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S. G. HOUSE

2,728,556

OSCILLATING DRILL SHANK ADAPTOR

Filed June 24, 1954

2 Sheets-Sheet 1

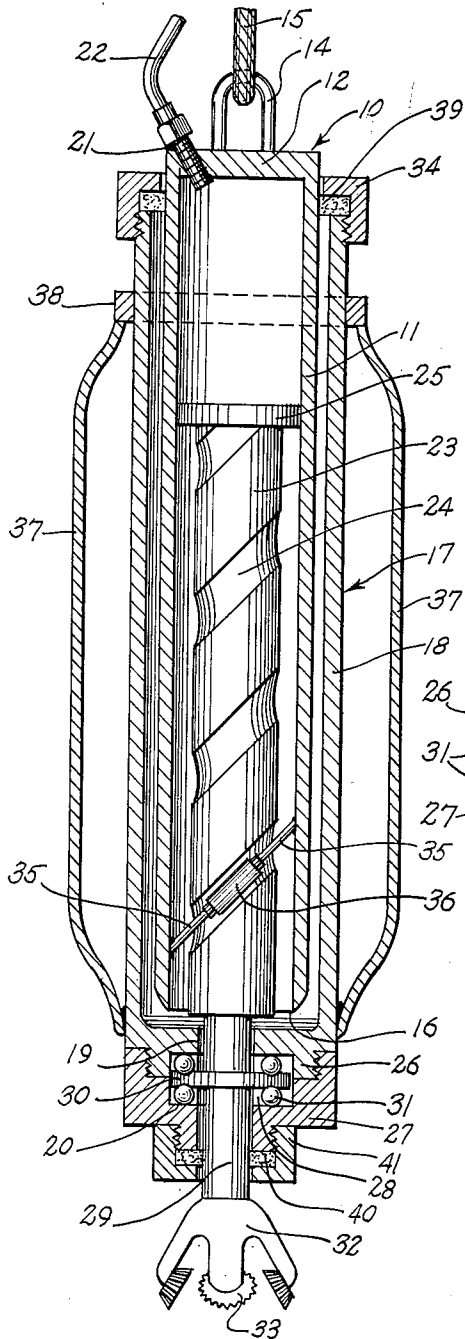
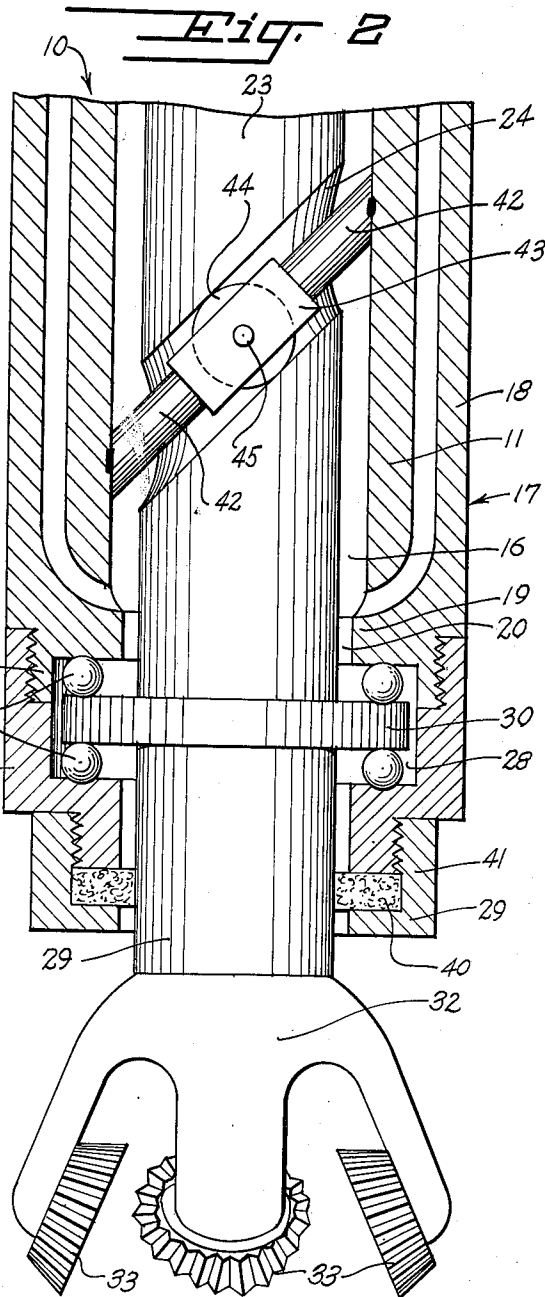


Fig. 1



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2 Sheets-Sheet 2

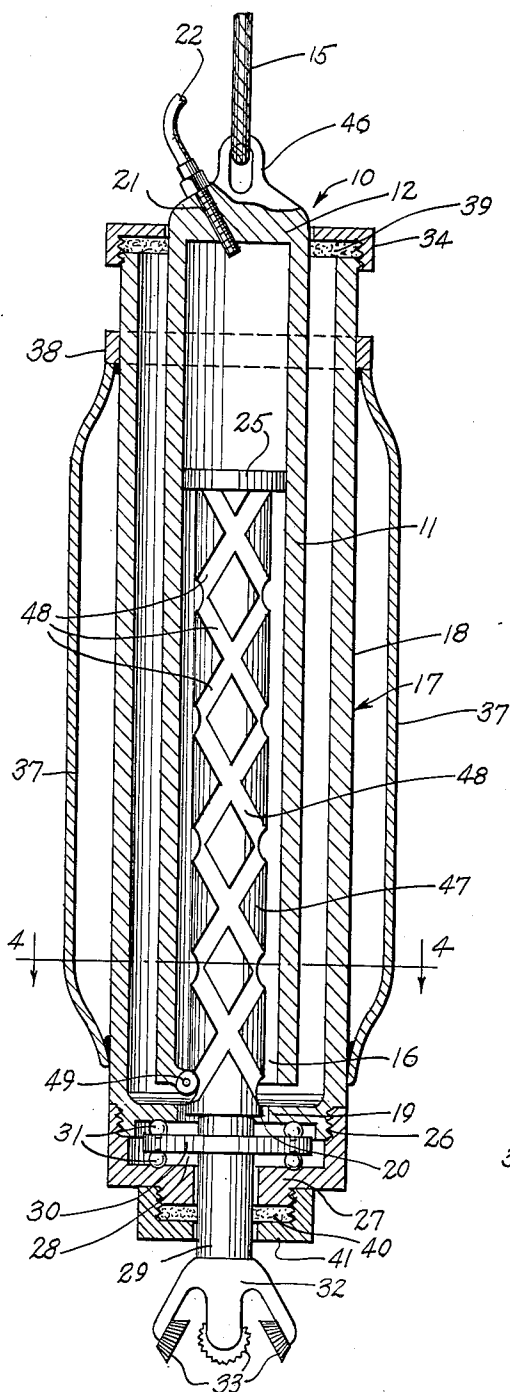


Fig. 3

Fig. 5

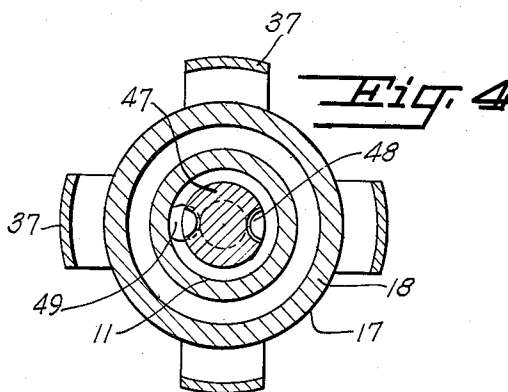
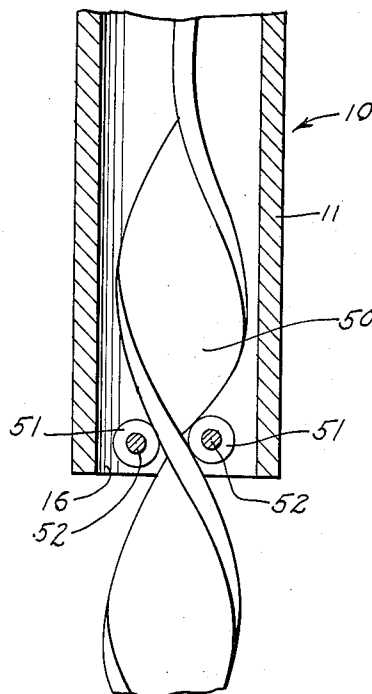


Fig. 4

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OSCILLATING DRILL SHANK ADAPTOR

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3 Claims. (Cl. 255—14)

This invention relates to well drilling equipment, and more particularly to a drill shank adaptor for use with cable beam equipment.

The object of the invention is to provide an oscillating drill shank adaptor which will impart a rotary motion to a drill bit as a beam of a rig is raised and lowered vertically whereby a well can be sunk or dug quickly and easily.

Another object of the invention is to provide a rotary drill shank which will enable a straight or vertical hole to be drilled by using standard cable tool walking beam equipment and wherein the drill shank can be rotated in a clockwise or anticlockwise direction to cause the bit or bits to cut much faster and wherein the life of the cutting bits will be lengthened or increased.

Another object of the invention is to provide a drilling tool which will save time when being used since it will not be necessary to withdraw the drilling tool for inspection since there is no drill pipe to be unscrewed and stacked since with the present invention an actuating cable can be rapidly reeled up so that the drill assembly can be quickly taken out of the hole and placed on a derrick floor.

A further object of the invention is to provide an oscillating drill shank adaptor which is extremely simple and inexpensive to manufacture.

Other objects and advantages will be apparent during the course of the following description.

In the accompanying drawings, forming a part of this application, and in which like numerals are used to designate like parts throughout the same:

Figure 1 is a longitudinal vertical sectional view taken through the adaptor of the present invention.

Figure 2 is a fragmentary enlarged sectional view showing the lower portion of the unit, and showing a modified bearing assembly.

Figure 3 is a longitudinal sectional view showing another modified adaptor.

Figure 4 is a sectional view taken on the line 4—4 of Figure 3.

Figure 5 is a fragmentary sectional view showing another modification wherein a spiral blade-like member is arranged in engagement with rollers.

Referring in detail to the drawings, the numeral 10 designates a hollow housing which includes an annular side wall 11 and a top wall 12. A hook 14 extends upwardly from the top wall 12 and is secured thereto, Figure 1, and a cable 15 is arranged in engagement with the hook 14. The lower end of the housing 10 is open as at 16.

Arranged in surrounding relation with respect to the housing 10 is a casing 17 which includes an annular side member 18 and a bottom wall 19 which is provided with a central opening 20 for a purpose to be later described. Extending through the top wall 12 is a fitting 21 which has a conduit 22 connected thereto whereby fluids can be pumped into or out of the hollow housing 10. Positioned in the housing 10 is a shank which includes an upper enlarged body portion 23 that is provided with a continuous spiral groove 24 for a purpose to be later described. An annular flange or head 25 is secured to the upper end of the body portion 23, and the flange 25 rotatably engages the inner surface of the side wall 11 of the housing 10. Depending from the bottom of the casing 17 is an

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exteriorly threaded skirt 26, and a plug 27 is arranged in threaded engagement with the skirt 26. The plug 27 coacts with the skirt 26 to define a chamber 28. Depending from the lower end of the body member 23 is a cylindrical stem 29 of reduced diameter, and an annular plate or flange 30 extends outwardly from the stem 29, the plate 30 being seated in the chamber 28. Ball bearings 31 are positioned in the chamber 28 on opposite sides of the plate 30.

Arranged within the housing 10 is an inclined pin 35 which is secured as by welding to the inner surface of the side wall 11. A cylindrical bearing 36 is mounted on the pin 35, and the bearing 36 is arranged in engagement with the groove 24. Mounted on the lower end of the stem 29 is a cutting head 32 which includes a plurality of bits or cutting members 33, and the head 32 may be threadedly connected to the stem 29.

The assembly of the present invention further includes a plurality of yieldable or spring fingers 37 which each has its lower end secured to the outer surface of the casing 17 in any suitable manner, as for example by welding. A collar 38 is secured to the upper ends of the spring fingers 37, and the collar 38 slidably engages the casing 17. A cap 34 is arranged in threaded engagement with the upper end of the casing 17, and the cap 34 serves to retain in place a packing 39. Packing 40 is also retained in place on the stem 29 by means of a cap 41.

Referring to Figure 2 of the drawings, there is shown a slightly modified arrangement wherein pins 42 are used in lieu of the previously described pin 35. The pins 42 may be secured as by welding to the housing 10, and the pins 42 are positioned within the housing. A bracket 43 is secured to the pins 42, and the bracket 43 has a roller 44 journaled therein by means of a pin 45, the roller 44 engaging the spiral groove 24 for the same purpose as the previously described bearing 36.

Referring to Figure 3 of the drawings, there is shown a further modification wherein a slightly different type of hook 46 is formed integral with the upper end of the housing 10, and the hook 46 is engaged by the cable 15, the hook 46 being used in lieu of the hook 14. Positioned within the housing 10 of the assembly shown in Figure 3 is a shank which includes a body portion 47, and the body portion 47 has a plurality of grooves 48 which are arranged in crisscross relation with respect to each other. A bearing finger or knob contains a free running roller 49 at the lower end of the housing 10 for engagement with the grooves 48.

Referring to Figure 5 of the drawings there is shown a still further modification wherein a spiral member 50 forms the shank, and the spiral member 50 extends through the housing 10 and engages rollers 51 which are mounted on shafts or pins 52 that are secured to the housing 10.

From the foregoing it is apparent that there has been provided an oscillating drill shank adaptor which will facilitate the drilling of oil wells and the like. In use the cable 15 can be connected to a boom of a piece of conventional rigging and then when the boom and cable 15 are raised, the housing 10 will be raised and this will cause rotation of the body member 23 since the bearing 36 engages the spiral groove 24. Then, when tension on the cable 15 is quickly released, gravity will cause the body member 23 to move to the position shown in Figure 1 so that the interengaging bearing 36 and groove 24 will cause rotation of the shank including the body member 23 whereby the drill head 32 will be rotated so that the cutting members 33 will readily penetrate the earth being drilled. Instead of using the bearing 36, the cylindrical roller or bearing 44 shown in Figure 2 can be used. Also, the modified arrangement shown in Figure 3 includes a bearing finger or knob having a roller 49 engaged in the

grooves 48 which imparts rotation to the shank and drill head 32. Or, the spiral shank 50 can be used, the shank 50 having a drill head secured to its lower end, so that the interengagement between the spiral shank 50 and the rollers 51 will cause rotation of the drill head as the tool is raised and lowered.

With the present invention it is possible to drill a straight hole using standard cable tool walking beam equipment. By using the rotary adaptor shank which can rotate the bits 33 in a clockwise and anti-clockwise direction, the bits will cut much faster since this two-way rotation will clear the spaces between the teeth of the cutting rollers and also the life of the cutting bits 33 will be extended. Also, the circulating mud will not climb up from the bottom of the hole being drilled as is the case with steady one-way rotation, and also there will be a time saving effected since with the present invention the drill pipe does not have to be unscrewed and stacked because it is only necessary to reel up the cable so that the entire drill assembly is out of the hole and can be located on a derrick floor. This is especially valuable in core testing. Also, the adaptor is perfectly aligned and there is no wobbly swaying or twist as is the case when drill pipe is used. The desired pressure on the cutting bits can be controlled by lowering the cable 15 to the desired depth and for heavy cutting, added weight may be placed just above the adaptor assembly to cause a deeper penetration of the cutting rollers and a light cut may be obtained by slightly lifting the suspending cable 15. The spring members 37 serve to hold the entire assembly perfectly straight in the drilled cavity at all times to thereby prevent slant and off-side drilling which causes the loss of many operations. Any standard roller bit can be accommodated in the adaptor and the housing 10 includes the conduit 22 so that pumping operations can take place in order to acquire samples which are to be used in cooling, sampling or pressure readings. The spring members 37 are secured to the sliding collar 38 which surrounds the outer casing 17 and these spring members serve as a centralizing support to keep the shank from turning in the hole with the upstroke of the cable 15 and also serve to remain upright and directly in the center of the hole the entire drill shank. These spring members 37 are also of value in maintaining perfectly straight drilling when hard rock is encountered which would ordinarily throw the roller bits 33 off-center. The operation of the drill shank is similar to a ratchet screw driver since the inner housing 10 moves up and down as the cable 15 is moved up and down by the walking beam of a standard cable tool oil drilling rig. The housing 10 contains the roller 36 or 44 so that the shank is rotated as the housing 10 moves up and down. The housing 10 moves freely up and down within the outer casing 17, and the roller bearings 31 support the stem 29 but yet permit the stem to freely rotate. The collar or cap 34 holds the packing 39 in place to seal the space between the inner moving housing 10 and the outer casing 17. The similar packing 40 is retained in place on the bottom of the adaptor by means of a cap 41. The flange 25 limits movement of the shank in one direction. The fitting 21 and conduit 22 can be used when fluids are to be pumped into or out of the assembly.

I claim:

1. In an oscillating drill shank adaptor, a hollow housing including an annular side wall and a top wall, a hook extending upwardly from said top wall and secured thereto, a cable arranged in engagement with said hook, the lower end of said housing being open, a casing surrounding said housing and provided with a central opening in its lower end, a cap arranged in threaded engagement with the upper end of said casing, a shank rotatably mounted in said housing and including an upper enlarged body portion provided with a continuous spiral groove, an annular flange on the upper end of said body portion engaging the inner surface of the side wall of said housing,

an inclined pin secured within said housing, a cylindrical bearing mounted on said pin and engaging said groove, a stem of reduced diameter depending from said body portion and extending through the opening in the bottom of said casing, an exteriorly threaded skirt depending from said casing, a plug arranged in engagement with said skirt and coacting therewith to define a chamber, an annular plate seated in said chamber and extending from said stem, ball bearings arranged in engagement with said plate and seated in said chamber, a cutting head mounted on the lower end of said stem, a plurality of spring fingers each having their lower end secured to said casing, and a collar slidably mounted on said casing and secured to the upper ends of said spring fingers.

2. In an oscillating drill shank adaptor, a hollow housing including an annular side wall and a top wall, a hook extending upwardly from said top wall and secured thereto, a cable arranged in engagement with said hook, the lower end of said housing being open, a casing surrounding said housing and provided with a central opening in its lower end, a cap arranged in threaded engagement with the upper end of said casing, a shank rotatably mounted in said housing and including an upper enlarged body portion provided with a continuous spiral groove, an annular flange on the upper end of said body portion engaging the inner surface of the side wall of said housing, inclined pins secured within said housing, a bracket secured to said pins, a roller journaled in said bracket and engaging said groove, a stem of reduced diameter depending from said body portion and extending through the opening in the bottom of said casing, an exteriorly threaded skirt depending from said casing, a plug arranged in engagement with said skirt and coacting therewith to define a chamber, an annular plate seated in said chamber and extending from said stem, ball bearings arranged in engagement with said plate and seated in said chamber, a cutting head mounted on the lower end of said stem, a plurality of spring fingers each having their lower end secured to said casing, and a collar slidably mounted on said casing and secured to the upper ends of said spring fingers.

3. In an oscillating drill shank adaptor, a hollow housing including an annular side wall and a top wall, a hook extending upwardly from said top wall and secured thereto, a cable arranged in engagement with said hook, the lower end of said housing being open, a casing surrounding said housing and provided with a central opening in its lower end, a cap arranged in threaded engagement with the upper end of said casing, a shank rotatably mounted in said housing and including an enlarged upper body portion provided with spiral grooves arranged in crisscross relation with respect to each other, an annular flange on the upper end of said body portion engaging the inner surface of the side wall of said housing, a bearing tooth on the lower end of said housing engaging said grooves, a stem of reduced diameter depending from said body portion and extending through the opening in the bottom of said casing, an exteriorly threaded skirt depending from said casing, a plug arranged in engagement with said skirt and coacting therewith to define a chamber, an annular plate seated in said chamber and extending from said stem, ball bearings arranged in engagement with said plate and seated in said chamber, a cutting head mounted on the lower end of said stem, a plurality of spring fingers each having their lower end secured to said casing, and a collar slidably mounted on said casing and secured to the upper ends of said spring fingers.

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