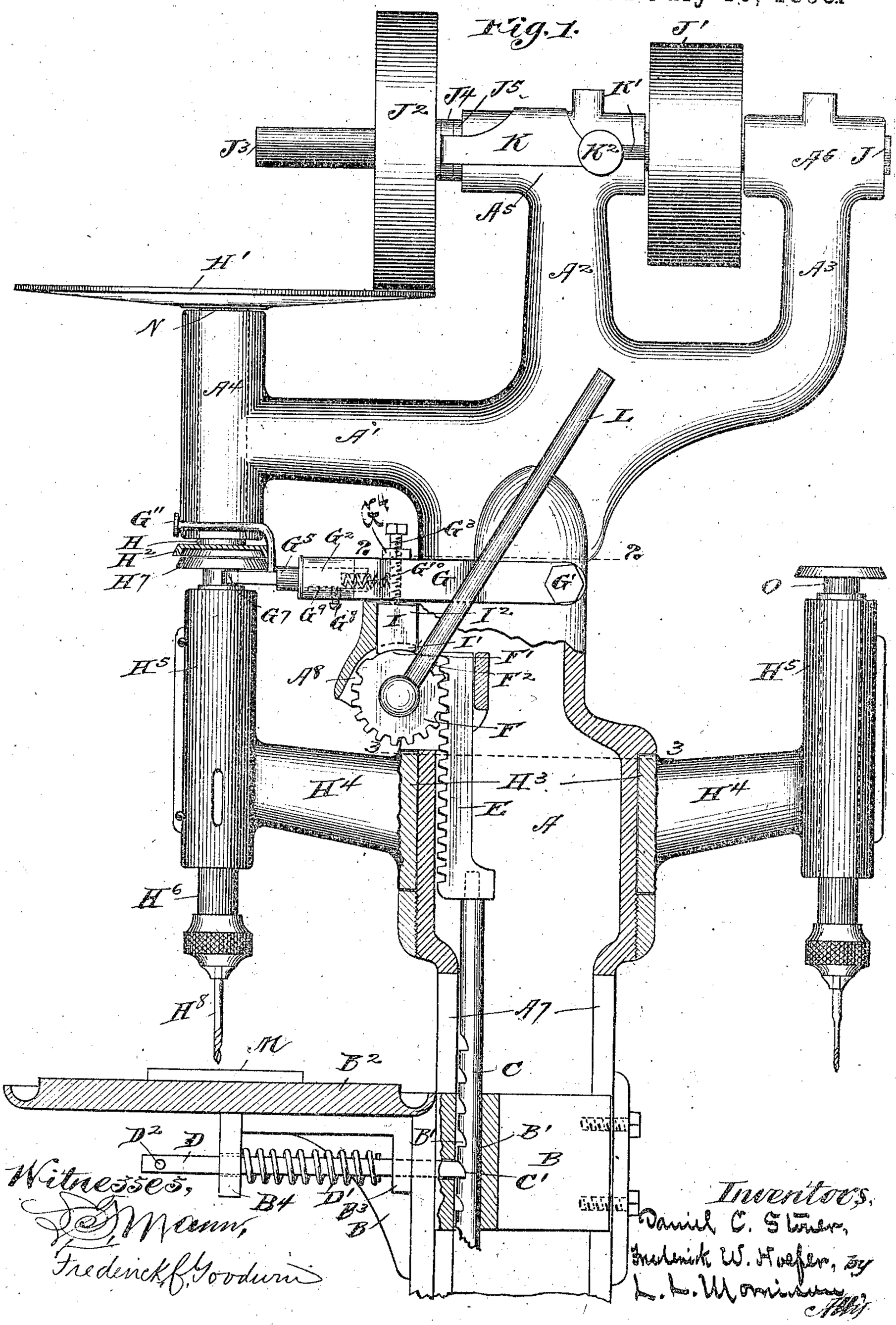
(No Model.) 2 Sheets—Sheet 1.

D. C. STOVER & F. W. HOEFER.

DRILLING MACHINE.

No. 542,695. Patented July 16, 1895.

Fig. 1.



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 2.

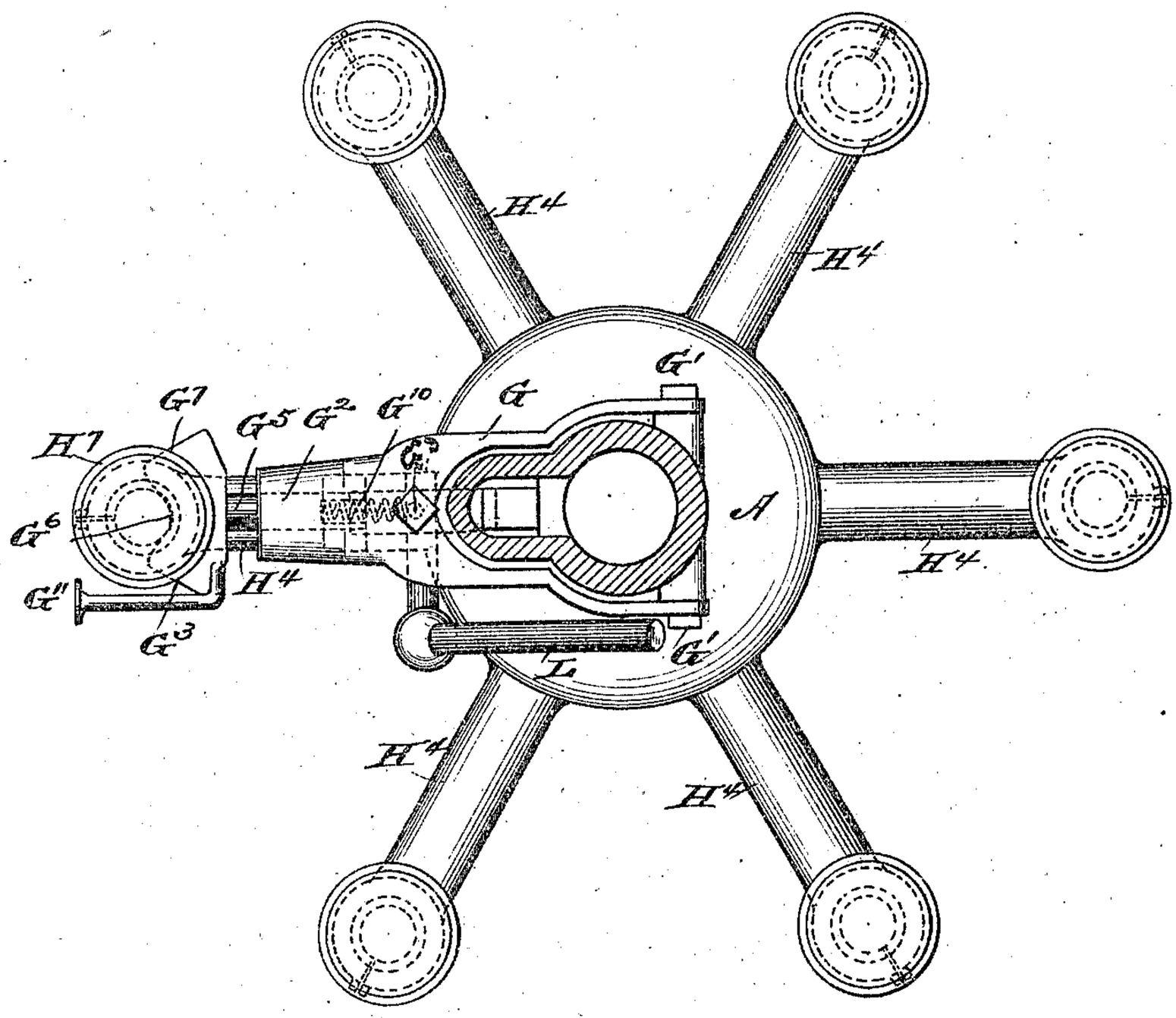
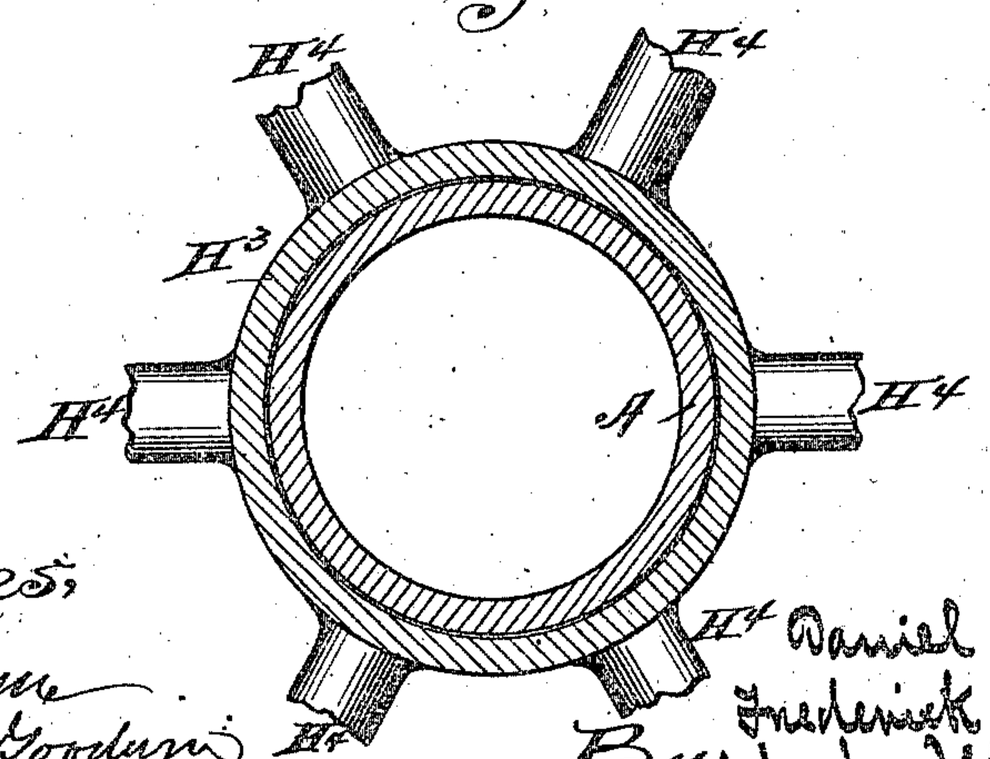


Fig. 3.



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UNITED STATES PATENT OFFICE.

DANIEL C. STOVER AND FREDERICK W. HOEFER, OF FREEPORT, ILLINOIS, ASSIGNORS TO THE STOVER NOVELTY WORKS, OF SAME PLACE.

DRILLING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 542,695, dated July 16, 1895.

Application filed June 13, 1894. Serial No. 514,483. (No model.)

To all whom it may concern:

Be it known that we, DANIEL C. STOVER and FREDERICK W. HOEFER, citizens of the United States, residing at Freeport, in the county of Stephenson and State of Illinois, have invented a certain new and useful Improvement in Drilling-Machines, of which the following is a specification.

Our invention relates to the class of drilling-machines commonly known as "sensitive" drills; and it consists of certain new and useful features of construction and combinations of parts, hereinafter fully described, and specifically pointed out in the claims.

The platen-lifting and friction-plate-supporting devices shown herein, are also shown and claimed in a pending application filed by us in the United States Patent Office December 26, 1893, having Serial No. 494,665.

Referring to the accompanying drawings, which form a part of this specification, Figure 1 is a side elevation of the drill, partly in central vertical section. Figs. 2 and 3 are horizontal sections at the dotted lines 2 and 3, respectively, in Fig. 1 of parts there shown.

Like letters of reference indicate corresponding parts throughout the three views.

A is the column of the machine-frame.

A′, A², and A³ are trifurcations integral with the column A and provided with bearings A⁴, A⁵, and A⁶ at their free ends for supporting parts to be described hereinafter.

B is a platen-bracket extending through the slot A⁹ in the column A, wherein it is vertically movable.

B′ is a circular opening extending vertically through the platen-bracket B, the use whereof will be explained hereinafter.

B² is a platen integral with or mounted on the platen-bracket B and is vertically movable therewith.

B³ B⁴ are bearings for a part to be described hereinafter.

C is a ratch of suitable diameter to be easily passed through the opening B′ in the platen-bracket B.

D is a sliding detent mounted in the bearings B³ B⁴, actuated by and normally held into engagement with any of the interdental spaces C′ in the ratch C by the spring D′.

D² is a pin passed transversely through the free end of the detent D to serve as a handle by which to disengage the latter from the ratch C.

E is a rack connected with the ratch C and forming an upward prolongation thereof.

F is a pinion mounted on the projection A⁸, meshing with the rack E, having a portion of its periphery F′ F² constructed without teeth and fastened into a cam.

G is a spindle-supporting arm pivot-jointed to the column A at G′, having a horizontal socket G² in the free end thereof, and being provided with an adjusting-screw G³, passing therethrough, furnished with a set-nut G⁴.

G⁵ is a locking-pin adapted to be freely slid in the socket G² in the arm G, having its free end somewhat bifurcated at G⁶ and beveled at G⁷, limited in its longitudinal movements by means of a screw G⁸, set through the arm G into a slot G⁹ therein, normally actuated by a spring G¹⁰, and provided with a thumb-push G¹¹ for pressing it into its socket G² against the action of the spring G¹⁰.

H is a spindle-driving shaft having free endwise-reciprocatory motion in the vertical bearing A⁴, mounted by means of the friction-disk H′ on such bearing, and provided at its lower end with one member H² of a friction-coupling.

H³ is a turret rotatably mounted on the column A, and having any desired number of radial horizontal arms H⁴, provided with vertical spindle-bearings, one thereof H⁵ carrying a drill-spindle H⁶, furnished at its upper end with one member H⁷ of a friction-coupling—the counterpart of the member H²—at its lower end with a drill H⁸, and adapted to be engaged by the bifurcated portion G⁶ of the locking-pin G⁵, which performs, with its connections, the function of locking the turret H³ so that one member H⁷ of the friction coupling device will be concentric with its counterpart member H². The part G⁵, together with the parts operating it, also performs an additional and vital function which will be fully described hereinafter.

I is a loose stud having its lower end I′ resting upon the cam portion F′ of the pinion F and its upper end I² impinging through the

adjusting-screw G^5 against the lower side of the spindle-supporting arm G.

J is a shaft horizontally mounted in the bearings A^5 A^6.

J′ is a driving-pulley fast to the shaft J.

J^2 is a friction-wheel that may be freely slid to regulate the speed of the drill along the projecting portion J^3 of the shaft J, therewith it revolves by reason of a spline connection therewith.

J^4 is an annulus set into a counterpart annular groove in the hub J^5 of the friction-wheel J^2.

K is a yoke fast at one end to the annulus J^4, and adapted to slide in two like and opposite ways K′ in the outer portion of the bearing A^5, wherewith it is connected by means of counterpart flanges (not shown) projecting from the inside of the yoke K into the ways K′ therein.

K^2 is a thumb-screw for setting the yoke at any desired point along the bearing A^5.

L is a lever projecting from and rigidly connected with the pinion F, and performs through its connections—the parts F, I, G^2, G, G^5, H^7, H^2, and H—the double function of regulating the platen B^2 by raising and lowering the same and of maintaining the friction-disk H′ in operative contact with the friction-wheel J^2 whenever the point of the drill H^8 strikes a sand-hole or other cavity in the work being drilled.

M is a piece of work on the platen B^2.

The platen B^2 may be so adjusted as to adapt it to receive work of any desired thickness by disengaging the detent D from its ratch C, afterward raising or lowering the same, as the case may require, and then permitting the detent D to re-engage with its ratch C, and whenever the platen B^2 is low and it is desired to raise the same, the operator may support it with one hand and with the other press the lever L toward the column A, which, operating through the rack and pinion E F, will push the ratch C downward through the opening B′ in the platen-bracket B, when a reverse motion of the lever will raise the platen.

The use and operation of our invention are as follows: Supposing all parts of the machine to be in the positions shown in Fig. 1, and the shaft J in rotation, then if the lever L be moved toward the drill-spindle H^6 sufficiently, the platen B^2 will be thereby caused to move upward until the work M thereon comes in contact with the point of the drill H^8. The pressure thereby produced being transmitted through the drill H^8 will cause the drill-spindle H^6 and its friction-coupling H^7 to slide upward, thereby throwing the latter into and maintaining it in engagement with the counterpart friction-coupling H^2, which in turn will cause the shaft H and its friction-disk H′ to slide upward, thereby also throwing the latter into and maintaining it in engagement with the friction-wheel J^2. Simultaneously with the operations just described the stud I passes upward from the less elevated portion F′ to the more elevated portion F^2 of the cam on the pinion F, thereby causing the spindle-supporting arm G to travel upward until it will normally maintain the friction-disk H′ through the media of the parts G^5 H^7 H^2 H in engagement with the friction-wheel J^2 without reference to the upward pressure of the work M against the point of the drill H^8. In using the machine, it will be found that the upward pressure of the work M against the point of the drill H^8 will always be sufficiently great to force the friction-disk H′ upward and slightly out of contact with its bearing N on the upper end of the part A^4, except when the point of the drill H^8 strikes a sand-hole or other cavity in the work being drilled, in which event the drill H^8, drill-spindle H^6, friction-couplings H^7 H^2, shaft H, and friction-disk H′ would descend sufficiently to break the engagement existing between the latter and the friction-wheel J^2, and as a result the drill H^8 would instantly cease revolving were it not for the bearing provided by the upper side of the bifurcated portion G^6 of the locking-pin G^3, which will still maintain, through the media of the parts H^7 H^2 and H, the friction-disk H′ and friction-wheel J^2 in operative contact until the point of the drill H^8 shall have passed downward through the sand-hole or other cavity and again come in contact with the solid metal, when upward pressure of the work against the point of the drill H^8 will again force the drill-spindle H^6 and the friction-disk H′ through their intermediate connections upward, so that the latter will be out of contact with the bearing N on the part A^4, and the functions of the cam portion of the pinion F, stud I, and spindle-supporting-arm G will become and remain suspended until the point of the drill H^8 shall again encounter a sand-hole or other cavity in the work. Whenever it is desired to use some other tool than the drill H^8, the operator will press the thumb-push G^{11} inward until the bifurcated portion G^6 of the locking-pin G^3 is so far out of engagement with the drill-spindle H^6 that the turret H^5 can be revolved until the requisite spindle, as O, Fig. 1, comes into engagement with the locking-pin G^5, which engagement will automatically take place by virtue of the bevels G^7 thereon. From the illustration just given it will be seen that all the various tools (not shown) carried by the turret H^5 may be operatively and speedily connected with the driving-shaft H of the drill.

In this machine the frictional contact between the friction-disk H′ and the friction-wheel J^2 is always proportionate to the resistance met by the drill H^8 in drilling. The greatest power is attainable thereby when its speed its lowest, and obviously vice versa. Slight movements of the platen-regulating lever L will automatically start and stop the same. Its operator can quickly change the speed thereof with one hand by turning the

thumb-screw K^2 and sliding the yoke K and friction-wheel J^2 thereby and afterward tightening the same.

We claim—

1. In a drilling-machine, in combination, a column, a drill-spindle driving-shaft provided, at its upper end, with a friction driving-device, at its lower end, with one member of a friction-coupling, a rotatably-mounted turret, having radial arms furnished with spindle-bearings carrying spindles, each provided, at its upper end, with a counterpart member of said friction-coupling, the spindle-supporting-arm provided, at its free end, with means of connection with the drill-spindles, and means for operating the spindle-supporting-arm, wherethrough the members of the friction-driving and friction-coupling devices may be maintained in operative connection independently of the application of upward pressure to the point of the drill-spindle by work on the platen, substantially as and for the purpose specified.

2. In a drilling-machine, in combination, a column, a drill-spindle driving-shaft provided, at its upper end, with a friction driving-device, at its lower end, with one member of a friction-coupling, a rotatably-mounted turret, having radial arms furnished with spindle-bearings carrying spindles, each provided, at its upper end, with a counterpart member of said friction-coupling, the locking-pin, the spindle-supporting-arm, and means for operating the same, wherethrough the members of the friction-driving and friction-coupling devices may be maintained in operative connection independently of the application of upward pressure to the point of the drill-spindle by work on the platen, substantially as and for the purpose specified.

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