March 31, 1953 L. B. HALVERSON 2,633,042

ROTARY IMPACT TOOL WITH LONGITUDINAL DELIVERING MEANS

Filed June 19, 1950

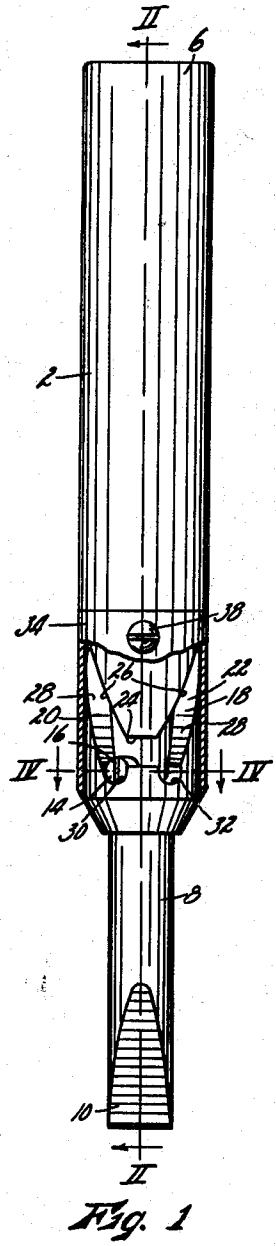


Fig. 1

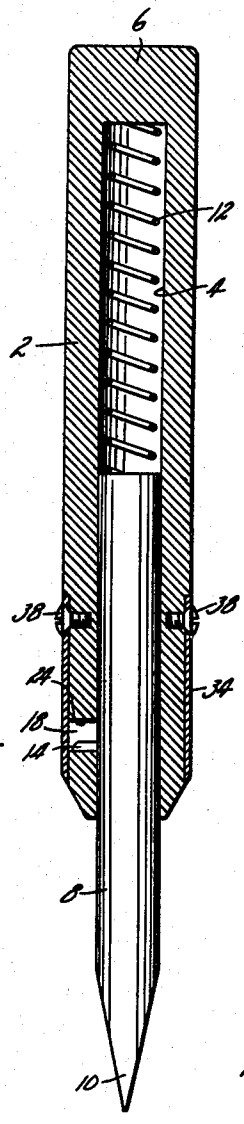


Fig. 2

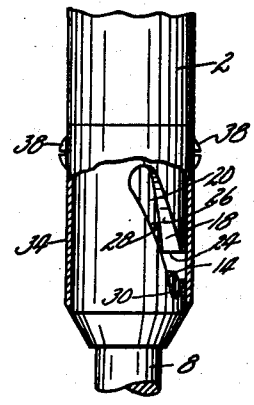


Fig. 3

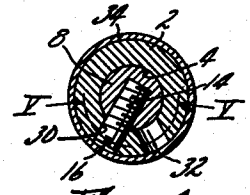


Fig. 4

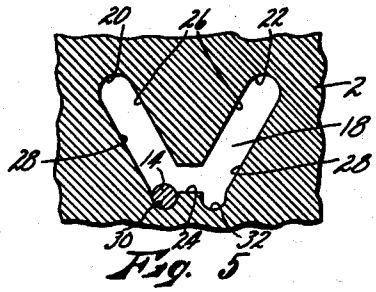


Fig. 5

INVENTOR.
Lloyd B. Halverson
BY
Hamilton & Hamilton
Attorneys.

Patented Mar. 31, 1953

2,633,042

UNITED STATES PATENT OFFICE

2,633,042

ROTARY IMPACT TOOL WITH LONGITUDINAL DELIVERING MEANS

Lloyd B. Halverson, Topeka, Kans.

Application June 19, 1950, Serial No. 169,026

2 Claims. (Cl. 81—52.3)

1

This invention relates to new and useful improvements in screwdrivers, and relates particularly to screwdrivers of the rotary impact type.

The principal object of the present invention is the provision of a screwdriver so constructed that a hammer blow struck longitudinally of the shank thereof will impart both a longitudinal pressure or shock and a rotational force to said shank. This is useful particularly where screws or the like are set so tightly that they cannot be loosened by ordinary means, or where it is desired to set a screw in a hard material which resists penetration by the screw.

Another object is the provision, in a screwdriver of the class described, of means whereby the cam members which impart the rotary impact to the screwdriver shank are automatically returned after each blow to proper alignment for the next blow.

A further object is the provision of a screwdriver of the class described which is adapted to be used as an ordinary screwdriver without adjustment.

Other objects are extreme economy and simplicity of construction, durability, efficiency and dependability of operation, and adaptability for use in connection with wrenches or other similar tools.

With these objects in view, as well as other objects which will appear in the course of the specification, reference will be had to the drawing, wherein:

Fig. 1 is a side elevation of a screwdriver embodying the present invention, partially broken away.

Fig. 2 is a longitudinal sectional view taken on line II—II of Fig. 1.

Fig. 3 is a fragmentary side elevation looking at right angles to the direction of view in Fig. 1.

Fig. 4 is a sectional view taken on line IV—IV of Fig. 1.

Fig. 5 is a planar layout of a section taken on line V—V of Fig. 4.

Like reference numerals apply to similar parts throughout the several views, and the numeral 2 applies to a body member or handle which is tubular, having a circular bore 4 formed longitudinally therein, being open at its lower end and closed at its upper end to form a head 6 suitable for receiving hammer blows. Carried for longitudinal sliding movement and axial oscillation in said body member is a bit or shank 8 formed of circular rod stock. At its lower end said bit extends outwardly from body member 2 and is formed at its outer end to present a screwdriver

2

blade 10 of conventional shape. A helical compression spring 12 is carried within body member 2, bearing at one end against the inner end of bit 8 and at its opposite end against head 6. Said spring urges bit 8 outwardly at all times.

Bit 8 is operated and retained in body member 2 by a pin 14 fixed in said bit intermediate the ends thereof and extending radially at right angles thereto. As shown, pin 14 is threaded into bit 8, and is provided at its outer end with a screwdriver slot 16, for a purpose hereinafter set forth. Said pin extends into and is contained in a substantially V-shaped slot 18 formed through the wall of body member 2 adjacent the open end thereof. As best shown in Fig. 5, said slot has two upwardly divergent arms 20 and 22, and a connecting portion 24 extending between the lower or closer ends of said divergent arms at right angles to the axis of the tool. All of slot portions 20, 22, and 24 are sufficiently wide to permit free movement of pin 14 therein. Each of divergent arms 20 and 22 of slot 18 has an upper wall 26 and a lower wall 28, said walls being adapted to act as cams for turning bit 8 as hereinafter described. The lower wall of horizontal connecting slot 24 is cut out to present two downwardly extending spaced apart notches 30 and 32 disposed respectively in alignment with the lower ends of divergent slot arms 20 and 22. Said notches have side walls parallel to the axis of the tool, and are slightly deeper than half the diameter of pin 14. A tubular cover 34 is disposed about the lower portion of body member 2, covering slot 18. At its upper end said cover butts against a shoulder 36 formed in said body member, and it is held releasably in position by a pair of screws 38 extending into the body member. The purpose of said cover is to prevent possible injury to the user should his fingers or a fold of his skin enter slot 18.

The operation of the tool is substantially as follows. The bit 8 is normally held in its extended position by spring 12, pin 14 resting in one or the other of notches 30 and 32. The drawing shows pin 14 in notch 30, this being the setting when it is desired to use the screwdriver for setting or tightening right-handed screws. The screwdriver may then be used as any ordinary screwdriver, the parallel sides of slot 30 retaining pin 14 to prevent axial rotation of bit 8 in the body member. The strength of spring 12 may be such as to prevent the bit from being moved into the body member by the axial pressure exerted on the screwdriver during normal hand operation. When the screwdriver can no longer

be turned easily in the usual manner, the operator taps on head 6 with a hammer or other suitable tool.

At each blow of the hammer, body member 2 is forced downwardly over bit 8 against the pressure of spring 12 until upper wall 26 of slot arm 20 strikes pin 14. Said slot wall acts as a cam to deliver a rotational impact to said pin, thereby causing bit 8 to turn axially to advance the screw into the work. The body member is formed with substantial mass, in order that the inertia thereof will cause a larger proportion of the momentum to be delivered to the bit, rather than being expended in rotating the body member. After the momentum of the hammer blow has been exhausted, body member 2 is forced upwardly by spring 12 until slot wall 28 contacts pin 14, said wall then acting as a cam to rotate said body member on the bit until notch 30 again engages pin 14. Pin 14 is thus automatically reset in proper alignment with cam wall 26 after each blow, eliminating the necessity of resetting the cam members after each blow and permitting rapid operation. When it is desired to loosen a screw, the bit is pushed into the body member slightly and turned so that pin 14 passes through connecting slot 24 and comes to rest in notch 32. The pin then cooperates with slot arm 22, and the operation is the same as in slot arm 20, except that the bit will be rotated in the opposite direction. It is believed that the merit of this type of tool lies not only in the rotary impact imparted to the bit, but in the simultaneous delivery thereto of both an axial and a rotary impact. The axial impact tends to loosen the screw threads in the work, while the rotary impact turns the screw.

Although slot 18 is normally covered by cover 34 and the setting of pin 14 is therefore not visible, the setting may be quickly and easily made, or checked, simply by pushing the bit inwardly and turning it in the direction in which it is desired to turn the screw. Also, it will be noted that slot arms 20 and 22 are of greater width than the diameter of pin 14. This provides that during the upward or return stroke of body member 2, when said pin is riding along the lower wall 28 of one of slot arms 20 and 22, said pin will be held well away from the entry to connecting slot 24, thus precluding accidental disturbance of the setting.

It is quite apparent that the invention is not limited to use in connection with a screwdriver. The outer end of bit 8 could be formed as an impact drill, or for holding socket wrenches or other rotary tools. Also, it might be desirable to insert interchangeable screwdriver bits, or springs of different strengths. For this purpose, the device may be readily disassembled by first removing cover 34 and then removing pin 14 with an ordinary screwdriver. The bit and spring may then be removed, and other tools or springs inserted as desired.

Although I have shown a specific embodiment of my invention, it is apparent that the above

described changes and other changes of construction and operation could be made without departing from the spirit of the invention, and it is therefore desired that my patent protection extend to all subject matter falling properly within the scope of the appended claims.

What I claim as new and desire to protect by Letters Patent is:

1. A tool of the class described comprising a tubular body member open at one end and having a slot formed in the wall thereof, said slot comprising two sections inclined relative to the axis of the tool and divergent away from the open end of the body member and a connecting portion extending at right angles to the axis of the tool and interconnecting the closer ends of said inclined portions, the wall of said connecting slot portion closest to the open end of said body member having a notch formed therein in alignment with the adjacent end of each of said inclined slot portions, a tool bit carried for rotational and axial sliding movement in said body member and extending outwardly from the open end thereof, a work engaging tool carried at the outer end of said bit, resilient means urging said bit outwardly, and a member fixed in said bit and extending radially therefrom into said slot.

2. A tool of the class described comprising a tubular body member open at one end and having a slot formed in the wall thereof, said slot comprising two sections inclined relative to the axis of the tool and divergent away from the open end of the body member and a connecting portion extending at right angles to the axis of the tool and interconnecting the closer ends of said inclined portions, the wall of said connecting slot portion closest to the open end of said body member having a notch formed therein in alignment with the adjacent end of each of said inclined slot portions, the side walls of said notches being parallel with the axis of the tool, a tool bit carried for rotational and axial sliding movement in said body member and extending outwardly from the open end thereof, a work engaging tool carried at the outer end of said bit, a spring urging said bit outwardly, and a pin fixed in said bit and extending radially therefrom into said slot.

LLOYD B. HALVERSON.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
284,933	Wilbur	Sept. 11, 1883
1,731,979	Krumnel	Oct. 15, 1929
2,484,769	Turgeon	Oct. 11, 1949
2,507,167	Lemmerman	May 9, 1950

FOREIGN PATENTS

Number	Country	Date
803,270	France	June 29, 1936
343,400	Italy	Sept. 28, 1936