July 16, 1957 D. W. OSMUN 2,799,351

JUNK TRAP

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Fig. 1

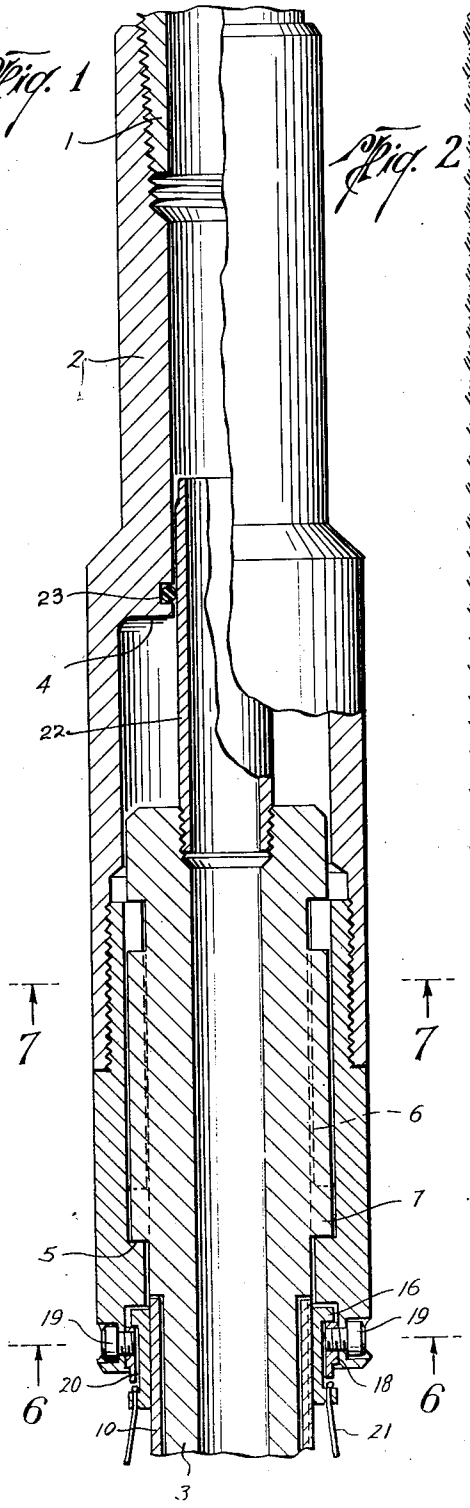
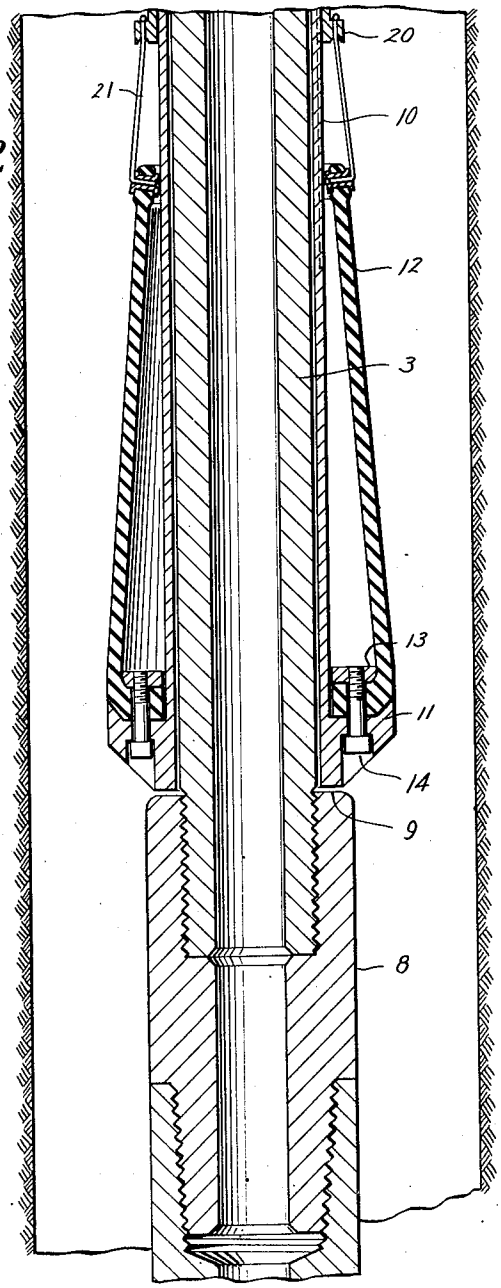



Fig. 2




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Fig. 3

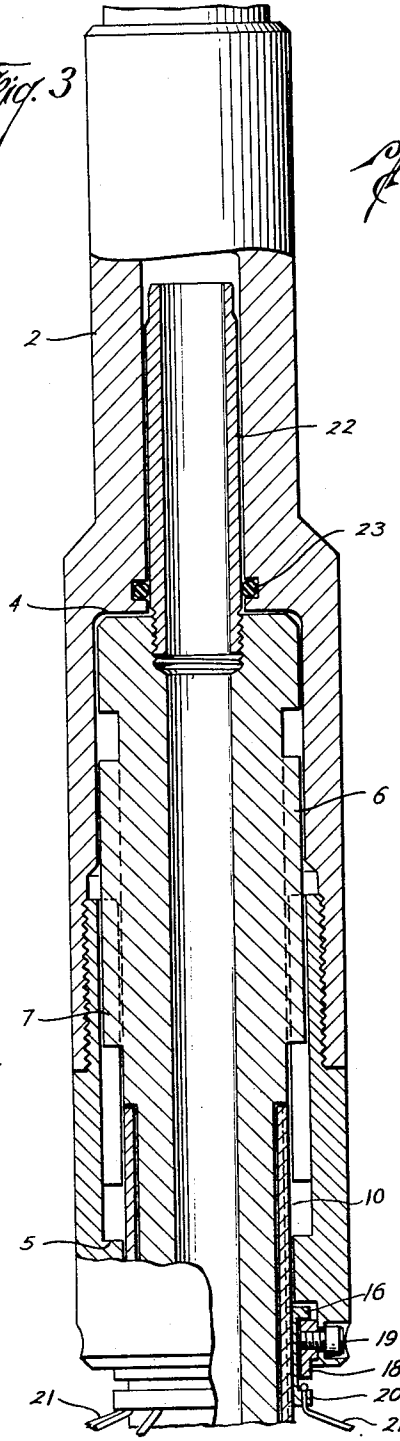
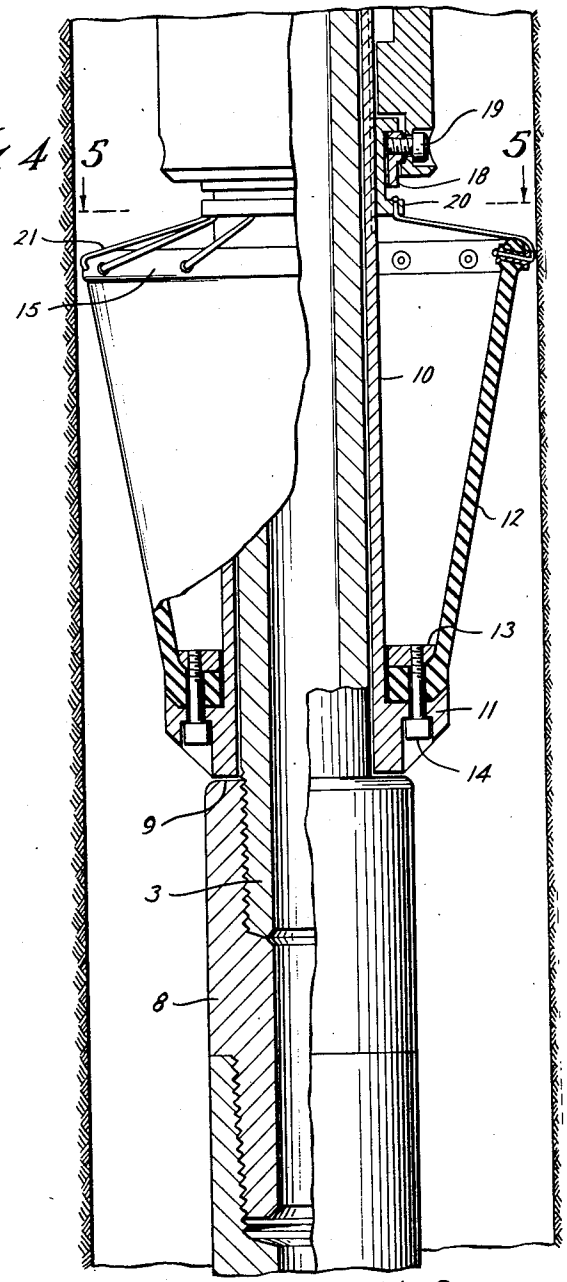



Fig. 4




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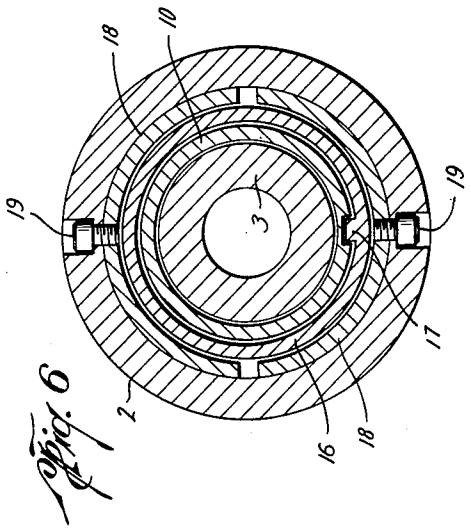



Fig. 6

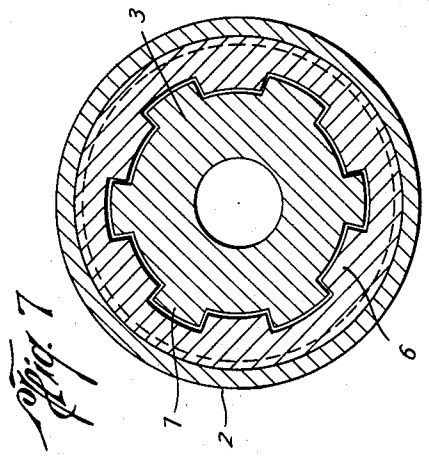



Fig. 7

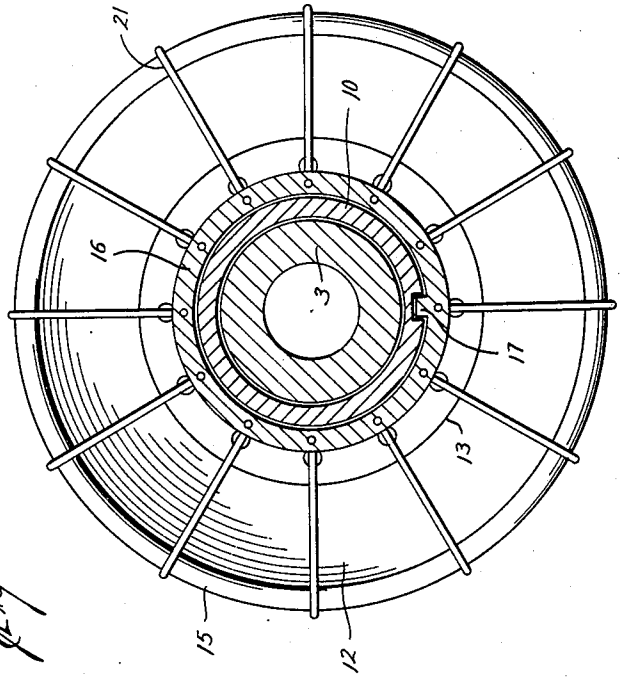



Fig. 5

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2,799,351

# JUNK TRAP

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Application June 19, 1953, Serial No. 362,741

6 Claims. (Cl. 166—243)

This invention relates to a junk trap.

An object of the invention is to provide a trap of the character described especially designed for entrapping, and removing from a well, small metal objects and metal particles which may accumulate in the well as the well operations are carried on.

It is particularly desirable that metal objects and metal particles or other hard particles, such, for example, as commercial diamonds from drills, be not allowed to accumulate in a well bore, for the reason that they interfere with certain operations to be carried on in the well bore.

Large metal objects may be removed by other types of equipment for that purpose, but the smaller metal objects and metal particles are difficult to remove by equipment now in common use, and the trap herein described has been designed particularly for removing these smaller particles.

If these smaller particles are not removed, they will be forced back into the wall of the bore and will thereafter interfere with the operation of electrical appliances which may be lowered into the well for obtaining well data.

The trap is of such construction that it may be used in connection with a regular string of drilling or fishing tools without interfering with any of the operations common to the use of such tools, and includes means for mounting the trap on the string to permit the string to rotate without rotation of the trap.

While he trap has been particularly designed for entrapping and removing metal, it is obvious that it may be used for other similar purposes.

Other objects and advantages will be apparent from the following specification which is illustrated by the accompanying drawings wherein:

Figure 1 is a side elevation partly in section, of the upper end of the tool in closed position.

Figure 2 is a vertical sectional view of the lower end thereof.

Figure 3 is a side elevation, partly in section, of the upper end of the tool with the trap in open position.

Figure 4 is a side view partly in section of the lower end thereof.

Figure 5 is an enlarged cross-sectional view taken on the line 5—5 of Figure 4.

Figure 6 is an enlarged cross-sectional view taken on the line 6—6 of Figure 1 and

Figure 7 is an enlarged cross-sectional view taken on the line 7—7 of Figure 1.

This application is a continuation of a previous application of the same applicant filed on July 11, 1949, under Serial No. 104,026.

Referring now more particularly to the drawings, wherein like numerals of reference designate similar parts in each of the figures the numeral 1 designates the main tubular stem which extends to the ground surface and to the lower end of which the junk trap proper is connected.



The numerals 2 and 3 designate upper and lower telescoping tubular sections, the upper end of the sections 3 telescoping into the lower end of the section 2.

The lower end of the section 2 is transversely enlarged and formed of two parts screwed together. It has the inside upper shoulder 4 and the inside lower shoulder 5. The telescoping ends of the sections 2, 3 are provided with intermeshing, longitudinal keys 6, 7 and the lower ends of keys 7, are adapted to rest on the shoulder 5 when the trap is in inactive, or closed position.

The distance between the shoulders 4 and 5 is somewhat greater than the distance between the upper end of the section 3 and the lower ends of the keys 7 so that there is provided a limited longitudinal movement between the parts 2, 3, but these parts rotate together as a unit.

The lower end of the section 3 includes a coupling member 8 whose upper end forms an external annular shoulder 9, and screwed onto the lower end of the coupling 8 there may be any type of tool or equipment desired. Usually it will be merely a section of pipe forming an outlet nozzle through which fluid forced down through the stem 1 under pressure may be discharged into the bore hole and returned up around the stem.

Supported on the shoulder 9 there is the trap proper, which, in the present illustration, includes a sleeve 10 which surrounds the section 3 above the shoulder 9 and which is freely rotatable relative to the section 3.

The lower end of this sleeve is provided with an external, annular flange 11. Above the flange there is a flexible sack 12 whose lower end is inwardly turned and rests on the flange 11 and is clamped thereon by means of an inside clamp ring 13 which is clamped in place by suitable clamp bolts as 14.

This sack, preferably, flares upwardly and should be of maximum transverse dimension substantially equal to the transverse diameter of the bore hole in which it is used.

The sack 12 is also preferably formed of rubber or similar resilient material, and its upper margin is preferably thickened as at 15 so that said margin will have the required stiffness.

Around the lower section 3 there is an anchor ring 16 which is keyed against rotation, relative to the sleeve 10 by means of the key 17 which works in a key-way in the sleeve 10, as shown in Figure 6, and the lower end of the upper section 2 is internally countersunk and within the countersunk portion there are the arcuate retainers 18, 18, which are complementary and which are secured in the section 2 by the set screws 19, 19. These retainers are seated in an external, annular groove 20 of the anchor ring 16, and retain said anchor ring in place.

Flexible tie members 21 are connected, at their inner ends, to the lower end of the anchor ring 16 and at their outer ends they are connected, in any suitable manner, to the thickened margin 15 of the sack 12.

In going into the well the lower ends of the keys 7 will rest on the shoulder 5 as shown in Figure 1. The sections 2, 3, thus being extended, will create a pull, or tension, on the ties 21 and hold the upper end of the sack inwardly as shown in Figure 2.

When the lower end of the tool lands on bottom and the string supporting equipment is slacked off, the upper section 2 will move downwardly relative to the lower section 3 and the upper end of the sack 12 will be permitted to spread. This spreading will be facilitated by the thickened reinforcing rib 15 around the upper margin of the sack.

Liquid under pressure may now be forced downwardly into the string and it will pass on outwardly into the well beneath the sack and will be returned upwardly about the

string, thus passing by the sack in its upward movement. This liquid should be under considerable pressure to the end that it will have sufficient velocity to pick up and carry with it, from the bottom of the bore, the earth materials and metal particles therein and carry the same upwardly above said sack. It is obvious that the sack will flex inwardly so as not to interfere with this upward movement of the liquid.

Intermittently, the pressure may be relieved, and in such case, the liquid outside of the stem above the sack will lose its velocity, and solid materials therein, including the metals, will be released and will drop back by gravity, but will be caught by the sack **12**.

Thereafter, the velocity of the washing fluid may be again increased as before, thus picking up additional material and carrying it upwardly to be dropped into the sack upon a reduction of the liquid velocity.

In order to prevent leakage of liquid between the telescoping parts, a nipple or wash pipe **22** has been provided whose lower end is screwed into the upper end of the section **3** and whose upper end fits snugly up into section **2** above and is surrounded by a close-fitting seal ring **23** seated in an inside groove within the section **2** and which forms a seal between said nipple and said last mentioned section.

Having thus clearly shown and described the invention, what is claimed as new and desired to secure by Letters Patent is:

1. A junk trap comprising, a supporting body composed of tubular, telescopically arranged, upper and lower sections which are movable longitudinally relative to each other, means for connecting the upper end of the upper section and the lower end of the lower section to an operating string of pipe for rotation with the string and through which fluid in the string may flow through said sections, means arranged to prevent the separation of said sections, a sleeve rotatably mounted on said lower section and movable longitudinally therewith, a sack whose lower end is fitted around and secured to the sleeve and whose upper end is open, said sack being formed of flexible material and having a thickened marginal portion at its upper end, means rotatable with said sleeve and rotatably connected to said upper section for longitudinal movement therewith, and flexible tie members spaced apart around the sleeve whose outer ends are secured to the margin of the sack and whose inner ends are connected to said rotatable means to exert a pull on the margin of the upper end of the sack to contract said upper end to close the sack upon relative longitudinal movement of the sections in a direction to extend the sections.

2. A junk trap comprising, a supporting body composed of tubular telescopically arranged, upper and lower sections, means connecting said sections for limited longitudinal movement relative to each other, means for connecting the upper end of the upper section and the lower end of the lower section to an operating string of pipe for rotation with the string and through which fluid in the string may flow through said sections, a sleeve rotatably mounted on said lower section for longitudinal movement therewith, a sack formed of flexible material surrounding said sleeve, clamping means carried by the sleeve and clampingly engaging the lower end of the sack, said sack having its upper end open, flexible tie members spaced apart around the trap and secured at their outer ends to the open end of said sack, and an annular member connected to said sleeve and rotatable therewth and to which the inner ends of said tie members are secured, said annular member being movable longitudinally on said sleeve, and means carried by the upper member and forming a rotatable connection with said annular member to cause said members to exert a pull on said open end of said sack to close the sack upon relative longitudinal movement of said sections in a direction to extend the sections.

3. A junk trap comprising, a supporting body composed of tubular telescopically arranged upper and lower sections, means connecting the sections for limited longitudinal movement relative to each other, means for connecting the upper end of the upper section and the lower end of the lower section to an operating string of pipe for rotation with the string and through which fluid in the string may flow through said sections, means forming a fluid tight seal between the sections, a sleeve rotatably mounted on said lower section and longitudinally movable therewith, a sack whose lower end is fitted around and secured to the sleeve and whose upper end is open, said sack being formed of flexible material, radial, flexible tie members spaced apart around the trap whose outer ends are secured to the margin of the open end of the sack, and means rotatably mounted on said upper section and movable longitudinally therewith and to which the inner ends of the tie members are secured.

4. A junk trap comprising a support formed of tubular telescopically arranged upper and lower sections which are longitudinally movable relative to each other, means for connecting the upper end of the upper section and the lower end of the lower section to an operating string of pipe for rotation with the string and through which fluid in the string may flow through said sections, means arranged to prevent the separation of said sections, a flexible upwardly flaring sack whose lower end is fitted around and secured to the lower section for longitudinal movement therewith, and in which said lower section is rotatable, the upper end of said sack being open, flexible tie members spaced apart around the trap whose outer ends are secured to the upper margin of the sack, and means rotatably mounted on the upper section for longitudinal movement therewith and connected to the inner ends of said members to cause said members to exert a pull on said upper margin of said sack to close the sack upon relative longitudinal movement of said sections in a direction to extend the sections.

5. A junk trap comprising, a supporting body composed of tubular, telescopically arranged, upper and lower sections which are movable longitudinally relative to each other, means arranged to prevent the separation of said sections, means for connecting the upper end of the upper section and the lower end of the lower section to an operating string of pipe for rotation with the string and through which fluid in the string may flow through said sections, an upwardly flaring sack, means rotatably mounted on the lower section for longitudinal movement therewith and around which the lower end of the sack is fitted, the upper end of said sack being open, said sack being formed of flexible material and having a thickened resilient marginal portion at its upper end, radial flexible ties spaced apart around the trap, means connected to the inner ends of the members and rotatably mounted on the upper section for longitudinal movement therewith, the outer ends of said members being secured to the margin of the sack to exert a pull on said margin to close the sack upon relative longitudinal movement of said sections in a direction to extend the sections.

6. A junk trap comprising, tubular telescoping sections, means connecting said sections to allow limited relative longitudinal movement, said sections having a splined connection to rotate as a unit, means for connecting one of said sections to an operating string of pipe for movement therewith and through which fluid in the string may flow through said sections, an upwardly flaring sack whose lower end is secured around the lower section for longitudinal movement therewith, said sack having a resilient marginal portion at its upper end, the upper end of the sack being open, and flexible connecting means connecting the upper margin of the sack to the upper section for longitudinal movement therewith to exert a pull on said margin to close the sack upon relative longitudinal move-

ment of the sections in a direction to extend the sections, said upper section being rotatable relative to said connecting means.


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