

Feb. 7, 1967

M. WALTON

3,302,672

SCREW DRIVING TOOL

Filed July 12, 1965

2 Sheets-Sheet 2

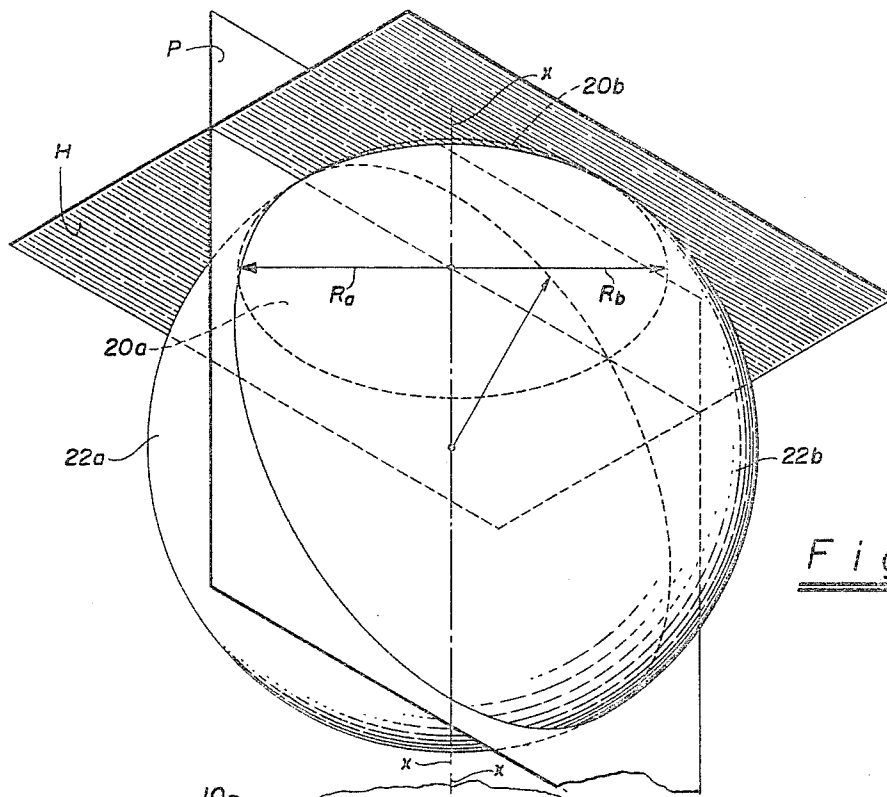


Fig. 4

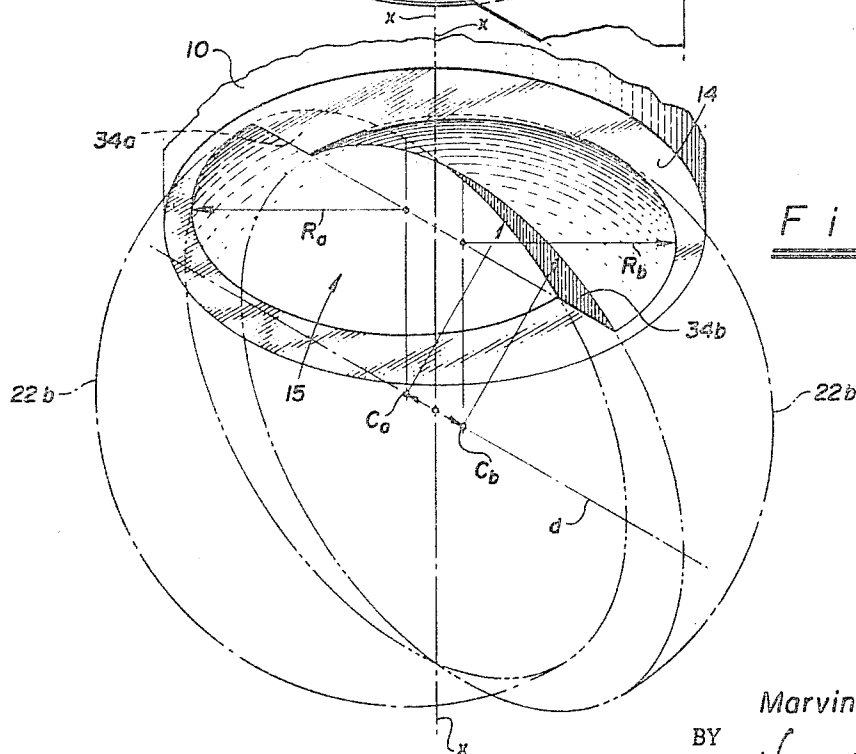


Fig. 5

INVENTOR
Marvin Walton
BY

W. H. Fawcett

1

3,302,672
SCREW DRIVING TOOL
Marvin Walton, 134 Tuscaloosa Ave.,
Atherton, Calif. 94025
Filed July 12, 1965, Ser. No. 471,152
6 Claims. (Cl. 145—50)

The present invention relates to screw driving tools. More particularly, the present invention relates to driving tools for screws of the type known as "one-way screws" or "irretrievable screws."

The present invention relates particularly to drive tools for round-headed one-way screws that are provided with indentations or excisions along diametrically opposite circumferential areas of their rounded heads which end in abutment surfaces that are located in a common plane containing the axis of the screw. To effectively engage and drive such screws into position, the driving tool must have drive elements capable of bearing against both said abutment surfaces. In a direction opposite to the direction in which the screw is to be driven into position, the floors and/or side walls of the circumferential indentations or excisions are shaped in such a manner that upon reversal in the operation of the drive tool, the tool is cammed out of said indentations or excisions and cannot effectively engage the screw head. A particularly effective one-way screw designed for operation with high speed power tools is described in my copending U.S. patent application Serial Number 458,604, filed May 25, 1965.

It is an object of my invention to provide an effective screw driving tool that is particularly suitable for high speed operation with one-way screws of the type referred to and which may be smoothly and effectively engaged with such screw heads and may be smoothly disengaged from the screw heads, upon reversal in its operation.

More particularly, it is an object of the invention to provide a drive tool for screws of the type described, that may be engaged with, or disengaged from, the screw heads without chattering, and without jarring the operator's hand, and which is not likely to mar the screw head and/or the objects into which screws are driven by its operation.

Still another object of the invention is to provide a screw driving tool of the type referred to, that lends itself readily to mass production methods.

These and other objects of the present invention will be apparent from the following description of the accompanying drawings which illustrate a preferred embodiment thereof and wherein

FIGURE 1 is a perspective of a screw driving bit embodying my invention and shows below said bit a fragmentary perspective of a one-way screw of the type which it is intended to drive;

FIGURE 2 is a side elevation, partly in section, of the screw driving bit shown in FIGURE 1;

FIGURE 3 is a bottom plan view of the end surface of the screw driving bit; and

FIGURES 4 and 5 are schematic perspectives of a sphere and of two radially displaced hemispheres thereof, illustrating the geometrical parameters of the surfaces that define the conformation of the concavity in the end surface of the screw driving bit of the invention.

The screw driving bit of my invention comprises a cylindrical head portion 10 mounted upon the end of a shank or stem 12 by means of which it may be coupled to the socket of a rotary drive tool. The flat end surface 14 of said head contains a shallow rounded recess or concavity 15 of a diameter to fit over the head 16 of the screw 18 for which it is designed (FIGURE 1). Geometrically, the conformation of said recess is established by the top segments 20_a and 20_b of two complementary hemispheres 22_a and 22_b (FIGURE 4) whose

2

center points C_a and C_b lie below the end surface 14 of the head 10 and are displaced from each other in a plane P containing the center axis x of the screw driver, along a common diameter d to opposite sides of said axis (FIGURE 5). FIGURE 4 shows the sphere 22 before its halves 22_a and 22_b are displaced relative to each other in the manner explained above. In addition to the vertical plane P in which the displacement occurs, said figure indicates the horizontal section plane H that separates the segments from the sphere 22 and which coincides with the plane defined by the end surface 14 of the screw driving bit. The radii R_a and R_b of the base circle of said segments are somewhat smaller than the radius of the cylindrical head 10 of the screw driver and are about equal to the radius of the intersection line L between the ramp 24 of an excision or indentation 26 in the head 16 of the one-way screw and the side wall 28 of said indentation or excision (FIGURE 1); and the degree of diametrical displacement of the center points C_a and C_b of the hemispheres 22_a and 22_b is about equal to, or slightly larger than, the radial depth of the floor or ramp 24 of an excision or indentation in the head of the screw adjacent the abutment surface 30 thereof.

When the concavity in the end face of the screw driver bit is of a conformation as defined hereinbefore, the two relatively displaced, juxtaposed sphere segments 20_a and 20_b, form inwardly directed circumferential ledges 32_a and 32_b that increase gradually in depth in a direction radially of the concavity and terminate in flat end surfaces 34_a and 34_b, respectively, that lie within the plane P in which the hemispheres are displaced. Said end surfaces are of horn-shape, as best shown in FIGURE 1, and are the driver surfaces of the tool. In the preferred embodiment of the invention illustrated in the accompanying drawings the inner edges of said ribs 34_a and 34_b are beveled as best shown at 36 in FIGURES 1 and 2; and especially the inwardly directed end corners 38 of said ribs are preferably chamfered as likewise shown in FIGURE 1 and as also shown in FIGURE 3.

In the preferred embodiment of the invention illustrated in the accompanying drawings, the driving head is provided with a centering boss 40 which may be of trunco-conical conformation and which rises from the bottom of the concavity 15 coaxially with the drive head 10 preferably to a level slightly beyond the end surface 14 of the head, as best shown in FIGURE 2. Such a centering boss facilitates proper coaxial engagement of the screw driver with the screw. Accordingly, the heads of one-way screws of the type described and illustrated in FIGURE 1 are usually provided with axially located centering bores or holes 42 of inverted conical or trunco-conical shape.

A screw driver having a head formed as described above and illustrated in the accompanying drawings, may easily be brought into proper coaxial engagement with the head of a one-way screw of the type exemplified in FIGURE 1. Its driver surfaces 34_a and 34_b will effectively engage the abutment surfaces 32 in the head of the screw 18 without chattering or jarring, even though the tool may be in rotation. Due to the smoothly rounded nature of the concavity 15, of its ribs 32_a and 32_b, and of the corners 38 of its driver surfaces 34_a and 34_b, the tool will not mar the screw head or the article into which the screw is to be driven, and it may readily be disengaged from the screw; and the screw driver will not cause chattering nor jar the operator's hand, even when its operation may be accidentally reversed, but will smoothly disengage itself from the screw head. Moreover, the construction of the screw driver bit of my invention is such that it may be easily manufactured with great accuracy by mass production methods. It is therefore as

3

economical in manufacture as it is dependable, effective and trouble-free in operation.

I claim:

1. A screw driving tool comprising a cylindrical head having an end surface, said end surface containing a concavity defined by adjacent segments of two complementary hemispheres, said segments being displaced to opposite sides of the center axis of said head upon said end surface to form with said end surface a pair of oppositely located, inwardly projecting ribs terminating in driver surfaces located at either side of said center axis in a common plane containing said axis.

2. A screw driving tool according to claim 1, wherein the inwardly pointing corners of said ribs are chamfered.

3. A screw driving tool according to claim 1, wherein the inner edges of said ribs are beveled.

4. A screw driving tool according to claim 1, including a centering boss rising coaxially with the center axis of said head from the bottom of said concavity.

5. A screw driving tool according to claim 1, including a trunco-conical centering boss rising coaxially with the center axis of said head from the bottom of said concavity to a level beyond the end surface of said head exteriorly of said concavity.

4

6. A screw driving tool for high speed power operation of one-way screws of the type described comprising a cylindrical head having a flat end surface, said end surface containing a concavity defined by juxtaposed segments of two complementary hemispheres of equal radii whose geometrical center points are displaced along a common diameter of the cylindrical surface defined by said head to opposite sides of the center axis of said head, said spherical segments defining with said end surface a pair of oppositely located, inwardly projecting circumferential ribs of gradually increasing radial depth terminating in horn-shaped driving surfaces located at either side of said center axis in a common plane containing said center axis.

References Cited by the Examiner

UNITED STATES PATENTS

1,956,963	5/1934	Salmen	145—50
2,180,633	11/1939	Holt	145—50
3,134,292	5/1964	Walton	145—50

WILLIAM FELDMAN, *Primary Examiner.*

R. V. PARKER, JR., *Assistant Examiner.*