Jan. 23, 1951 N. A. KESSLER ET AL 2,538,969

AUTOMATIC FEED FOR HAND DRILLS

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Fig. 1

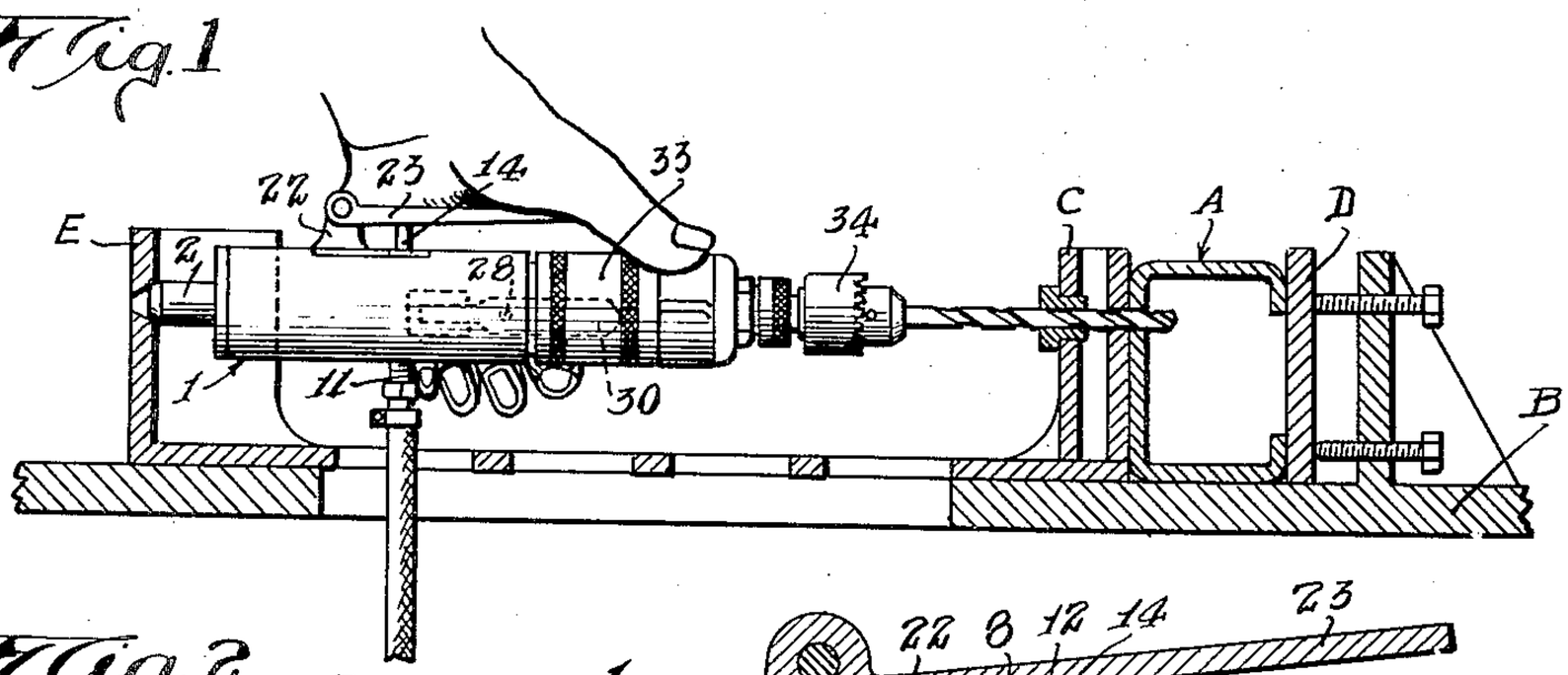


Fig. 2

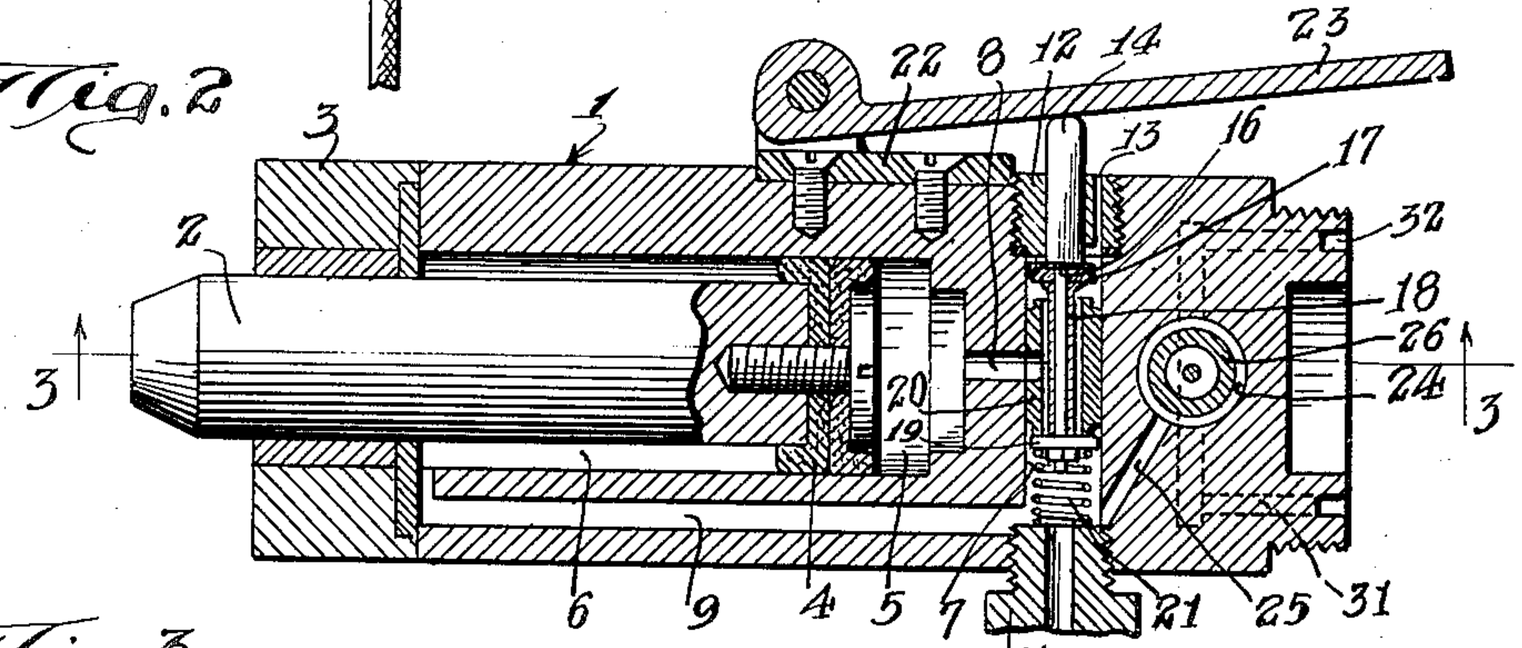


Fig. 3

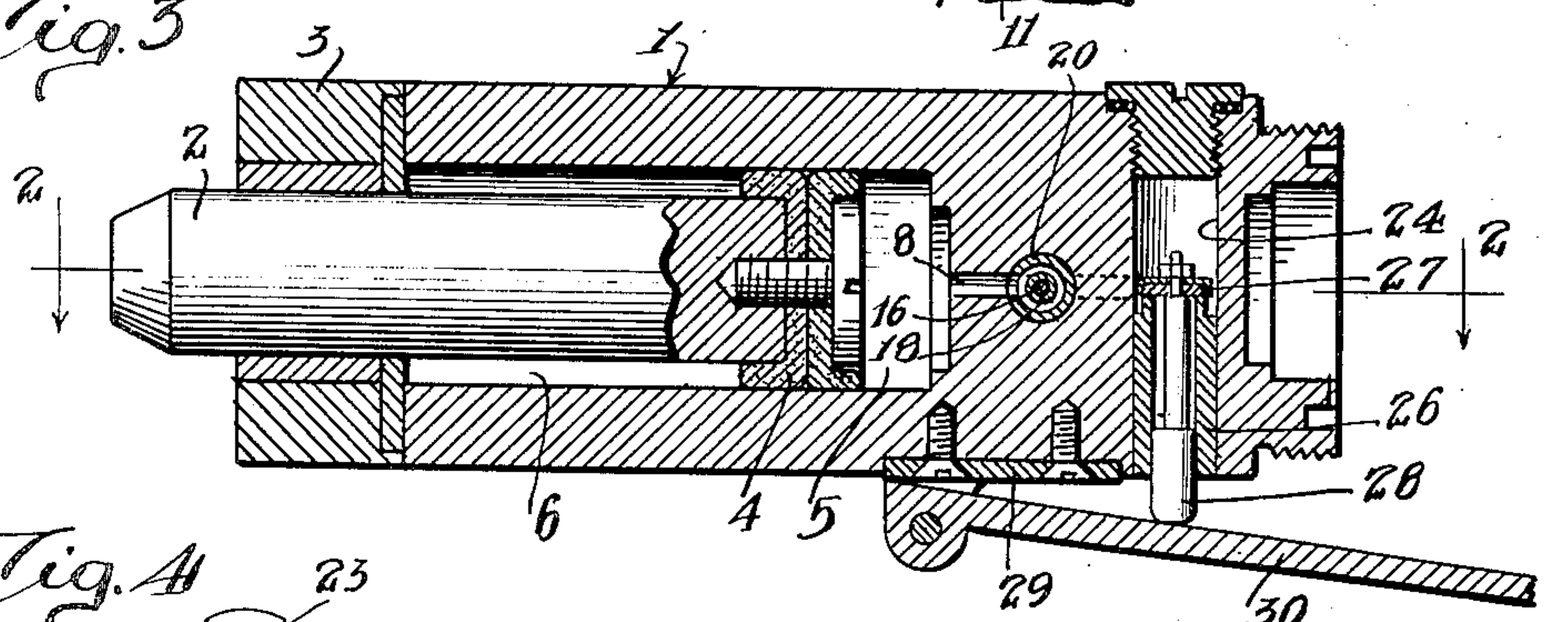
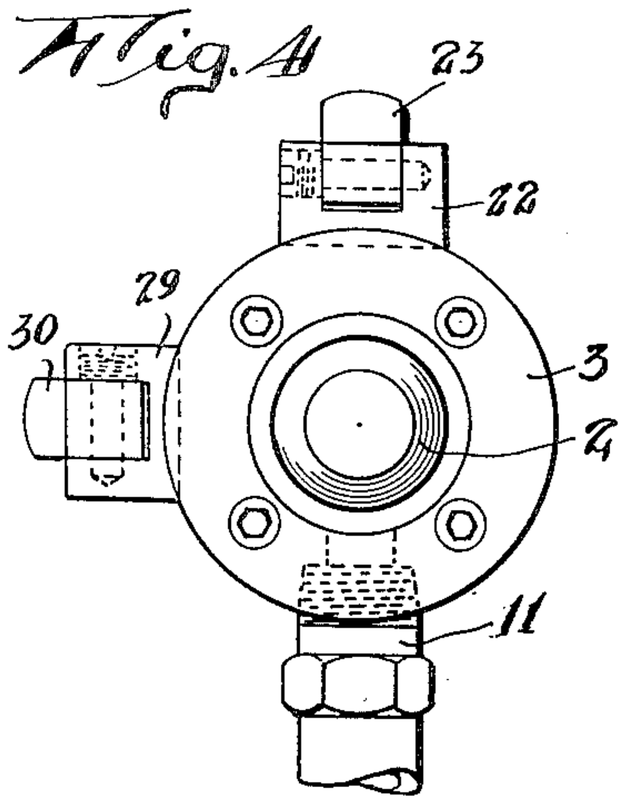


Fig. 4



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AUTOMATIC FEED FOR HAND DRILLS

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Our invention relates to automatic feeds for hand drills, more particularly to pneumatic feeds for pneumatic hand drills.

Among the objects of our invention are:

First: to provide an automatic feed device of this character which incorporates a novel and paricularly simple hand control valve which advances and retracts the hand drill or other tool.

Second: to provide an automatic feed device wherein the feeding force may be readily varied at the will of the operator.

Third: to provide a pneumatic feed device and pneumatic motor so combined that the controls for both the motor and feed device may be simultaneously or individually actuated, as desired, by a single gripping movement of the operators hand, so that the operator has under his immediate control both the feed and the rotation of the drill or other tool.

With the foregoing and other objects in view as may appear hereinafter, reference is directed to the accompanying drawings, in which:

Fig. 1 is a side view of our automatic feed as adapted to pneumatic motor-driven drills, showing in cross-section a jig structure employed to hold work in the desired relation to the drill; and

Fig. 2 is an enlarged, longitudinal, sectional view of the automatic feed, the section being taken through 2—2 of Fig. 3; and

Fig. 3 is another longitudinal, sectional view thereof taken through 3—3 of Fig. 2; and

Fig. 4 is a rear end view of the automatic feed device.

Our automatic feed device includes a cylindrical body 1 having a cavity in one end which receives a plunger 2. The cavity is closed by an end plate 3 having a suitable packing gland and bearing through which protrudes the plunger 2. The inner end of the plunger 2 is provided with a packing head or piston 4 which divides the cavity in the body 1 into a drive chamber 5 at the end of the plunger and a return chamber 6 surrounding the plunger. The plunger occupies a substantial portion of the body cavity, so that the effective area of the drive chamber 5 is substantially greater than the return chamber 6.

The body 1 is provided with a transverse or valve bore 7 located beyond the inner end of the body cavity. The central portion of the valve bore is connected to the drive chamber 5 by a passage 8. A passage 9 extends along the wall of the body 1 from the forward end of its cavity in communication with the return chamber 6 to the valve bore 7 near one end thereof. This end of the valve bore is closed by a fitting 11 which is connected by suitable means, such as a hose, to a source of fluid pressure.

The other extremity of the valve bore receives

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an exhaust plug 12 having a small vent hole 13 therethrough. The exhaust plug 12 has a central bore which slidably receives a pin 14. The inner end of the pin 14 is provided with a reduced stem 16 forming a shoulder which is fitted with a disk valve 17. The disk valve 17 is held in place by a sleeve 18 at the extended end of which is a second disk valve 19 which opposes or faces toward the disk valve 17. A nut at the extremity of the stem 16 secures both valves 17 and 19. The central portion of the valve bore may have press-fitted therein a liner 20 having a port registering with the passage 8. The extremities of the liner 20 form valve seats which coact with the disk valves 17 and 19, the stem 16 and sleeve 18 extending through the liner. It should be noted, of course, that in place of the liner the valve bore 7 itself may be reduced in cross-section, so that in effect the liner would be integral with the body 1.

A spring 21 is positioned between the valve 19 and the supply fitting 11. The spring 21 urges the valve 19 against its seat so that valve 17 is normally open, and the pin 14 protrudes from the side of the body 1. Secured in an appropriate position on the side of the body 1 is a bracket 22 having journal lugs which pivotally support a lever 23. The lever extends over, and is engaged by, the pin 14. By depressing the lever 23 toward the body 1, valve 19 is opened and valve 17 is closed.

Offset axially from the valve bore 7 is a right angularly disposed cross bore 24, the central portion of which is connected by a passage 25 to the end of the valve bore 7 adjacent the fitting 11. One end of the cross bore 24 receives a valve liner 26 or is constricted to form a shoulder which is engaged by a disk valve 27 attached to a pin 28 slidably mounted in the liner 26 and protruding from the body 1. A bracket 29 is secured to the body 1 and supports a hand lever 30 which overlies the pin 28 to engage the pin and receives the valve 27 from its seat. The outer end of the pin 28 forms a sliding seal for the bore of the liner 26. The bore of the liner 26 is connected by passages 31, indicated by dotted lines in Fig. 2, to the axial extremity of the body 1 remote from the end plate 3. This end of the body is provided with an annular channel 32 intersecting the extremities of the passages 31 and is externally threaded for attachment to the end of an air motor 33. The motor is so constructed that supply passages therein communicate with the channel 32. The extended end of the motor 33 is provided with a suitable chuck 34 for holding drills or other tools.

Our feed device may be employed in different manners. One satisfactory means of using our

feed device is in conjunction with drilling operations in structural elements, such as spars, channels or other work pieces designated A in Fig. 1. Such work pieces are preferably held in a jig frame B against a jig-boring fixture C by clamps D. The jig-boring fixture has a series of holes adapted to admit and guide drills. The jig frame includes an abutment E having recesses in alignment with the holes in the jig-boring fixture and adapted to receive the extended end of the plunger 2. It is, of course, obvious that the plunger 2 may be rigidly attached to a suitable support, so that the body 1 and the motor 33 may be urged away from such support or retracted as the plunger is extended or retracted into the body 1.

Operation of our feeding device is as follows:

Normally the valve 19 is closed and valve 17 is open. Consequently air enters through fitting 11 and flows through passage 9 to the return chamber 6. The air in the drive chamber 5 is vented through valve 17 and vent hole 13. When the hand lever 23 is depressed, valve 17 is closed and valve 19 is opened, thus admitting pressure to the drive chamber 5. By reason of the fact that the drive chamber 5 is larger than the return chamber 6, the plunger is driven outwardly.

The hand lever 30 is so positioned relative to the hand lever 23 that the operator can grasp both levers while holding the body 1 and the motor 33, so that he can exercise control over both the rotation and feed of the drill.

Many other embodiments of the invention may be resorted to without departing from the spirit of the invention.

We claim:

1. An automatic feed and drive control for pneumatic motor rotated tools comprising: a body member forming a hand grip and adapted to be connected coaxially to a pneumatic rotary motor and defining passages for connecting said rotary motor to a source of fluid supply, a cylinder bore, and other passages connecting the ends of said cylinder bore to said source of fluid supply, said body member also defining valve bores interposed in said motor passages and cylinder passages, respectively; a piston for said cylinder bore including a stem protruding from said body member; valve means in said valve bores for controlling flow of fluid to said motor and to said cylinder to drive said motor and reciprocate said stem; and selective levers for said valve means mounted externally of said body member and alternatively or simultaneously engageable by a single hand of the operator when gripping said body to advance said stem and drive said motor, thereby to apply either or both torque and axial forces on a tool carried by said motor.

2. A feed and drive control mechanism for rotary pneumatic motors, comprising: a cylindrical body adapted for coaxial attachment to the end of a pneumatic motor, said cylindrical body defining a pair of axially displaced diametrically extending valve bores; valve control levers secured to the sides of said body and overlying said valve bores and so positioned that either or both of said levers may be manipulated by an operator's hand grasping said body; said body defining a piston chamber in its end remote from said motor; a piston in said chamber; a stem extending from said piston and protruding from said body for engagement with an abutment thereby to apply axial pressure on said motor; valves in said valves bores, said body defining passages including an air intake passage, and passages communicating through said valves to said motor and to said piston chamber.

3. A feed and drive control mechanism for rotary pneumatic motors, comprising: a cylindrical body adapted for coaxial attachment to the end of a pneumatic motor, said cylindrical body defining a pair of axially displaced diametrically extending valve bores; valve control levers secured to the sides of said body and overlying said valve bores and so positioned that either or both of said levers may be manipulated by an operator's hand grasping said body; said body defining a piston chamber in its end remote from said motor; a piston in said chamber; a stem extending from said piston and protruding from said body for engagement with an abutment thereby to apply axial pressure on said motor; said body defining an air supply port, drive passage and a return passage communicating with one of said valve bores; a valve therein for controlling air supply to said piston to extend and retract said stem; said body also defining a passage communicating through said other valve bore to said motor; and a valve in said other valve bore; said valves being operatively connected with said levers whereby either or both axial pressure or torque may be applied to a tool carried by said motor.

4. A feed and drive mechanism for rotary pneumatic motors, comprising: longitudinally extensible and retractable pneumatic piston and cylinder means adapted to be disposed between a rotatable pneumatic motor and an abutment in coaxial relation to said motor; said means constituting a hand grip; axially directed hand levers overlying the surface of said means positioned to fit respectively within the palm and under the fingers of the operator's hand when gripping said means whereby said levers may be selectively and simultaneously operated; and valves contained within said means engageable by said levers and operative to control the supply of air to said means and to said motor respectively.

5. A feed and drive mechanism comprising: a rotary motor and a reciprocable motor disposed in coaxial relation, the exteriors of said motors forming a hand grip; a pair of levers mounted longitudinally on the exterior of at least one of said motors and disposed so that one lever may underly the palm while the other underlies the fingers of an operator gripping said motors whereby said levers may be selectively and simultaneously operated; and control devices for said motors operatively associated with said levers.

6. A feed and drive mechanism for rotary pneumatic motors, comprising: a reciprocable pneumatic motor adapted for coaxial attachment to said rotatable pneumatic motor and its exterior forming a hand grip; a pair of levers mounted on said reciprocable motor, the one positioned to underly the palm and the other positioned to underly the fingers of an operator's hand when gripping said reciprocable motor; and valve means operatively associated with said levers and connected respectively with said reciprocable motor and said rotatable motor to effect selective and simultaneous operation thereof.

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