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O. ARNOLD.

CONVERTIBLE DRILL MECHANISM.

APPLICATION FILED AUG. 17, 1907.

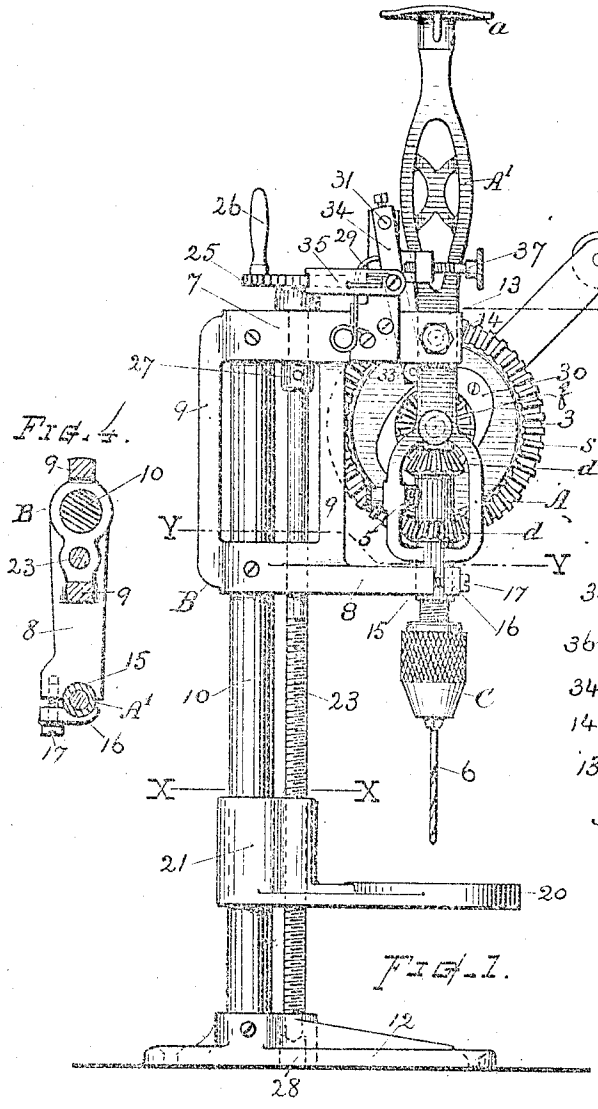


Fig. 1.

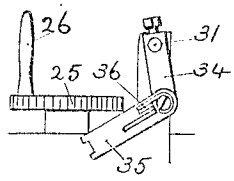


Fig. 6.

Fig. 4.

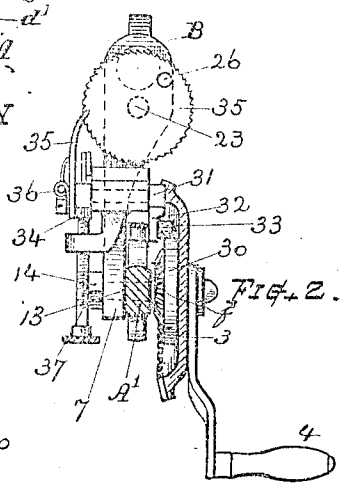


Fig. 2.

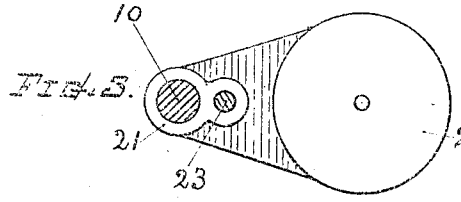


Fig. 3.

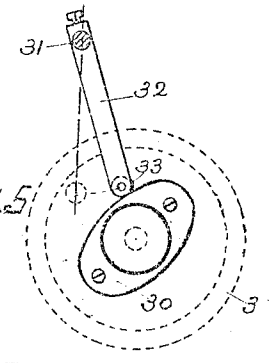


Fig. 5.

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UNITED STATES PATENT OFFICE.

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CONVERTIBLE DRILL MECHANISM.

No. 892,115. Specification of Letters Patent. Patented June 30, 1908.

Application filed August 17, 1907. Serial No. 388,375.

To all whom it may concern:

Be it known that I, OLIVER ARNOLD, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented a new and useful Convertible Drill Mechanism, of which the following is a specification, reference being made therein to the accompanying drawings.

The object of my present invention is to provide a practical, convenient and efficient mechanism whereby a simple breast or hand drill may be convertibly employed as an upright standing drill with automatic feed; thereby adapting the mechanism for many classes of work where a small drilling mechanism is required.

Another object is to provide a convenient stand and feed-mechanism with which an ordinary portable drill can be detachably combined for temporary use as an upright and table drill-press.

Another object is to provide means for the stationary support of a hand-drill brace and drill mechanism, a movable work-supporting table or bed therefor, and adjustable means for automatically feeding said table or bed toward the drill in conjunction with the operation of the drill-spindle.

Another object is to provide a drilling machine or appliance comprising a pillar, or standing frame, a drill-spindle supported parallel therewith, a movable work table, a screw-threaded shaft located between the pillar and drill-spindle, for feeding the table towards or from the drill tool, and means for operating said shaft, as more fully hereinafter explained.

These objects I attain by the mechanism illustrated in the accompanying drawings, wherein

Figure 1 represents a side elevation of a mechanism embodying my invention. Fig. 2 is a plan view showing the feed operating devices; the main gear being in section, and the brace-frame cut off at line W on Fig. 1. Fig. 3 is a plan view of the work-supporting table with the post or upright pillar and feed-shaft shown in section at line X X on Fig. 1. Fig. 4 is a horizontal section at line Y Y on Fig. 1. Fig. 5 is a diagram view showing the feed-operating cam and rocker-arm actuated thereby; and Fig. 6 is a side view diagram illustrating the manner of disengaging the feed pawl for permitting reverse movement of the feed-shaft.

Referring to the drawings, the part marked A represents a portable hand-drill or breast-drill mechanism, comprising the brace, drill-stock, or frame A^1, with its breast-pad *a;* the drill-spindle 2 rotatable in suitable bearings in said frame; the spindle-driving gears d, d^1; and the main operating gear 3, the latter being disposed with its axis perpendicular to the spindle axis, and having an operating means or hand-crank 4 combined therewith. Said main gear is provided with beveled gear-teeth that mesh with the spindle-driving gears so that rotation of the drill-spindle is effected by turning the crank and main gear, in well known manner. In the present illustration the main gear is shown with two series of gear teeth, as *f* and *s*, and two driving gears *d* and d^1 are arranged on the drill-spindle for imparting thereto different speeds, suitable clutch devices being provided, at 5, for connecting either one of said gears *d* or d^1 to drive the drill-spindle. This dual form of gearing, however, is not a feature of my present invention; and any other suitable style of breast-drill, or gearing, can be employed as an equivalent element in my claimed combinations, if preferred.

C indicates the drill-holding chuck, and 6 the drilling tool held therein.

The part marked B represents the stand or supporting appliance comprising an upright post, pillar or column 10, and a head-frame having an upper forwardly projecting arm or member 7, and a lower projecting arm or member 8; said arms preferably united by an integrally formed bar, or bars, as indicated at 9. Said head-frame is rigidly attached to the upright post, pillar or column 10; which latter is preferably made of a cylindrical rod, either solid or tubular, and is provided with a suitable foot or base member 12 fixed thereon, and provided with screw-holes or facilities for its attachment to a bench or platform.

The upper member 7 is fitted, at or near its front end, with a seat 13 for receiving the drill-brace frame A^1; and a bolt 14, or other suitable fastening device is provided for detachably but firmly securing the drill-brace to the head-frame. The fore end of the lower member 8 is also fitted with a seat 15 for supporting the bearing or lower part of the drill-brace frame, and is provided with a clamping clip 16 and screw 17, or equivalent fastener, for retaining the drill-brace in detachable connection therewith.

A work-supporting table 20 is arranged beneath the drill spindle, and is provided with a bearing-hub 21 that slides on the post 10 for guiding the table as it is moved up or down. For moving said table I arrange an upright feed-screw or shaft 23 parallel with the post 10 and mounted to turn in bearings formed in or upon the head-frame arms 7 and 8, and foot-piece 12; said shaft being screw-threaded along its lower portion which engages with a counter-matching thread formed in the hub 21 of the work-table. By rotation of the screw-shaft the table is moved up or down accordingly as the shaft is turned. This feed-screw shaft is best located between the post 10 and drill spindle 2, so that the leverage of the parts under the force exerted by the screw acts in opposition to the stress of the drilling pressure when at work.

A ratchet-wheel 25 is fixed on the top end of the shaft 20, and provided with suitable notches and teeth, and also with a handle or crank-pin 26. A collar 27 is secured to the shaft beneath one of its bearings to prevent endwise displacement, and a suitable step-bearing 28 is arranged for the shaft in the foot piece to take up any undue looseness or wear.

For actuating the feed devices a cam 30 is attached to the main gear 3, a rocker 31 is supported in bearings upon the head frame arm 7; said rocker having at one end an arm 32 provided with a member or roll 33 that runs on the cam, and at its other end an arm 34 carrying a pawl 35 that is pivotally attached to said arm and adapted to engage the teeth of the ratchet wheel 25. A spring 29 is provided for pressing back the rocker or its arm, to keep the roll normally against the face of the cam. The end of the pawl that engages the ratchet is formed with suitable projections or means that keep it normally in alinement with the periphery of the wheel, but permit of its release so that it can be swung up or down edgewise, as shown in Fig. 6, when reverse motion is to be given the shaft 23 by means of the crank 26. A spring 36 is provided to keep the pawl against the ratchet-wheel; said spring is arranged to swing up and down with the pawl, and to maintain its relation thereto when the latter is shifted into and out of working position.

The cam 30, as shown, is formed as an elliptical annulus, and attached to the inner side of the main gear 3. Said cam may be made with two, three, or more projections or swells, so as to give a plurality of impulses to the rocker and feed-pawl at each revolution of the gear, thus rendering the feed more or less nearly continuous.

A stop-screw or device 37 is preferably provided at the back of the pawl-carrying arm or rocker, whereby adjustment can be effected so that the pawl will take one, two, or more ratchet teeth at each action, thereby giving more or less rapid feed for the drilling operation.

In the operation, the table 20 is adjusted at the desired level by turning the feed-shaft 23 backward by the hand-crank 26. The work is placed upon the table beneath the drill 6. The operator then, by means of the hand crank 4, rotates the gear 3 which operates the mechanism; the drill being rotated by either of the sets of gears *f*, *d*, or *s*, *d*'. The cam 30 actuates the rocker 31 and pawl 35, causing an intermittent rotative movement of the feed-screw-shaft 23, which slowly elevates the table 20, thereby feeding the work onto the drilling tool as the drilling progresses. When the hole is completed the pawl 35 is thrown off (as in Fig. 6) and a reverse movement is given to the screw-shaft, by the crank 26, for depressing the table and releasing the drill.

By releasing the fastening devices, at 14 and 16, the drill-brace can be readily detached from the stand or supporting appliance, so as to be employed upon any work as a breast-drill when desired. Or again, it may be secured to the stand or supporting appliance and there employed as an automatically feeding upright drilling mechanism.

By this invention I provide a very serviceable, convenient and efficient drill-press or appliance that is well adapted to go in a traveling kit, or in automobiles; as well as for use in many other situations and in various branches of the mechanic trades, for doing moderately small drilling work. It drills fast, and it drills straight; and is readily convertible for a variety of uses, as above described.

I claim—

1. A drill-supporting stand comprising an upright member having a projecting head portion and a suitable standing foot, and provided with a work-supporting device that is movable up and down between the foot and head of the stand, an automatic feed-mechanism for moving said work-supporting device to feed the work to the drill, and devices for the detachable connection of a portable drill-brace rigidly to said stand; in combination with a portable-drill mechanism comprising the drill-brace, drill-spindle, drill-holding chuck, and gearing for operating the drill-spindle, and means carried by said gearing for actuating the automatic feed-mechanism.

2. In a mechanism of the class described, including a portable drill-brace provided with drill-operating devices, a stand therefor, provided with a work-supporting and feeding mechanism mounted on said stand, and means for detachably securing said drill-brace to said stand; the combination of a feed-actuating member carried on the stand, and an operating member carried on the

drill-brace, said member being respectively positioned for unattached coacting engagement with each other when the drill-brace and stand are united and readily separable by removal of said drill-brace from the stand.

3. A drill-supporting attachment comprising an upright post having a base or foot member, a work-supporting table slidable upon said post, a head-frame fixed upon said post and provided with upper and lower bearing seats for the support of a drill-brace with its drill-operating mechanism, means for detachably securing said drill-brace to said head-frame, a feed-shaft mounted in bearings on said foot and head-frame, and threaded into the table-supporting arm, a ratchet-wheel fixed on said feed-shaft, a drill-operating gear having a cam thereon, a feed-pawl engaging said ratchet wheel, and means for actuating said pawl from the cam on the drill-operating gear.

4. In mechanism of the character described, the combination with the upright post, the drill-carrying frame, the drill-spindle, drill-operating gearing, and a work table mounted to slide on said post and projecting beneath the drill-spindle; of a feed-shaft disposed approximately in the same plane with and positioned between said post and the drill-spindle, said feed-shaft being threaded for moving said table to feed the work to the drilling tool, and means for rotatively actuating said feed-shaft automatically by the same primal operating means and in conjunction with the operation of the drill-spindle.

5. In a mechanism of the character specified, the combination, with a supporting stand having upper and lower arms fitted with seats for sustaining a breast or hand drill-mechanism, and means for detachably securing the same to said seats, a work-feeding table having a bearing-hub movably supported on the stand beneath said arms; of a threaded feed-shaft mounted in said stand and connected for moving said table, a ratchet wheel on the feed-shaft, a pawl-device for moving said ratchet-wheel, a rocker comprising a pawl-carrying arm to which the pawl is pivoted, and an actuating-arm provided with a cam-engaging roll or member, the drill-mechanism, its operating gearing, and a cam fixed to the primary drill-operating gear and engageable with said actuating-arm for oscillating the rocker.

6. In a drilling mechanism, the combination of the upright standard having a standing foot and forwardly projecting head-frame, a drill-spindle, drill-holding chuck, and spindle-actuating gearing rotatively supported in connection with said head-frame, axially parallel with said standard, a drill-operating gear provided with a cam fixed thereon, said cam having a plurality of protuberances, a work-supporting table slidably mounted to move up and down said standard, an upright feed-shaft threaded for moving said table, and means actuated by said cam for imparting rotative movement to said feed-shaft, in conjunction with the operation of the drill-spindle.

7. In a mechanism of the character described, in combination with the feed ratchet-wheel, and the vibrating pawl-carrying arm; of a pawl pivotally attached to said arm for sidewise disengagement, and having means for its normal retention in alinement with the ratchet-wheel face, and a pawl-pressing spring arranged to swing with said pawl while maintaining its normal position in relation to the pawl member.

Witness my hand this 12th day of August, 1907.

OLIVER ARNOLD.

Witnesses:
CHAS. H. BURLEIGH,
A. G. DAVIS.