(No Model.)

2 Sheets—Sheet 1.

F. CHASE.

MACHINE FOR GRINDING DRILLS.

No. 331,115. Patented Nov. 24, 1885.

Fig. 1

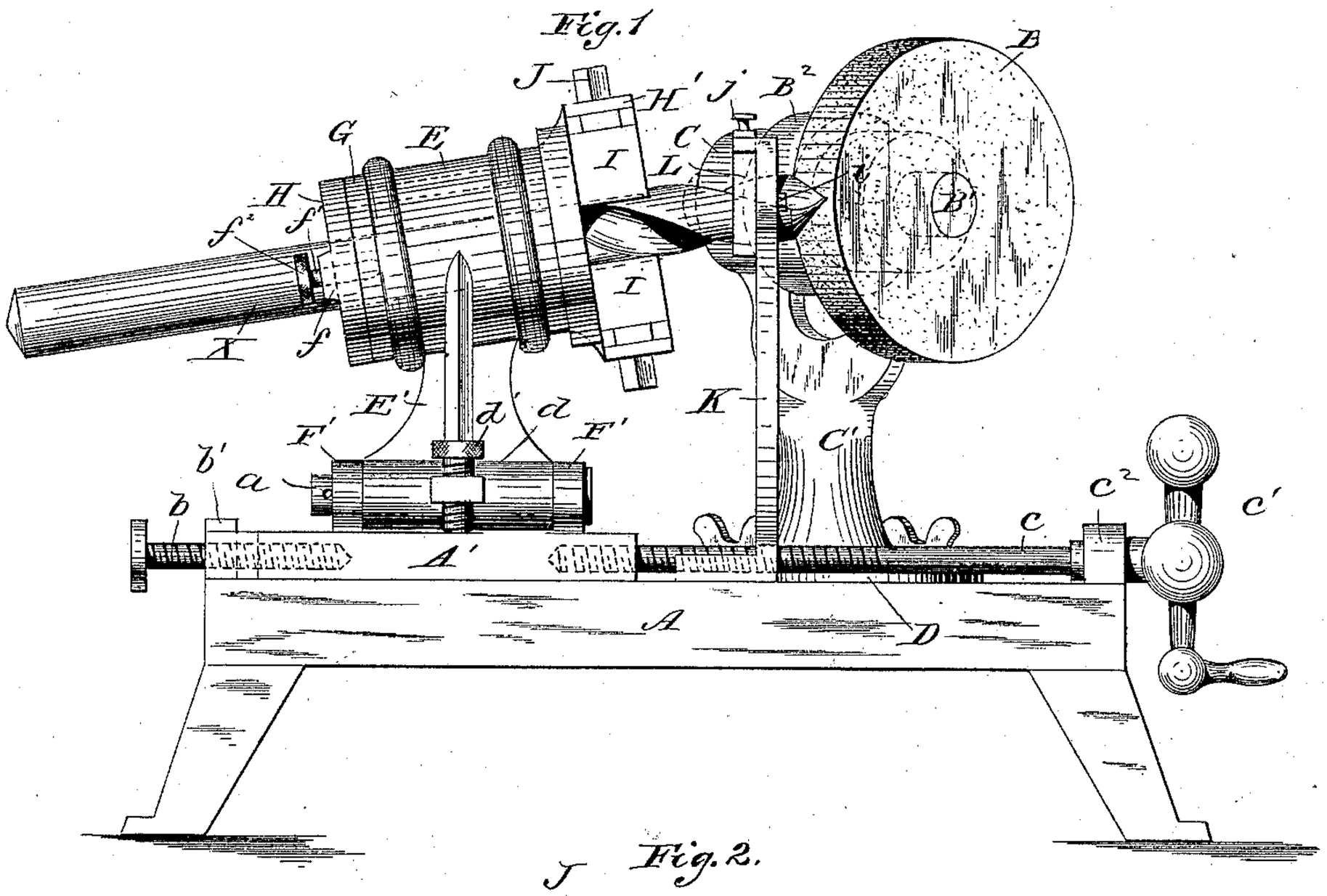
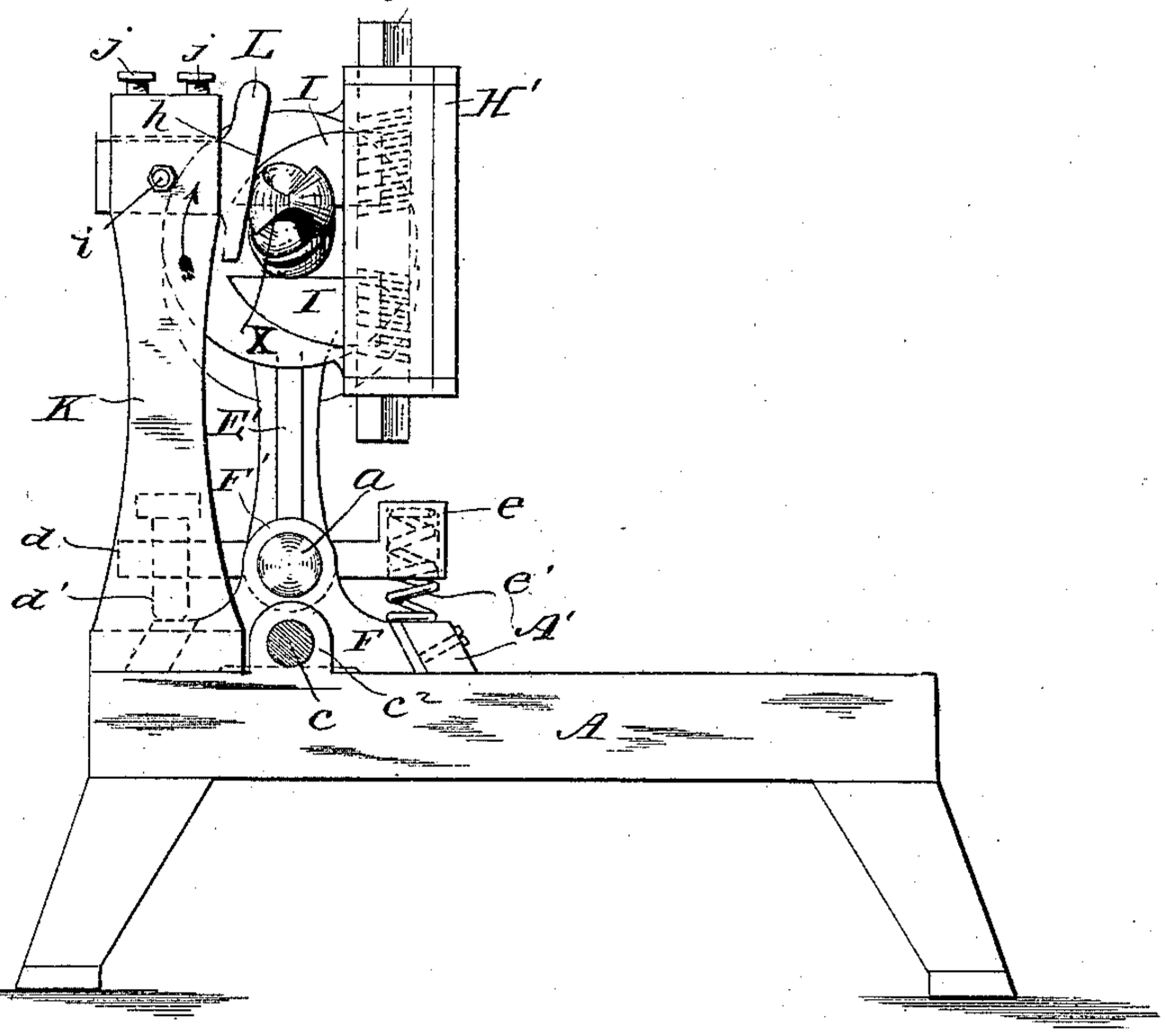


Fig. 2.



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Inventor:
Frank Chase
by Marcellus Bailey
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(No Model.) 2 Sheets—Sheet 2.

F. CHASE.

MACHINE FOR GRINDING DRILLS.

No. 331,115. Patented Nov. 24, 1885.

Fig. 3.

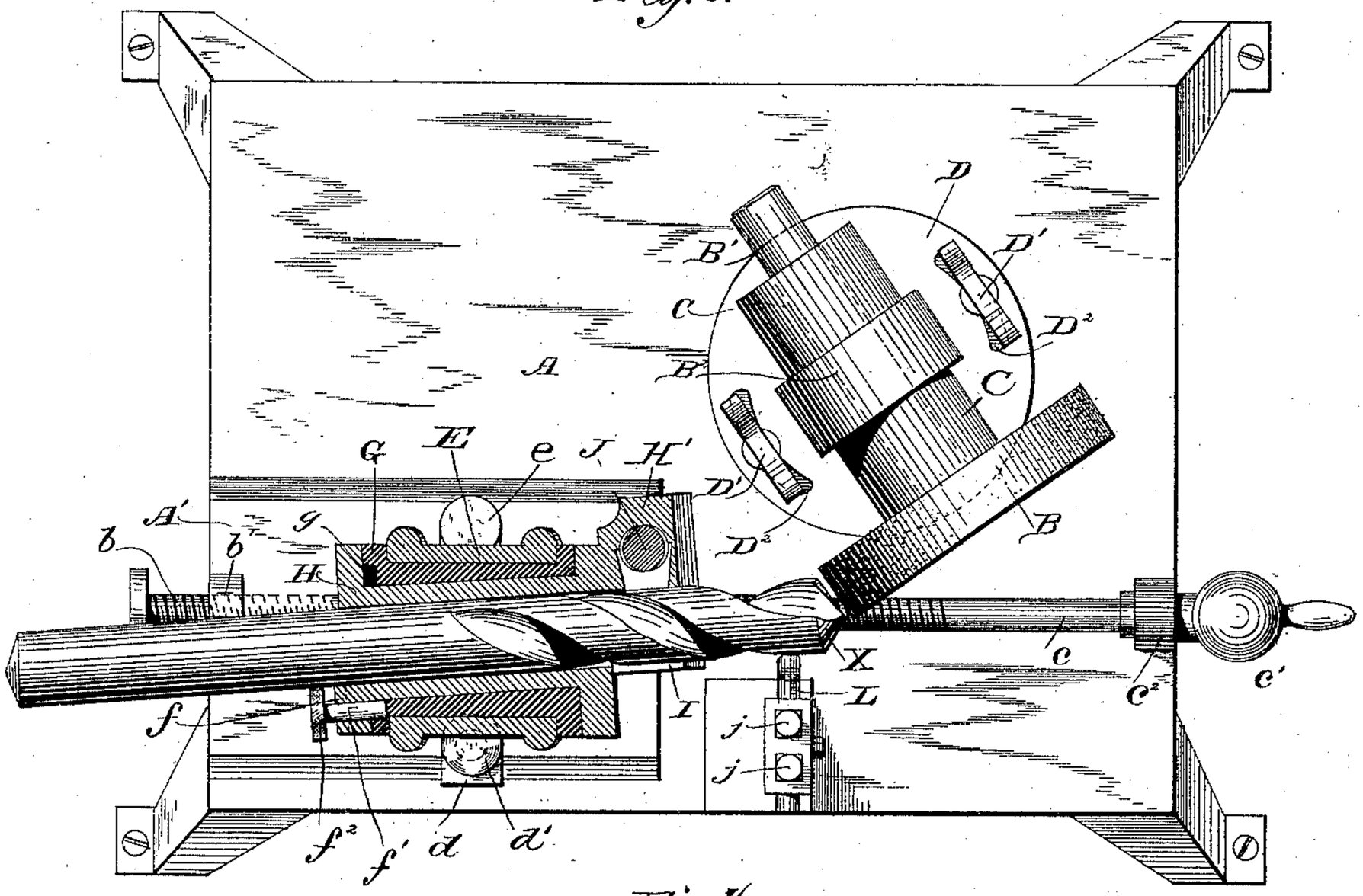
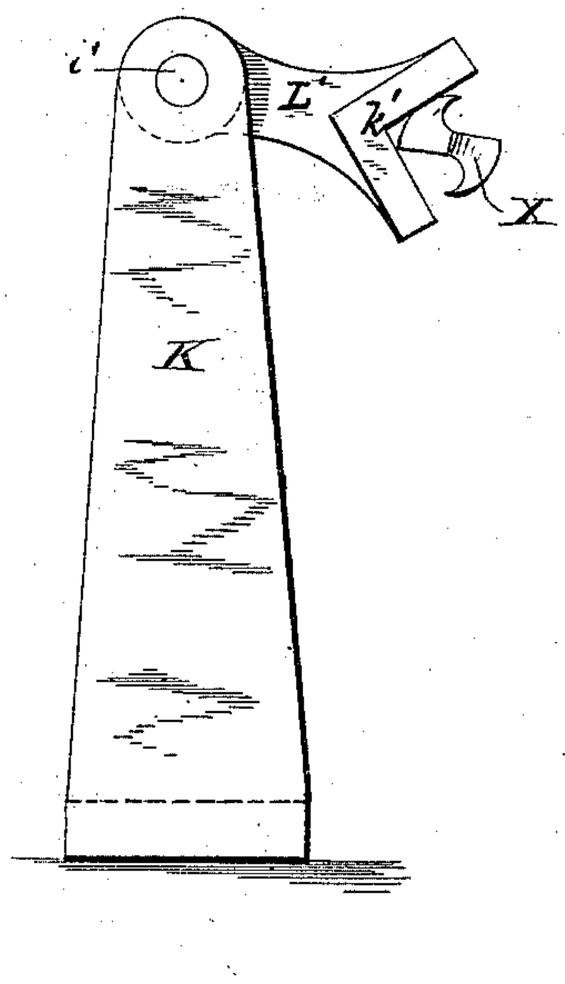


Fig. 4.



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his attorney

UNITED STATES PATENT OFFICE.

FRANK CHASE, OF BOSTON, MASSACHUSETTS.

MACHINE FOR GRINDING DRILLS.

SPECIFICATION forming part of Letters Patent No. 331,115, dated November 24, 1885.

Application filed May 16, 1885. Serial No. 165,725. (No model.)

To all whom it may concern:

Be it known that I, FRANK CHASE, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Machines for Grinding Drills, of which the following is a specification.

The machine in which my improvements are embodied while adapted to grinding and sharpening drills generally has been designed more particularly with reference to the grinding and sharpening of twist-drills, the object being to produce a machine by which the two cutting-lips of the drill can be readily ground so as to be accurately of the same length, and by which the proper clearance can be given to the point of the tool back of each lip. To this end I combine with the grinding-wheel and a rotary drill-holding chuck what I term a "side guide-rest," against which the drill is held during the grinding operation, the parts being so arranged during the grinding operation that when the point of the drill rises the guide-rest against which the drill constantly takes a lateral bearing will act to proportionately force or carry the drill over toward the grinding-wheel for a distance sufficient to effect the grinding away of the point back of each cutting edge or lip to the extent requisite to form the proper clearance. It is in this combination of parts that my invention mainly is comprised.

In the accompanying drawings I have represented the preferred embodiment of my invention.

Figure 1 is a side elevation of the machine. Fig. 2 is a front elevation thereof with the grinding-wheel removed. Fig. 3 is a plan of the same with the chuck in longitudinal horizontal section. Fig. 4 is a front elevation of a modified form of guide-rest.

A is the bed of the machine, on which is supported the grinding-wheel B, having its shaft B′ in proper bearings, C, on the upper end of a standard, C′, fixed to a base-plate, D, pivoted centrally to the bed A, and held in place by set-screws D′, which pass through curved slots D^2 in the base-plate into the bed A. On shaft B′, between the bearings C, is fixed the pulley B^2, around which passes a belt from some suitable driving-pulley, for the purpose of rotating the grinding-wheel. The pivoting of the wheel-supporting stand is to permit the face of the wheel to be properly adjusted with reference to the part upon which it is to act. There is nothing new in the arrangement thus far described.

The drill-holding chuck consists of a tubular outer barrel, E, cast in one with a standard, E′, hung on a horizontal pivot, *a*, between ears F′, so as to be capable of vibratory movement laterally or transversely of the chuck. The ears F′ form part of a slide, F, resting upon the bed of the machine, and held in longitudinal dovetailed ways A′ thereon, between which it can move lengthwise of the bed. A stop-screw, *b*, screwing into the rear end of the slide and passing loosely through lug *b*′ on the bed, limits the extent of movement of the slide. A screw-shaft, *c*, provided with a crank-handle, *c*′, and held in a bearing, c^2, on the front of the bed, is used to move the slide back and forth as far as permitted. The lateral rocking movement of the chuck is limited and controlled by a set-screw, *d*′, which passes through an extension, *d*, on one side of the standard E′, and bears on the top of the piece A′ that forms the guideway on that side, and by a spring, *e*′, which is seated in a recess formed in an extension, *e*, on the other side of the standard and bears on the way A′ on that side.

The tubular barrel E is preferably set so as to incline from front to rear, its front end being the higher. Supported concentrically within it, and adapted to rotate therein, is the externally-cylindrical case G, which is bored out cylindrically but obliquely, as shown in Fig. 3, for the reception of the drill-holding sleeve H. Upon the front end of this sleeve is a frame, H′, that carries the two chuck-jaws I, for holding the drill, and a right and left screw, J, for operating the same. The jaws are provided with inner ends, which fit and slide in dovetailed ways in frame H′, and are formed each as a half-nut to engage the right and left screw J, which latter is supported in proper bearings in frame H′. By rotating the screw the jaws can be caused to approach or recede from one another, as desired.

The sleeve H and case G are flanged at the ends, so that while capable of free rotary movement relatively to each other and to the

barrel E all three are incapable of longitudinal movement independently of one another. On the rear end of the inner sleeve, H, is a boss, *f*, in which is supported a sliding pin, *f'*, preferably spring-impelled, which is adapted to enter and engage one of two diametrically-opposite holes, *g*, in the rear end of the intermediate case, G, and thus to lock the two together. A head, f^2, on the pin *f'* serves as a handle by which the two parts G H can be rotated bodily within the outer barrel, E. By withdrawing the pin the inner sleeve can be rotated independently of the other.

Under the arrangement thus far described, if the two parts G H are locked together and rotated bodily in the outer barrel, E, it will be noted that the drill X, by reason of the obliquity of the bearing in which it is held relatively to the axis of rotation of the part G, will revolve in a circle—that is to say, at both ends it will move in a circular path. This manifestly would prevent it from being acted on promptly by the grinding-wheel. It is consequently indispensable that the movement of the point of the drill should be controlled during the rotary movement of the parts G H. To this end I make use of what I have heretofore termed a "side guide-rest." This device consists in the present instance of a post, K, fixed to the bed of the machine and carrying at its upper end a bearing-piece, L. This bearing-piece has a slanting or inclined bearing-surface, *h*, against which the side of the drill at its front end bears. The slant of the surface *h* is such that the drill when it rises shall be caused to move laterally toward the grinding-wheel, and consequently in the present arrangement the upper end of the bearing-face *h* overhangs the lower end. This bearing-piece is pivoted at *i* to the part K, and its tilt is controlled by means of two set or bearing screws, *j*, which screw down through a ledge on top of the post and rest on the top edge of the bearing-piece on opposite sides of the pivot *i*.

When the drill is in the chuck in the position shown, the chuck during the operation of grinding either of the cutting-lips of the drill is partly rotated by hand in the direction of the arrow, and at the same time is held by the workman so as to keep the drill pressed against the guide-rest. So much of this rotary movement as tends to cause the front end or point of the drill to rise is permitted, but at the same time the drill-point is restrained by the guide-rest against which it bears from moving laterally away from the grinding-wheel. When, however, the drill rises, (the chuck being held by the workman so as to keep the drill always against the guide-rest,) it travels over the inwardly-slanting bearing-face *h*, and this has the effect of forcing the drill over toward the grinding-wheel, which movement is permitted by reason of the fact that the chuck can rock laterally on the axis *a*. Thus as the drill, which normally or at the start of the operation is opposite the center of the grinding-wheel, rises, it does not leave the wheel, but is forced over to continue in contact therewith, and the degree of slant or inclination of the bearing-face *h* is sufficient to make up for the curvature of the wheel above the center, and also to carry the drill enough farther over to form back of the cutting edge or lip the requisite clearance upon the point.

The drill shown in the drawings is a twist-drill with two cutting-lips. It is put in the chuck so as to bring one of the cutting-lips in proper position with respect to the grinding-wheel. It is fastened in that position by the chuck-jaws, and the two parts G H are locked together. They are then rotated by hand bodily, as above described, until the cutting-lip and clearance therefor are properly formed, the requisite back and forth movement of the chuck being obtained by the screw-shaft *c*, which is turned by the hand of the workman, and the extent of this movement being determined by the stop-screw *b*. As soon as the part operated on is properly ground and finished, the parts G H are unlocked, the inner sleeve is rotated half way, so as to bring the locking-pin *f'* opposite to and into engagement with the other hole, *g*, and by this movement the other lip of the drill has been brought into the same position as that originally occupied by the one first operated on. This being done, the second lip is operated on in the same way as first was, which completes the operation.

In lieu of having the drill travel up and down the slanting face of the guide-rest, I can by a slight modification arrange these parts so that they will move together. Such an arrangement is shown in Fig. 4. In this modification the bearing-piece L' is pivoted at *i'* to the stand or post K. The bearing-face of the piece L' instead of being slanting, is recessed or of V form to receive the drill, and the bearing-piece itself is free to oscillate on its axis. Inasmuch as the drill engages laterally the guide-rest, it is manifest that, while the drill may rotate independently of the bearing-piece, yet the latter will move up and down with the drill. The axis or pivot *i'* is above the horizontal center of the stone; consequently as the drill is raised it will be forced or carried over toward the stone, the extent of this movement being determined by the height of the pivot above the center line, *x x*, and the radial length of the bearing-piece L'.

Having described my improvements and the best way now known to me of carrying the same into effect, I state, in conclusion, that I do not desire to be understood as restricting myself to the details hereinbefore described, as the same can be considerably varied without departure from my invention; but

What I claim as new and of my invention is—

1. The combination of the rotatable and laterally and vertically movable drill-holding chuck, the grinding-wheel, and a side guide-rest, arranged and operating substantially as

described to move the drill toward or to permit its recession from the grinding-wheel, according to the direction of the vertical movement of the drill, substantially as and for the purposes hereinbefore set forth.

2. The combination, with a laterally-movable and rotatable drill-holding chuck, of a side guide-rest provided with a slanting or inclined bearing-face, these parts being combined and arranged together for joint operation substantially in the manner hereinbefore set forth, so that the said side guide-rest and drill held in said chuck shall by and during the rotation of the chuck be caused to move relatively to one another in the direction of the length of the said inclined bearing-face, as and for the purposes described.

3. The combination of the laterally-movable chuck-stand, the barrel E, intermediate case, G, inner sleeve, H, and drill-gripping jaws carried by the same, the grinding-wheel, and the side guide-rest, these parts being arranged together for joint operation substantially as hereinbefore set forth.

4. The laterally-rocking chuck-stand and barrel forming a part of the same, in combination with the inner jaw carrying sleeve H, and intermediate case, G, detachably connected together, as described, the side guide-rest, and the grinding-wheel, substantially as and for the purposes hereinbefore set forth.

5. The rotatable drill-holding chuck arranged and adapted to move vertically, laterally, and longitudinally, in combination with the side guide-rest and the grinding-wheel, substantially as and for the purposes hereinbefore set forth.

6. The guide-rest provided with a bearing-piece adjustable to vary the slant of the face against which the drill takes a lateral bearing, in combination with the laterally-movable and rotatable drill-holding chuck, and the grinding-wheel, substantially as and for the purposes hereinbefore set forth.

In testimony whereof I have hereunto set my hand this 2d day of May, 1885.

FRANK CHASE.

Witnesses:

J. WALTER BLANDFORD,

EWELL A. DICK.