United States Patent

Ames et al.

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[54] **CRANIAL DRILLING INSTRUMENT**

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[52] **U.S. Cl.** **128/310,** 306/43, 408/202

[51] **Int. Cl.**.....**A61b 17/16,** A01b 1/22, B23b 51/00

[58] **Field of Search** ...128/310; 306/42, 43; 408/144, 408/202

[56] **References Cited**

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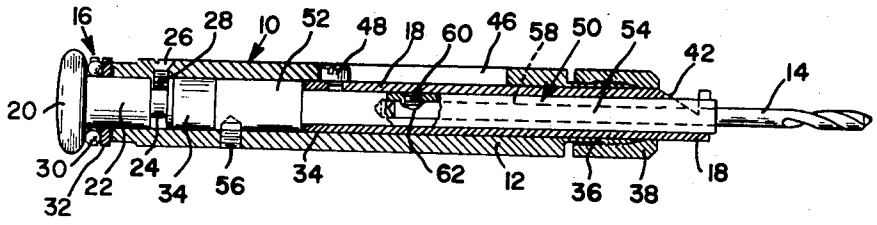
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[57] **ABSTRACT**

A cranial drilling instrument having an adjustable guard for gauging the depth of penetration. The instrument includes a rotatable handle portion for positively locking the drill in place and a thrust bearing mounted on the handle opposite the drill.

7 Claims, 3 Drawing Figures



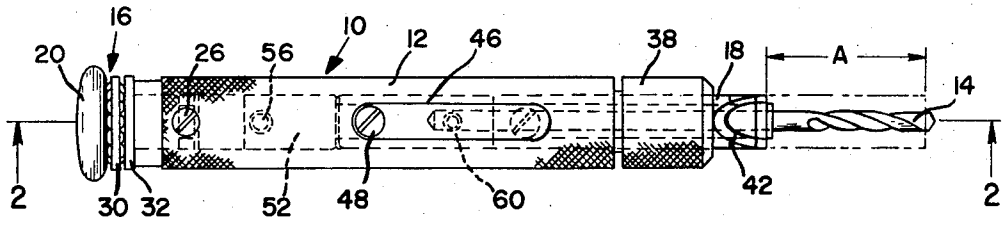


FIG. 1

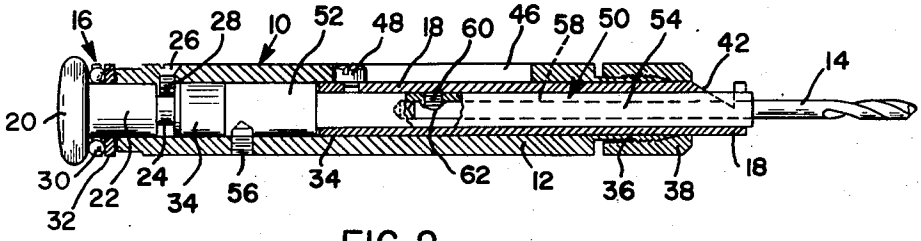


FIG. 2

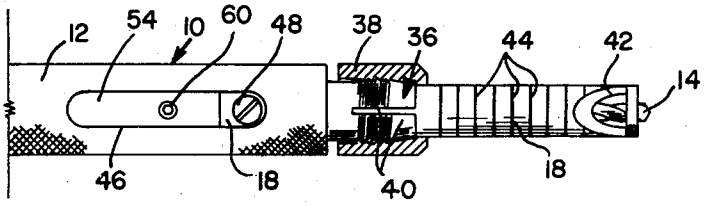


FIG. 3

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CRANIAL DRILLING INSTRUMENT

BRIEF SUMMARY AND OBJECTS OF THE INVENTION

The present invention relates generally to surgical instruments and more particularly to a twist drill for gaining access to the interior of the cranium.

The use of twist drills for entering the skull has been utilized by neurosurgeons for some time. In emergency situations, such as when a person sustains a stroke, there is a necessity of a means for entering the skull rapidly, and frequently remote from a hospital where the most desirable instruments are available. An individual whose condition is deteriorating rapidly from uncompensated increasing intracranial pressure requires immediate emergency relief. Such an individual demands immediate ventricular tap, aspiration of an intracranial hematoma or absess, etc.

The present cranial drill is invaluable for twist drill ventriculography, emergency relief of intracranial pressure, and especially for drilling seating holes for the insertion of Crutchfield skull tongs.

Briefly, the invention is preferably constructed of stainless steel and includes a knurled, elongated cylindrical handle having the drill bit extending from one end and a thrust bearing provided at the opposite end. The drill bit is locked to the handle for rotation therewith and surrounded by an adjustable guard member. An adjustable guard, which has indicia provided thereon, is releasably clamped within a chuck secured to the handle. The adjustable depth guard allows the surgeon to penetrate the skull, without the need of instruments, with ease and the assurance that the depth of penetration will be controlled positively. The thrust bearing facilitates operation of the twist drill and eliminates the tendency of the instrument to tear or otherwise destroy the gloves of an operator.

One of the primary objects of the invention is to provide a compact novel cranial drill for positively controlling the penetration of the drill without the use of additional instruments.

Another object of the invention is the provision of a depth-controlling guard which is readily and conveniently adjustable to selected positions.

Still another object of the invention is the provision of a drilling instrument constructed throughout of stainless steel and having a normally unbreakable drill point.

A further object of the invention is the provision of a thrust bearing means for supporting the drill to facilitate and enhance the operation thereof.

These and other objects of the invention will be more readily apparent during the course of the following detailed description taken in conjunction with the accompanying drawing of a preferred embodiment.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a side elevational view of the cranial drilling instrument illustrating a substantial portion of the guard recessed within the handle portion;

FIG. 2 is a cross-sectional view of the instrument taken along line 2—2 of FIG. 1; and

FIG. 3 is a fragmentary, side elevational view illustrating the guard in the maximum extended position.

DETAILED DESCRIPTION OF THE INVENTION

Referring to the drawing, reference numeral **10** designates a preferred embodiment of the cranial drilling instrument for permitting a surgeon to penetrate the human skull of a patient with ease and with assurance the the penetration depth will be positively controlled.

The instrument includes a handle **12** of tubular construction having a drill bit **14** extending therefrom at one end and a thrust bearing **16** at the opposite end. An adjustable depth guard **18** is slidably received within the tubular handle **12** and surrounds the drill bit **14**.

The thrust bearing **16**, which is provided to facilitate drilling and support of the instrument during the actual drilling operation, includes a bearing member **20** integral with a stem portion **22** which is rotatably secured within one end portion of the tubular handle **12**. The stem **22** has an intermediate section **24** of reduced diameter which receives an end portion of a screw **26** to prevent axial displacement of the thrust bearing **16** from the handle **12**. The screw **26** is threaded through a radial opening **28** in the handle **12**, as shown by FIG. **2**. A ball bearing arrangement **30** and a washer **32** surround the stem portion **22** intermediate the bearing member **20** and the end of handle **12** to facilitate rotation of the thrust bearing **16** with respect to the handle.

The adjustable, sleeve-like depth guard **18** is slidably displaceable within the bore **34** of handle **12**, as shown at A in FIG. **1**, to regulate the degree or depth of penetration of the drill bit **14**. The cylindrical guard **18** is mounted in a chuck **36** integral with handle **12** and clamped to the handle through a lefthand threaded coupling **38**. The chuck comprises a series of jaws **40** which jaws are threaded on the exterior portions thereof for receiving the coupling **38**. The jaws **40** are urged into clamping engagement with the guard **18** as the clamping coupling **38** is tightened thereon, and permitted to release the guard when the coupling **38** is loosened. The guard **18** has a series of spaced graduations or indicia **44** thereon to expedite the adjustment thereof, and is further provided with a notched opening **42** adjacent to the outermost end portion for observation and removal of material. An elongated opening **46** is provided in handle **12** for slidably receiving a screw **48** or other suitable member which is threaded to the guard **18**. The screw **48** is arranged to permit the positioning of the guard **18** to a selected location after the coupling **38** has been rotated to release the clamping effect of the chuck jaws **40** on the guard **18**.

The twist drill bit **14**, which is of normally unbreakable, stainless steel construction, may vary in size. However, for most procedures, a ⅛ inch drill bit is the optimum size. The drill is securely mounted within the handle **12** by a cylindrical member **50** having a portion **52** of enlarged diameter which corresponds substantially to the diameter of bore **34**, and an elongated portion **54** of reduced diameter which extends axially throughout the interior of the tubular depth guard **18**. A set screw **56**, threaded through handle **12**, engages the enlarged portion **52** of the cylindrical member **50** for retaining the member within the handle. The reduced diameter portion **54** of member **50** is provided with an axial bore **58** fro receiving the drill **14** therein. Set screw **60** is threaded through the reduced diameter

portion 54 of member 50 and seats within a recess 62 in drill bit 14 to lock the drill bit in position.

In operation of the instrument 10, the threaded clamping coupling 38 is loosened, permitting the depth guard to be adjusted axially to a selected position. Coupling 38 then is tightened to secure the guard in position. During the drilling procedure, pressure is applied by the surgeon to the bearing member 20 and the thrust bearing 16 as the handle 12 is turned to rotate drill 14 as it penetrates the skull. The drill bit may be removed and the depth guard 18 readjusted in the desired direction should a greater depth be required.

Many modifications may be made in the type of thrust bearing and the handle as well as the means for adjusting the displacement of the guard and such modifications are contemplated.

We claim:

1. A cranial drilling instrument comprising a handle means including a tubular member having a first longitudinal bore therethrough, a drill holder secured within said bore and having a reduce diameter end portion leaving a space between itself and said first bore and protruding from said handle means, the reduced diameter portion having a second longitudinal bore therein and a drill secured within said second bore for rotation with said holder and said handle means, a depth controlling means comprising a guard having graduations thereon, said guard being a tubular member slidably disposed within the first bore in the space surrounding the reduced diameter portion of the drill holder for axial displacement relative to said drill and handle means and in surrounding relation with respect to said drill, said guard being adjustable relative to the handle means and drill to positively control the depth of penetration of the drill during a drilling operation.

2. A drilling instrument as defined in claim 1, said handle comprising a tubular member of stainless steel construction having a knurled exterior surface, said handle having a thrust bearing secured to one end thereof and said drill extending axially from the opposite end of said handle means.

3. A drilling instrument as defined in claim 1, wherein said drill is of stainless steel construction having an unbreakable point.

4. A drilling instrument as defined in claim 1, and further comprising means for releasably securing said controlling means in various positions.

5. A drilling instrument as defined in claim 4, said means for releasably securing said depth-controlling means in adjusted positions including a chuck integral with said handle means.

6. A drilling instrument as defined in claim 1, wherein said handle means comprises an elongated member having said drill extending axially from one end portion thereof.

7. A drilling instrument as defined in claim 6, and further including bearing means rotatably secured within the end portion of said handle means opposite to said drill.

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