

Aug. 8, 1950

G. A. GUMP
APPARATUS FOR INSTALLING REMOVING
SHUTOFF PLUGS IN WELL PIPES

2,517,870

Filed Sept. 24, 1948

2 Sheets-Sheet 1

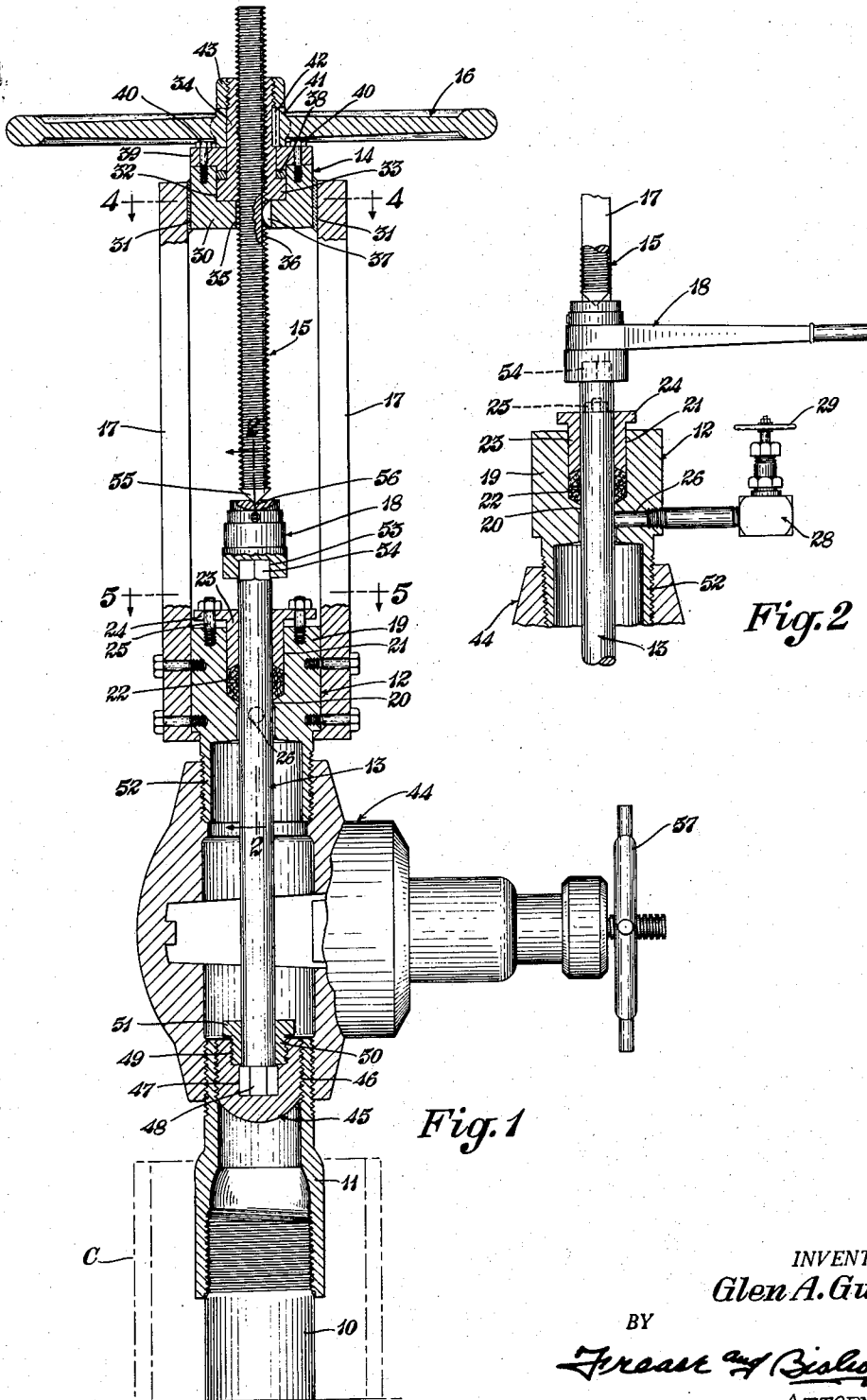


Fig. 2

Fig. 1

INVENTOR.
Glen A. Gump

BY
Freese and Bishop
ATTORNEYS

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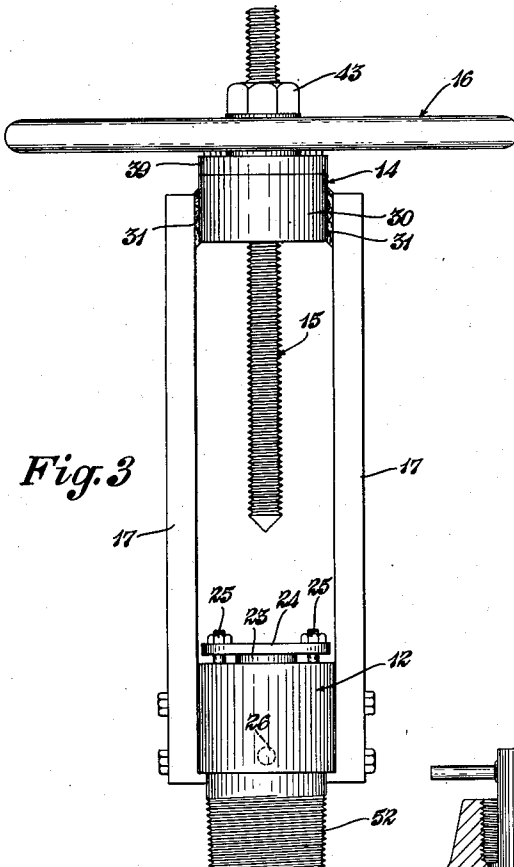


Fig. 3

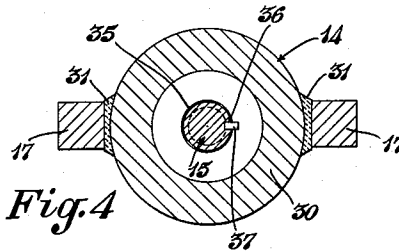


Fig. 4

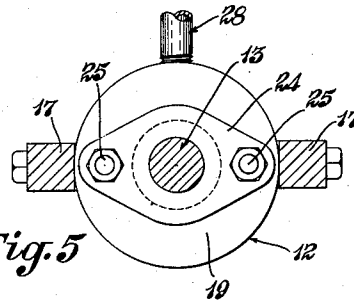


Fig. 5

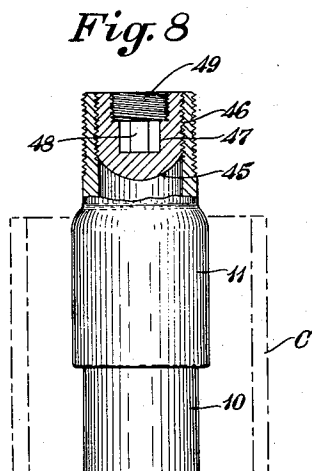


Fig. 8

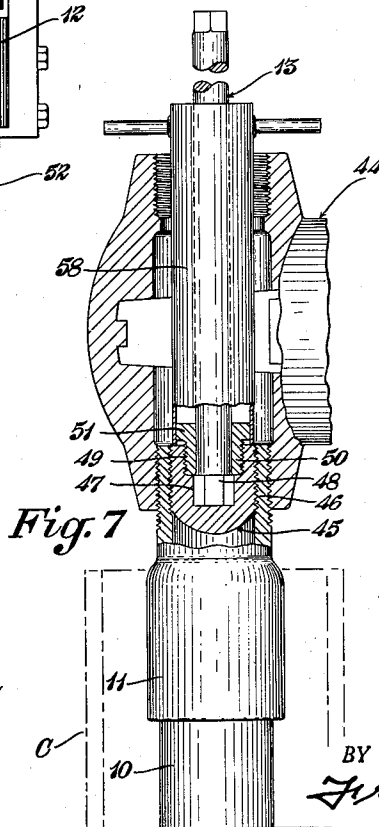


Fig. 7

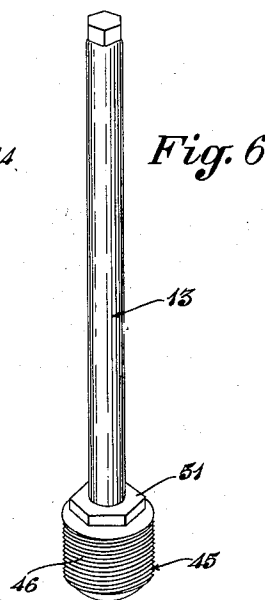


Fig. 6

INVENTOR.
Glen A. Gump

BY
Fitzgerald and Bishop
ATTORNEYS

UNITED STATES PATENT OFFICE

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APPARATUS FOR INSTALLING AND REMOVING SHUTOFF PLUGS IN WELL PIPES

Glen A. Gump, Canton, Ohio

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8 Claims. (Cl. 166—15)

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The invention relates to mechanism for use in connection with gas and oil wells where it is desired to "pull" the outer or non-producing casing of the well, and more particularly to an apparatus for installing a shut-off plug into the top of the inner tubing or producing pipe of the well so that the outer casing may be pulled from the ground without danger of combustion or explosion of the inflammable product of the well and without any waste of the gas or oil.

It is common practice in the gas and oil drilling industry to place a gate valve upon the top of the inner tubing or producing pipe, after the well has been completed. Frequently, it is desirable to "pull" or remove the outer, non-producing casing, for use elsewhere, after a well has been completed, but, owing to the fact that this conventional gate valve is larger than the diameter of the casing, it is necessary that this gate valve be first removed from the inner tubing, and the same plugged, before the casing can be withdrawn from the ground.

As there is usually a considerable fluid pressure in the tubing, there is great danger of fire or explosion of the escaping gas or oil, as well as a considerable waste thereof, between the time that the gate valve is removed and a plug is placed in the top of the tubing. Furthermore, this is a very difficult operation because of the fluid pressure in the tubing.

It is therefore an object of the invention to provide means for inserting a screw plug into the top of the inner tubing while the gate valve is attached thereto, after which the gate valve may be removed so that the outer casing may be pulled from the well.

Another object is to provide such a device for sealing off the flow of gas or oil from a well without waste of fluid from the well.

A further object is to provide an apparatus of the character referred to which may be disconnected and removed after the sealing plug has been inserted in the inner tubing.

A still further object is to provide an apparatus of this type adapted to install the shut-off plug against the fluid pressure in the tubing.

Another object of the invention is to provide such an apparatus with a bleeder valve for controlling the flow of gas from the tubing during the time that the gate valve is opened for inserting the shut-off plug, whereby, after the plug has been inserted in the tubing the small amount of fluid which has been trapped in the gate valve may be released.

The invention further contemplates the general improvements and simplification of the construction and operation of apparatus of the character referred to.

The above and other objects, apparent from the drawings and following description, may be

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attained, the above described difficulties overcome, and the advantages and results obtained by the apparatus, construction, arrangement and combinations, sub-combinations and parts which comprise the present invention, a preferred embodiment of which, illustrative of the best mode in which applicant has contemplated applying the principle, is set forth in detail in the following description and illustrated in the accompanying drawings, in which:

Figure 1 is a vertical, sectional view of an apparatus embodying the invention, showing the same associated with a gate valve mounted upon the top of the well tubing or producing pipe, at the time when the shut-off plug has been inserted in the top of the tubing;

Fig. 2 a fragmentary, vertical sectional view, showing the needle valve on the stuffing box assembly, and the ratchet wrench for rotating the stem upon which the shut-off plug is carried;

Fig. 3 a detached side elevation of the stuffing box, hand wheel and operating screw rod assembly;

Fig. 4 an enlarged, transverse, sectional view, showing the key-way for the operating screw-rod, taken on the line 4—4, Fig. 1;

Fig. 5 an enlarged, transverse, sectional view, showing the stuffing box assembly, taken on the line 5—5, Fig. 1;

Fig. 6 a detached, perspective view of the stem showing the shut-off plug attached thereto by the stem nut;

Fig. 7 a vertical sectional elevation of the top of the inner tubing of a well, with the shut-off plug installed therein after removal of the stuffing box assembly and before the gate valve has been removed, showing the pipe socket wrench for removing the stem nut, and

Fig. 8 a vertical sectional elevation of the top of the tubing with the shut-off plug therein, after the stem has been removed.

Referring to the embodiment of the invention illustrated in the accompanying drawings, in which similar numerals refer to similar parts throughout, the upper end of the inner tubing, a producing pipe of a gas or oil well is indicated at 10, and a conventioned male and female collar 11 is shown screwed thereon.

The improved apparatus to which the invention pertains comprises generally the stuffing box assembly indicated generally at 12, having the stem 13 slidably and rotatably located therethrough, the thrust nut assembly, shown generally at 14, with operating screw-rod 15 and hand wheel 16 therefor, the assemblies 12 and 14 being connected in spaced relation by the bars 17, and the ratchet wrench 18, interposed between the screw-rod 15 and the stem 13, for rotating the stem to install a shut-off plug in the tubing, as will be later described in detail.

The stuffing box assembly includes the cylindric box 19, having the central bore 20, for slidably and rotatably receiving the stem 13, and the enlarged cavity 21 housing the packing material 22 and the hollow, cylindrical follower 23, provided with the elliptical flange 24 and bolts 25 for holding the packing material under compression in the cavity.

A radial passage 26 is provided in the box 19, below the cavity 21, and the bore 20 is preferably slightly enlarged from this point to the bottom of the box, so that fluid may pass up around the stem 13 to said radial passage. For the purpose of controlling the escape of fluid, when the gate valve is opened, a valve, which may preferably be a needle valve, as indicated generally at 28, is connected to the passage 26 of the stuffing box, and adapted to be controlled as by the conventional band wheel 29.

The thrust nut assembly 14 includes the cylindric block 30, welded or otherwise attached to the upper ends of the bars 17 as indicated at 31, the lower ends of which are rigidly attached to the box 19, as by the cap screws. A cylindric cavity 32 is formed in the upper side of the block 30, and houses the lower enlarged portion 33 of the bushing nut 34, which is threaded upon the screw-rod 15, which is slidably located through the bore 35 and provided with a longitudinal groove or key-way 36, receiving the key 37 carried by the block 30.

A brass thrust washer 38 is located within the cavity 32, upon the top of the enlarged portion 33 of the bushing nut, and is held in position by means of the cap plate 39 and cap screws 40, which connect said cap plate to the block 30.

The hub 41 of the hand wheel 16 is keyed, or otherwise fixed, upon the bushing nut 34, as indicated at 42, and a jamb nut 43 is screwed upon the externally threaded upper end of the bushing nut, in contact with the hub of the hand wheel, to retain the hand wheel in position upon the bushing nut.

In usual practice, after a well has been "brought in" or completed, a conventional gate valve, as indicated generally at 44 in Fig. 1, is connected to the male and female collar 11, at the top of the inner tubing, and may be normally closed.

When it is desired to seal off the well, by the use of the apparatus to which the instant invention pertains, a shut-off plug, indicated generally at 45, is attached to the lower end of the stem 13. This shut-off plug is externally threaded at 46 to fit the internal threads at the upper end of the male and female collar 11, and has a hexagonal or squared socket 47, adapted to snugly receive the hexagonal, or squared, head 48 upon the lower end of the stem 13, the upper open end of said socket being enlarged and internally threaded as indicated at 49, to receive the stem nut 50, having a hexagonal head 51. As best shown in Figs. 1 and 7 this stem nut fits against the top of the hexagonal head 48 of the stem, securing the shut-off plug 45 upon the lower end of the stem.

With the stem 13 and operating screw-rod 15 in raised position, the depending, externally threaded nipple 52, of the stuffing box assembly, is screwed into the upper end of the gate valve 44, which valve, as well as the needle valve 28, should at this time be in closed position.

The socket 53, of the ratchet wrench 18, is then engaged with the hexagonal or squared upper end 54 of the stem 13, and the hand wheel 16 is then operated to move the operating screw-rod 15 down

so that the conical lower end 55 thereof engages in the central socket 56 in the top of the ratchet wrench.

The gate valve 44 is then opened by means of the usual hand wheel 57 thereon, and the hand wheel 16 is operated to lower the screw rod 15 and stem 13, moving the shut-off plug 45 down through the gate valve and into contact with the turned threads at the top of the male and female collar 11, the hand wheel 16 being turned counter-clockwise during this operation.

As soon as the shut-off plug enters the threads of the collar 11 the ratchet wrench 18 is operated to rotate the stem in clockwise direction, while the counter-clockwise rotation of the hand wheel 16 is continued, so as to screw the shut-off plug into the upper end of the collar 11, as shown in Fig. 1.

When the shut-off plug is tightly screwed into the collar 11, sealing off the flow of gas or oil from the tubing 10, the needle valve 28 is opened to release the gas trapped in the gate valve.

The stuffing box assembly is then unscrewed from the top of the gate valve, and lifted off of the stem 13, leaving the stem in position attached to the shut-off plug, and a socket wrench 58 is slipped over the stem 13, and through the gate valve, and into engagement with the head 51 of the stem nut 50, as shown in Fig. 7, and the stem nut is unscrewed so that the stem may be withdrawn from the shut-off plug, and the gate valve is then unscrewed from the collar 11, leaving the shut-off plug screwed into the top of the collar 11, sealing off the tube 10, as shown in Fig. 8.

In this condition there is no obstruction around the exterior of the inner tubing or pipe 11 which would interfere with the pulling of the outer casing or pipe C of the well, which may then be withdrawn from the well.

If it is desired to again replace the gate valve upon the inner tubing, it may be screwed upon the collar 11, the stuffing box assembly may be again screwed onto the gate valve, and the shut-off plug removed by operating the parts of the apparatus in the reverse to the operation above described.

From the above description, and the accompanying drawings, it will be apparent that a simple, efficient and safe device is provided for easily and readily sealing off the inner tubing of a gas or oil well so that the outer casing or pipe may be withdrawn from the well when desirable.

According to the provisions of the patent statutes, I have explained the principle of my invention and described one embodiment thereof, but I desire to have it understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically illustrated and described, the invention residing in the apparatus for installing a shut-off plug in the inner well tubing, to seal off the flow of gas or oil therefrom, so that the usual gate valve may be removed to permit the outer casing or pipe to be easily withdrawn from the well.

I claim:

1. Apparatus for installing a shut-off plug for sealing off the flow of fluid from a well tubing having an internally and externally threaded upper end and a gate valve mounted upon the externally threaded portion thereof, said apparatus comprising a stuffing box assembly for detachable connection to the gate valve, a fluid pressure release valve in the stuffing box assembly, a thrust nut assembly connected in spaced relation to the stuffing box assembly, a stem slidably and rotatably located through the stuffing

box assembly, means for detachably connecting the shut-off plug to the lower end of the stem, and means operatively connected to the thrust nut assembly for moving the stem longitudinally through the stuffing box assembly and for rotating the stem to screw the shut-off plug into the internal threads of the well tubing.

2. Apparatus for installing a shut-off plug for sealing off the flow of fluid from a well tubing having an internally and externally threaded upper end and a gate valve mounted upon the externally threaded portion thereof, said apparatus comprising a stuffing box assembly for detachable connection to the gate valve, a fluid pressure release valve in the stuffing box assembly, a thrust nut assembly connected in spaced relation to the stuffing box assembly, a stem slidably and rotatably located through the stuffing box assembly, a stem nut for detachably connecting the shut-off plug to the lower end of the stem, and means operatively connected to the thrust nut assembly for moving the stem longitudinally through the stuffing box assembly and for rotating the stem to screw the shut-off plug into the internal threads of the well tubing.

3. Apparatus for installing a shut-off plug for sealing off the flow of fluid from a well tubing having an internally and externally threaded upper end and a gate valve mounted upon the externally threaded portion thereof, said apparatus comprising a stuffing box assembly for detachable connection to the gate valve, a fluid pressure release valve in the stuffing box assembly, a thrust nut assembly connected in spaced relation to the stuffing box assembly, a stem slidably and rotatably located through the stuffing box assembly, means for detachably connecting the shut-off plug to the lower end of the stem, and screw means operatively connected to the thrust nut assembly for moving the stem longitudinally through the stuffing box assembly and for rotating the stem to screw the shut-off plug into the internal threads of the well tubing.

4. Apparatus for installing a shut-off plug for sealing off the flow of fluid from a well tubing having an internally and externally threaded upper end and a gate valve mounted upon the externally threaded portion thereof, said apparatus comprising a stuffing box assembly for detachable connection to the gate valve, a fluid pressure release valve in the stuffing box assembly, a thrust nut assembly connected in spaced relation to the stuffing box assembly, a stem slidably and rotatably located through the stuffing box assembly, a stem nut for detachably connecting the shut-off plug to the lower end of the stem, and screw means operatively connected to the thrust nut assembly for moving the stem longitudinally through the stuffing box assembly and for rotating the stem to screw the shut-off plug into the internal threads of the well tubing.

5. Apparatus for installing a shut-off plug for sealing off the flow of fluid from a well tubing having an internally and externally threaded upper end and a gate valve mounted upon the externally threaded portion thereof, said apparatus comprising a stuffing box assembly for detachable connection to the gate valve, a thrust nut assembly connected in spaced relation to the stuffing box assembly, a stem slidably and rotatably located through the stuffing box assembly, means for detachably connecting the shut-off plug to the lower end of the stem, and a screw rod and ratchet wrench operatively connected to the thrust nut assembly for moving the stem longi-

tudinally through the stuffing box assembly and for rotating the stem to screw the shut-off plug into the internal threads of the well tubing.

6. Apparatus for installing a shut-off plug for sealing off the flow of fluid from a well tubing having an internally and externally threaded upper end and a gate valve mounted upon the externally threaded portion thereof, said apparatus comprising a stuffing box assembly for detachable connection to the gate valve, a thrust nut assembly connected in spaced relation to the stuffing box assembly, a stem slidably and rotatably located through the stuffing box assembly, means for detachably connecting the shut-off plug to the lower end of the stem, a screw rod and hand wheel operatively connected to the thrust nut assembly for moving the stem longitudinally through the stuffing box assembly and means interposed between the screw rod and the stem for rotating the stem to screw the shut off plug into the inturned threads of the well tubing.

7. Apparatus for installing a shut-off plug for sealing off the flow of fluid from a well tubing having an internally and externally threaded upper end and a gate valve mounted upon the externally threaded portion thereof, said apparatus comprising a stuffing box assembly for detachable connection to the gate valve, a thrust nut assembly connected in spaced relation to the stuffing box assembly, a stem slidably and rotatably located through the stuffing box assembly, means for detachably connecting the shut-off plug to the lower end of the stem, a screw rod and hand wheel operatively connected to the thrust nut assembly for moving the stem longitudinally through the stuffing box assembly and a ratchet wrench interposed between the screw rod and the stem for rotating the stem to screw the shut-off plug into the inturned threads of the well tubing.

8. Apparatus for installing a shut-off plug for sealing off the flow of fluid from a well tubing having an internally and externally threaded upper end and a gate valve mounted upon the externally threaded portion thereof, said apparatus comprising a stuffing box assembly for detachable connection to the gate valve, a fluid pressure release valve in the stuffing box assembly, a thrust nut assembly connected in spaced relation to the stuffing box assembly, a stem slidably and rotatably located through the stuffing box assembly, means for detachably connecting the shut-off plug to the lower end of the stem, a screw rod and hand wheel operatively connected to the thrust nut assembly for moving the stem longitudinally through the stuffing box assembly and means interposed between the screw rod and the stem for rotating the stem to screw the shut-off plug into the inturned threads of the well tubing.

GLEN A. GUMP.

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