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Pearson

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[54] **DRILL HEAD ASSEMBLY**

[75] Inventor: **Bernard A. Pearson,** Bothell, Wash.

[73] Assignee: **Smith-Williston, Inc.,** Seattle, Wash.

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[52] **U.S. Cl.** ..... **173/80,** 173/131, 175/410, 287/103 D, 287/125

[51] **Int. Cl.** **E21c 13/06**

[58] **Field of Search** ..... 173/90, 128, 131, 132, 139, 173/80; 175/293, 91; 408/143; 287/103 D, 125

[56] **References Cited**

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Primary Examiner—Marvin A. Champion
Assistant Examiner—William F. Pate, III

[57] **ABSTRACT**

An impact rock drilling tool is provided with a removable head assembly and an anvil which receives percussive and rotational loads. The anvil and head assembly are threaded together to hold the head assembly on the anvil. The anvil has a radially outer shoulder surface which opposes a radially outer impact surface on the head assembly. The anvil also has an end surface which opposes a radially inner impact surface on the head assembly. Deformable washers are interposed between the impact surfaces of the head assembly and the opposed surfaces on the shoulder and end of the anvil respectively. The deformable members uniformly distribute the load across the entire surfaces and thus increase the effective bearing surfaces for transmitting the load between the anvil and the head assembly.

5 Claims, 2 Drawing Figures

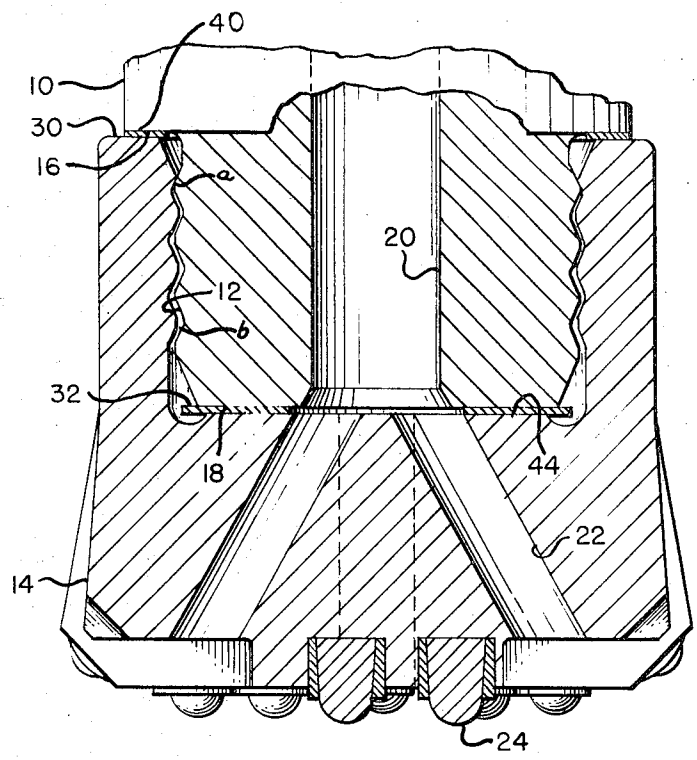
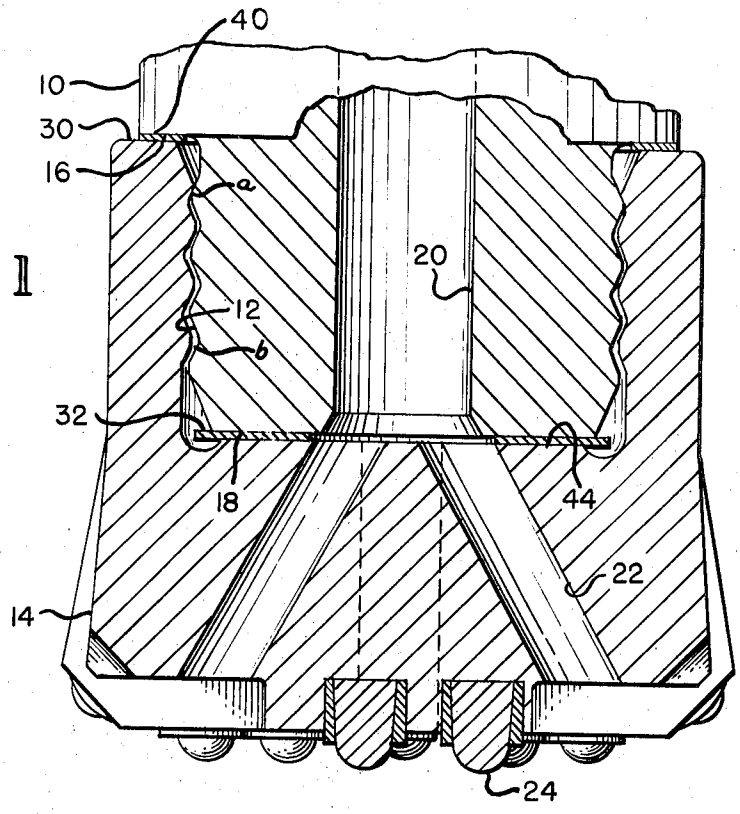


FIG. 1



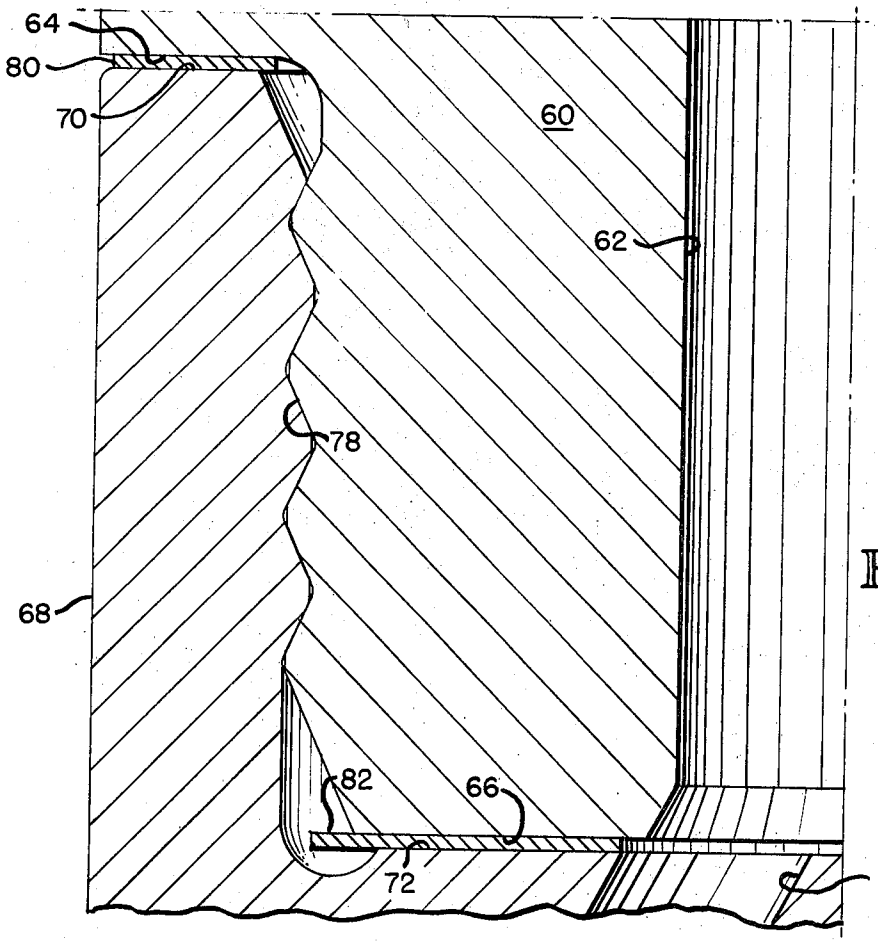


FIG. 2

DRILL HEAD ASSEMBLY

CROSS REFERENCE TO RELATED APPLICATION

This application discloses subject matter shown in my copending application Ser. No. 232,695, filed Mar. 8, 1972.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention pertains to impact and rotary rock drilling tools.

2. Description of the Prior Art

A difficulty with prior art rock drilling tools of the type having a removable head assembly fastened to an anvil is that the constant percussive and rotary loading on the head assembly provides extreme stresses on the threaded interconnection between the head assembly and anvil resulting in fatigue cracks and ultimately failure.

SUMMARY OF THE INVENTION

It is an object of this invention to provide means for securing a head assembly to an anvil of an impact drilling tool which allows the head assembly to receive extreme torque and percussive impact loads without failing.

It is another object of this invention to distribute the impact loading between an anvil and a drill head assembly over the widest possible area.

Basically, these objects are obtained by providing an anvil with multiple impact surfaces, providing the head assembly with impact surfaces confronting those of the anvil, and placing between each confronting set of impact surfaces a deformable member. The deformable member becomes compressed under the loading to fill all of the voids, microscopic irregularities or machining errors in the impact surfaces of the anvil and the head assembly so that the impact loading is borne by the entire surface area of the available impact surfaces. In this manner distribution of the shock wave of the percussive loading occurs over a larger surface area than heretofore possible and a substantial portion of the impact loading is transmitted from the radially inner end surface of the anvil to the head assembly where shock transfer is most effective.

BRIEF DESCRIPTION OF THE FIGURES OF THE DRAWING

FIG. 1 is an axial section of an anvil and rock drill head assembly embodying the principles of the invention.

FIG. 2 is a modified form of an anvil and rock drill head assembly also embodying the principles of the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

As best shown in FIG. 1 an anvil **10** is provided with a threaded interconnection of **12** of the type illustrated in said co-pending patent application in which the threads have a tight engagement at a point *a* and a gap at point *b*. The anvil is provided with a radially outer shoulder having an impact surface **16** and a radially inner end having an impact surface **18.** An air passage **20** is provided for introducing a pressurized stream of air into the head assembly for clearing broken bits of rock or soil or the like from the forward end of the head assembly.

The head assembly **14** is provided with corresponding air passages **22** and a plurality of carbide bits or buttons **24.** the bits can be of conventional construction or, if preferred, can be of the type illustrated in said copending application Ser. No. 232,695.

Due to the threaded interconnection **12,** and the percussive and rotary loads placed on the anvil and head assembly, the threads **12** normally tend to tighten during operation of the drilling tool. In order to reduce this tightening the loading is more uniformly distributed in this invention thus increasing the loading to which the tool can be subjected. The head assembly is also provided with impact or bearing surfaces. One of which is a radially outer impact surface **30** opposed to the anvil impact surface **16** and the other is a radially inner impact surface **44** opposing the anvil end surface **18.** Interposed between the surfaces **16** and **30** is a deformable washer **40** preferably of cold rolled steel that upon subjection of the loading will deform to fill all of the irregularities in the surfaces to which it abuts so that the entire surfaces of the impact surface **16** and impact surface **30** are utilized for transmitting the load. Similarly a second washer **32** of cold rolled steel is used to uniformly distribute the load over the entire surfaces **18** and **44.**

The advantages of the use of these deformable members or washers are that irregularities in each of the surfaces used for transmitting the loads can be compensated for so that the loading is distributed over the entire surfaces rather than isolated points on those surfaces. Secondly, since it is difficult, if not impossible, to machine all of the surfaces **16, 30, 18** and **44** to match perfectly for distributing loads, the deformable washers allow a mating between both the radially outer surfaces and the radially inner surfaces so that both sets of surfaces are utilized in distributing the loads. Thus not only is the bearing surface for distributing loads increased, thus decreasing localized stresses in the anvil or head assembly, but also the shock wave of the loading is permitted to travel straight up the anvil directly into the head assembly close to the axial center of the head assembly. This portion of the head assembly has the highest strength and is best able to withstand the shock wave thus prolonging the useful life of the head assembly.

FIG. **2** illustrates a modified embodiment of the anvil and head assembly. An anvil **60** is provided with an air passage **62,** a radially outer impact surface **64** and a radially inner impact surface **66** on the end of the anvil. The head assembly **68** is provided with a radially outer impact surface **70** opposed to the impact surface **64** and a radially inner impact surface **72** opposed to the impact surface **66.** Corresponding air passages **74** are provided in alignment with the air passage **62.** A conventional standard J thread removably secures the head assembly to the anvil. Interposed between the impact surfaces **64** and **70** is an annular deformable washer **80.** Correspondingly, a second washer or deformable member **82** is provided between the impact surfaces **66** and **72.** The function and operation of the impact surfaces and deformable members is the same as that described for the preferred embodiment of FIG. **1** and further explanation is not believed necessary. The advantage of this embodiment is that it achieves the simplicity of standard thread design with the added load capability.

While the preferred forms of the embodiment have been illustrated and described, it should be understood that variations and modifications will be apparent to one skilled in the art without departing from the principles of the invention. Accordingly, the invention is not intended to be limited to the specific forms described.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A rock drilling tool having an anvil and a head assembly, means threadably securing the head assembly to said anvil, first and second sets of impact surface means respectively confronting one another on said anvil and head assembly, the first and second deformable members interposed between each set of said impact surface means for providing full uniform contact between each set of impact surfaces so as to increase the impact bearing surface of the head assembly and anvil.

2. The combination of claim **1** said first set of impact surfaces including a radially outer shoulder surface on said anvil opposed to an annular radially outer surface on said head assembly, said second set of impact surfaces including an end surface on said anvil opposed to a radially inner surface on said head assembly, and said deformable members each including a cold rolled steel washer positioned respectively between the entire opposed surfaces of said anvil shoulder surface and head assembly radially outer surface and said anvil end surface and head assembly radially inner surface.

3. The combination of claim **2** said threadably securing means including an external thread on said anvil and an interval thread on said head assembly, said threads having a variance for producing normal thread engagement toward the axially inner end of the anvil and a gap between the threads toward the axially outer end of said anvil.

4. The combination of claim **2** said threadably securing means including a standard thread externally positioned on the anvil and interconnected with an internally positioned standard thread on the head assembly.

5. A rock drilling tool having an anvil, a head assembly removably secured to said anvil, and means for guiding air through said head assembly, the improvement comprising;

a radially outer shoulder impact surface on said anvil,

a radially inner impact surface on said head assembly opposed to said anvil shoulder impact surface, an end impact surface on said anvil, a second impact surface on said head assembly opposed to said anvil end impact surface, and first and second deformable impact transferring means interposed respectively between said first impact surface and said shoulder impact surface, and said second impact surface and said anvil end impact surface for spreading the impact loads uniformly over said impact surfaces.

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