

April 2, 1940.

V. E. KUSTER

2,195,871

TOOL GUIDE

Filed May 25, 1938

Fig. 1

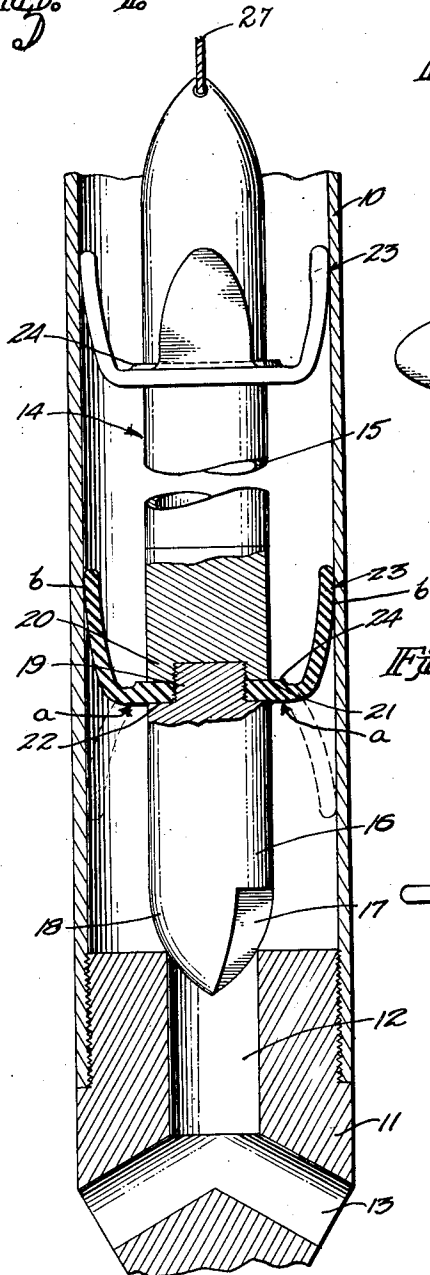


Fig. 2

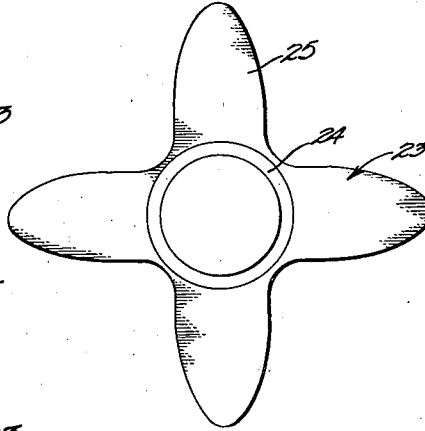
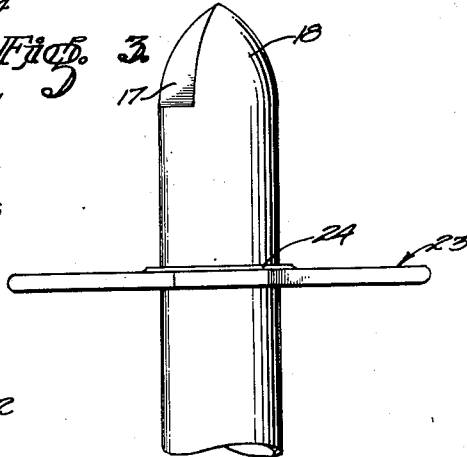


Fig. 3



INVENTOR
V. EDWARD KUSTER
BY

James M. Abbott
ATTORNEY

UNITED STATES PATENT OFFICE

2,195,871

TOOL GUIDE

Vivian Edward Kuster, Long Beach, Calif., assignor to The Hewitt-Kuster Co., Long Beach, Calif., a copartnership

Application May 25, 1938, Serial No. 210,043

4 Claims. (Cl. 308—4)

This invention relates to oil well tools and particularly pertains to a tool guide therefor.

In the operation of various oil well tools it is necessary that they be lowered through the drill string tubing or bore to the bottom of the well or open hole. In some instances a structure, such as a well surveying instrument, is lowered to the bottom of a well either by being freely dropped through the string of pipe or lowered on a cable. Quite often when using fragile or delicate apparatus, such for example as an acid bottle or surveying mechanism, it is difficult to adequately protect the structures against jar and shock as the housing of the instrument strikes the walls of the drill pipe or passes through the joints thereof.

It will be evident that when undue shock is imposed upon such structures they will be rendered inaccurate and possibly will be permanently damaged or demolished. It is the principal object of the present invention to provide a guide structure adapted to be associated with the housing of an instrument or tool which is lowered through a string of pipe and which acts to guide the housing centrally of the pipe or bore as it passes downwardly therethrough and to absorb the shock of the impact both in transit and as the structure reaches its seated position, whereby the apparatus within the housing will be protected and will be maintained in a centrally aligned position without interfering with the circulation of drilling or other fluids through the pipe when desired.

The invention contemplates the provision of a housing to receive a piece of apparatus which forms a part of a tool to be used in a well and upon which are preferably carried pliable guide members, having inherent resiliency and which extend radially from the housing in a plane substantially at right angles to the longitudinal axis thereof to engage the walls of the conduit through which the structure passes, and to guide the tool centrally thereof.

The invention is illustrated by way of example in the accompanying drawing of which:

Figure 1 is a view in vertical section and elevation, showing a device of the type of which the present invention is concerned seated upon a drill collar and within a drill string through which it has passed.

Fig. 2 is a view in end elevation showing the structure with which the present invention is concerned.

Fig. 3 is a fragmentary view in side elevation

showing the guide structure prior to its introduction into a drill pipe or the like.

Referring more particularly to the drawing, 10 indicates the wall of a drill stem such as is used in drilling oil wells. Mounted at the lower end of the drill stem is a drill bit 11 of any conventional design formed with the usual water course 12, terminating in eyes 13. Disposed within this structure is an instrument generally indicated at 14. This instrument may be an acid bottle go-devil, a declination instrument, pressure bomb or other structure which is lowered into the well on a sand line or is freely dropped into the well. In any event, it is common to such structures to include an outer housing 15 within which the instrument or apparatus is enclosed and at one or both ends of which is mounted a nose piece 16. As here shown, the lower nose piece is formed with flutes 17, which project laterally of the pointed end 18 of the member and engage the upper edge of the central water course of the drill bit. This insures that the nose member 16 will not be driven into the end of the water course to plug the bit and to prevent circulation of drilling fluid therethrough. As here indicated, the nose members 16 are formed with threaded pins 19 which seat within threaded sockets 20 at the ends of the housing 15. Disposed between the end faces 21 of the housing and the end faces 22 of the nose pieces are guide structures 23 with which the present invention is particularly concerned. These guide structures are preferably formed with a relatively thick hub portion 24 which reinforces the center of the structures and is formed with a central opening through which the pin 19 may extend.

Extending radially from the central portion 24 is a series of guide fingers 25. These fingers are formed integral with the central portion 24 and may be of any suitable number. As shown in Fig. 2 of the drawing, four such fingers are provided, thus making it possible for free circulation of drilling fluid between the fingers and through the drill string in its normal course of flow.

In practice it has been found that a suitable material for constructing the guide members 23 is rubber. It will be evident, however, that other materials might be used which have a desired degree of resiliency and flexibility. It will also be evident that if necessary the guide structures 23 may be made with reinforcing members of metal or fabric incorporated in their general structure. In any event, it is desirable that the fingers 25 be pliable and that they hold themselves yieldably against the casing with a uni-

form pressure which insures that the several fingers will cooperate to hold the structure 14 centrally of the drill string 10 while the structure 14 passes downwardly through the drill string.

It is also evident that the guide structures should be made out of material of such a character as to insure that when the structure is withdrawn from the well the fingers 25 may flex and reverse the directions of the fingers within the drill pipe or if necessary tear them away to remove the instrument when excessive resistance to its removal occurs.

In operation of the structure, as here disclosed, an instrument such as generally indicated at 14 may be used. This instrument is provided with the housing 15 and the nose pieces 16. If desired, the upper nose piece may be formed with an eye 26 to receive a cable 27. It is to be understood that the radial length of the fingers 25 is appropriately greater than the radius representing the inside diameter of the pipe 10, so that the fingers 25 when encountering the side walls of the pipe on entering the pipe will be flexed longitudinally and away from the direction of travel of the instrument 14 within the pipe. Thus, it will be seen that the fingers 25 will provide a lower curved face *a* and a flexible face *b* which contacts with the inner surface of the pipe. The curved faces *a* tend to guide the pipe downwardly through irregularities along the pipe walls and through the tool joints. The faces *b* yieldably bear against the side walls of the pipe due to the inherent flexibility of the fingers and will center the structure 14 within the pipe when a restriction is encountered. It will also be evident that due to the frictional engagement between the faces *b* of the fingers 25 and the side walls the instrument 14 will not pass downwardly through the pipe at great speed, and will not, therefore, strike the tool joints and the drill collar with the usual violence which would accompany the lowering of the instrument into the well without such a structure as is shown at 23 in the drawing.

The invention has been here described as being designed so that the fingers 25 will have a length sufficient to extend radially entirely into contact with the surface of the conduit through which the structure is passing. It is to be understood that this need not be necessary for the reason that the completely distended fingers 25 would tend to prevent the structure to be lowered through the drill string tubing from coming into contact with the surface of the conduit.

After the instrument has passed downwardly through the pipe and the point 18 of its nose 16 has come to rest at a suitable position with relation to the drill bit 11, or a member designed to receive it, the structure will assume the position as indicated in Fig. 1 of the drawing. It will be evident that due to the centering action of the guide structures 23 the longitudinal center axis of the instrument 14 will be in substantial alignment with the longitudinal center axis of the drill stem, and that in taking measurements such as might involve the declination of the drilled hole the instrument will be accurately positioned for the reading.

When it is necessary to remove the instrument from the member 10, the instrument 14 is drawn upwardly by the cable 27. Under normal conditions the fingers 25 will be deformed until they have been forced to flex in the opposite direction of that shown in solid lines of Fig. 1 of the draw-

ing but indicated in dotted lines at the upper end of this figure of the drawing.

In the event that the instrument is difficult to dislodge it is evident that the fingers 25 may be torn away so that the instrument may be recovered without necessitating the withdrawal of the entire drill string from the well bore. Under such circumstances the particles of material from which the guides 23 are made will pass downwardly through the water course of the drill bit and will be ground up with the drillings during subsequent drilling operations.

It will also be recognized that due to the dielectric properties of the elements 23 that they will electrically insulate an instrument from metal parts when an instrument is used in a manner to require such insulation.

It will thus be seen that the guide structure here disclosed provides simple and effective means for maintaining an instrument centrally of a conduit through which it passes, for appropriately retarding its speed of travel there-through and for protecting the instrument from jar or damage when it encounters irregularities and other abutments in the course of its travel.

While I have shown the preferred form of my invention as now known to me, it will be understood that various changes may be made in combination, construction and arrangement of parts by those skilled in the art, without departing from the spirit of my invention.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. A device of the character described comprising an elongated structure adapted to pass through a conduit, the diameter of the structure being materially less than the diameter of the conduit, and guide means carried by said structure comprising a pliable element being formed with separate fingers and lying normally at right angles to the longitudinal axis of the elongated structure, said fingers being of a diameter greater than the diameter of the elongated structure upon which they are mounted whereby the pliable fingers will flex in a direction opposite to the direction of travel of the structure when engaging the wall of the conduit and will dispose the elongated structure centrally thereof, said guide means permitting flow of fluid between its fingers.

2. A device of the character described comprising an elongated structure adapted to pass through a conduit, the diameter of the structure being materially less than the diameter of the conduit, and guide means carried by said structure comprising a plurality of pliable fingers of a diameter greater than the diameter of the conduit through which the structure passes and whereby the fingers may flex in a direction opposite to the direction of travel of the structure to thereby substantially engage the wall of the conduit and dispose the elongated structure centrally thereof while allowing free circulation of fluid through the space occurring between the fingers.

3. A device of the character described comprising an elongated structure adapted to be lowered through a pipe, said structure being of a diameter materially less than the pipe through which it passes, a guide element carried upon said structure made of rubber or the like, said guide member comprising a plurality of fingers radially disposed around the longitudinal axis of the elongated member, said guide member including a central portion by which it is mounted upon

the elongated member, said fingers of the guide member being adapted to flex and bear against the wall of the pipe through which the structure passes, the overall dimensions of the guide member being substantially greater than the inside diameter of the pipe.

5 4. A device of the character described comprising an elongated structure adapted to be lowered through a pipe, said structure being of a diameter materially less than the pipe through which it passes, a guide element carried upon said structure made of rubber or the like, said guide member comprising a plurality of fingers radially dis-

posed around the longitudinal axis of the elongated member, said guide member including a central portion by which it is mounted upon the elongated member, said fingers of the guide member being adapted to flex and bear against the wall of the pipe through which the structure passes, the overall dimensions of the guide member being substantially greater than the inside diameter of the pipe, the spaces occurring between the radially disposed fingers permitting free circulation of fluid therethrough. 10

VIVIAN EDWARD KUSTER.