(No Model.) 3 Sheets—Sheet 1.

I. L. PENNEY.

Grinding Twist Drills.

No. 230,715. Patented Aug. 3, 1880.

FIG. 1

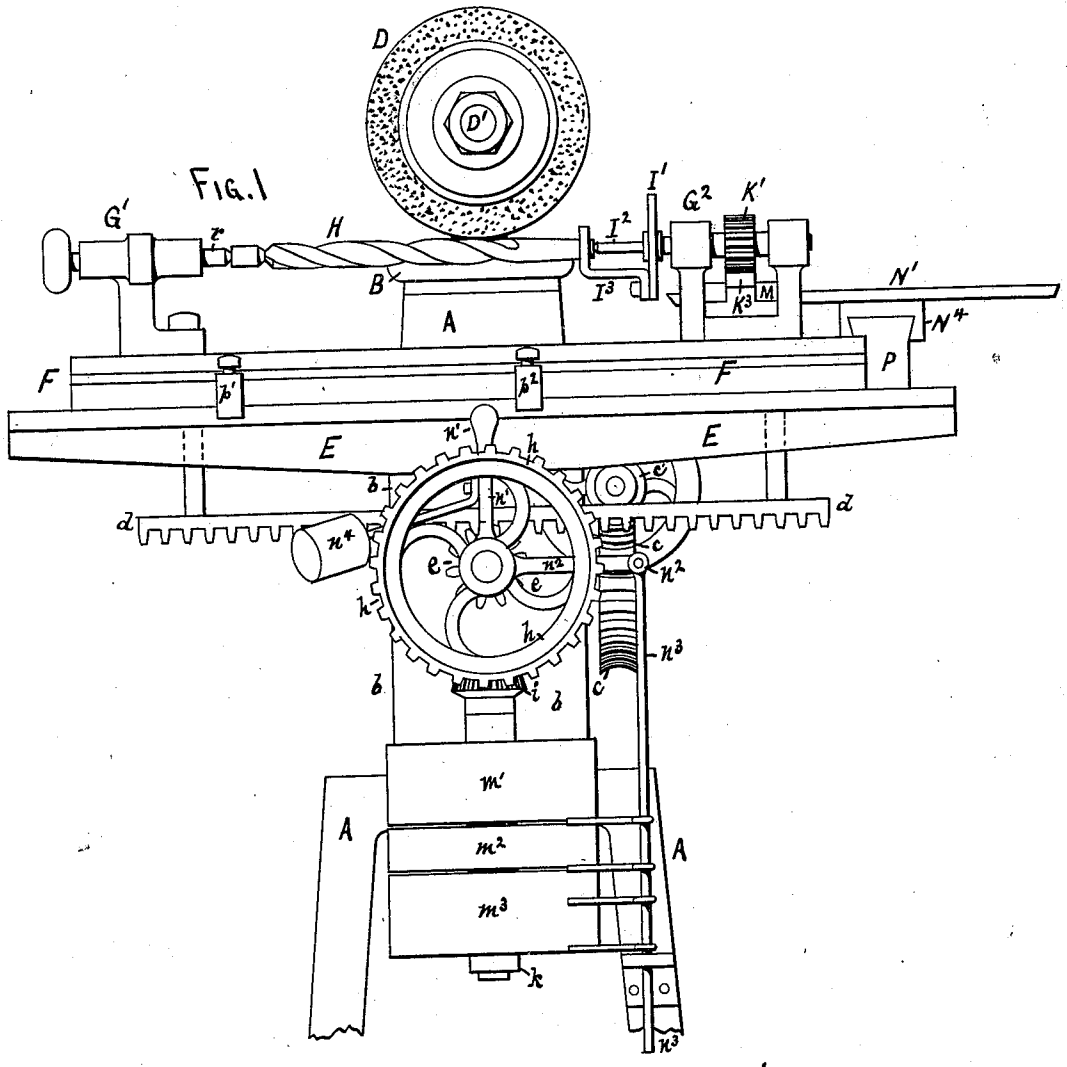
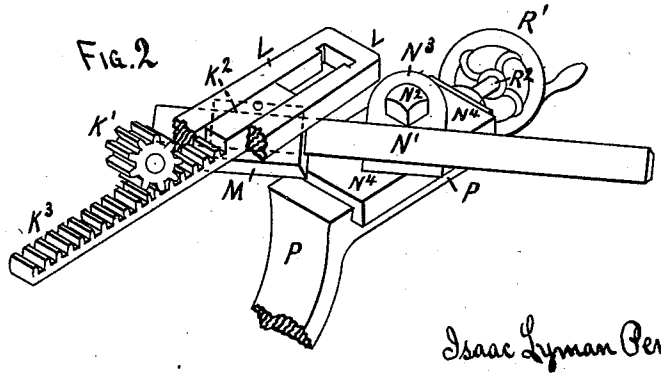


FIG. 2



WITNESSES.
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(No Model.) 3 Sheets—Sheet 2.

I. L. PENNEY.

Grinding Twist Drills.

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FIG. 3.

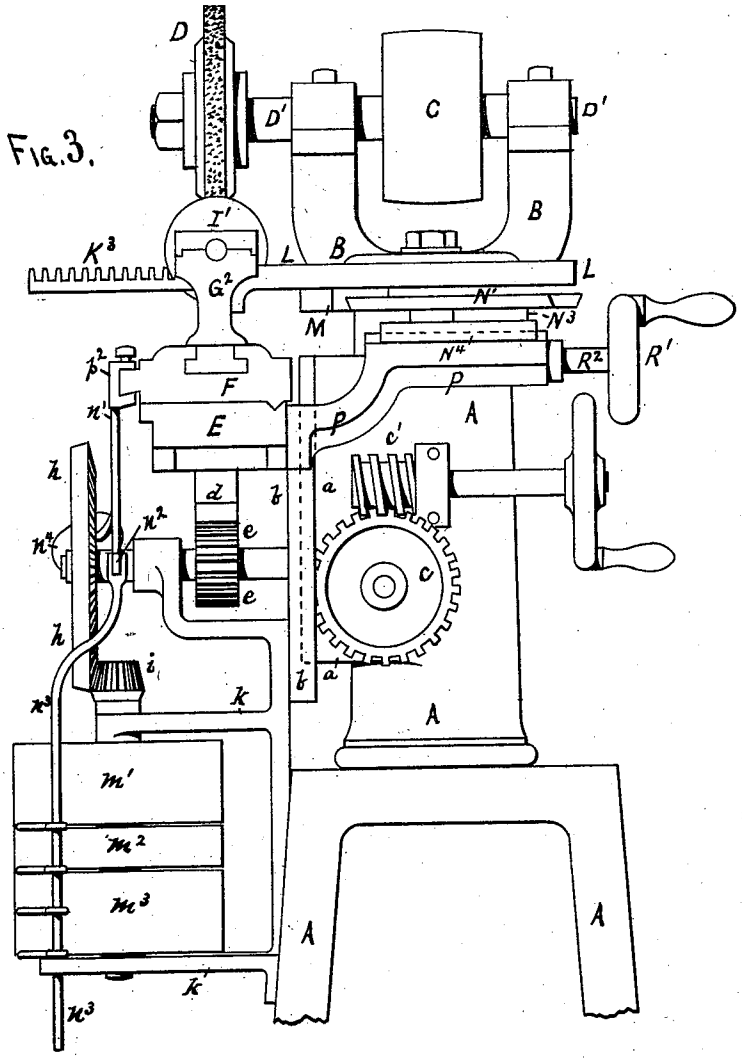
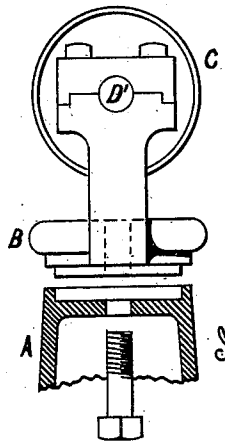


FIG. 4.



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3 Sheets—Sheet 3.

I. L. PENNEY.

Grinding Twist Drills.

No. 230,715. Patented Aug. 3, 1880.

FIG. 5

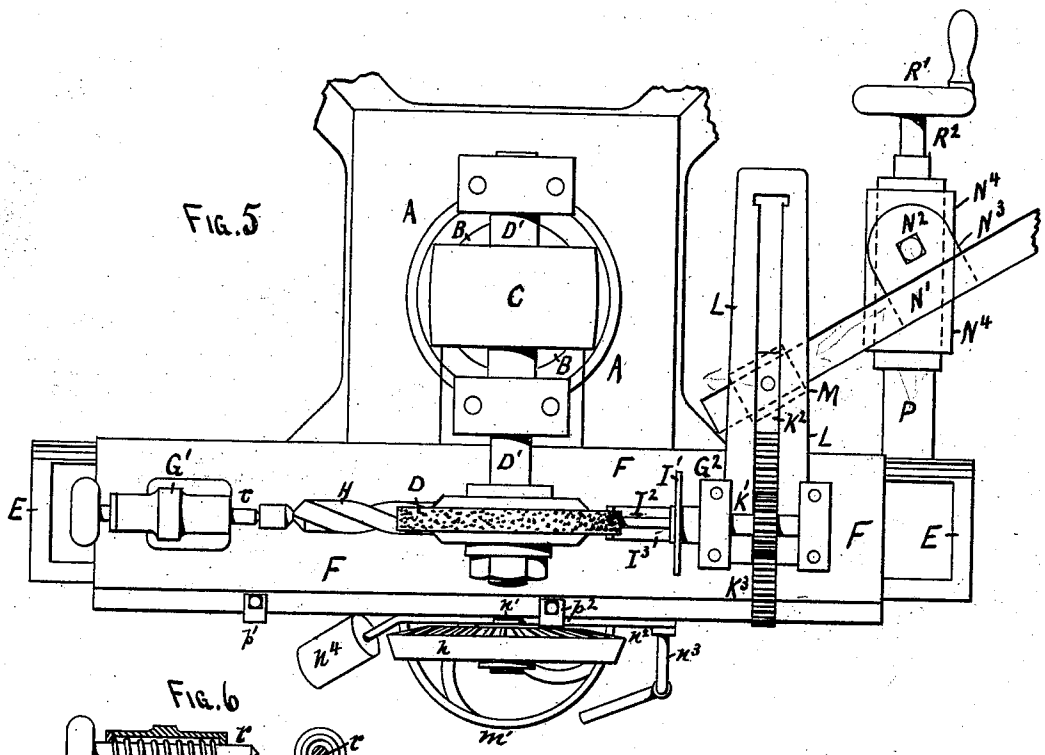


FIG. 6

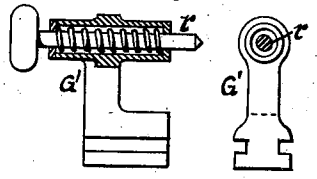


FIG. 8

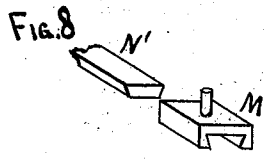
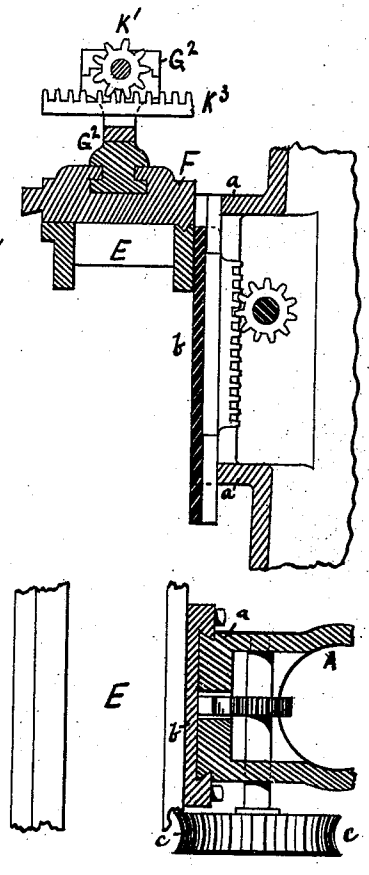


FIG. 7



Isaac Lyman Penney,

INVENTOR. BY

Louis Fessenden & Co.

Atty's.

WITNESSES.

Edw. Robert

W. Goodenow.

UNITED STATES PATENT OFFICE.

ISAAC L. PENNEY, OF MINNEAPOLIS, MINNESOTA, ASSIGNOR OF ONE-HALF OF HIS RIGHT TO EDWARD GEORGE BROOKS, OF SAME PLACE.

GRINDING TWIST-DRILLS.

SPECIFICATION forming part of Letters Patent No. 230,715, dated August 3, 1880.

Application filed April 26, 1880. (No model.)

To all whom it may concern:

Be it known that I, ISAAC LYMAN PENNEY, of Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain Improvements in Machines for Grinding Twist-Drills, &c., of which the following is a specification.

This invention relates to machines for grinding twist-drills, &c.; and it consists in a laterally-sliding frame mounted upon a vertically-adjustable table and provided with two adjustable heads, between which the drill or other article to be ground is centered and held beneath an emery-wheel, the rear head being provided with a pinion adapted to be acted upon by a rack working in a slotted arm attached to the sliding frame, said rack being connected at one end by a swiveled clamp to an inclined bar or guide attached adjustably to a bracket upon the vertically-adjustable table, whereby the lateral movement of the drill-holding frame revolves the drill in one direction by the forward motion, and back again in the opposite direction by the backward motion of the same table, so that all parts of the drill may be ground, or the distance it is revolved adjusted to cause the emery-wheel to follow the channels or twist of the drill, as hereinafter set forth. I accomplish these results by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a front elevation. Fig. 2 is a perspective view of the drill-revolving mechanism detached. Fig. 3 is an end elevation. Fig. 4 is a sectional elevation of the swiveled emery-wheel shaft-head and a portion of the standard, illustrating the manner of attaching them to each other. Fig. 5 is a plan view. Fig. 6 is a sectional side elevation and an end view of the spring-center back head. Fig. 7 is a sectional side elevation and sectional plan view of the standard, double-sliding adjustable frame, and front head, showing the manner of adjusting them; Fig. 8, a perspective view of the inclined drill-revolving bar and its slide detached.

A is the base or standard, upon which a head, B, is swiveled, and carrying a pulley, C, and emery-wheel D on a shaft, D′, in the usual manner, so that the wheel D may be revolved vertically and adjusted horizontally, as hereinafter set forth.

Attached to the front of the standard A is a plate, *a*, upon which a slide or bracket, *b*, is mounted, so that it may be moved up or down by a worm-gear, *c*, and worm-pinion *c′*. Upon this sliding bracket *b* a horizontal table, E, is set, upon which a frame, F, is arranged to slide back and forth. Beneath this frame F, and attached to it, is a rack, *d*, adapted to be acted upon by a pinion, *e*, mounted on a shaft journaled in the adjustable bracket *b*, and carrying a beveled gear, *h*, on its outer end.

i is a beveled pinion upon an upright shaft carrying three pulleys, m' m^2 m^3, and journaled in a frame, *k*, attached to the same bracket *b*, so that the table E and pulleys and gears may be all raised and lowered together. Two of the pulleys, m' m^3, are loose upon their shaft, while the third, m^2, or center one, is tight upon the shaft. Two belts are run from these pulleys to a drum upon the main driving-shaft of the machinery, one being crossed while the other is straight, so that when the crossed belt is run upon the tight pulley m^2 the frame F, through the rack *d* and wheel and pinions *e h i*, will be moved in one direction, and then when the straight belt is run upon the tight pulley the frame will be moved in the opposite direction.

n' n^2 is a bell-crank lever pivoted upon the shaft of the gear *h* and pinion *e*, one arm, n', of which extends upward alongside the sliding frame F, where it is acted upon by small adjustable lugs p' p^2 upon the frame F, to raise and lower the other arm, n^2, to which the shipper-rod n^3 is connected, so that the belts are changed from the tight pulley m^2 to the loose pulleys m' m^3 automatically by the forward and backward movement of the frame F.

The lugs p' p^2 being adjustable, enable the length of travel of the frame F to be controlled or regulated at pleasure, while a counter-weight, n^4, on the arm n', balances the shipper-rod and renders the operation easy.

The upper side of the frame F is provided with a longitudinal groove or channel, in

which two heads, G′ G², are set and held by set-screws, so that they may be adjusted to receive different lengths of drills, &c.

The rear head, G′, is provided with a center, *r*, having a spring by which it is held in contact with the drill H or other article being ground, (see small detached view beneath the rear head, G′, in Fig. 1,) while the front head, G², is provided with a face-plate, I′, and a center, I², by which the drill H is centered and held by a dog, I³, in the ordinary manner of holding work in lathes, so that when the journal of the face-plate is revolved the drill will be revolved with it.

The front head, G², is formed with two standards carrying the journal of the face-plate I′, and between which, upon the same journal, a pinion, K′, is keyed, as shown.

Attached to the side of the head G² or frame F, opposite the pinion K′, and projecting outward at right angles thereto, is a slotted arm, L, in which a slide, K², on the end of a rack, K³, operates. This rack runs backward beneath the pinion K′, and meshes into it, so that when the slide K² is run back and forth the pinion K′ will be revolved to the right and left.

Pivoted to the under side of the slide K² is a plate, M, having a dovetailed groove cut in its under side and adapted to receive a dovetailed edged bar, N′, secured by a set-screw, N², and lug N³, to another slide, N⁴, mounted upon a bracket, P, attached rigidly to and at right angles with the end of the table E.

R′ is a hand-wheel upon a screw, R², journaled in the rear end of the bracket P, and acting in a nut on the slide N⁴, so that the latter may be run inward and outward to alter the throw of the rack K³ and slide K², as hereinafter explained.

In that class of tools known as "twist-drills" two or more grooves or channels are formed therein, and consequently two or more lands or ridges; and to grind these lands perfectly true is the principal object of my invention.

When the machine is started the sliding frame F and drill H are vibrated beneath the emery-wheel, as before described. This action causes the slide K² to run back and forth on the inclined bar N′, by means of the slide M, and thus move the rack K³ inward and outward, and revolve the pinion K′ back and forth, and with it, through the dog I³, the drill H.

By properly adjusting the bar N′ and slide N⁴ the number of revolutions of the drill may be perfectly controlled and the lands or ridges of the drill kept in constant contact with the emery-wheel D, and the latter made to follow any desired twist or serpentine form.

In grinding out the channels or grooves in the drills a round rimmed wheel, D, is used, and the dog I³ and rack K³ removed, and the drill held only by the centers *r* I′.

The table E and frame F are adjusted by the worms *c c′*, so that the edge of the emery-wheel D will enter one of the channels of the drill. Then, when the latter is moved back and forth, the wheel will follow the serpentine-shaped channel, and cause the drill to revolve on the centers *r* I′, thus doing away with all apparatus for holding the drill, while the channels are being ground out, except the plain centers.

The emery-wheel will be adjusted on its swivel-head B to bring its shaft at right angles to the drill-channel, so that it will follow the channel freely.

When the drill H is being acted upon by the emery-wheel the friction raises its temperature sufficiently to expand it longitudinally—in some cases one-sixteenth of an inch. This would, were the centers *r* I′ both fixed, cramp the drill so that it could not be revolved; but by forming the rear center, *r*, with a spring this expansion will simply depress the spring and enable the drill to be revolved easily at all times, no matter how much expanded or shrunk. This is a very important part of my invention, and is novel, so far as I am aware.

The swivel-headed emery-wheel is also a very important feature of my invention, as by its use I am enabled to adjust the emery-wheel to the angle of the channels in the drills, and thus grind them out very truly and cheaply.

What I claim as new is—

1. In an emery-grinding machine, the vertically-adjustable table E, surmounted by the vibrating frame F, having the head G², provided with means for centering and holding the article to be operated upon, in combination with an adjustable mechanism adapted to be acted upon by the vibrating movement of frame F to revolve the article being ground back and forth as it passes beneath the emery-wheel, whereby all parts of its surface may be equally acted upon, substantially as set forth.

2. The front head, G², mounted adjustably upon the frame F, and having suitable means for centering and holding the article being ground, and provided with a pinion, K′, adapted to be acted upon by a rack, K³, sliding in a slotted arm, L, in combination with an inclined adjustable bar, N′, whereby the lateral vibration of the frame F will cause the bar N′ to move the rack K³ back and forth beneath the pinion K′ and revolve the article being ground back and forth, substantially as set forth.

3. The combination and arrangement of the bracket P, secured to the table E, slide N⁴, adjustable at right angles to the table E, and provided with the adjustable bar N′, slide M, rack K³, slide K², arm L, pinion K′, and head G², substantially as set forth.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

ISAAC LYMAN PENNEY.

Witnesses:
C. N. WOODWARD,
EDWARD ROTERT.