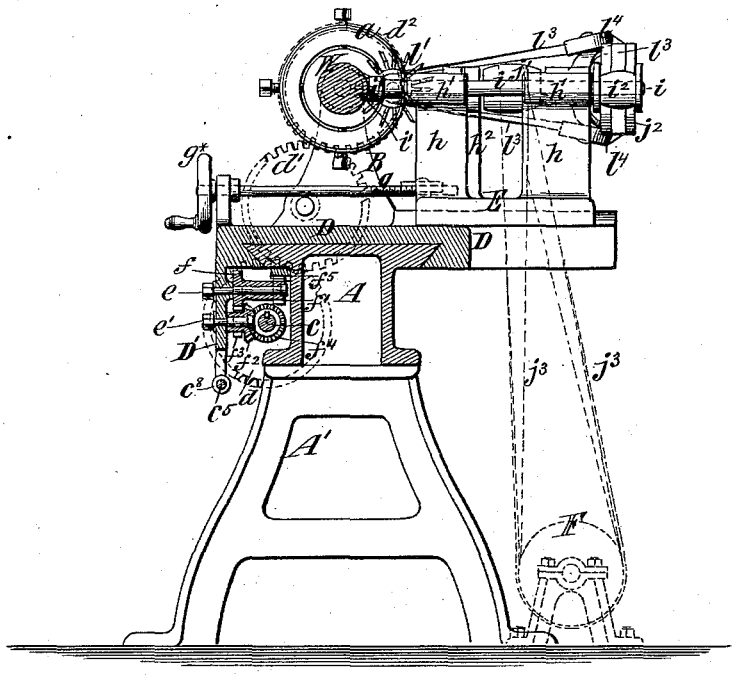


Fig. 3.

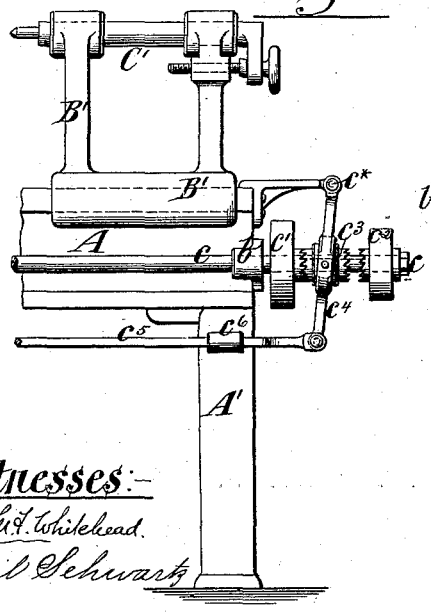
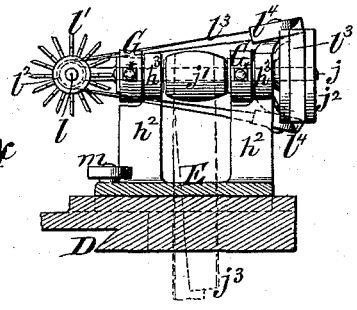


Fig. 5.



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UNITED STATES PATENT OFFICE.

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LATHE FOR TURNING SPIRALS.

SPECIFICATION forming part of Letters Patent No. 312,736, dated February 24, 1885.

Application filed September 29, 1884. (No model.)

To all whom it may concern:

Be it known that I, EDWARD D. MACKINTOSH, of Brooklyn, in the county of Kings and State of New York, have invented a new and useful Improvement in Twist-Machines for Producing Spiral or Helical Wood Work or Twist, of which the following is a specification.

The invention relates to a machine very similar in some respects to a lathe for producing spirally or helically grooved rods or pieces of wood, such as are used largely in furniture and cabinet work, and may be termed "twists;" and the invention consists in the novel combination of parts hereinafter described, and illustrated in the accompanying drawings.

Figure 1 is a front elevation of a machine embodying my invention, only a portion of the tail-stock being shown. Fig. 2 is a plan of the machine, also omitting the principal part of the tail-stock. Fig. 3 is a front elevation of the portion of the machine not shown in Fig. 1, including the tail-stock. Fig. 4 is a transverse vertical section on the irregular dotted line *x x* of Fig. 1; and Fig. 5 is a similar section of certain parts on the dotted line *y y* of Fig. 2.

Similar letters of reference designate corresponding parts in all the figures.

A designates the bed or shears of the machine, supported by legs A′, and made very similar to a lathe-bed. At one end of the bed is a head-stock, B, wherein is journaled a live or head spindle, C, and at the other end of the bed is a tail-stock, B′, in which is a tail-spindle, C′. On the end of the head-spindle C is a representation of a chuck, *a*, which may be of any suitable construction, and which holds and drives the work W, and the work is centered by the tail-spindle C′.

D designates the saddle, which is fitted to slide along the bed, and comprises a portion, D′, depending at the front of the bed, and in bearings *b* is mounted a rod, *c*, which is longitudinally grooved, and to which rotary motion may be imparted by any suitable system of driving-belt, or belts and pulleys.

In Fig. 3 I have shown one form of mechanism which may be employed to drive the rod *c*, and this I will now describe. Upon the rod *c* are loose pulleys c' c^2, which are to be driven by open and twist belts to rotate them in reverse directions. These pulleys are loose on the shaft, and between them is a clutch-piece, c^3, which is locked to the rod *c* by a groove and feather, and which has at each end a clutch formation to engage with a similar formation on one or other of said pulleys c' c^2. When the clutch-piece is shifted into engagement with the pulley c', the rod *c* is rotated in one direction, and when in engagement with the pulley c^2 said rod is rotated in the reverse direction. As here shown, the clutch-piece is in engagement with the pulley c', and by such engagement the rod is rotated to move the saddle D toward the right in Fig. 1 by means which I shall soon describe. The clutch-piece c^3 is moved by a lever, c^4, fulcrumed at c^*, and with the lower end of said lever is connected a longitudinal rod, c^5, which is free to slide in bearings c^6. On the rod c^5 are secured adjustable collars c^7 c^{7*}, and on the saddle is an arm or bracket, c^8, which slides on the rod c^5 between the collars. The saddle moves toward the right until the arm c^8 strikes the collar c^{7*}, whereupon the rod c^5 is moved lengthwise, and the clutch-piece c^3 is shifted to a position intermediate between the pulleys c' c^2, and the rod or shaft *c* is stopped. By shifting the rod c^5 to move the clutch-piece c^3 into engagement with the pulley c^2, the rod *c* will be turned in a reverse direction and at a quicker speed, owing to the small diameter of the pulley c^2. The rod or shaft *c* is geared by wheels *d* d' d^2 with the head-spindle C, and hence it will be seen that the rod or shaft and the head-spindle turn at the same time, their relative speeds being according to the gearing employed. The wheel d' is on a stud, d^*, which is adjustable, and by changing the gear-wheels in a manner similar to changing the feed-gears on a lathe the speed of the spindle and work C W may be increased or diminished relatively to the speed of the shaft *c*. By introducing a fourth gear in the train

of feed-gears, the direction of rotation of the work relatively to the feed rod or shaft *c* may be reversed, if desired. The change of feed-gears is to be accomplished as in any slide-rest lathe, and as no claim is made thereto such feature is not illustrated. In the depending portion D′ of the saddle are fixed two studs, *e e′*. On the upper stud, *e*, is loosely fitted a sleeve or hub, having spur-pinions *f f′* at its opposite ends, and on the lower stud is loosely fitted a hub or compound wheel comprising a bevel-pinion, f^2, and a spur-pinion, f^3, capable of rotating as one piece. The bevel-pinion f^2 gears into or engages with a bevel-pinion, f^4, which is locked by a feather to turn with the grooved rod or shaft *c*, but which may slide along said rod or shaft. The bevel-pinion f^4 is embraced by an arm projecting inward from the saddle portion D′, and consequently as the saddle moves all the described system of feed-gears moves with it, and still receives motion from the rotation of said rod or shaft *c*.

The spur-pinion *f′*, above described, gears with a rack, f^5, on the bed A, and its rotation moves the saddle along the bed, the power to move the saddle being transmitted, as described, from the rod or shaft *c*. On the top of the saddle D is a dovetailed or gibbed projection or cross-slideway, to which is fitted a cross-carriage, E, capable of sliding toward and from the front of the machine, and adapted to be moved by the screw *g*, capable of being turned by a hand-wheel or handle, *g**. On the cross-carriage E are formed or secured standards *h h*, having at their upper ends bearings *h′* for a spindle, *i*, the said spindle being in the same horizontal plane as the head-spindle C. On the end of the spindle is a rotary cutter or cutter-head, *i′*, and on the end opposite the cutter is a pulley, i^2, to which may be imparted motion by a belt. (Not here shown.) The cross-carriage E also carries standards or uprights h^2 h^2, having formed in their upper ends bearings h^3 for a short shaft, *j*, which is at right angles to the work, and carries two pulleys, *j′* j^2. The shaft *j* is to be rotated by a quarter-twist belt, j^3, which receives motion from a long driving-drum, F, and drives on to the pulley *j′*. The said belt and drum are shown by dotted lines in Figs. 1 and 4, and as the saddle D D′ and all the parts supported by it are moved along the bed the belt j^3 will shift longitudinally on the drum F. The bearings h^3 are turned down on their exterior for a part of their length to form trunnion-bearings for a swinging frame, G, fitting thereon, and which may be held in any desired position by set-screws **. (Shown in Figs. 2 and 4.) In bearings *k* on the frame G is journaled in a plane parallel with the work a small spindle, *l*, carrying a fly-cutter, *l′*, of any suitable form and construction, and a pulley, l^2. The spindle *l* and fly-cutter *l′* are rotated rapidly by a belt, l^3, driving from the pulley j^2 on shaft *j* around guide-pulley l^1 and around the pulley l^2 on the spindle *l*, and its fly-cutter will receive a rapid rotary motion whatever be the position of the swinging frame G. The depth to which the cutter *i′* and the fly-cutter *l′* groove the work may be regulated by the screw *g;* but, if desired, a pattern might be arranged just above the saddle D and parallel with the work, and in such case the cross-carriage would have a pulley or wheel, *m*, at its front end, as shown in Figs. 2 and 5. The wheel *m* would be held in contact with the pattern by a cord and weight or by a spring, and as the saddle was traversed along the bed the cross-carriage E would move in and out on the saddle, as permitted or compelled to do by the form of the pattern. The swinging frame G is capable of adjustment, as described, to enable the fly-cutter *l′* to be set so as to cut in a plane corresponding to the degree of spirality of the groove formed in the work, and as the said frame may be swung through about half a circle, provision is afforded for setting the fly-cutter to a groove of any degree of spirality, either right or left hand. The cutters *i′ l′* are not intended to be used both at the same time, and when one is in use the other is removed to get it out of the way. When the cutter *i′* is to be used, the belt l^3 is taken off and another belt is applied to connect the pulleys j^2 and i^2, in order to rotate the spindle *i*.

What I claim as my invention is—

1. The combination, with the bed, work-spindles, saddle, and a cutter-spindle journaled in bearings supported by the saddle, and arranged transversely to the work, of the rotary feed rod or shaft and bevel-pinion sliding thereon, and the bevel and spur pinions carried by the saddle and engaging with a rack on the bed for moving the saddle, substantially as herein described.

2. The combination, with the bed and work-spindles, saddle, and cross-carriage, of the swinging frame pivoted transversely to the work, and a spindle journaled in said frame in a plane parallel with the work and carrying a fly-cutter for spirally grooving the work, substantially as herein described.

3. The combination, with the bed, work-spindles, saddle, and carriage, of a shaft journaled in said cross-carriage transversely to the work, a swinging frame pivoted concentrically with said shaft, a spindle journaled in the swinging frame in a plane parallel with the work, and a belt and guide pulleys for transmitting motion from a pulley on the said shaft to a pulley on the spindle, substantially as herein described.

4. The combination, with the bed, work-spindles, saddle, and cross-carriage, of a spindle and cutter journaled in the said carriage transversely to the work, the swinging frame pivoted on said carriage transversely to the work, and a spindle journaled in said frame in a plane parallel with the work and carry-

ing a fly-cutter, substantially as herein described.

5. The combination, with the bed, work-spindles, saddle, and cross-carriage, of a spindle and cutter journaled in said carriage transversely to the work, a transverse shaft, also journaled in the carriage, a swinging frame pivoted concentrically with the said shaft, and a spindle journaled in said frame in a plane parallel with the work and carrying a fly-cutter, substantially as herein described.

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