(No Model.) 3 Sheets—Sheet 1.

G. K. GARVIN & C. E. HADLEY.

TAPPING MACHINE.

No. 342,866. Patented June 1, 1886.

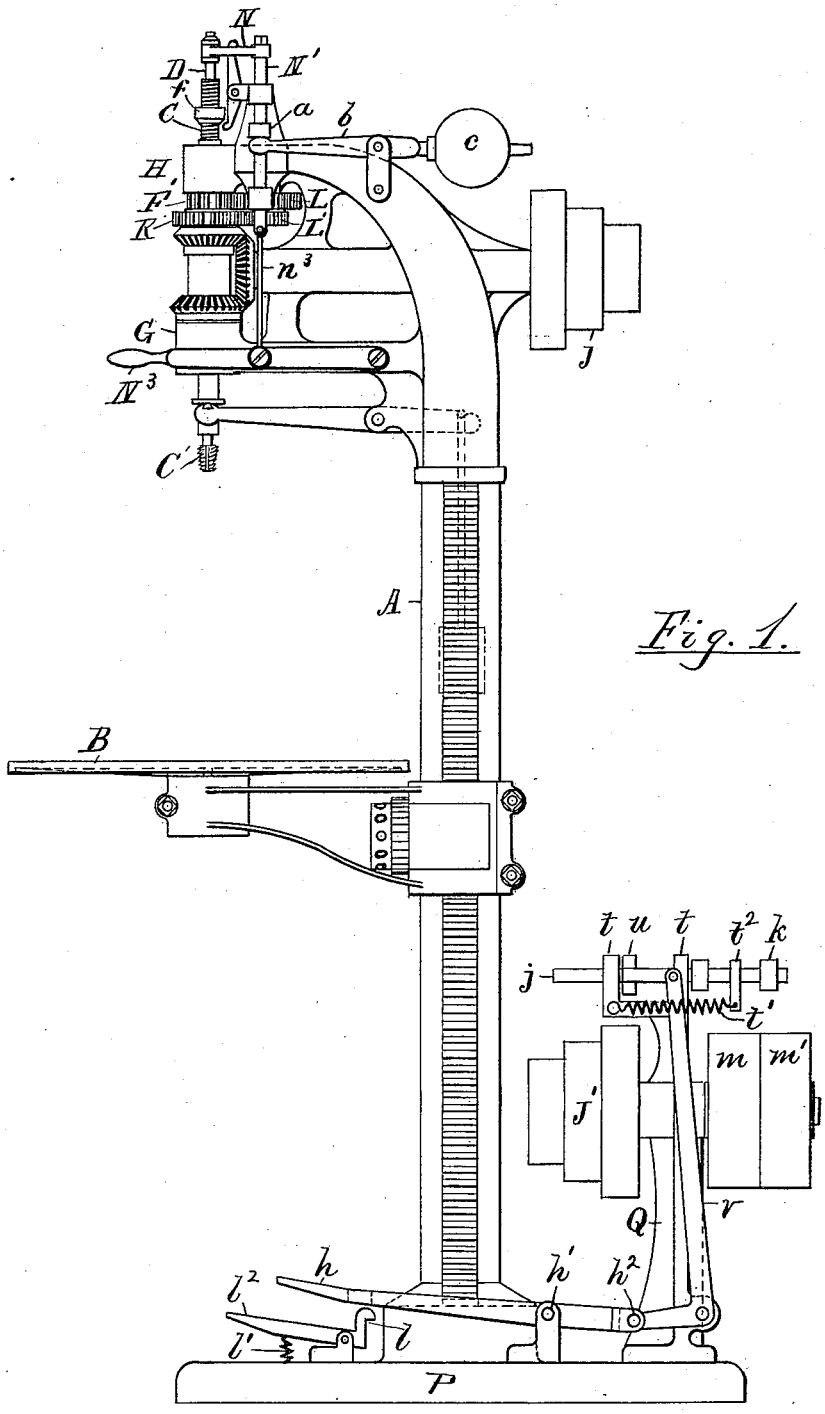

Fig. 1.

Attest:
L. Lee
J. H. Theberath,

Inventor.
Geo. K. Garvin & Chas. E. Hadley.
per Crane & Miller, attys.

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G. K. GARVIN & C. E. HADLEY.

TAPPING MACHINE.

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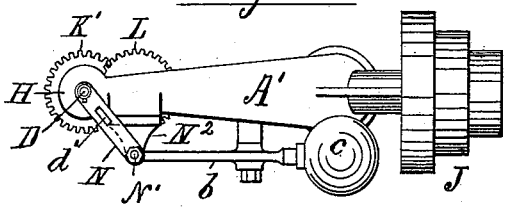
Fig. 2.



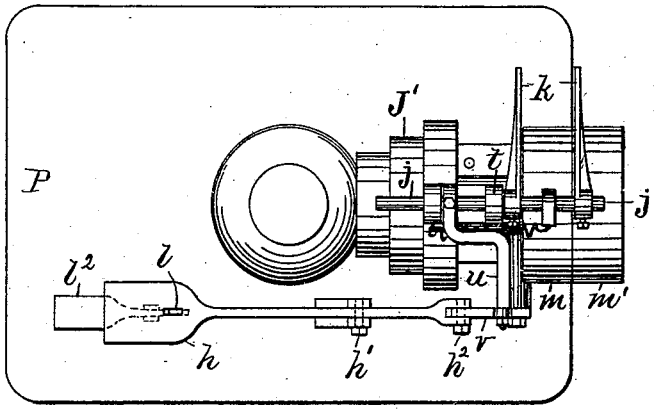


Fig. 3.

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L. Lee Geo. K. Garvin & Chas. E. Hadley.

J. H. Theberath. per Crane & Miller, attys.

(No Model.) 3 Sheets—Sheet 3.

G. K. GARVIN & C. E. HADLEY.

TAPPING MACHINE.

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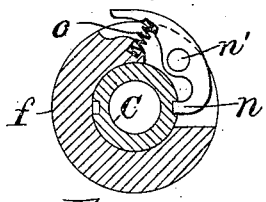

Fig. 7.

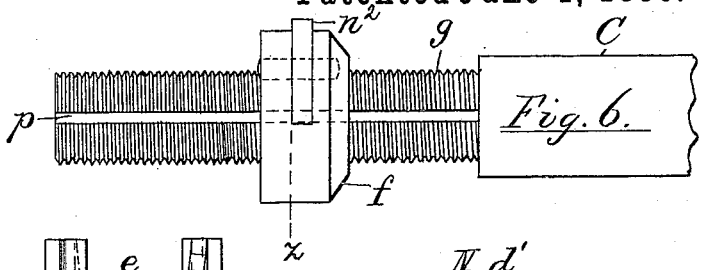

Fig. 6.

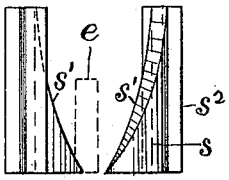

Fig. 11.

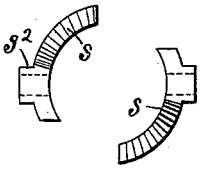

Fig. 10.

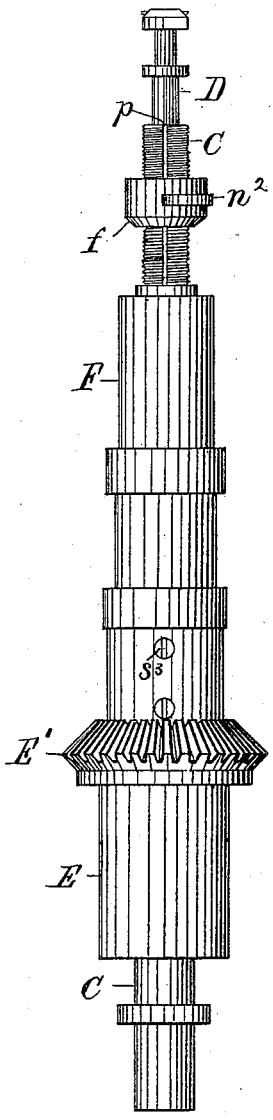

Fig. 5.

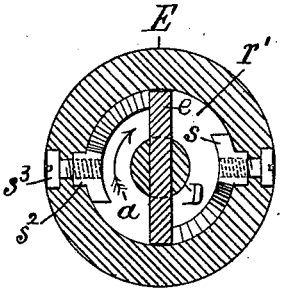

Fig. 9.

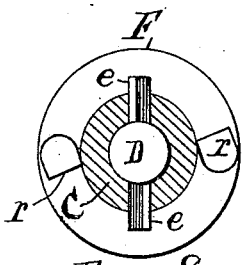

Fig. 8.

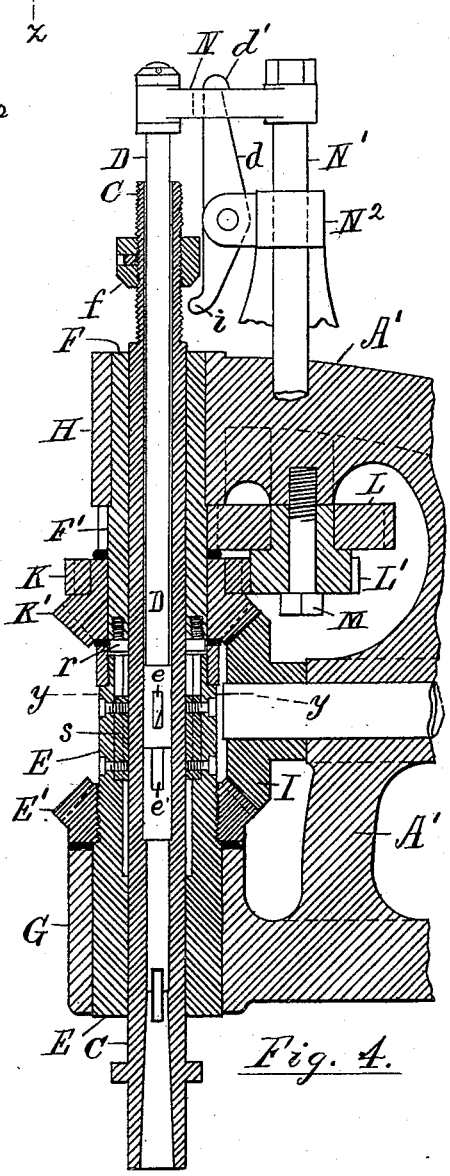

Fig. 4.

Attest;

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J. H. Thebrath

Inventor,

Geo. K. Garvin & Chas. E. Hadley

per Crane & Miller, Attys.

UNITED STATES PATENT OFFICE.

GEORGE K. GARVIN AND CHARLES E. HADLEY, OF NEW YORK, N. Y., ASSIGNORS TO E. E. GARVIN & CO., OF SAME PLACE.

TAPPING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 342,866, dated June 1, 1886.

Application filed October 3, 1885. Serial No. 178,882. (No model.)

To all whom it may concern:

Be it known that we, GEORGE K. GARVIN and CHARLES E. HADLEY, citizens of the United States, residing at New York, in the county and State of New York, have invented certain new and useful Improvements in Tapping-Machines, fully described and represented in the following specification, and the accompanying drawings, forming a part of the same.

The object of this invention is to furnish a more effective construction for reversing the rotations of the spindle, for running the same upward at an increased speed, and for shifting the driving-belt by means of a treadle. These improvements will be understood by reference to the annexed drawings, in which—

Figure 1 is a side elevation of a tapping-machine provided with my improvements. Fig. 2 is a plan of the head of the machine. Fig. 3 is a plan of the bed-plate with the belt-shifting devices. Fig. 4 is a vertical section of the head, the view also including a trip-lever for automatically reversing the clutch mechanism; and Fig. 5 is an external view of the tap-spindle, and of the sleeves and other clutching apparatus directly attached to the spindle. Fig. 6 is an enlarged view of the top of the spindle, with the tripping-cone, Fig. 7 being a transverse section of the same at one side of the latch on line *z* in Fig. 6. Fig. 8 is an end view of the upper clutch-sleeve and reversing rod and key, with the spindle C shown in section. Fig. 9 is a section of the clutch devices on line *y y* in Fig. 4, looking downward, the spindle being omitted to introduce an arrow, *a*, to show the direction of rotation. Fig. 10 is a plan, and Fig. 11 a side elevation, of the sloping seats, Fig. 11 being projected from Fig. 10, an end view of the key *e* being shown in dotted lines with its beveled face in contact with the sloping surface *s*.

A represents the column of the machine, upon which is mounted a table, B, adapted to support the various fixtures to be tapped.

C is the spindle of the machine, and D a reversing-rod inserted within its bore and furnished with a transverse key, *e*, to operate with the clutching devices.

e' is a slot formed in the spindle, through which the opposite ends of the key project, to engage with seats and dogs which are revolved in opposite directions by sleeves surrounding the spindle. These sleeves are fitted, respectively, to the lower spindle-bearing, G, and its upper bearing, H, the sleeves being revolved in opposite directions by gearing connected with a bevel-wheel, I, operated by a cone-pulley, J, in the usual manner. The seats *s* are fitted inside the lower sleeve, E, to which is attached a bevel-gear, E', meshing directly with the gear I. The dogs *r*, for reversing the rotations of the spindle, are attached to the lower end of the upper sleeve, F, upon which is formed a spur-pinion, F'. A pair of spur-wheels, L L', are fitted to turn together upon a stud, M, adjacent to the sleeve F, the wheel L meshing with the pinion F'. Below said pinion a bevel-gear, K', is fitted to turn loosely upon the sleeve F, with a spur-wheel, K, which meshes with the wheel L', and the wheels L L' are so proportioned that one rotation of the bevel-wheel K' will produce two or more rotations of the sleeve F, to operate the tap more rapidly during its reverse movement. The sleeves E and F are rotated in opposite directions by the action of their respective gearings, and the dogs *r* and seats *s* operate upon the projecting ends of the key *e* to turn the spindle in the same direction as the sleeve with which the key is engaged. The movement of the reversing-rod and holder is sufficient to shift the key from the dogs *r* to the seats *s*, and the rod is actuated by a holder, N, swiveled to its upper end and carried by a rod, N', which is fitted to bearings N^2 upon the head of the machine at A', and a handle, N^3, and link n^3 are pivoted to the rod N' to shift the rod by hand. It may thus be moved to engage the key *e* with either the dogs *r* or seats *s* at pleasure; but is pressed normally upward to make the key engage with the dogs *r* by a weight, *c*, acting through a lever, *b*, upon a collar, *a*, on the rod N'. A latch, *d*, is pivoted upon the bearing N^2, and provided with a hook, *d'*, to engage the holder and retain the key in contact with the seats *s*. Such a clutch-key, operated by sleeves revolving in opposite directions, is not new; but our improvement consists in the particular construction of the seats *s*, which we have shown upon a larger scale in Figs. 9, 10, and 11, to illustrate their construction more fully.

The object of our improvement is to facilitate the shifting of the key from the seats to the dogs, so as to secure an immediate reversal of the rotary movement when the tap has penetrated the desired amount, such reversal being commonly effected by a cone, *f*, applied to the upper end of the spindle, and operating to trip the latch *d* by contact therewith.

A tap, C′, is shown affixed to the nozzle of the spindle C in Fig. 1, and the operator, by pressure downward upon the handle N³, applies the tap to the object which requires tapping when secured upon the table B, and maintains such pressure until the tap is engaged in the hole which is to be threaded. The continued rotation of the tap then serves to draw the spindle downward, and thus move the cone *f* toward the latch *d*. The cone is adjustable upon the spindle to trip the latch when the tap has penetrated the threaded hole a sufficient distance. The latch is shown formed with a projection, *i*, to engage the cone, the sloping face of which pushes such projection sidewise and detaches the hook *d′* from the holder, which latter is shown in Fig. 2 provided with a mortise to receive the top of the latch. Heretofore, when the cone has thus tripped the latch a heavy weight has been required to withdraw the key from the seats *s*, because of the friction resulting from the heavy strain upon them, and the parallelism of their sides with the movement of the key.

Our improvement consists in sloping the faces of the seats backward, as shown at *s′* in Fig. 11, and beveling the ends of the key in contact therewith, as is shown upon the key in Fig. 4, thereby inducing an immediate longitudinal movement of the key and rod N′ as soon as the latch is tripped.

The seats, to secure durability, are separately formed of steel, as segments of a bush inserted within a recess, *r′*, in the sleeve E, and are formed with tongues *s²*, fitted to corresponding grooves in the sleeve, as shown in the section of the sleeve in Fig. 9. Screws *s³* are inserted through the outside of the sleeve into the tongues to hold the seats in place. An arrow, *a′*, in said figure shows the direction of the sleeve's rotation, and indicates clearly how the sloping faces upon the seats tend to force the key upward when relieved from the restraint of the latch *d*, and the upward movement is thus promptly effected with the assistance of a very light weight upon the lever *b*. Such construction, therefore, not only dispenses with the greater part of the weight heretofore employed to reverse the rod D, but secures much greater accuracy and certainty in the reversing movement of the clutching devices.

It is obvious that the angle or slope *s′*, Fig. 11, may be varied, so as to effect the reversing movement at any required rate; but as the driving of the tap is effected through these sloping surfaces, it is obvious that their angle should not greatly exceed that which is required to overcome the friction of their contact with the key, the driving of the spindle being thus effected without any great upward strain upon the latch *d*, while the upward movement of the key is greatly hastened when the latch is unlocked.

To adjust the point at which the cone *f* engages the latch, the cone is commonly fitted upon a screw-thread, *g*, upon the upper end of the spindle, and in such case has required a lock-nut to hold it in its adjusted position. To obviate the use of such lock-nut, and to hold the cone detachably upon the sleeve, we have invented a spring-catch, *n*, fitted to a continuous groove, *p*, formed in the screw-thread *g*, the latch being pivoted at *n′* upon the cone, and provided with a spring, *o*, to hold it normally in the groove. The catch is shown fitted in a slot in the side of the cone, and projects beyond the pivot to receive the pressure of the spring and to form a thumb-piece, *n²*, by which it may be withdrawn from the groove, and when thus withdrawn the cone may be held stationary by the hand of the operator, while the spindle is rotated through the agency of its driving-pulley J to adjust the cone *f* to the desired point. When thus adjusted, the catch is allowed to engage with the groove *p*, and serves to hold the cone securely in such position until it requires readjustment.

In practice we form two grooves, *p*, at opposite sides of the spindle, to secure a more minute adjustment of the cone upon the thread *g*. The counter-shaft of the machine, carrying the cone-pulley J′ and fast and loose pulleys *m m′*, is shown mounted upon the bed-plate P by means of a standard, Q, the latter being constructed at its upper end with guides *t*, to receive a slide, *j*, to which are fitted shifters *k*, to guide the fast and loose pulleys *m m′*. The slide is provided between the bearings *t* with an arm, *u*, to which is jointed the upper end of a bell-crank, *v*, and a treadle, *h*, is pivoted upon the bed-plate *h′* and jointed to the bell-crank at *h²*, so that the depression of the treadle by the operator's foot serves to throw the driving-belt (not shown in the drawings) upon the pulley *m′*. A spring, *t′*, is affixed to one of the bearings and to a dog, *t²*, upon the slide, and operates to hold the belt-guides over the loose pulley; and a pawl is pivoted to the bed adjacent to the foot-plate of the treadle to hold the same downward when depressed by the operator, and to thus retain the belt-guides over the fast pulley in opposition to the spring *t′*. The pawl is provided with a spring, *l′*, to keep it normally hooked upon the treadle, and with a tail-piece, *l²*, which may be depressed at any time when the treadle is locked down to release the treadle and permit the spring *t′* to shift the belt-guides and belt gradually over the loose pulley *m*. By this construction the spring *t′* operates to shift the belt without attention from the operator after the pawl *l* is detached, and the operator is also able, with equal facility, to throw the belt upon the fast pulley

by merely depressing the treadle *h*. The stopping and starting of the machine are therefore effected exclusively by the foot of the operator, leaving his hands entirely free to manipulate the working parts at the head of the machine, and to remove the fixtures from the table as they are tapped.

Having thus described the nature and objects of our invention, what we claim is—

1. In a tapping-machine, the clutching-mechanism consisting in a spindle and two sleeves rotated in opposite directions around the same, a key inserted transversely in the spindle and having beveled ends projected therefrom and movable longitudinally with a central shifting-rod, projections upon one of the sleeves to rotate the spindle in a reverse direction, and seats *s*, affixed within the other sleeve around the spindle and formed with faces sloped toward the said dogs, and adapted both to rotate the spindle by contact with the key and to move the shifting-rod longitudinally by pressure upon the beveled faces of the key, all combined substantially as herein shown and described.

2. In a tapping-machine having a spindle and two sleeves rotated in opposite directions around the same, the combination, with a movable key fitted transversely in the spindle, of seats *s*, secured within one of the rotating sleeves by tongues s^2 and screws s^3, the seats being formed with inclined faces *s'* sloped backward from the direction of their rotation, substantially as and for the purpose set forth.

3. In a tapping-machine, the combination, with the spindle C and the surrounding sleeves E and F, rotated in opposite directions, of the bevel-gear I, the bevel-gear E', affixed to the sleeve E, the pinion F', affixed to the sleeve F and rotated in a direction opposite to the wheel E', the spur-wheels L L', mounted to turn together upon the stud N, the bevel-wheel K', fitted loosely upon the sleeve F and rotated by the wheel I, and the spur-wheel K, affixed to the wheel K', for driving the wheel L', the whole arranged and operated substantially as and for the purpose set forth.

4. A tapping-machine constructed with a column, A, mounted upon a bed-plate, P, and provided with a table, B, and operating and reversing mechanism, substantially as described, and the bed-plate jointly with a counter-shaft having fast and loose pulleys, a movble belt-shifter sustained adjacent to the pulleys, a treadle pivoted upon the bed-plate and connected with the belt-shifter, and a pawl arranged and operated to hold the treadle when depressed, the stopping and starting of the tapping mechanism being thus allowed to be effected by the foot of the operator, leaving his hands at liberty to manipulate the objects applied to the table B, and to operate the shifting-handle N^3, substantially as herein set forth.

5. The combination, in a tapping-machine, of a tap-spindle having a threaded portion provided with a longitudinal groove, a reversing clutch mechanism for actuating the spindle, a cone or dog fitted to the screw-thread to actuate the clutch-reversing devices, and a catch pivoted on the cone or dog and locking into the said groove, as and for the purpose set forth.

6. In a tapping-machine, the combination, with the spindle C, provided with screw-thread and longitudinal groove, as described, of the cone *f*, fitted to such thread, the catch *n*, pivoted on the cone and fitted to said groove, and the spring *o* and tail-piece n^2, for operating the catch, substantially as and for the purpose set forth.

In testimony whereof we have hereunto set our hands in the presence of two subscribing witnesses.

GEO. K. GARVIN.
CHARLES E. HADLEY.

Witnesses:
THOS. S. CRANE,
JOHN T. WILLIAMS.