United States Patent [19]

Hougen

[11] E **Re. 30,519**

[45] Reissued **Feb. 17, 1981**

[54] **ACCESSORY SUPPORT PLATES FOR A MAGNET BASE DRILL**

[76] Inventor: **Everett D. Hougen**, G-5072 Corunna Rd., Flint, Mich. 48504

[21] Appl. No.: **94,591**

[22] Filed: **Nov. 15, 1979**

Related U.S. Patent Documents

Reissue of:

[64] Patent No.: **4,047,827**
Issued: **Sep. 13, 1977**
Appl. No.: **745,393**
Filed: **Nov. 26, 1976**

[51] **Int. Cl.**[3] **B23B 39/00**
[52] **U.S. Cl.** **408/76**
[58] **Field of Search** 408/72, 76, 103, 105, 408/108, 241, 712; 409/175; 90/DIG. 23

[56] **References Cited**

U.S. PATENT DOCUMENTS

3,791,755	2/1974	Warren	408/76
4,105,358	8/1978	Walker	408/103

FOREIGN PATENT DOCUMENTS

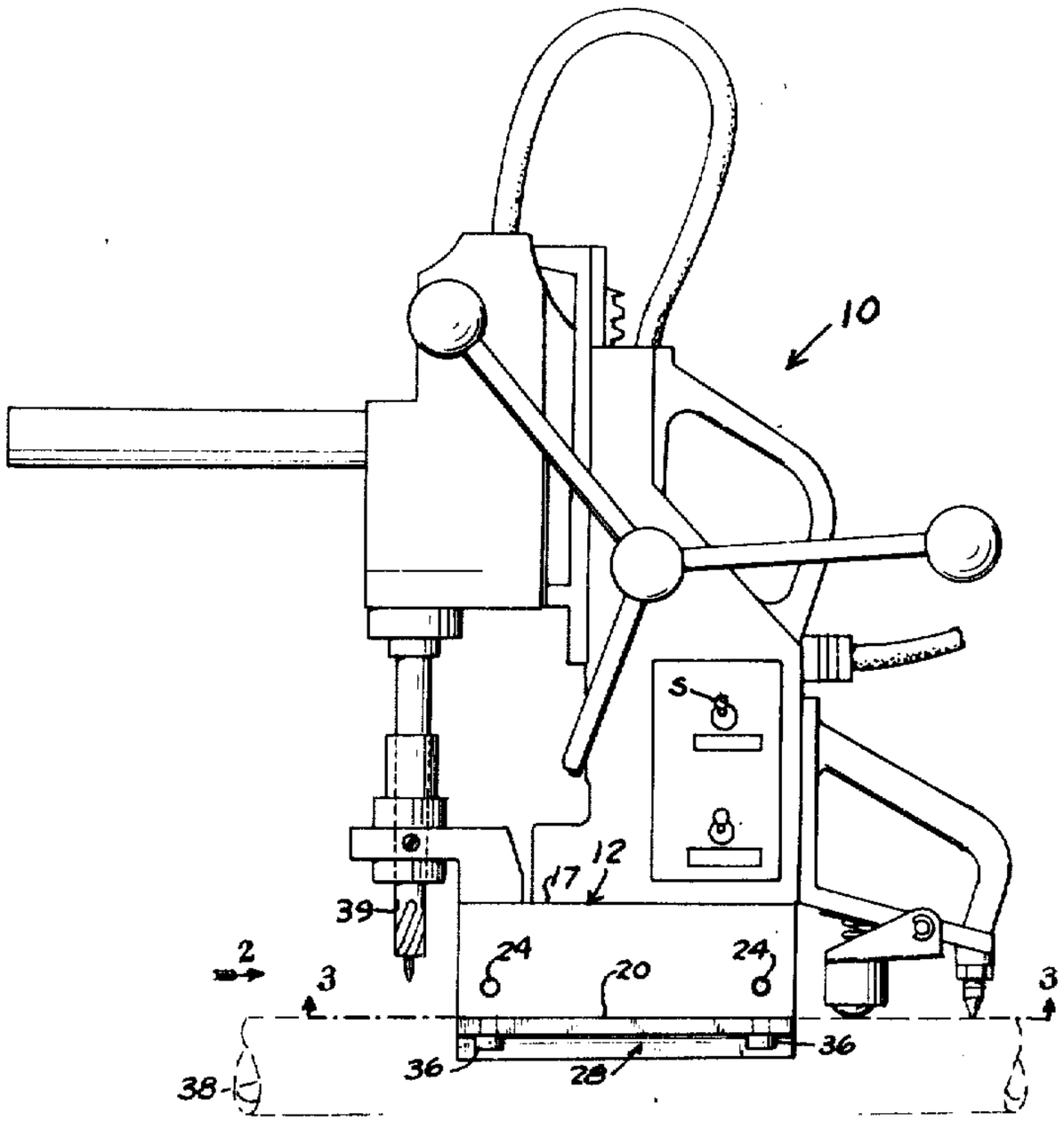
896945	5/1944	France	408/76
1260818	4/1961	France	408/76
50-39479	11/1975	Japan	408/76

Primary Examiner—Harrison L. Hinson
Attorney, Agent, or Firm—Barnes, Kisselle, Raisch & Choate

[57] **ABSTRACT**

A magnet base drill having a pair of plates formed of magnetic material removably mounted on either the side walls or the bottom face of the electromagnet forming the base of the drill and adjustable thereon to contact portions of a convex support surface spaced laterally outwardly from the central lonitudinal axis of the electromagnet when the latter is positioned on the support surface.

4 Claims, 9 Drawing Figures



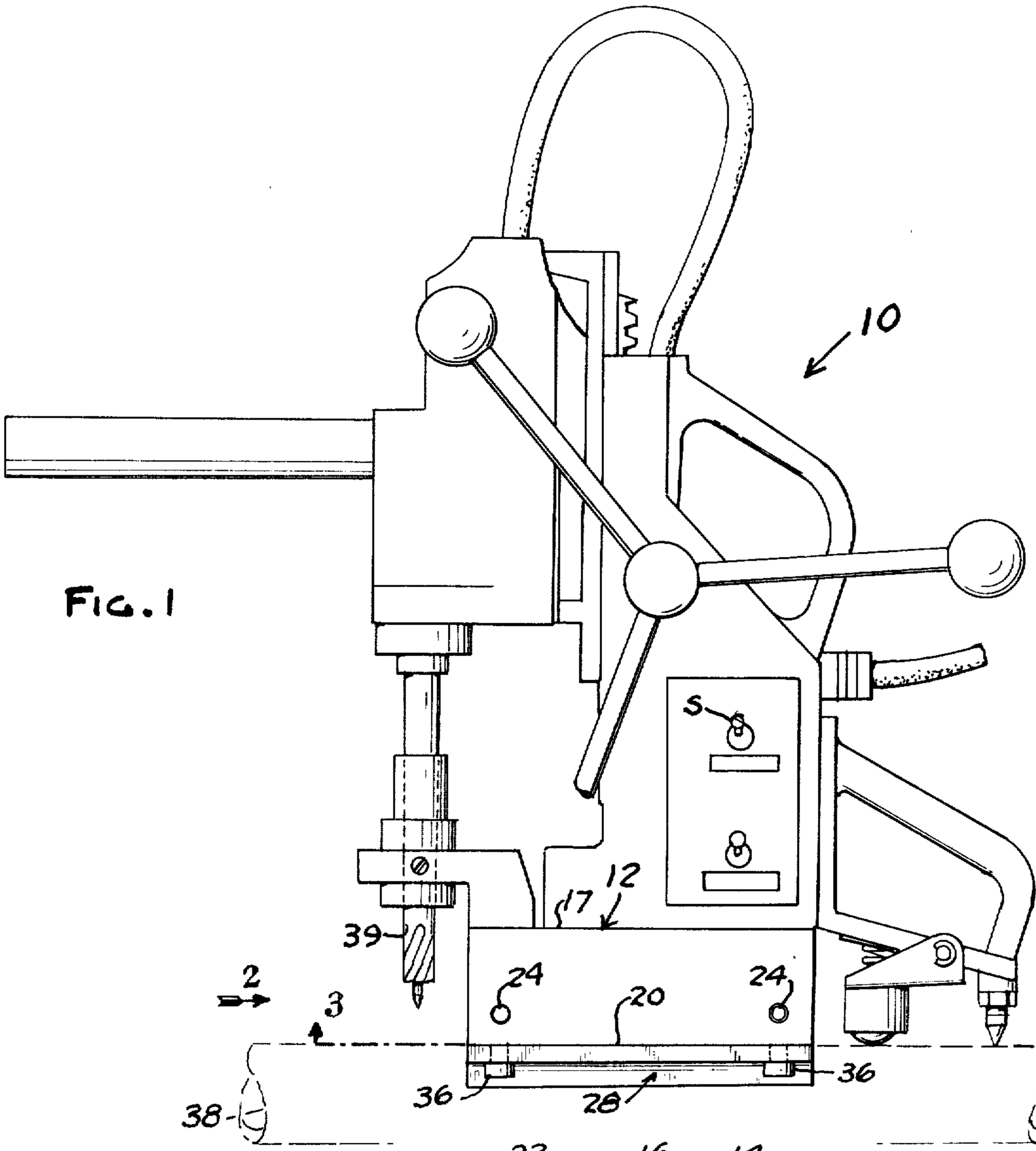


FIG. 1

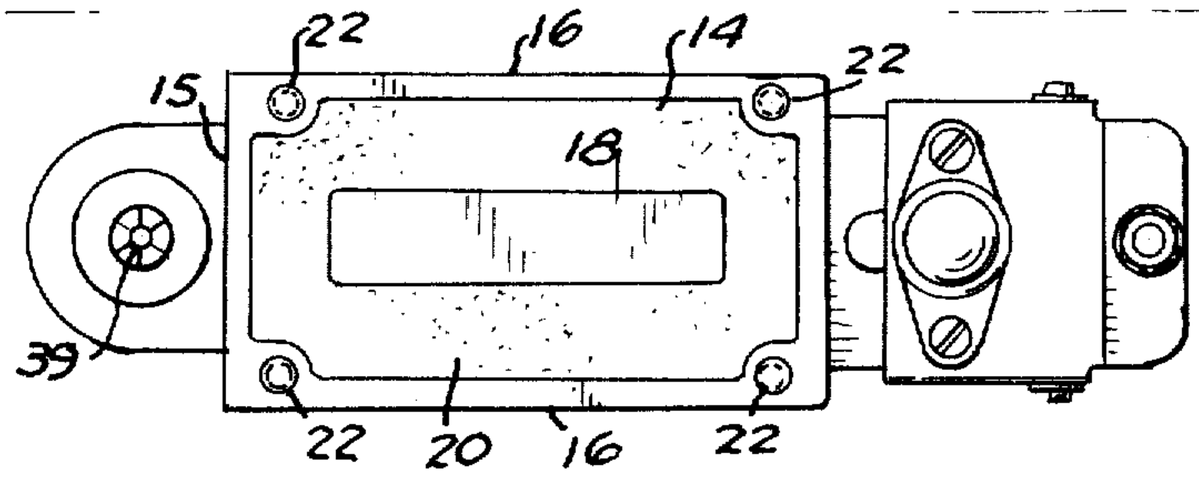


FIG. 3

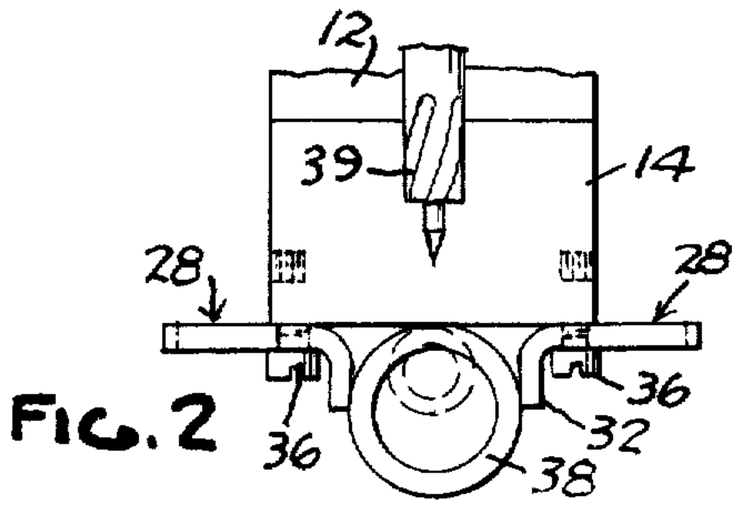


FIG. 2

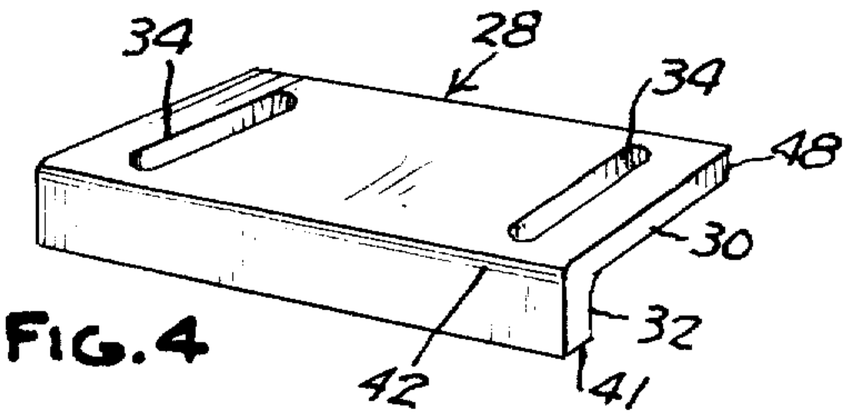


FIG. 4

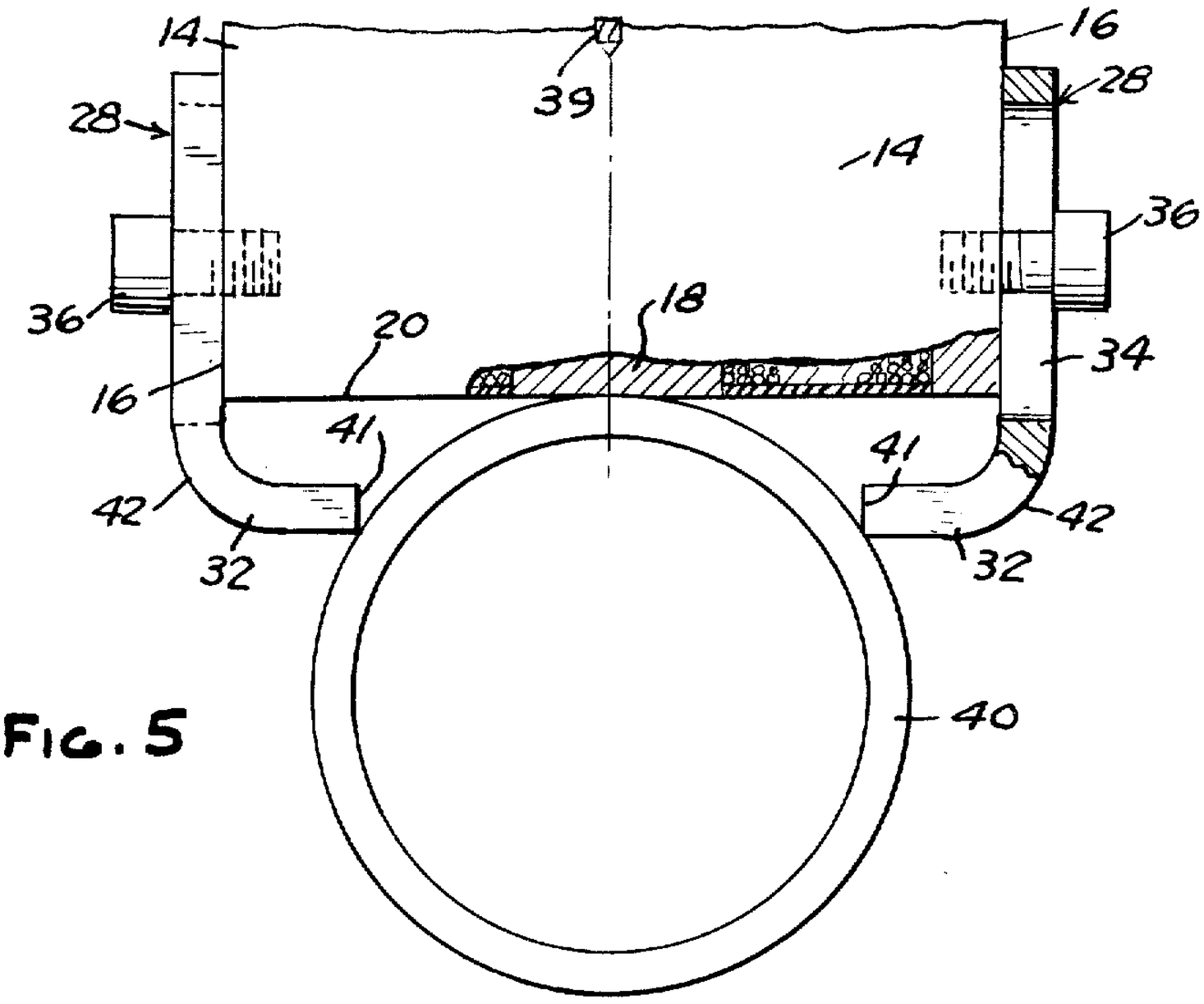

14
16
39
28
28
14
36
36
18
20
34
16
41
41
42
42
32
32
40

FIG. 5

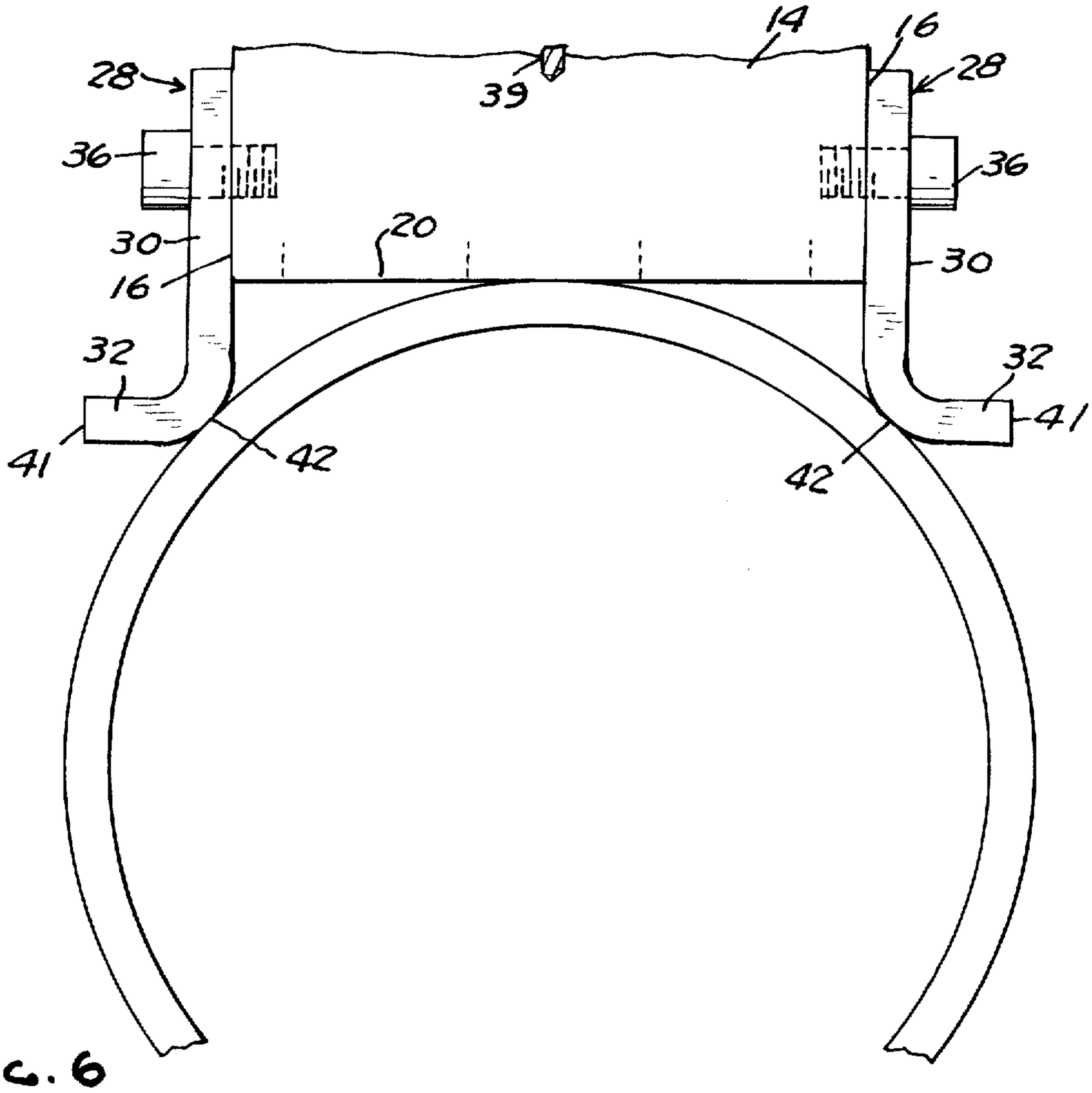

14
16
28
39
28
36
36
30
20
30
16
32
32
41
41
42
42

FIG. 6

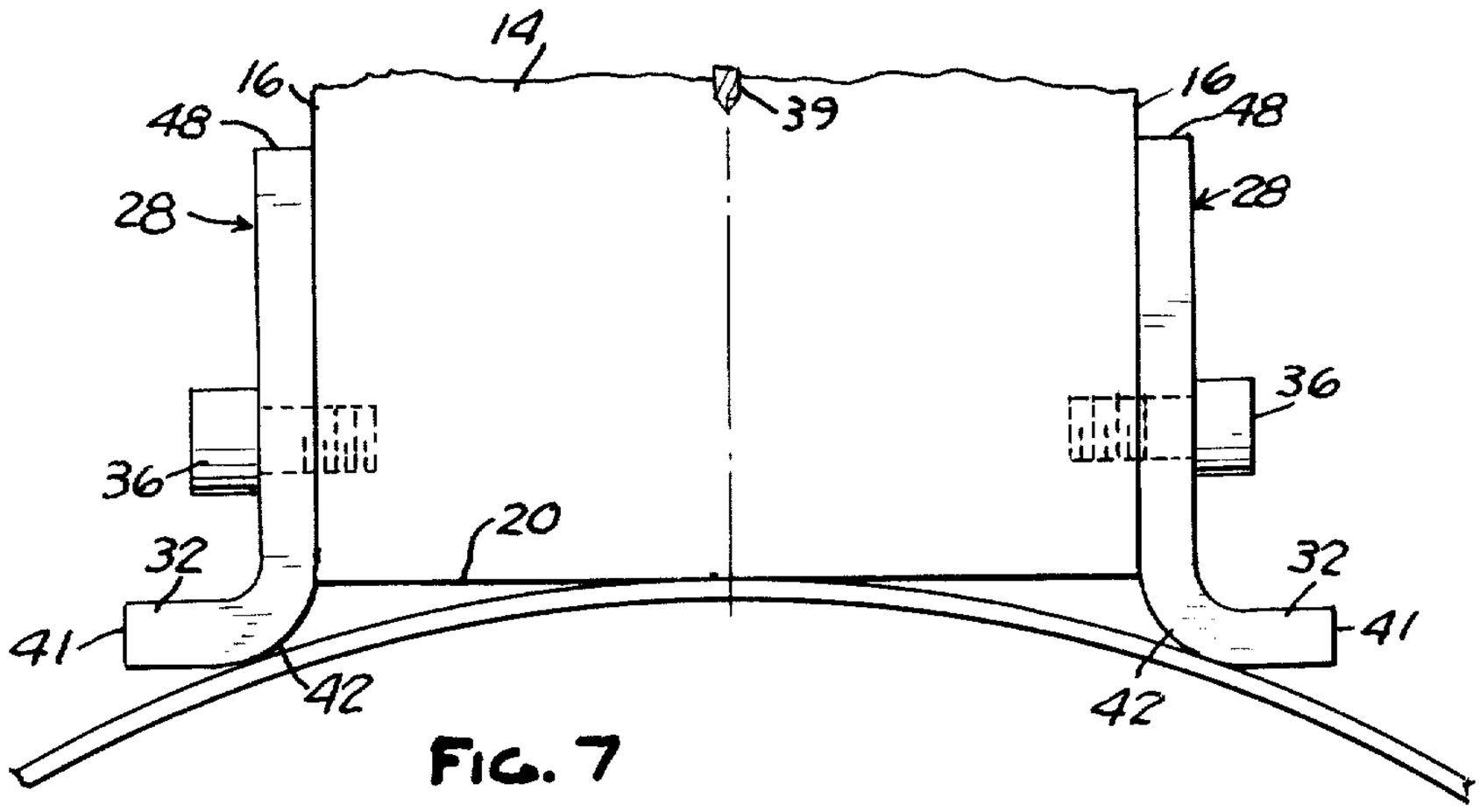


FIG. 7

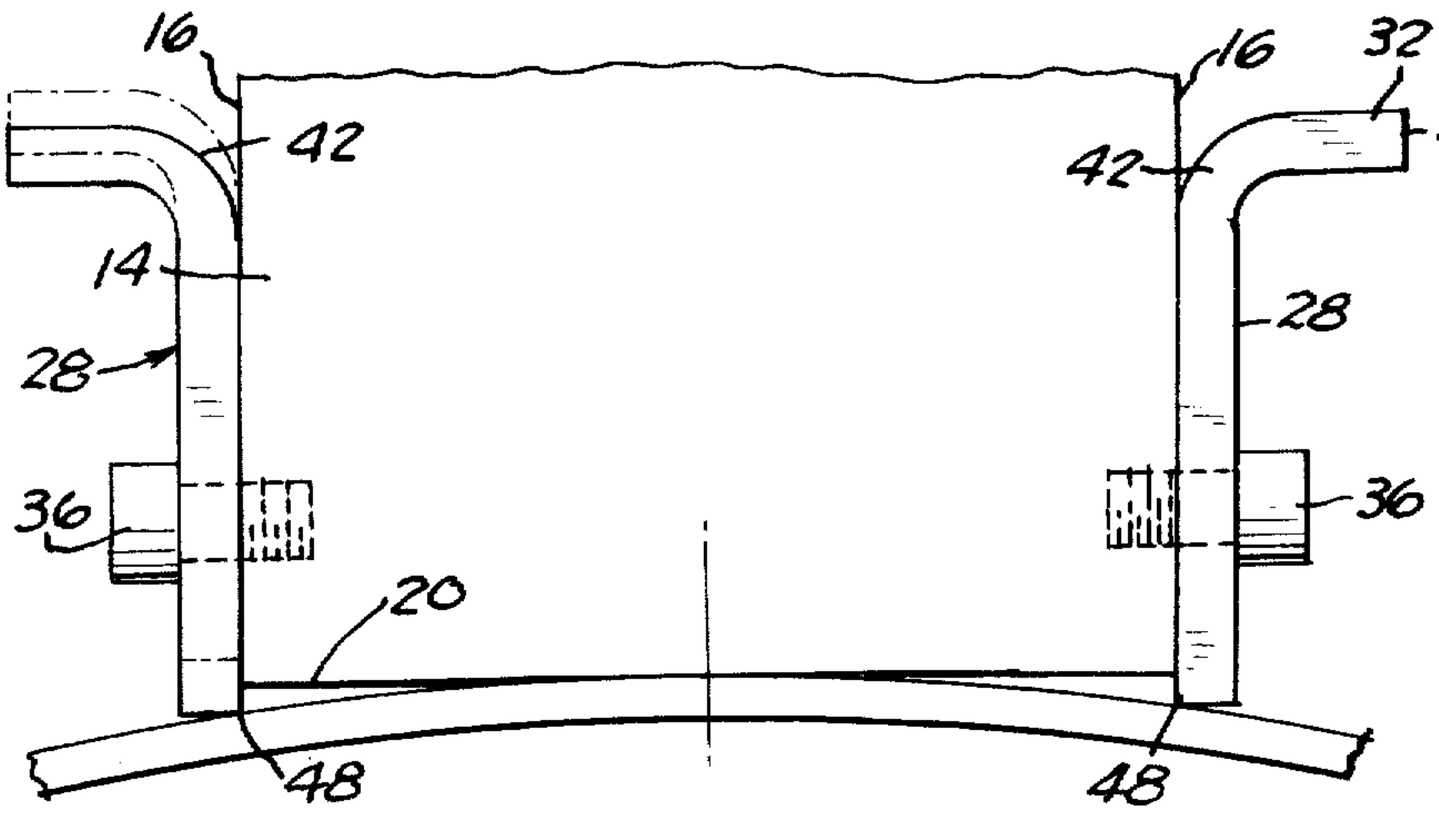


FIG. 8

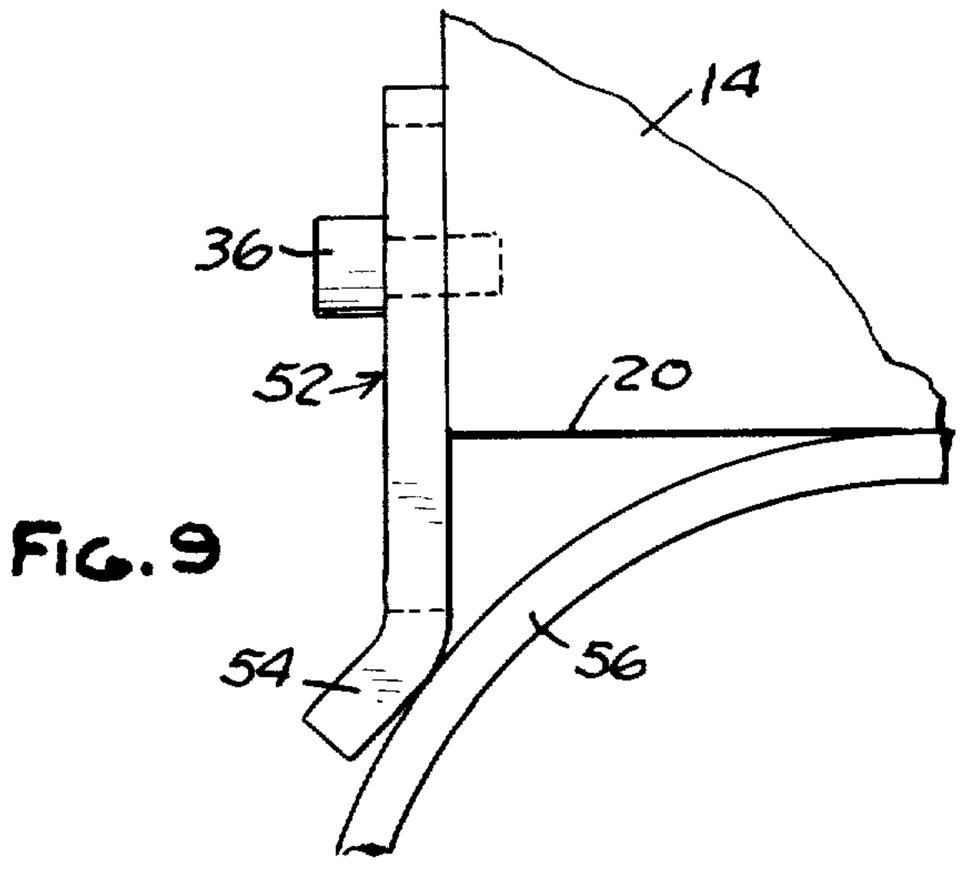


FIG. 9

ACCESSORY SUPPORT PLATES FOR A MAGNET BASE DRILL

Matter enclosed in heavy brackets [ ] appears in the original patent but forms no part of this reissue specification; matter printed in italics indicates the additions made by reissue.

This invention relates to a magnet base drill and, more specifically, to accessory means for such drills to enable the firm attachment thereof to convexly shaped support surfaces.

Drills having a base in the form of an electromagnet for supporting the magnet on a magnetic support surface have been used for many years. When the magnetic support surface is flat, such as the face or web of a structural beam, little difficulty is encountered in retaining the magnet in a fixed, stable position on the support. However, such drills have not been used with any degree of success on magnetic surfaces which are convex in shape, such as pipes and cylindrical tanks. On a convex surface it is difficult to retain the magnet in a stable position because of the inability to obtain sufficient area of contact between the electromagnet and the convex support surface and also because of the fact that the support surface is in itself curved while the bottom face of the electromagnet is flat.

The object of the present invention is to provide an accessory for such magnet base drills which enables the drills to be easily and firmly supported on a convex surface, such as an iron pipe.

More specifically, the present invention contemplates a pair of plates formed of a magnetic material which are adapted to be mounted on either the side walls or the bottom wall of the electromagnet and so adjusted as to contact portions of the convex surface spaced laterally outwardly from the central portion thereof and thus provide sufficient additional contact surfaces for enabling the drill to be firmly supported magnetically on the support.

Other objects, features and advantages of the present invention will become apparent from the following description and accompanying drawings, in which:

FIG. **1** is a side elevational view of a magnet base drill having the accessory plates of the present invention mounted on the bottom face thereof;

FIG. **2** is a fragmentary end view of the drill shown in FIG. **1**;

FIG. **3** is a bottom plan view of the drill along line **3—3** in FIG. **1** with the accessory plates removed;

FIG. **4** is a perspective view of one of the accessory plates according to the present invention; and

FIGS. **5** through **9** show various arrangements of the accessory plates on the base of the drill for accommodating the electromagnet to workpieces of different sizes.

In FIG. **1** numeral **10** designates a magnet base drill substantially identical with that shown in my U.S. Pat. No. 3,969,036, dated July 13, 1976. The base of the drill comprises an electromagnet **12** of rectangular shape which is adapted to be energized and de-energized by a switch S. Electromagnet **12** comprises a housing **14** formed as a ferrous casting having front and rear end walls **15**, flat side walls **16**, a top wall **17** and an open bottom. Within the housing **14** there is arranged an iron core **18** around which is wound a coil (not illustrated). Core **18** is connected to or formed integrally with top

wall **17** and is spaced out of contact with walls **15,16**. Electromagnet **12** has a substantially flat bottom wall **20** defined by the lower edges of the housing and the lower end face of the core **18**. The space therebetween is filled with an insulating material, such as a resin. The two poles of the magnet are defined by the walls of the housing and core **18**. When the lower edges of side walls **16** and the lower end face of core **18** are bridged by a body of magnetic material and the electromagnet is energized, the body of magnetic material forms a continuous magnetic flux path between the housing **14** of the electromagnet and core **18**. The electromagnet base thus far described is of conventional construction.

In accordance with the present invention the bottom face of the electromagnet is provided with four threaded openings **22** at the four corners thereof and each of the two side walls **16** is also provided with a pair of threaded openings **24** spaced upwardly from the bottom wall **20** of the electromagnet. The threaded openings **22,24** are utilized for attaching to the electromagnet a pair of accessory plates **28**. Accessory plates **28** are formed of a ferrous material, such as steel, and are preferably of L-shape, having a long leg **30** terminating in a short foot **32** extending perpendicular to leg **30**. In addition, each plate **28** is provided with a pair of elongated slots **34**, the spacing of which corresponds to the spacing between openings **22,24**. Plates **28** have a length generally corresponding to the length of housing **14** and are adapted to be secured to the side walls **16** or the bottom wall **20** of the electromagnet by means of screws **36**.

If it is desired to support drill **10** on a pipe, for example, which has a diameter substantially smaller than the width of the electromagnet, plates **28** can be mounted on the bottom face of the electromagnet in the manner illustrated in FIGS. **1** and **2**. Screws **36** extend through slots **34** and into threaded opening **22**. Before the screws are tightened the electromagnet is centered longitudinally on the pipe **38**. Thereafter the two plates **28** are shifted inwardly until the feet **32** thereof contact the outer surface of the pipe. Screws **36** then are tightened. When switch S is thereafter actuated to energize the electromagnet, plates **28** cooperate with the pipe to form a continuous magnetic flux path between core **18** and the housing **14**. The drill thus firmly adheres to the pipe in a stable upright position so that the rotating drill bit **39** can be driven downwardly to cut a hole in the pipe at a location forwardly of base **12**.

If the pipe on which the drill is to be supported has a diameter only slightly smaller than the width of housing **14**, then plates **28** can be mounted on the side walls **16** of housing **14** in the manner illustrated in FIG. **5**. More specifically, in FIG. **5** plates **28** are mounted on side walls **16** with feet **32** of the plates projecting inwardly toward each other. The plates are adjusted vertically and clamped in place by screws **36** so that the inner opposed ends **41** of feet **32** contact the periphery of pipe **40** above the center thereof when the bottom face **22** of housing **14** is resting on the upper surface of the pipe.

FIGS. **6** and **7** show the drill mounted on convex surfaces of progressively greater diameters. In the arrangements shown in these figures the feet **32** of plates **28** project outwardly and the rounded corner portions **42** of the plates contact the convex support surface. In FIG. **6** the support comprises a large diameter pipe **44** and in FIG. **7** the support comprises an even larger diameter convex surface **46**. In each instance plates **28** are adjusted vertically on the side walls of housing **14** so

that, when the bottom face **20** of the electromagnet is positioned on the top of the support, the corner portions **42** of plates **28** engage the convex support surface at portions thereof spaced laterally outwardly from the central longitudinal axis of the electromagnet.

In the event the support surface has an unusually large diameter, such as the side wall of a large cylindrical tank, the accessory plates **28** can be arranged on the side walls **16** of housing **14** in the manner illustrated in FIG. **8**. In this arrangement plates **28** are secured to the side walls of the housing with the feet **32** at the upper ends thereof so that the lower straight ends **48** of the plates engage the support surface **50**. The broken line showing in FIG. **8** illustrates the fact that it is not necessary to remove the plates **28** from housing **14** when the drill is used on a flat support surface. In this case it is merely necessary to loosen screws **36**, shift the plates vertically to the position indicated at **28'** and then tighten screws **36**. In this position the lower straight edges **48** of plates **28** are disposed above the bottom face **20** of the housing.

FIG. **9** shows a modified form of accessory plate. Accessory plate **52** is similar in all respects to accessory plate **28**, except that the foot portion **54** thereof is inclined to the vertical leg of the plate at an acute angle rather that at a right angle. Under some circumstances the location of foot **54** at an acute angle such as shown in FIG. **9** will present a larger area of surface contact between the accessory plate and the convex support surface **56**.

It will be appreciated that where plates **28** are arranged on housing **14** so that they contact the convex support surface along lines disposed above the center of curvature of the convex surface the drill is vertically supported along three laterally spaced locations. This tends to provide a very stable positioning of the drill on the convex surface. As shown in FIG. **5**, this type of support is obtainable even when the diameter of the pipe is less than the width of the electromagnet base. This form of support is also obtainable when the pipe diameter is as small as shown in FIG. **2** by simply mounting plates **28** on the bottom face of the base so that the straight edges **48** engage the surface of the pipe instead of the feet **32**. This is possible because slots **34** extend substantially the full width of legs **30** and the width of each leg **30** is equal to at least half the width of housing **14**.

I claim:

[1. In combination, a portable drill unit having an electromagnetic base for magnetically adhering the drill to a magnetic support, said base having a bottom wall and a pair of opposite side walls, a pair of plates formed of magnetic material, means for mounting said plates on the side walls of said base for vertical adjustment thereon, said plates having lower edge portions and being adjustable on said base so that said lower edge portions project downwardly below said bottom wall of said base, and means for rendering at least the central portion of said bottom wall and said plates magnetic when the electromagnet is energized, whereby, when said base is mounted on a convex magnetic support surface, said plates can be extended downwardly to a position wherein the lower edge portions thereof engage portions of said support surface at locations spaced laterally outwardly on opposite sides from the central portion of said base to thereby magnetically adhere the drill on said support in a stable position when the electromagnet is energized.**]**

[2. The combination set forth in claim **1** including means for mounting said plates on said bottom wall for lateral adjustment towards and away from each other in a plane parallel to said bottom wall.**]**

[3. The combination set forth in claim **1** wherein said plates are generally L-shaped.**]**

[4. The combination set forth in claim **1** wherein said plates have a length generally corresponding to the length of said base.**]**

[5. The combination set forth in claim **4** wherein the plates have a width equal to at least one-half the width of said base.**]**

[6. The combination set forth in claim **5** wherein each plate has a pair of parallel slots therein extending substantially the full width thereof.**]**

[7. The combination set forth in claim **1** wherein the means for adjustably mounting said plates on said base comprise a pair of vertically elongated slots on each plate and a screw extending through each slot and threaded into said base.**]**

[8. The combination set forth in claim **1** wherein the side walls of said base are formed of a magnetic material and form part of the magnetic circuit of said electromagnet.**]**

[9. The combination set forth in claim **8** wherein said plates contact the side walls of said base to form part of said magnetic circuit.**]**

[10. The combination set forth in claim **1** wherein each plate in vertical section comprises a vertical leg having a short foot at one end thereof angularly inclined to said vertical leg.**]**

[11. The combination set forth in claim **9** wherein said foot is disposed perpendicular to said vertical leg.**]**

[12. The combination set forth in claim **8** wherein said foot is inclined to said vertical leg at an acute angle.**]**

13. In combination, a portable drill unit having an electromagnetic base for adherring the drill to a magnetic support, said base having a rectangular bottom wall and a pair of opposite side walls, a pair of plates formed of magnetic material and adapted to be mounted on said base for magnetically adherring the drill unit to a cylindrical support surface having a diameter less than the width of said base, each plate having a long planar leg and a short transversely inclined foot extending lengthwise along one edge thereof, means for mounting the plates one on each side wall of said base, said plates being adapted to be mounted on the side walls for vertical adjustment thereon with the feet extending along lower edges thereof and projecting inwardly toward each other in a plane below said bottom wall, and means for rendering said bottom wall and said plates magnetic when the electromagnet is energized, whereby, when said base is mounted on said support surface with the longitudinal central portion of said bottom wall abutting said surface, said plates can be adjusted vertically on the side walls of the base to a position wherein the opposed inner edge portions of said feet abut portions of said cylindrical support surface at locations spaced laterally outwardly on opposite sides from the central portion of said base, to thereby magnetically adhere the drill unit on said cylindrical support surface in a stable position when the electromagnet is energized.

14. The combination as called for in claim 13 including means for mounting said plates on said bottom wall in laterally opposed relation with the short feet projecting downwardly along the inner opposed edges of the long legs and being laterally adjustable toward and away from each other in a horizontal plane parallel to said bottom wall to

a position where said short feet abut the convex surface of a cylindrical workpiece having a diameter less than the width of the base when the central portion of the bottom wall engages said convex workpiece surface.

15. The combination as called for in claim 13 wherein said plates are generally L-shaped in cross section.

16. The combination as called for in claim 13 wherein the long leg of each plate has a width equal to at least one-half the width of said base.

* * * * *