Nov. 30, 1954 H. W. BUTENHOFF 2,695,525

PORTABLE DRILL JACK

Filed March 3, 1950

FIG. 1.

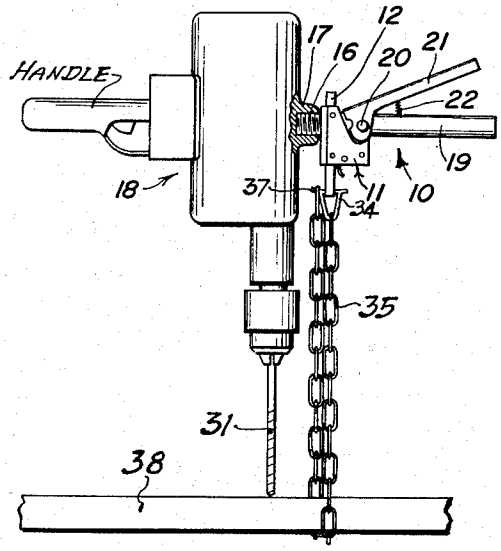


FIG. 8.

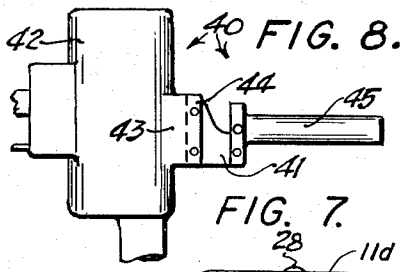


FIG. 7.

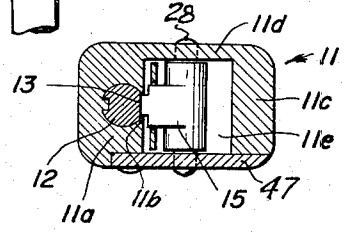
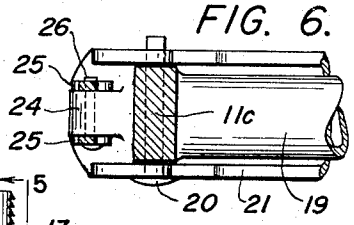


FIG. 6.



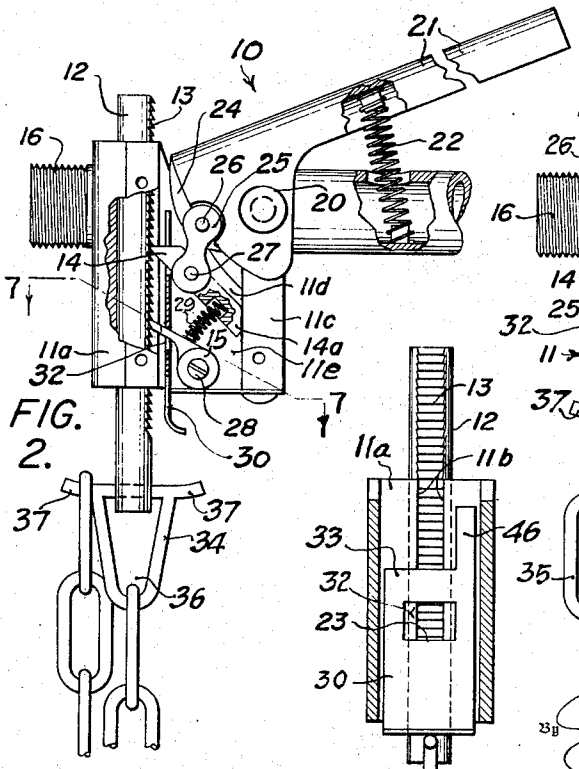


FIG. 2.

FIG. 5.

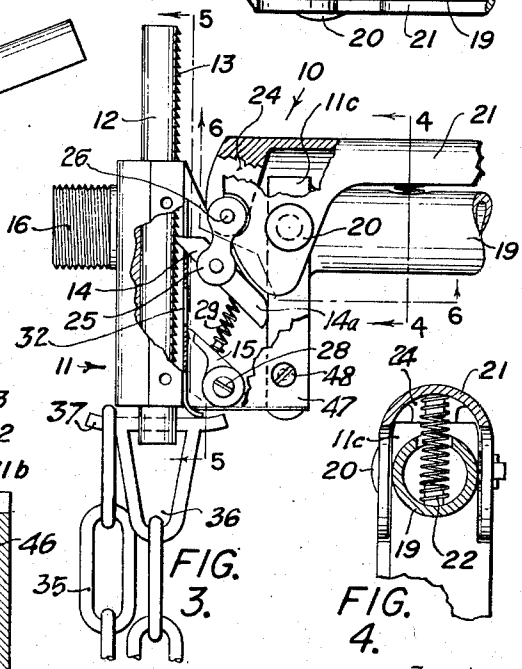


FIG. 3.

FIG. 4.

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PORTABLE DRILL JACK

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6 Claims. (Cl. 74—169)

This invention relates to a portable drill jack.

The principal objects of the invention are to provide a mechanism that is simple, inexpensive, convenient and adapted for use with ordinary portable drills such as electric or pneumatic.

In general, the purpose of any drill jack is to provide the resistance that is necessary in holding a drill to the work and to feed the drill against such resistance.

A feature of the invention is that it is easily and quickly attachable to an ordinary drill without making any structural changes in such a drill. Another feature is that after attaching the jack to the drill, the combination is ready to be applied to the work without any tedious preparation.

According to the aforesaid objects a housing is provided in which a ratchet-toothed plunger is disposed to move back and forth. A threaded boss extends from the housing on one side thereof, and an operating handle from the other side. The threaded boss is screwed into the drill structure in the place of a usual handle after which the mechanism is ready for use.

The ratchet-toothed plunger is propelled in the working direction by means of a combination of pawls that is actuated by a lever which closes against the handle in a scissor-like fashion. The necessary resistance to the operation of the drill is made possible by a flexible connector, such as a chain that is attached to the plunger and extends to a fixed part of the work to be drilled. A convenient way of attaching to the work is to wrap a turn of the chain around the work and to bring the loose end of the chain back to a fastening on the housing. Now, working the lever against the handle, pump fashion, feeds the drill into the work, it being understood that a compression spring operates between the lever and the handle in opposition to the manual actuation.

In the accompanying drawing which illustrates one embodiment of the invention,

Fig. 1 represents an assembly side elevation of the drill jack and a drilling mechanism set up ready for work;

Fig. 2, a side elevation of the drill jack alone drawn to an enlarged scale, portions being broken away for convenience;

Fig. 3, a side elevation similar to Fig. 2, certain working parts however, being shown in alternative positions;

Fig. 4, a cross section taken on line 4—4 in Fig. 3;

Fig. 5, a section on line 5—5 in Fig. 3;

Fig. 6, a section on line 6—6 in Fig. 3; and

Fig. 7, a section on line 7—7 in Fig. 2.

Fig. 8, a side elevation of the invention built into the drilling mechanism as an integral part thereof, the illustration in this instance showing the combination structure stripped of the movable parts.

Referring to the drawing, the numeral **10** denotes the assembled mechanism of the invention. This includes as important parts, a housing **11** and a plunger **12**, the latter having a ratchet face **13**.

The plunger slides axially in a guide **11***a* which in this instance is an integral part of the housing **11**. Facing the inside of the housing is a slotted portion **11***b* through which the ratchet **13** is engageable by a forwarding or feeding pawl **14** and a restraining or holding pawl **15**. Advantageously, the guide **11***a* serves as the back wall of the housing while an opposingly spaced wall **11***c* constitutes the front of the housing. A side wall **11***d* connects the back wall **11***a* and the front wall **11***c* together, thereby largely defining the interior space **11***e* within which certain of the moving parts of the mechanism are located.

Projecting outwardly from the back wall is a threaded boss **16** that screws into the threaded socket **17**, Fig. 1, which usually accommodates one handle (not shown) of an existing drilling mechanism to which the jack happens to be applied. Such an existing drilling mechanism is shown at **18** by way of illustration only, and not of limitation. Projecting outwardly from the front wall of the housing, advantageously as an integral part thereof, is a handle **19**, and pivoted at **20** in proximity to the base of this handle is a lever **21** which is adapted to be manually operated in pump-handle fashion. Normally the lever **21** is held retracted by a compression spring **22**. At **24**, as a part of the lever **21**, is a lug that extends into the housing **11***e* and has suspended from it, the forwarding pawl **14**. Here, the suspension means consists of a pair of links **25** pivotally secured to the lug **24** and to the pawl **14** by the respective pins **26** and **27**.

The compactness and efficiency of the present device is brought about largely because of the unique construction and operation of the ratchet and pawl assembly. This is illustrated clearly in Figs. 2 and 3 where the space **11***e* constitutes a gangway or well alongside the slotted guideway **11***a*.

The pawl **14** in this instance spans substantially the space between the front and back walls of the housing so that the tail portion **14***a* of the pawl slides along the inside surface of the front wall **11***c* while the nose at **14**, Fig. 2, engages the ratchet **13**.

At **28** is a stationary post on which is pivoted the holding pawl **15** which latter, under the urge of a compression spring **29**, engages the ratchet and holds it during the feeding intervals of pawl **14**. The spring **29** exerts its tension between the body of pawl **15** and the tail portion **14***a* of pawl **14** to urge both pawls in common to simultaneously enter engagement with ratchet **13**. The present pawl assembly is unique in that the one spring-urge that causes one pawl to hold the ratchet, at the same time provides the yielding pressure upon the other pawl to allow the latter to swing free from engagement with the ratchet during the intervals of recession.

The floating suspension of pawl **14** by means of links **25** provides its aforementioned swinging freedom. Furthermore, such suspension allows the spring **29** to constantly push the tail **14***a* into sliding contact with the inside surface of wall **11***c* and thereby to bring into play by reaction a horizontal force component that normally keeps the nose of pawl **14** in engagement with a ratchet tooth. This can be clearly visualized from what is shown in Fig. 2, in connection with a downstroke of lever **21**, the short arm of which overhangs the well **11***e*. In Fig. 2 are pictured the normal operating positions of the different parts.

A slide **30** is important in certain phases of the functioning of the pawl assembly. The said slide has an opening **32** with a lower edge **23** adapted to lift pawl **15**, while the upper edge of the slide lifts pawl **14**. In the normal working position of the pawls, Fig. 2, the slide hangs loosely on pawl **15**. Suppose it is desired to reset the ratchet plunger: the lever **21** is allowed to remain in the retracted position (handle **21** up) while the slide **30** is pushed clear up manually to release both pawls from the ratchet and to cause them to be mutually interlocked by the slide. In the interlocked position the lips of both pawls bear against the surface of the slide, and the interlock is caused to hold because the tension of spring **29** is exerted through pawl **15** to keep the slide frictionally stationary against the inner face of wall **11***a*, thereby holding both pawls free of engagement with the ratchet **13** and interlocked with respect to each other. This permits the plunger **12** to be easily withdrawn from its guide.

After the ratchet plunger is replaced in its guide, reengagement of both pawls with the ratchet is effected by first pushing down on lever **21**. This raises the pawl **14** so its lip will have passed over the upper edge **33** of the slide as in Fig. 3. In the meantime the pawl **15** is left in contact with slide **30**. Then, by sharply releasing lever **21**, the slide receives an impact from pawl **14** which pushes the slide down slightly past the lip of pawl **15**. The latter then assumes its normal position through opening **32** to engage the ratchet. Thus, the normal working relation of the pawls is restored.

In the normal operating phase, pumping of the handle **21** finally brings the ratchet plunger into a position where it merely idles so as to prevent any undue stresses upon the working parts. Such functioning is explained more fully hereinafter.

The portability of the drill jack has hereinbefore been emphasized since it can be applied to existing drills, but it is to be clearly understood that the design of the structure is readily adaptable to constitute original built-in equipment with any standard electric, pneumatic or other drill. When that is the case, the boss **16**, which is shown in the drawing in the nature of an adapter, is actually eliminated by making the portion **16** of Fig. 1 an integral part of the socket **17**. Since the socket **17** is an integral part of the body **39** of a usual drill, it is obvious that the housing **11** would also be an integral part of the body **39**.

An alternative integral structure **40** is illustrated in Fig. 8 where the housing **41** corresponds to the housing **11** of Fig. 1, but is integrally connected to the body **42** by the portion **43**. The ratchet guide **44** corresponds to the guide **11***a* in Fig. 7, and the handle **45** to the handle **19** in other figures.

Obviously, it is a primary purpose to supply mechanically the force necessary to push a rotating drill bit against the work, rather than to exert such force through sheer manual effort.

In preparation for drilling, an attachment member such as a swiveled hanger link **34** depends from the plunger **12** and serves to hold two portions of a flexible connector, presently shown as a link chain **35**, fast to the plunger. Preferably one end of the chain is permanently attached at the eyelet **36**, leaving the other end of the chain, or an intermediate portion thereof, free to hang on one or the other of two horns **37**.

In operation, assuming a usual drilling mechanism **18** to be equipped with the device of the invention, the combination is set up after the manner suggested in Fig. 1. This means that the drill bit **31** is in contact with a piece of work **38**, the chain **35** having meanwhile been looped around the work and a free portion of the chain suspended from a horn **37**. By working the lever **21** back and forth, any slight slack in the chain is first taken up by the plunger. Afterwards, continued working of the lever causes the chain to be stressed and the bit to be fed to the work as desired. It is to be observed that a downstroke of the lever **21** obviously lifts the pawl **14** together with the plunger **12** and feeds the bit **31** a corresponding distance. Then, on the upstroke of the lever, the restraining pawl **15** is caused to hold the plunger until the next downstroke comes into action. The upward travel of the hanger **34** finally brings it into contact with the slide **30** and automatically causes the same to act as a "kick-out" just before reaching the aforementioned interlocking position.

The slide **30**, Fig. 5, is advantageously provided with an arm **46** which is effective to prevent undue sidewise rocking of the slide.

Serving as a closure for the housing **11** is a removable cover **47** held in place by suitable means, for illustration, screws **48**.

Whereas this invention is here illustrated and described with respect to certain preferred embodiments thereof, it should be understood that various changes may be made therein and various other constructions may be adopted on the basis of the teachings hereof, by those skilled in the art, without departing from the protective scope of the following claims.

Having fully described my invention what I claim is:

1. A holding and feeding mechanism, comprising a ratchet; a guideway for the ratchet; a gangway adjacent the guideway and having a surface opposite the guideway; a pawl having a nose engaging the ratchet and a tail slidable on said surface; another pawl engaging the ratchet apart from the first pawl; spring means reacting between the second pawl and said tail; linkage pivoted on said pawl between said spring means and said nose; and means disposed to reciprocate the linkage.

2. A holding and feeding mechanism according to claim 1, wherein the reciprocating means for the linkage consists of a handle having a fulcrum adjacent the gangway surface and a connection to said linkage.

3. A holding and feeding mechanism according to claim 2, wherein said handle has two depending lugs straddling said gangway surface so as to engage the fulcrum; and wherein a depending suspension lug is spaced between the straddling lugs so as to constitute said connection to the linkage.

4. A holding and feeding mechanism according to claim 1, wherein is included a plate slidably disposed between the ratchet and the pawl assembly, said plate having edge portions disposed to lift both pawls simultaneously from engagement with the ratchet; and wherein is further included a projection from the ratchet effective to actuate said plate at a given point of ratchet travel.

5. A holding and feeding mechanism comprising a feed ratchet; a wall spaced apart from and facing the ratchet; a feed pawl having a nose in engagement with the ratchet and a tail in contact with the wall; a holding pawl having a body spaced apart from the feed pawl and a nose in engagement with said ratchet; spring means disposed to exert force between tail of the feed pawl and body of holding pawl; and handle means disposed to propel the feed pawl so the tail therof slides along said wall, and simultaneously, the nose thereof imparts feeding motion to said ratchet.

6. A holding and feeding mechanism according to claim 1, wherein is included a slide between the two said pawls and the ratchet, said slide being effective to selectively withdraw both pawls from engagement with the ratchet.

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