G. SIPP.

AUTOMATIC FEED MECHANISM FOR DRILL PRESSES.

APPLICATION FILED JULY 10, 1917.

**1,265,269.**

Patented May 7, 1918.

4 SHEETS—SHEET 1.

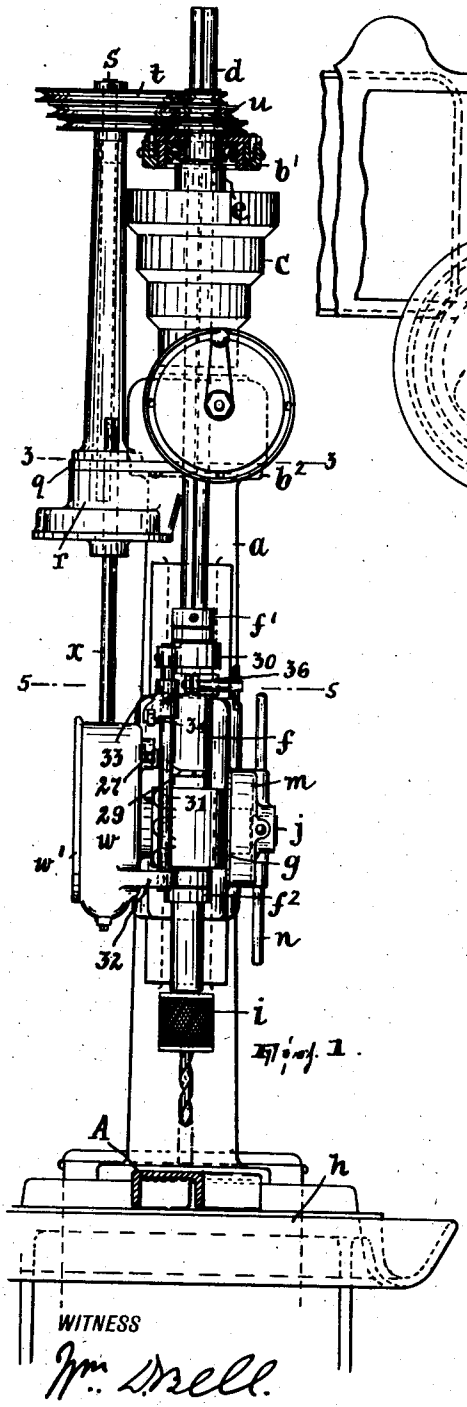



Fig. 1.

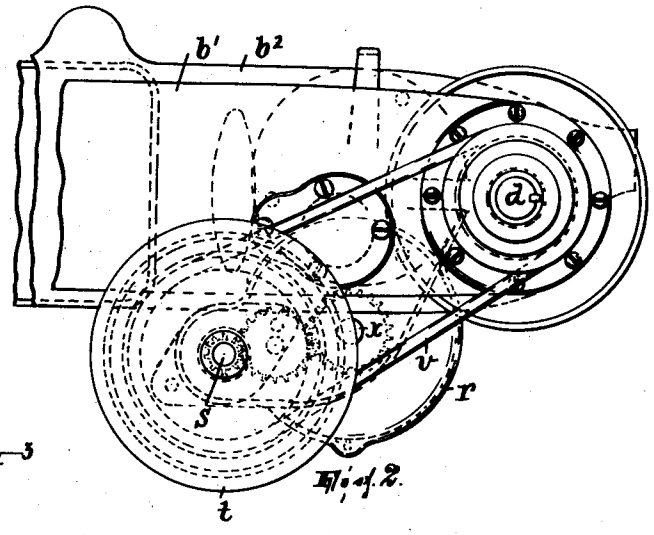



Fig. 2.

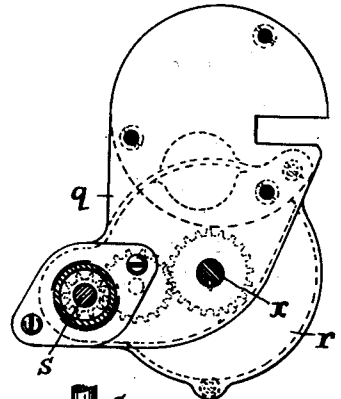



Fig. 3.

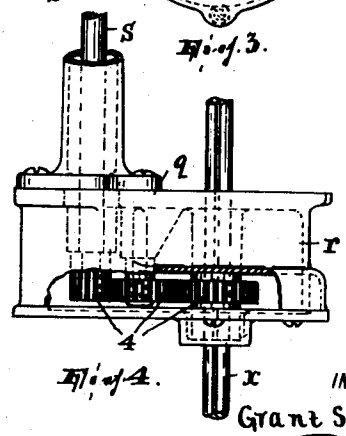



Fig. 4.

WITNESS

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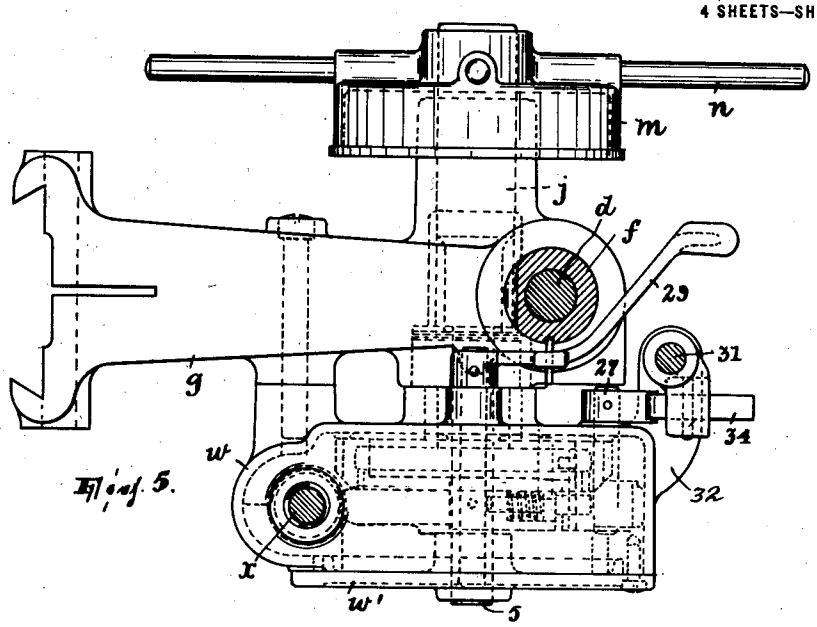



Fig. 5.

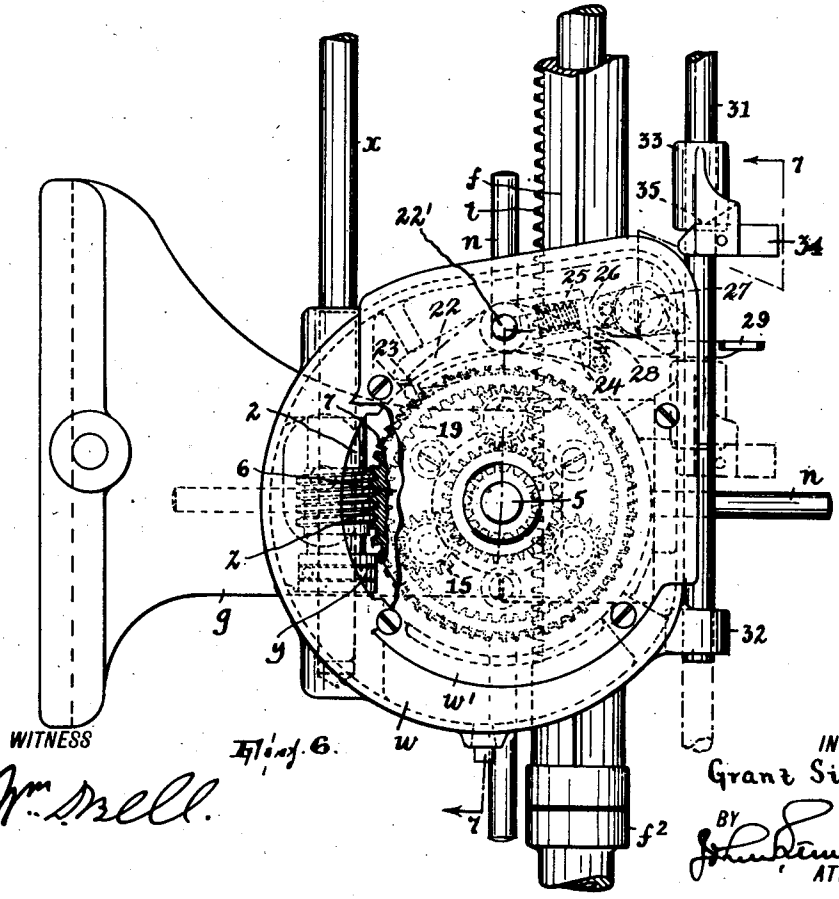



Fig. 6.

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4 SHEETS—SHEET 3.

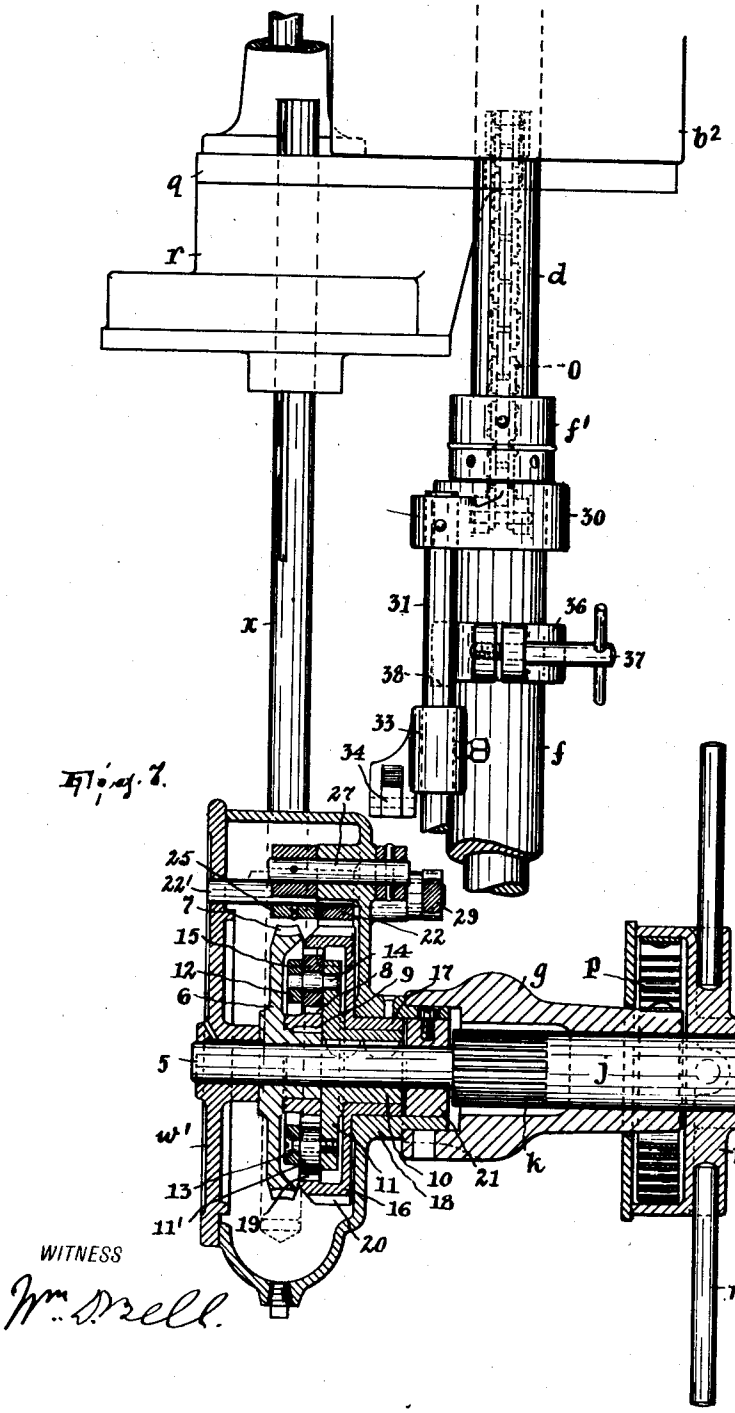



Fig. 7.

WITNESS

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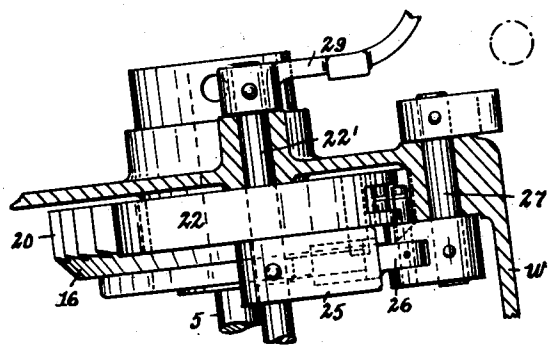



Fig. 10.

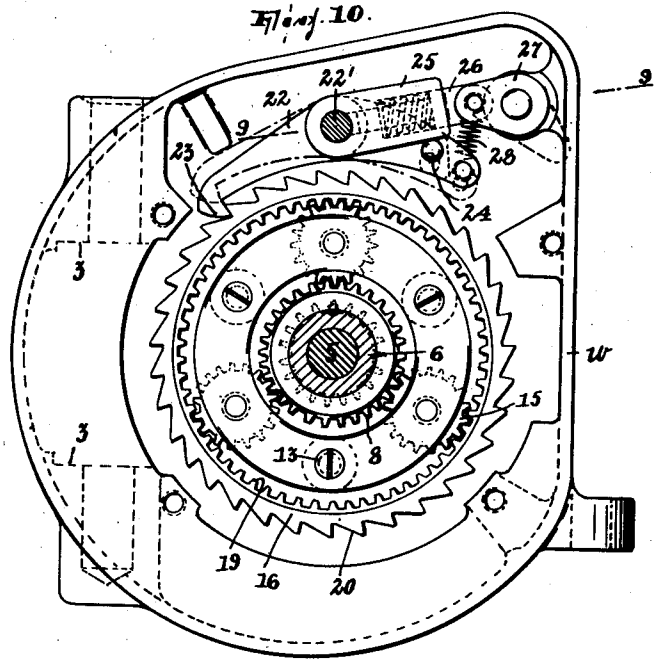



Fig. 8.

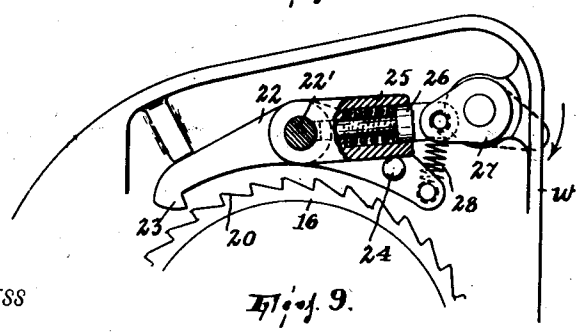



Fig. 9.

WITNESS

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# UNITED STATES PATENT OFFICE.

GRANT SIPP, OF PATERSON, NEW JERSEY.

## AUTOMATIC FEED MECHANISM FOR DRILL-PRESSES.

1,265,269. Specification of Letters Patent. Patented May 7, 1918.

Application filed July 10, 1917. Serial No. 179,675.

*To all whom it may concern:*

Be it known that I, GRANT SIPP, a citizen of the United States, residing at Paterson, in the county of Passaic and State of New Jersey, have invented certain new and useful Improvements in Automatic Feed Mechanisms for Drill-Presses, of which the following is a specification.

Drill presses in which the drill spindle is power-driven to perform its thrust-movements are of three known types to wit, (1) where the drill spindle is power-reciprocated constantly, (2) where the drill-spindle is brought down to a certain point manually and then manually thrown into connection with the power drive mechanism, and (3) where the drill-spindle is depressed manually until it contacts with the work, whereby the resulting resistance causes the drill-spindle to be coupled with the power-drive mechanism for continuing the downward thrust. The third known type is an improvement on the first and second in that on the one hand the movements of the drill-spindle are subject to manual control and on the other require only one of the attendant's hands to be occupied. My present invention represents a further advance in the art, notably in this that whereas as in the third type the movements of the drill-spindle are subject to manual control and such control involves the occupation of only one of the operator's hands, the coupling of the drill-spindle with the power-drive mechanism is dependent not on contact of the tool with the work but on the drill-spindle first moving a definite distance under manual influence. Thus in a practical application of my invention, since the coupling occurs entirely without reference to contact of the tool with the work and the utilization of incidental resistance to effect it, it may very desirably be adapted to occur just before the contact accrues, whereby the tool comes to the work subject to a constant, power-drive effort, the operator is saved the fatigue incident to overcoming resistance in order to effect the coupling, less skill is required on the operator's part, and certain other advantages obtained which will be evident to those skilled in the art.

In the accompanying drawings,

Figure 1 is a front elevation of a drill-press embodying my improvements;

Fig. 2 is a fragmentary top-plan view thereof;

Fig. 3 is a horizontal sectional view on substantially the line 3—3 of Fig. 1;

Fig. 4 is a side elevation of a fragment of what is shown in Fig. 1;

Fig. 5 is a sectional view on substantially line 5—5 of Fig. 1;

Fig. 6 is a side elevation of what appears in Fig. 5, a part of casing *w* being broken away to show internal mechanism;

Fig. 7 is a sectional view on line 7—7 of Fig. 6;

Fig. 8 shows the coupling in side elevation, partly in section, and its master member and casing;

Fig. 9 is a sectional view on line 9—9 of Fig. 8; and

Fig. 10 is a detail of Fig. 8, showing the master member retracted.

The drill press in connection with which the invention is herein illustrated is one of a type patented to me under Letters Patent No. 1,167,440, *a* being the pillar and $b'$ $b^2$ the spaced horizontal head members of the frame of the machine, *c* the forward pulley of a belt-and-pulley driving means arranged in said head members, *d* the drill spindle splined in the sleeve *e* which affords the journal part of said pulley, *f* the sleeve through which the spindle downwardly projects, being rotative therein but confined against vertical movement relatively thereto by the collars $f'$, $f^2$ thereon, *g* the frame arm, adjustable up and down on the pillar, in which sleeve *f* is splined, *h* the work table, *i* the chuck for the tool suitably attached to the lower end of the spindle—the sleeve, spindle and chuck forming an up and down movable tool carrier,—and *j* a rotary horizontal shaft journaled in the frame-arm *g* and having a pinion *k* meshing with rack teeth *l* on the sleeve and a fixed head *m* provided with radial handles *n*, the parts *j* and *n* forming means for manually moving the carrier up and down. To hold the carrier normally elevated I may provide either a weight having a flexible connection extending up over pulleys and then down and suitably affixed to the carrier, as in my aforesaid Letters Patent (the said flexible connections being actually illustrated herein at *o* in Fig. 7), or a spiral spring *p* coiled within the head *m*, (which is formed as a housing for the spring) and having one end attached to the head *m* and the other to the arm *g*, or both of these instrumentalities.

In the adaptation herein shown the con-

struction is such that the carrier, normally held elevated in some such way as above stated, is adapted to be started on its downward course manually, by turning shaft *j* by means of its described handle and, when it has thus been made to proceed downward a definite distance, to be driven downward by power a definite further distance, thereupon to be released and so return to the elevated position under the influence of the means normally acting to hold it in that position. To this end, there are a going driving means and a power transmitting coupling to connect the carrier with the driving means which will now be described.

A bracket *q*, which it will be appropriate to form as a housing at *r*, is bolted to and projects from the head member $b^2$ laterally thereof. It affords bearings for a vertical rotary shaft *s*, said shaft and the sleeve *e* being equipped with cone pulleys *t u* around which extends a belt *v*, whereby the rotation of the sleeve will be transmitted to the shaft *s*. A casing or housing *w*, having a removable cover plate *w'* (Figs. 5 and 6), is suitably secured to the side of frame-arm *g* and affords bearings for a vertical shaft *x* which is stepped on an anti-friction bearing *y* and has affixed to it a worm *z* and a collar 2 (Fig. 6), the step bearing, worm and collar fitting between opposed abutments 3 (Fig. 8) in the casing and so confining the shaft against vertical movement relatively to the casing. The shaft *x* extends up through the housing *r* and is rotated from shaft *s* through the gearing 4 shown in Figs. 3 and 4, with one member of which shaft *x* is preferably splined so as to permit vertical adjustment of the frame-arm *g*.

Shaft *j* has a reduced extension 5 on which is freely revoluble a gear member 6 which comprises peripheral worm teeth 7 and peripheral gear teeth 8 (the teeth 7 and 8 being formed in the illustrated construction as two separate parts keyed together at 9). Keyed on the shaft is the hub 10 of a face plate 11 to which there is affixed, spaced therefrom by disks 11' and concentric with the shaft, an annular plate or ring 12; the means for securing ring 12 to the face plate may be screws 13. On studs 14 supported at their ends by the ring and face plate are journaled pinions 15, meshing with gear teeth 8. 16 is a gear having a hub 17 journaled between and concentric with the hub 10 of the face plate and the bearing portion 18 of the casing *w*, the same comprising an interior peripheral series of gear teeth 19 and an exterior peripheral series of teeth 20, in the form (Fig. 8) of ratchet teeth. (A collar 21, secured in bearing portion 18, prevents displacement of shaft *j* to the right in Fig. 7 by affording an abutment to the face plate, which is keyed on the shaft, as stated). The interior teeth 19 mesh with the pinions 15, and it will now be obvious that if, assuming the member 6 to be constantly rotated from the worm wheel *z*, the member 16 be alternately held against and left free to rotate, shaft *j* will be alternately rotated and non-rotated or idle, respectively; that is, with member 16 held against rotation the parts 6 and 15 will constitute planetary gearing and so shaft *j* will be driven through the face plate, and with members 16 released, rotation of member 6 will be transmitted to member 16 through the pinions 15 without affecting the face plate, all as substantially in a well known type of differential gearing. For controlling the member 16 there is pivoted in the casing *w* on a shaft 22' parallel with shaft *j* a two-armed pawl 22, one arm of which has a hook 23 to engage ratchet teeth 20 of member 16 and the other arm a stud 24. Pinned to shaft 22', which may rock in its bearings, is a cylindrical socket 25 containing a plunger 26 spring-pressed outwardly and pivotally connected with one arm of a lever 27, the other arm of which protrudes from the casing; a spring 28 connects the pivot forming the joint between the pawl and lever 27 with the stud-carrying arm of the pawl. A spring-toggle is thus formed by the members 25, 26 and 27 the limit of whose movement in either direction is determined by contact of one of the pawl arms with the member 16; spring 28 normally holds 24 bearing against 25, and if the hook 23 should impinge against a high part of one of the teeth 20 the spring 28 permits the incidental toggle-movement to be completed nevertheless. Exterior of the casing shaft 22' is equipped with a fixed arm 29.

The shifting of the pawl through the medium of the spring-toggle is effected from the tool-carrier thus: A collar 30 (to which the flexible connection *o* may be attached) is fixed on the sleeve *f* and has suitably held therein a depending rod 31 which slides up and down in a fixed guide 32 of the casing *w*. In a collar 33, suitably affixed to the rod, is pivoted a dog 34 whose inner arm is normally held by the weight of its longer outer arm in the horizontal position (Fig. 6) bearing against a stop 35 immediately over the protruding arm of lever 27; when the carrier descends the dog will engage said protruding arm of lever 27 and so shift the toggle, and consequently the pawl, from the position in Fig. 9 to that in Fig. 8, but during the return movement the dog will be shifted idly on its pivot by said arm. On the sleeve *f* there is also arranged a strap 36 adapted to be adjusted vertically thereon by a clamp screw 37, said strap having a toe 38 which, a predetermined time after dog 34 shifts the toggle and pawl to the position shown in Fig. 8, impinges the arm 29 and shifts the toggle and pawl to the position shown in Fig. 9.

The operation will now be obvious to those skilled in the art. The elements *e*, *u*, *v*, *t*, *s*, 4, *x*, *z* and 6 may be regarded as a going driving means, the elements *d*, *f*, *j* and 11 as a tool-carrier-including driven means movable back and forth, and the elements 15 and 16 and pawl 22 as a coupling for operatively connecting the driving and driven means having a moving master member (the pawl) movable to one position to make or establish and to another to break or disestablish the coupling. Under the pull of the connection *o* or the torsion of spring *p* the carrier is normally held with collar $f^2$ abutting the frame arm *g*.

When the carrier is elevated the master member stands as shown in Fig. 9. On the operator turning shaft *j* to depress the carrier the dog 34 at a certain point in the descent of the carrier will trip the toggle, as explained, so that the master member 22 comes to the position (Fig. 8) to lock the gear member 6 against rotation, thus making or establishing the coupling so that the power of the going driving means will be transmitted to and continue downward the carrier; the carrier will continue downward, power driven, to a point (predetermined by adjusting up or down strap 36) where toe 38 impinges and trips back the toggle so that the master member returns to the position (Fig. 9) to release gear member 16, thus breaking or disestablishing the coupling, and, the carrier being now free, returns to the elevated position, the dog 34 wiping idly past the lever 27. The power applied to the tool is thus not only of a constant character while the tool is at work but is cut off at a definite point.

Adjustability of the collar 33 on rod 31 will generally be unnecessary. That is, usually the dog 34 will stand a fixed distance above the lever 27 when the carrier is fully elevated whatever the height of the work A (Fig. 1). The attendant, to adjust the machine for different heights of work, sets the frame arm *g* up or down as usual, always preferably allowing such a space between the point of the drill and the work that when the latter descends the drill spindle will be coupled with the power drive just before the spindle contacts with the work.

Adjustment of the strap 36 up or down obviously determines the depth of the hole drilled (adjustment down reducing and adjustment up increasing the depth of cut) by varying the time-interval occurring between the actuating of the toggle device first by the dog 34 and then by toe 38 on the working or downward stroke of the carrier.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. In combination, the frame, a tool-carrier-including means movable in a definite direction therein, a going driving means, and a power-transmitting coupling to connect said means with each other including a master member movable to one position to make, and to another position to break, the coupling and normally occupying one of said positions, said first-named means having means to move the master member during the movement in one direction of said first means.

2. In combination, the frame, a tool-carrier-including means movable in a definite direction therein, a going driving means, and a power-transmitting coupling to connect said means with each other including a master member movable to one position to make, and to another position to break, the coupling and normally occupying one of said positions, said first-named means having means to move the master member from the latter position and back again during the movement in one direction of said first means.

3. In combination, the frame, a tool-carrier-including means movable in a definite direction therein, a going driving means, and a power-transmitting coupling to connect said means with each other including a master member movable to one position to make, and to another position to break, the coupling and normally occupying the latter position, said first-named means having means to move the master member during the movement in one direction of said first means.

4. In combination, the frame, a tool-carrier-including means movable in a definite direction therein, a going driving means, and a power-transmitting coupling to connect said means with each other including a master member movable to one position to make, and to another position to break, the coupling and normally occupying the latter position, said first-named means having means to move the master member from said latter position and back again during the movement in one direction of said first means.

5. In combination, the frame, a tool-carrier-including means movable forward and back therein, a going driving means, and a power-transmitting coupling to connect said means with each other including a master member movable to one position to make, and to another position to break, the coupling and normally occupying the latter position, said first-named means having means to move the master member from said latter position and back again during the movement of said first-means in the forward direction.

6. In combination, the frame, a tool-carrier-including train including a rotary driven member, a rotary driving gear mem-

ber, a free rotary gear, said members and the gear being concentric, a pinion meshing with the gear and journaled in one and meshing with the other of said members, and a rotation preventing detent device for the gear movable into and out of locking relation thereto and actuable by a part of said train.

7. In combination, the frame, a tool-carrier-including means movable in a definite direction therein, a going driving means, and a power-transmitting coupling to connect said means with each other including a fulcrumed master member movable to one position to make, and to another position to break, the coupling and normally occupying one of said positions, said first-named means having means to move the master member during the movement in one direction of said first means.

8. In combination, the frame, a tool-carrier-including means movable in a definite direction therein, a going driving means, and a power-transmitting coupling to connect said means with each other including a toggle device movable to one position to make, and to another position to break, the coupling and normally occupying one of said positions, said first-named means having means to move the toggle device during the movement in one direction of said first means.

9. In combination, the frame, a tool-carrier-including means movable in a definite direction therein, a going driving means, and a power-transmitting coupling to connect said means with each other including a master device movable to one position to make, and to another position to break, the coupling and normally occupying one of said positions, said first-named means including a device to move the master device during the movement in one direction of said first means and one of said devices being adjustable relatively to the other longitudinally of the path of travel of said first means.

In testimony whereof I affix my signature.

GRANT SIPP.