

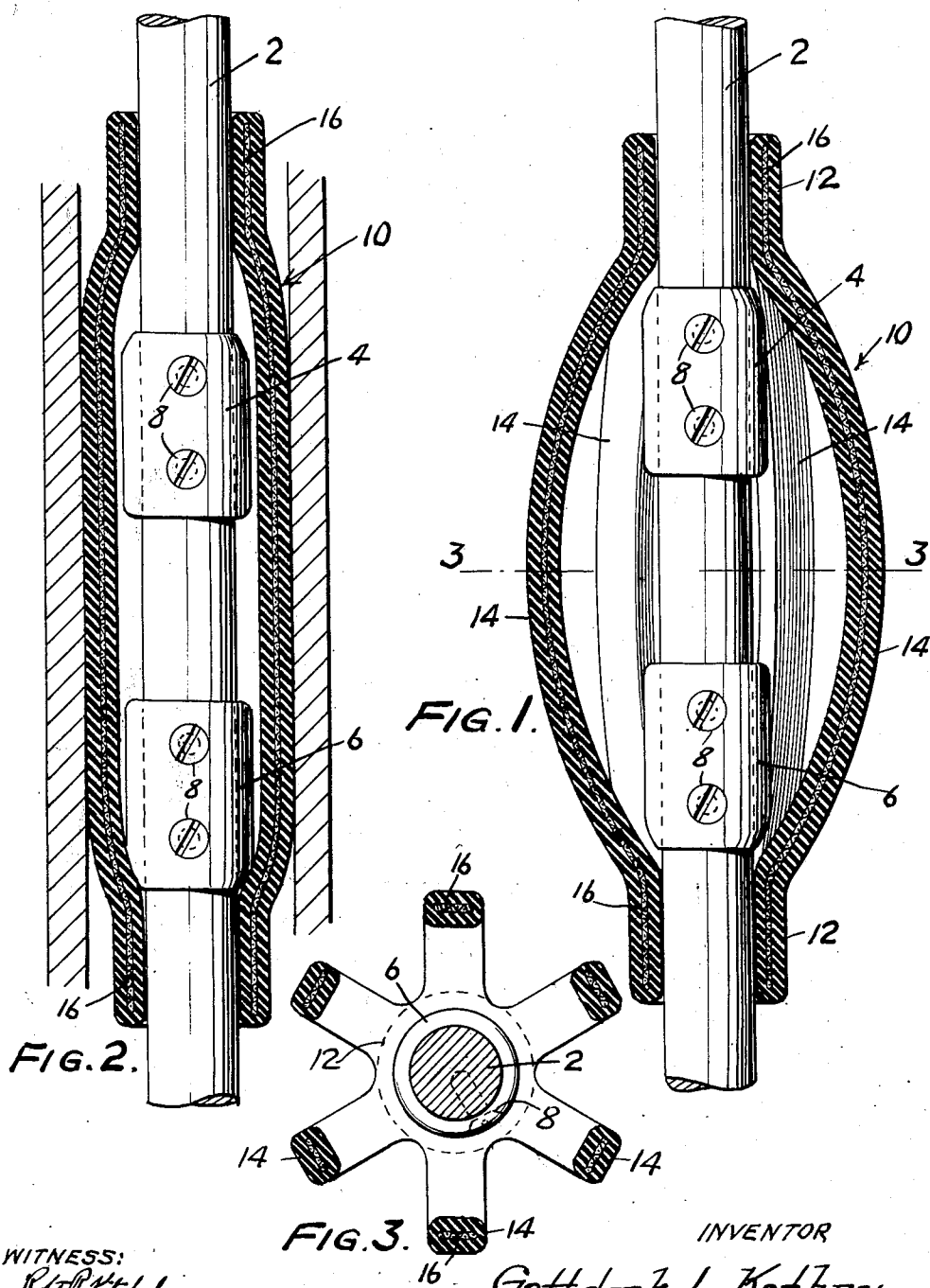
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G. L. KOTHNY

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BOREHOLE APPARATUS CENTERING GUIDE

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WITNESS:

Robert Mitchell

FIG. 3.

INVENTOR

Gottfrank L. Kothny

BY *James H. Harding*
ATTORNEYS

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BOREHOLE APPARATUS CENTERING GUIDE

Gotttdank L. Kothny, Strafford, Pa., assignor to
Sperry-Sun Well Surveying Company, Philadelphia, Pa., a corporation of Delaware

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1 Claim. (Cl. 308—4)

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This invention relates to a tool guide particularly for the purpose of centering a tool in a bore hole such as a surveying instrument within a drill pipe.

It is frequently necessary to center tools within bore holes using the term "tools" in a broad sense to include surveying apparatus or the like. In the use of surveying apparatus, it will be evident that if the apparatus does not fill a drill stem, bore hole casing or the walls of an uncased hole in which it is lowered, an error is likely to arise due to its inclination relative to the axis of the hole. For free passage of such an instrument, it is, of course, necessary that it should be substantially smaller in diameter than the bore through which it passes. Furthermore, it is desirable that whatever centering means is employed, that centering means should also effect, if possible, a buffering action to prevent damaging shocks to the apparatus during lowering or raising thereof. Apparatus which should thus be centered not only includes well surveying instruments, but various other tools and devices such as those involved in logging or the like.

Various proposals have been heretofore made in the direction of guiding means for such apparatus as illustrated, for example, by the guide shown in Kuster Patent 2,195,871, dated April 2, 1940, having a function somewhat similar to that of the guide of the present invention.

In accordance with the present invention, there is provided an improved guide for the controlled centering of apparatus which is adapted to be readily associated with the apparatus, in particular, being mountable on a solid cylindrical rod, and is simple in construction and rugged so as to withstand the substantial wear to which such a guide is subjected. It is also so designed as to interfere to a minimum degree with mud circulation.

One of the important features of the present invention is the provision of a guide which is always pulled, never pushed, by the tool in its movements, with the result that it cannot stab into the bore and become stuck.

The objects of the invention relating to the features of the improved guide indicated above as well as details of its construction will become apparent from the following description read in conjunction with the accompanying drawing in which:

Fig. 1 is an axial section through the guide showing its association with a rod which may form part of a surveying apparatus or the like, the guide being illustrated in the expanded condition which it will assume when not in a hole;

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Fig. 2 is a similar view but showing the disposition taken by the guide when it is located within a bore such as that of a drill stem; and

Fig. 3 is a transverse section taken on the plane indicated at 3—3 in Fig. 1.

There is illustrated at 2 a cylindrical rod which may be considered typical of the type of cylindrical member with which the guide may be associated. This may be a solid rod as illustrated, or alternatively, the casing of a surveying or logging apparatus, or a cylindrical portion of some other type of apparatus of the type designed to be lowered within a bore hole within a cased or uncased portion thereof, or within a drill stem or other tubing. Secured to the cylindrical member 2 are mounting sleeves or rings 4 and 6 fastened to the member 2 by means of screws 8 tapped therein. Embracing the cylindrical portion of the member 2 and the mounting sleeves 4 and 6 is the guide proper indicated generally at 10. This may be formed of a single molded member and comprises cylindrical portions 12 joined by lengthwise bearing members 14. Preferably, the various portions of this guide include fabric or cord elements 16 of the type generally used for imparting strength to vehicle tires, the rubber of the guide being molded about these to present rubber wearing surfaces as indicated. Desirably, these are made entirely of synthetic rubbers such as neoprene which will stand up in contact with oil or liquids of different characters such as are normally found in bore holes. Alternatively other flexible rubber-like materials may be used, and it will be understood that these are to be construed as included in the term "rubber" as used herein.

The mounting is preferably carried out so that when the guide is not subjected to confinement its elements 14 will bow outwardly as indicated in Fig. 1 to a limited degree so that an outer cylindrical envelope thereof would be of a diameter exceeding the diameter of the bore through which the guide is to pass. As will be evident from Fig. 1, any substantial outward expansion beyond the position illustrated is prevented by reason of the fact that in such expansion the cylindrical portions 12 of the guide would abut the mounting sleeves 4 and 6.

In the lowering of the guide, for example, within a drill stem, the guide will assume a condition such as illustrated in Fig. 2. Inward pressure on the members 14 will cause them to flatten out, increasing the spacing between the ends 12. While resilient, the rubber bearing members 14 have considerable stiffness and accordingly, being of the same size, will serve to center the member

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2 so that a plurality of them will maintain the member accurately concentric with the bore through which it is moved. When the apparatus moves downwardly, friction will retard the guide so that it will be engaged and pulled downwardly by the lower mounting sleeve 6. When the apparatus is raised, on the other hand, a reverse action occurs and the guide will be pulled upwardly by the upper mounting sleeve 4.

In any case, whether moving or at rest, it will serve to center the apparatus by which it is carried so that if two or more such guides are secured at various locations along the length of the apparatus, the apparatus will be held accurately centered within the bore. At the same time, it will be evident that the guide will cushion shocks by passing smoothly through joints and by preventing the ends of the apparatus from engaging the walls of the bore during both raising and lowering.

The advantages of the improved guide will be evident. Not only is it simple in construction and capable of effecting the desired results in operation, being prevented from over-expanding so as to hang on the walls of the hole, and being at all times symmetrical so as to secure proper centering of the apparatus, but its assembly with the apparatus is also very simple.

Heretofore, such guides have generally required for their mounting, multiple piece apparatus so that they may be clamped in the vicinity of screwed connections. In accordance with the present invention, it is evident that the guide may be carried by a solid cylindrical rod or cylinder inasmuch as it is held in proper position by external mounting sleeves, the various parts being readily placed in position over the end of the cylindrical apparatus, and the final position determined by securing mounting sleeves or collars such as 4 or 6 to the cylindrical apparatus by screws. By permitting sliding movement both

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upwardly and downwardly, the guide is always pulled by the apparatus rather than pushed so that stabbing into or hanging on the walls is avoided. There is no necessity when reversal of motion occurs for fingers or the like to reverse their positions and consequently, no portions of the guide are subject to violent stresses which would serve to crack or break them.

It will be evident that changes in details may be made without departing from the scope of the invention as defined in the following claim.

What I claim and desire to protect by Letters Patent is:

Guiding means for centering bore hole apparatus comprising a one piece rubber member having tubular ends in alignment with each other and adapted to pass over said apparatus, said ends being joined by resilient elements arranged to assume normally outwardly bowed positions extending radially outwardly beyond the tubular ends, and means constructed and arranged to be located on said apparatus between said tubular ends and under said resilient elements for engagement with the inner portions of said tubular ends for mounting said member on the apparatus, said member being free to move axially of the apparatus for a sufficient extent so as to be engaged and pulled by said mounting means without the exertion of any pushing action on said resilient elements.

GOTTDANK L. KOTHNY.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,841,929	Barclay	Jan. 19, 1932
2,174,085	Hartman	Sept. 26, 1939
2,195,871	Kuster	Apr. 2, 1940