Oct. 29, 1957 B. A. GUILLOT 2,811,210

CASING SCRAPER

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Fig. 1

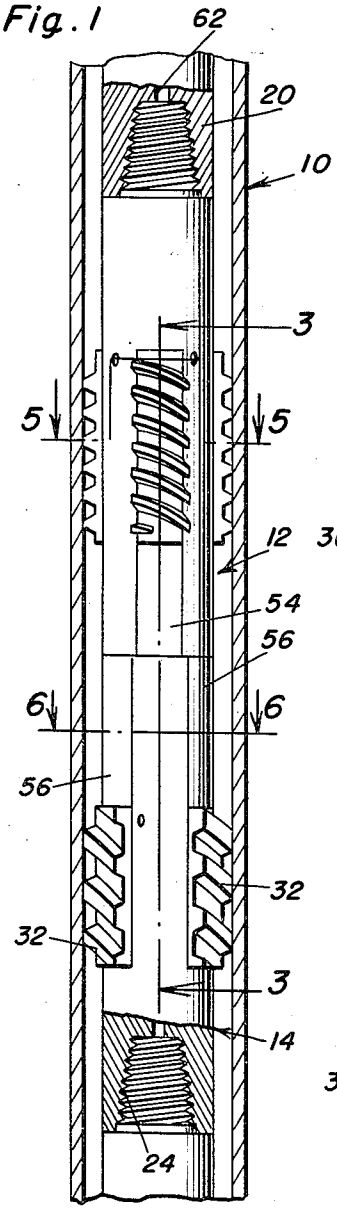


Fig. 2

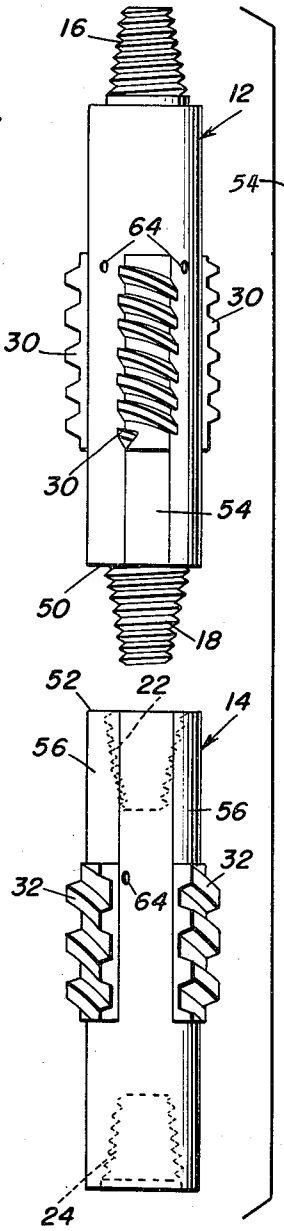
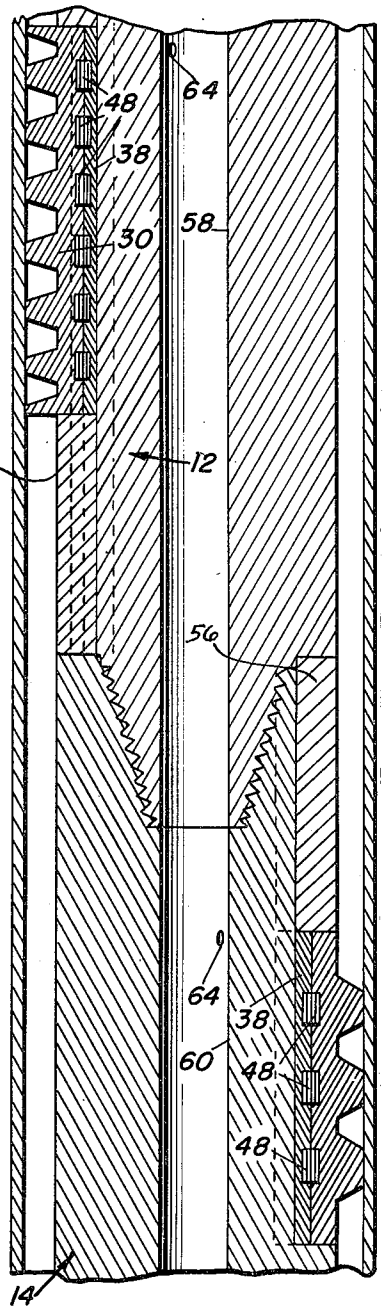


Fig. 3



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Fig. 4

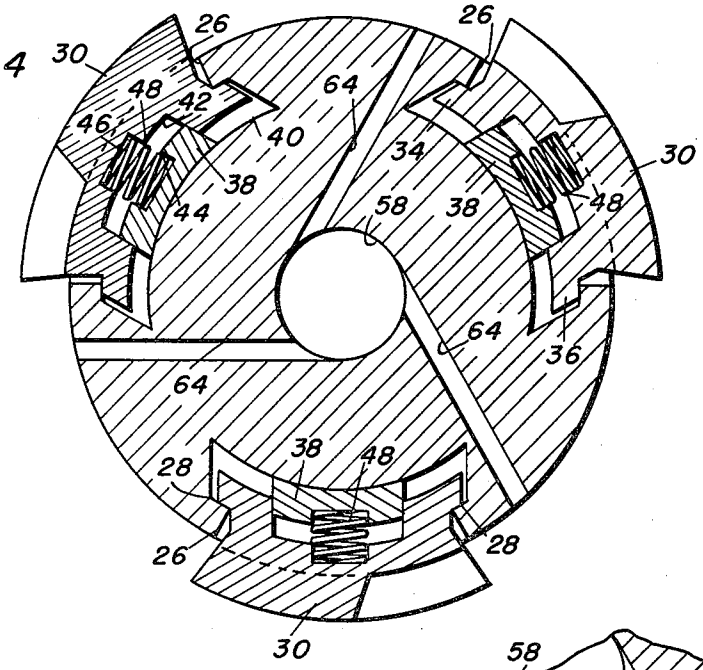


Fig. 5

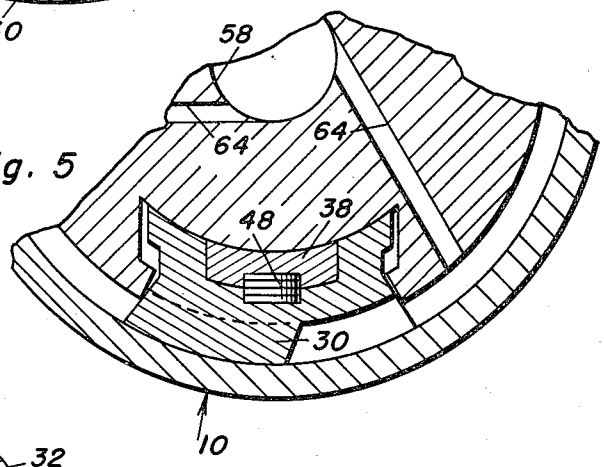
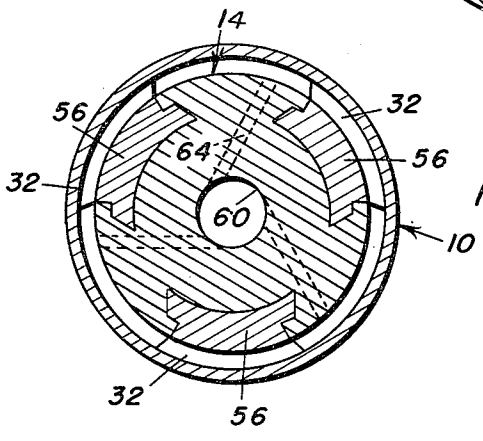


Fig. 6



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2,811,210

CASING SCRAPER

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Application August 19, 1954, Serial No. 450,871

3 Claims. (Cl. 166—173)

This invention relates generally to cutting tools and pertains more particularly to a scraping tool for removing foreign material, gunshot burrs and bullets and a variety of substances from the inner walls of well casings, liners or similar conduits.

The primary object of this invention is to provide an improved form of casing scraper which will remove such undesirable objects as described above and from the inner walls of well casings or the like and which will do so in response to longitudinal or rotative or a combination of such movements of the scraper with respect to the casing, liner or the like.

Another object of this invention is to provide an improved form of casing scraper which is formed of two-piece construction such that when the respective pieces are joined together an interengagement of parts is effected which retains especially formed cutter members in proper position on the respective pieces.

Still another object of this invention is to provide an improved casing scraper construction generally in accordance with the foregoing objects wherein a jet spray action is incorporated to supply fluid adjacent the cutting members of the scraper to maintain these members cool and to effectively flush away material cut from the well casing.

Another object of this invention is to provide an improved casing scraper construction which incorporates easily removable and replaceable cutter members which are maintained in proper place on a two-piece body construction by the operative interengagement between the body sections and wherein resilient mechanism is employed in conjunction with the cutter members to normally maintain them in pre-tensioned engagement with the inner wall of a well casing, liner or the like.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

Figure 1 is a longitudinal section taken through a well casing showing the improved scraper operatively associated therein;

Figure 2 is an exploded, elevational view showing the two pieces of the casing scraper in separated position;

Figure 3 is an enlarged longitudinal section taken substantially along the plane of section line 3—3 of Figure 1;

Figure 4 is a transverse section taken through the casing scraper and is taken intermediate the ends of one of the cutting members;

Figure 5 is an enlarged fragmentary section taken substantially along the plane of section line 5—5 in Figure 1; and

Figure 6 is an enlarged transverse section taken substantially along the plane of section line 6—6 in Figure 1.

Referring now more particularly to the drawings, reference numeral 10 indicates a well casing, liner or the like within which the casing scraper is to be utilized. The casing scraper is designed to operate in such casing 10 at the lower end of a string of drill pipe running to the top of the level of the well bore and by means of which a cutting tool member, of any desired character, not shown, secured to the lower end of the scraper is moved both longitudinally and rotationally with respect to the well bore, as desired. It will be noted that the scraper assembly consists of an upper and a lower member, these members being indicated by the reference numerals 12 and 14 respectively and that the upper member 12 is provided at its upper and lower ends with longitudinally projecting tapered portions 16 and 18, each provided with external threads with the upper of the projections 16 being adapted for attachment to the coupling member 20 to which the drill pipe is secured and the lower projection 18 of which is adapted to be threadedly engaged within a threaded recess 22 within the lower body section 14. The internally threaded recess 22 in the lower body section 14 is provided at the upper end thereof and the bottom end thereof is provided with a similar threaded recess 24 by means of which the cutting tool member of conventional construction, not illustrated, is attached to form a complete tool string.

In the specific embodiment of the invention shown in the drawings, each of the body members 12 and 14 are provided with three circumferentially spaced and longitudinally extending slots or grooves which are of generally T-shaped configuration in cross section and which have relatively narrow stem portions 26 opening upon the outer surface of the body members and a relatively wide inner portion including the branches 28 on opposite sides of the stem in the manner illustrated most clearly in Figures 4–6. Into each of these slots or grooves is inserted a cutter member, such as the finish cutting members 30 in the upper body member 12 and the roughening cutting members 32 in the lower body member 14. The roughening cutting members 32 are provided with heavier or more rapidly cutting teeth whereas the finish cutting members 30 are provided with narrower, more finely cutting teeth, it being preferred that there be approximately twice as many finish cutting teeth as there are roughening cutting teeth. Each of the cutting members is provided with a pair of oppositely extending, laterally projecting flange portions 34 and 36 which project into the previously mentioned branches 28 of the T-shaped slots or grooves in the body members and which prevent radial displacement of the cutting members with respect to the body members. At the same time, it will be noted that the radial depth of the branches 28 is such as to allow relative radial movement between the cutter members and the body members such that the cutter members are normally disposed under the urging of mechanism hereinafter described, to the radially projected position illustrated in Figure 4. On the other hand, when the scraper assembly is operatively associated with the well casing or liner 10 the cutter members are disposed in an inwardly converged position as illustrated most clearly in Figure 5.

For the purpose of urging the cutting blades to their normal outwardly projecting positions, a spring plate member 38 is associated with each cutting member and in underlying relation thereto so as to be disposed between the bottoms 40 of the T-shaped slots or grooves and the bottom surface of the cutter elements or members, it being preferred that the undersurface of the cutting members are grooved as at 42 to receive the spring plates 38 in the manner illustrated most clearly in Figures 4 and 5. The spring plates are provided with a series of recesses 44 and similar recesses 46 are pro-

vided in the cutter members in registry therewith such that coil spring members **48** may be disposed therebetween and in a properly seated engagement therewith whereby relative movement in a transverse direction is prevented between the spring plates **38** and the cutting members **30** or **32**. That is, the provision of the grooves **42** in the cutting members prevents transverse movement between the spring plates and the cutting members whereas the recesses **44** and **46** and their associated springs **48** will normally properly align the spring plates and cutter members longitudinally with respect to each other.

It will be noted that each of the slots or grooves in the body members **12** and **14** extend longitudinally thereof from one end and terminate short of the opposite end and it will be further noted that the assembled position of these body members are such that the ends thereof with which the slots communicate are disposed in abutting relationship, these ends being indicated by the reference characters **50** and **52** respectively. Further, the cutting members **30** and **32** are shorter in length than their corresponding slots but filler or key members **54** and **56** respectively, see Figures 1, 2 and 6, are inserted within these slots such as to fill the space between the ends of the cutter members and the ends of their associated slots or grooves. As will be seen from Figure 1, the slots and key members **54**, **56** of the upper and lower body portions **12** and **14** are out of alignment with each other, thereby insuring that the key members will be positively engaged by the surfaces **52** and **50**, respectively. In this manner, it will be evident that when the two body members are lockingly interengaged by the threaded engagement between the projections **18** within the recesses, the abutting relationship of the ends **50** and **52** thereof will be such as to properly locate the cutting members **30** and **32** longitudinally with respect to the body members and prevent other than a very slight end play. Of course, sufficient clearance must be maintained to permit the proper radial movement of the cutter members to perform their desired operation.

The keys or filler members **54** and **56** are so formed as to substantially completely fill the T-shaped slots or grooves within the body members, see particularly Figure 6, and it will be noted that their outer surfaces are flush with the outer surface of the body members. Thus, when it is desired to remove and replace cutter members in the two-piece body construction, it is merely necessary to disengage and separate the members **12** and **14** and slide the cutters out. New cutters may then be replaced within the T-shaped slots or grooves in the body members and the keys **54** and **56** reinserted whereafter interengagement between the body sections **12** and **14** will securely lock the cutter members in place. It will be also manifest that the provision of the spring plate members **38** provides a very easy means for entering the new cutter elements into the respective grooves or slots in the body members inasmuch as the operator merely presses these two members together a sufficient amount to permit the members **38** and their associated cutters to be entered into the slots whereafter they may be merely pushed the remainder of the way in by manual pressure alone.

Also provided in the body sections **12** and **14** are longitudinal bores **58** and **60** which are in proper alignment to form a continuous fluid passageway through the scraper assembly. This passageway communicates at its upper end with a similar passageway **62** formed in the coupling member **20** and at its lower end the passageway communicates with a similar passageway in the drill bit member not shown. As will be seen most clearly in Figures 4 and 5, conduits or passageways **64** are provided in tangential relationship with the main conduit through the body members and it will also be observed that these latter passageways **64** communicate with the outer surface of the body members closely adjacent the region of the cutter members **30** and **32**. Thus, water under pressure or any fluid that may be desired is introduced between the scraper assembly and the inner surface of the well casing for the purpose not only of cooling the cutter members but also for flushing foreign material as it is cut from the casing.

It is to be noted further that the passageways **64** may be disposed wholly within a transverse plane with respect to the body members or they may be slightly inclined longitudinally with respect thereto such as to provide a downward motion of the cooling and cleaning fluid in a swirling path down the well casing for obvious purposes. In any event, it is desired that the opening of the passageways is such that the cooling and cleaning fluid is first introduced at a point adjacent the top ends of the cutter elements **30** and **32**. In this manner, of course, the cooling and cleaning fluid is introduced for the full length of the cutting elements and most effectively performs its desired result.

The operation of the device is briefly as follows. When it is desired to replace a cutter **30** or **32**, it is necessary only to unscrew the upper section **12** from the lower section **14**, whereupon either of the filler or key members **54** or **56** may be slid from the open end of the grooves, thereby releasing the cutters for sliding axial movement from the grooves. When the sections are reassembled, the abutting edges of the two sections will cover the open ends of the grooves, thereby retaining the filler or key members and their abutting cutters. The springs **48** interposed between the plates **38** and the cutting members **30** or **32** will yieldingly urge the latter radially outwardly of the grooves and the sections **12** or **14** into operative contact with the well bore. The overlying ribs or flanges of the grooves will retain the cutters while allowing both radial and axial movement.

From the foregoing, the construction and operation of the device will be readily understood and further explanation is believed to be unnecessary. However, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction shown and described, and accordingly, all suitable modifications and equivalents may be resorted to, falling within the scope of the appended claims.

What is claimed as new is as follows:

1. A casing scraper comprising a pair of cylindrical upper and lower body members having adjacent end surfaces and being removably secured together with said end surfaces in abutting relation, each of said body members being provided with circumferentially spaced grooves extending longitudinally from said end surfaces and terminating short of their opposite ends, the grooves of said upper and lower body members being out of longitudinal alignment, a cutter member slidably received in each groove, a key member slidable in each groove and engaging the cutter member therein, the lengths of the cutter members, key members and grooves being such as to cause the surfaces to engage the key members and thereby prevent removal of the cutter members when the body members are secured together with said surfaces in abutting engagement, said grooves being T-shaped in cross section with top walls overhanging the bottom wall thereof, said cutter members being laterally projecting flanges underlying said overhanging top walls, said overhanging top walls and flanges having radial clearance therebetween thereby permitting limited radial movement between the cutter members and said bodies, spring means disposed between said cutter members and said bottom walls urging said cutter members to a radially projected position, said spring means comprising an elongated plate underlying each of said cutter members and springs disposed between and engaging each plate and its associated cutter member.

2. The combination of claim 1 wherein said springs are seated upon their associated plates and cutter mem-

bers whereby to prevent relative longitudinal displacement thereof.

3. The combination of claim 2 wherein said cutter members have longitudinal channels therein, said plates being movably disposed in said channels.

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