

UNITED STATES PATENT OFFICE.

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BOLT-EXTRACTING DEVICE.

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The object of this invention is to provide means for extracting broken bolts from castings and the like, by the use of a shank member and a dog or bit to be inserted in a bore drilled in the end of the element to be extracted.

A further object is to provide a shank having a lower end cut away on one side, to form a flat face, the remainder of the surface adjacent to this end of the shank being milled; and to provide a dog or bit of special form for contact with the flat face; the bit and shank together engaging the inner surface of a bore to be drilled in the end of the broken bolt.

In the drawings, Figure 1 shows the extracting device in elevation, and also shows in section an element in which a bolt has been broken off; Figure 2 is a section on line 2—2 of Figure 1; Figure 3 is a perspective view of the shank portion of the extracting device; Figure 4 is a similar view of the bit designed to engage the wall of a bore formed in the element to be extracted; Figure 5 is a perspective view of a slight modification, in which the outer end of the shank is drilled transversely for receiving a tool through which a twisting movement is imparted.

The shank 10 may have an angular head 11 for engagement by any suitable tool, the body portion 12 being usually circular in cross section, and the end opposite the head 11 being formed with a cut away portion providing a flat surface 13. Approximately two-fifths of the metal is cut away, and the portion retained is designated 14, the curved portion being milled, if desired, as shown at 15.

The dog or bit 16 is approximately triangular in form and includes two straight sides constituting cutting edges A, B, and a concave edge 17. The measurement at $a-b$ is about three-fourths of the width of the cut away portion adjacent to the flat surface 13.

The end of the bolt to be extracted is drilled to provide a bore 18, and the milled and flattened end of the shank is inserted in the bore, with the bit 16 in the position illustrated, or in a reverse position, depending upon whether the thread is a right or

left hand thread. Rotation is then imparted, for effecting the result desired.

In Figure 2 it will be observed that when shank 10 is rotated to the left in that view, there will be slight rocking movement of bit 16 about the left edge portion thereof. The drawing shows that the upper edge of the bit engages the wall of the bore at the left of the center of the base line at 16, and at this point binding action occurs in actual practice, in view of the mechanical conditions here disclosed.

The tool is quickly removed from the broken bolt or other element, after the latter has been extracted, by reversing the direction of movement of the shank, to a slight extent, permitting disengagement and allowing the bit to drop out.

In a slightly modified form the head 11' is formed with an aperture 11'' permitting of operation by the use of various tools not formed for turning a square or angular member,—and in general modifications may be made within the scope of the appended claims. Tubular elements of various kinds may be loosened in the manner herein described, and by the use of the same tool.

It will be observed that the shank is cut away transversely in a plane approximately parallel with its longitudinal axis, forming a flat portion extending entirely across the shank.

The bit of Figure 4 is an important element in the construction, and for purposes of distinction from other forms of bits, may properly be termed a floating loosely mounted bit. This element directly cooperates with the flat face portion of the shank shown at the left of Figures 3 and 5,—this cooperation being shown in Figure 2.

What I claim is:

1. A tool, comprising a shank cut away transversely in a plane approximately parallel with its longitudinal axis, and presenting a flat portion extending entirely across the shank, and an angular floating loosely mounted bit movable transversely and angularly with reference to the flat face of the shank and adapted to engage the inner wall of a bore receiving the shank, by movement transversely and angularly of the bore.

2. A tool, comprising a shank cut away transversely in a plane approximately parallel with its longitudinal axis, the cut away portion representing less than one half of the cross section of the shank and presenting a flat portion extending entirely across the shank, and a triangular floating loosely mounted bit movable transversely and angularly with reference to the flat face of the shank and adapted to engage the inner wall of a bore receiving the shank by movement transversely and angularly of the bore. 10

In testimony whereof I affix my signature.
WRIGHTSMAN DANIEL HIMES.