Dec. 26, 1933. J. H. HOWARD 1,940,682

TUBING SEPARATOR

Filed Nov. 24, 1930 2 Sheets-Sheet 1

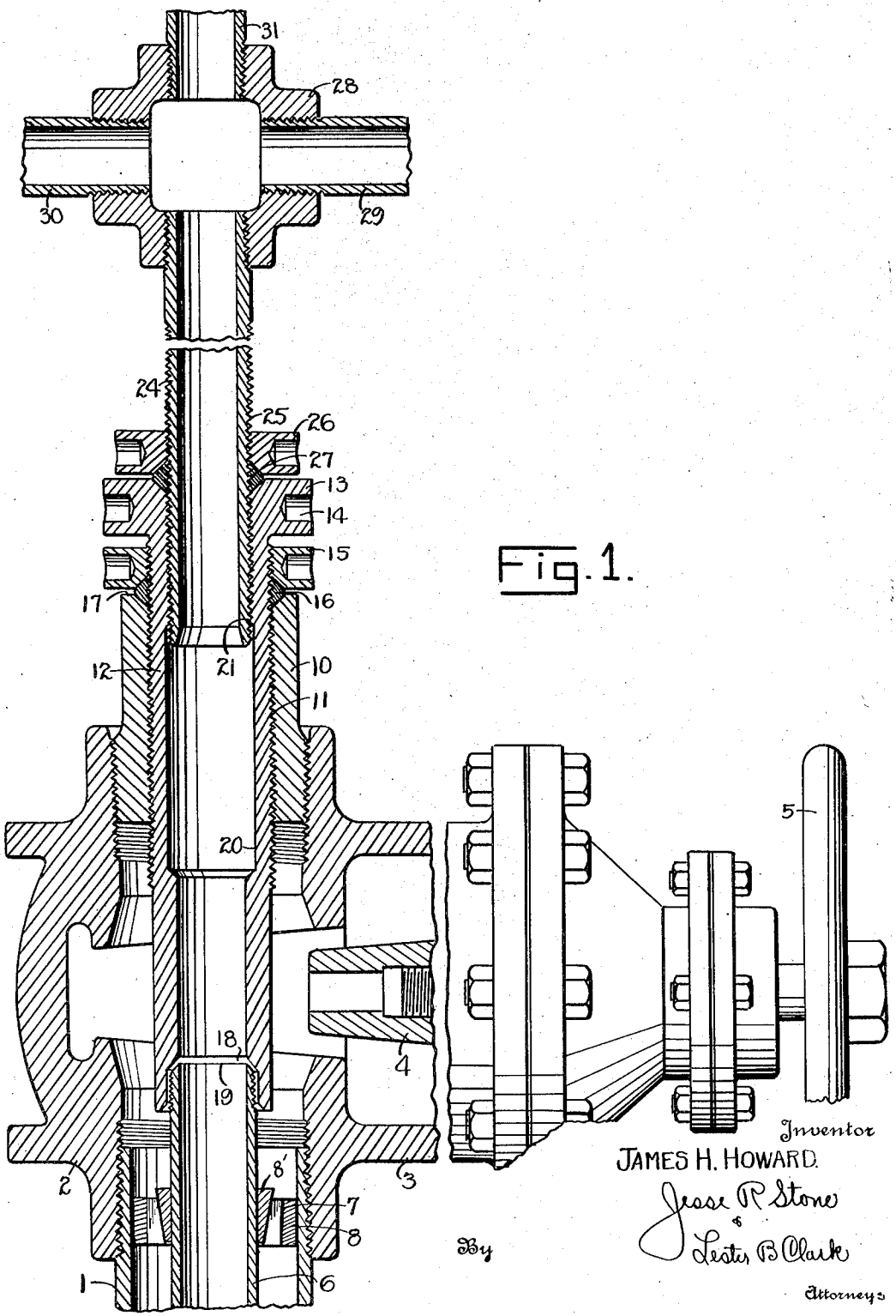


Fig. 1.

Inventor

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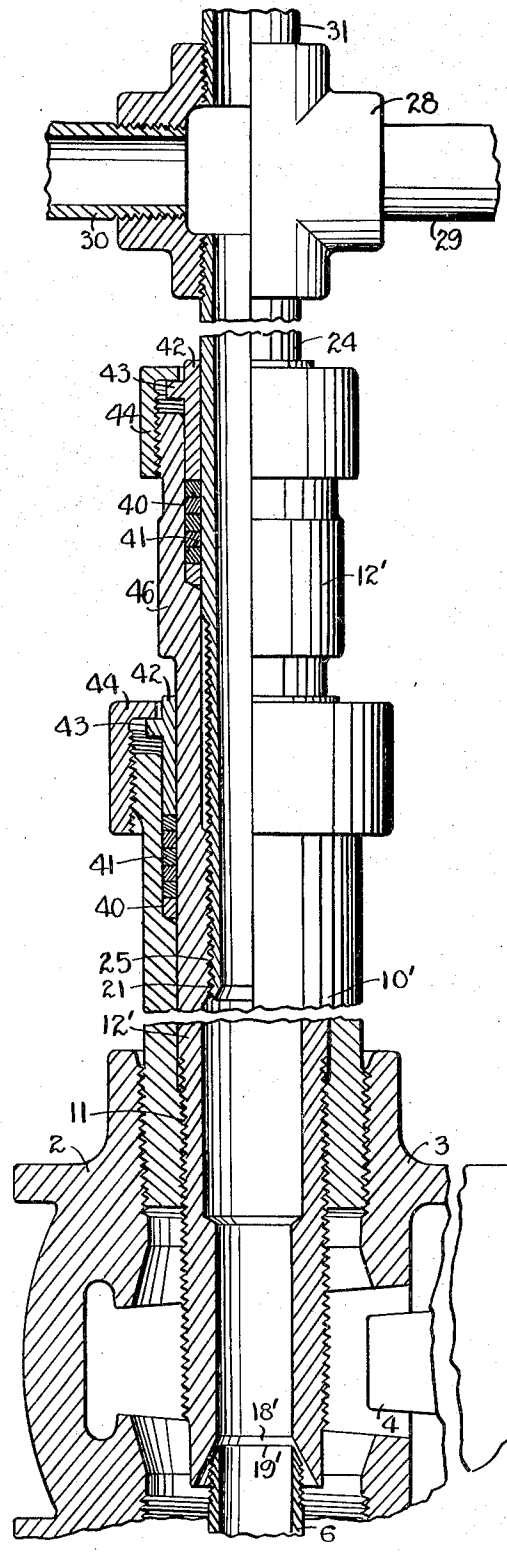
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TUBING SEPARATOR

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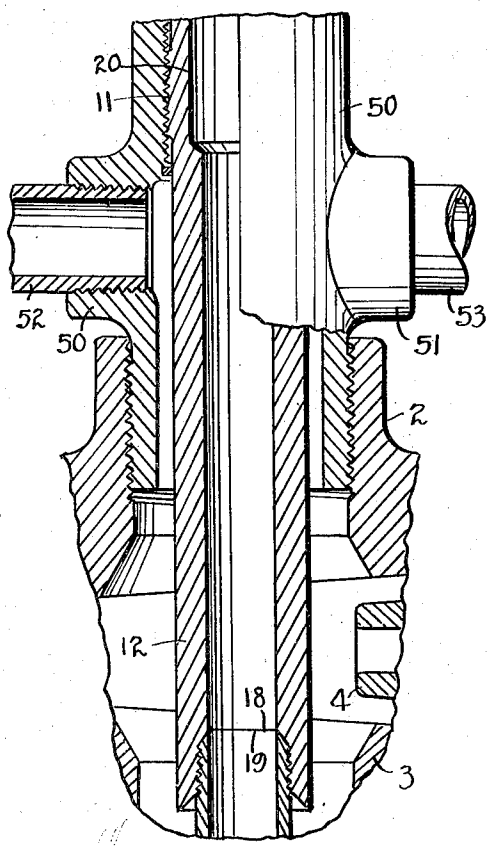
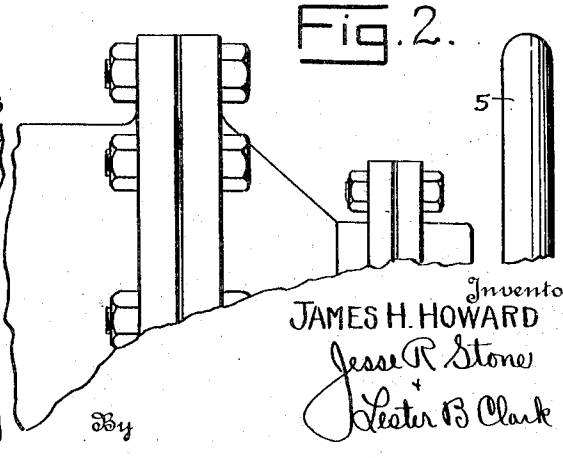


Fig. 3.

Fig. 2.



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UNITED STATES PATENT OFFICE

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TUBING SEPARATOR

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Application November 24, 1930
Serial No. 497,757

6 Claims. (Cl. 166—15)

The invention relates to an improvement in a casing control head assembly, which is particularly adaptable to wells wherein excessive gas and oil pressures are encountered.

The invention is intended to be applied to the top of the well casing after the drilling of the well has been completed, and is arranged to receive and support a string of tubing, and at the same time permit the separation of the string of tubing so that a valve may be closed to completely shut off the well.

One of the objects of the invention is to provide a simple and economical device, which may be readily attached to the well casing and placed in position so that the Christmas tree and associated flow lines may be mounted above the assembly.

Still another object of the invention is to provide a string of tubing, which may extend up through the well, and connect directly to the Christmas tree, but have a retractable section adjacent the well head so that the tubing string may be separated and the gate valve closed in case of emergency.

It is also one of the objects of the invention to provide a means for separating the tubing adjacent the well head so that the well may be completely closed when repairs or alterations are to be made in the Christmas tree or the flow lines.

Still another object of the invention is to provide a retractable section of tubing in combination with the well head assembly so that the tubing may separate to permit closing of the gate valve and at the same time eliminate the procedure of dismantling the Christmas tree.

It is also an object of the invention to provide a retractable section of tubing, which will be threaded both internally and externally with the same pitch thread so that rotation of the section will cause longitudinal movement thereof with respect to a piece of tubing threaded internally thereof and a section of pipe, which is threaded to the exterior.

Other and further objects of the invention will be readily apparent when the following description is considered in connection with the following drawings wherein:

Figure 1 is a side elevation of one form of the invention as applied to a well casing and showing a major portion of the device in section to illustrate the internal construction.

Figure 2 is a combination section and elevation of another form of the invention, which is slightly different from the structure shown in Figure 1.

Figure 3 shows the lower portion of either Figures 1 or 2 and includes an arrangement whereby the flow lines from the well are located above the gate valve so that when the valve is closed, it will completely shut off the entire well.

The casing, which extends from the well is illustrated at 1, and is arranged to receive the gate valve 2, which is of usual construction. This valve includes the housing 3 and the gate member 4, which is arranged to be moved to open or closed position by means of the handwheel 5. After the well is drilled, a string of tubing is usually run into the well and the upper end of this tubing, as illustrated by the section 6, which is suitably supported by means of a spider or support member 7. This support member is provided with passages 8 to permit a flow of gas or oil thereto, but at the same time serves to hold the string of tubing stationary and properly supported in the casing by means of the collar or other structure 8'.

Above the gate valve 2 and connected therewith is a coupling or nipple 10. This nipple is preferably threaded into the gate valve housing 3 and is internally threaded at 11 to receive a section 12 of tubing, which is in the nature of a sleeve and is arranged for rotation with respect to the coupling 10. This sleeve or retractable section of tubing extends above the coupling 10 and is provided with a head 13, which may be provided with openings 14 to receive a spanner wrench. It seems obvious that rotation of this section 12 of tubing will cause relative longitudinal movement with respect to the coupling 10 and the gate valve 2. A lock ring or washer 15 is provided directly below the head 13 and is arranged to retain a packing ring 16 in position. When it is desired, this locking ring may be turned down against the end 17 of the coupling so that it will serve as a lock washer or ring to insure that the section 12 will remain in position.

The section of tubing 12 is in the nature of a sleeve, and fits down through the coupling and at its lower end is cut away to form a seat 18, which is arranged to telescope over the upper end 19 of the string of tubing 6. It is to be understood that rotation of the pipe 12 will cause the portions 18 and 19 to closely engage each other, and, if desired, they may be provided with ground surfaces so that a non-leakable connection is maintained. Intermediate its ends, the pipe 12 is enlarged at 20 and threaded at 21. This threaded portion is arranged to receive the upper section of tubing or discharge pipe 24, which is threaded at 25 to be received inside of the retractable section.

A second locking ring 26 and packing 27 are

provided in order that a complete seal will be had between the upper section 24 and the retractable section 12. This upper section 24 is connected with a cross 28, which forms one element of the usual Christmas tree assembly, which is mounted on high pressure wells. This cross 28 serves as a support for the flow lines 29, 30 and 31. These pipes are controlled by suitable valves, which have not been shown. It is to be understood that the cross 28 is supported by means of the pipes 29 and 30, which are connected therewith and that once assembled, it is practically immovable unless the entire assembly is to be dismantled.

The threads 25, 21 and 11 are preferably of the same pitch and may be of the acme type so that when the section 12 is rotated its travel on the pipe 24 and the coupling 10 will be identical so that a seal will be maintained on both the inside and the outside of the retractable section.

The operation of the device seems obvious, and when repairs or alterations are to be made upon the flow lines or the Christmas tree, it is only necessary to rotate the end 13 of the section 12 so that the lower end thereof will be retracted to a position above the gate 4. As soon as this is accomplished, the hand-wheel 5 may be rotated to completely shut off the well. This may be accomplished without pumping mud into the well to kill the excessive pressures which are present, and may be accomplished while the well is flowing. As soon as the gate valve is closed, the desired repairs or alterations may be made and the valves again opened within a very short period.

When the valve is again opened the section 12 will be reversely rotated so that the seat 18 will come into proper position to form a continuous pipe between the section 6 and the section 24. This construction is of particular advantage in that the tubing section may be retracted without causing any inconvenience or movement of the Christmas tree, which is mounted on the well. Various types of tubing retractors are known to me in which it is necessary during the retracting movement to either dismantle the Christmas tree or disconnect the tubing therefrom, but with my invention, it is possible to leave the Christmas tree assembly intact and merely close off the well by the rotation of the sleeve 12.

Figure 2 shows a slightly modified form of the invention, but the principles are substantially identical with those described in connection with Figure 1. The packing for maintaining the seal about the various parts has been altered and the coupling connected with the gate valve is illustrated at 10' and is formed with a socket 40, which receives the packing rings 41. These are maintained in position by a gland 42, having a thread 43 thereon. This thread is engaged by a cap 44, which is threaded on the outside of the coupling 10'. The inside of the coupling 10' is threaded the same as the coupling 10 and permits rotation of the inner sleeve 12', which also extends above the coupling 10'. This sleeve or retractable section 12' is provided with an enlarged area 46, which is adapted to be gripped by the usual pipe tong used about well derricks. When the section 46 is gripped the pipe section may be rotated to insert or retract it with respect to the gate valve.

A socket, packing and gland member are also provided in connection wtih the sleeve 12', which parts are identical with the parts 40, 41, 42, 43 and 44. The discharge pipe 24 is identical with the one provided in Figure 1, as are the Christmas tree 28 and the flow lines 29, 30 and 31.

The lower end of section 12' is beveled, slightly different from the modification in Figure 1, and has the seat 18' which is arranged to engage with the upper end 19' on the tubing 6. The tubing in this modification of the invention is supported in the same manner as that shown in Figure 1 by the spider 7. This modification of the invention is of particular advantage where enormous pressures are encountered, as the degree of packing to be maintained can be adjusted by rotation of the caps 44 and a positive and efficient seal may be maintained about both the inside and the outside of the retractable section of tubing. The other parts in this figure are the same as those described in connection with Figure 1, and have been designated by the same reference characters.

The modification of Figure 3 shows an arrangement whereby the couplings 10 and 10' have been somewhat elongated and provided with flanges 50 and 51, which receive the flow lines 52 and 53, respectively. These flow lines are inserted through the couplings directly through the threads 11 and are arranged to permit the flow of oil or gas from the casing outside of the well tubing. It is to be understood that these lines 52 and 53 may be controlled by suitable shut-off valves, but they may be incorporated with the assembly in order that accumulation of gas may be withdrawn from the casing exteriorly of the tubing. The remaining description in connection with this figure is the same as in Figures 2 and 3, and it is not believed that additional detailed description thereof is necessary.

The invention is of particular advantage in connection with wells, which are brought in under heavy pressure, as the well being temporarily killed with heavy mud while the tubing is being run in, and as soon as the tubing is set the well may be opened up and permitted to flow or closed by retracting the tubing and closing the gate 4.

While I have shown and described two modifications of the invention, it is intended that various alterations may be made in the construction without departing from the spirit of the invention, which broadly includes the idea of a retractable section in the string of tubing, which may be withdrawn or inserted by rotation of such section.

Having thus described the invention, what I claim is:

1. A retractable tubing head of the character described including a valve body adapted for connection to the well casing, a gate valve in said body, a nipple on said body, a sleeve threaded into said nipple, a discharge pipe threaded into said sleeve, the threads on the inside and the outside of said sleeve being of the same pitch whereby rotation thereof will cause relative longitudinal movement of said sleeve with respect to both said nipple and said pipe.

2. A retractable tubing head for well casings wherein a string of tubing is supported, a valve body having a threaded nipple thereon, a valve in said body, a sleeve threaded to said nipple and adapted to contact the upper end of the supported tubing to form a continuation thereof, and a discharge pipe threaded into said sleeve and arranged to remain stationary upon retraction of said sleeve.

3. The combination of a casing, a valve body connected to said casing, a member carried by said body, a valve in said body, a tubing in said casing and supported beneath the path of said valve, a first pipe stationarily supported above the path

of said valve, and a second pipe connecting said tubing and said first pipe, said second pipe being connected by threads to said body member and by threads to said first pipe, the pitch of said threads being substantially the same so that said second pipe may be rotated to move it out of the path of said valve to permit closure of said valve.

4. The combination of a casing, a valve body connected to said casing, a valve in said body, a discharge string including a tubing, a first pipe and a second pipe, said tubing being in said casing and supported beneath the path of said valve, said first pipe being supported stationarily above the path of said valve, said second pipe connecting said tubing and said first pipe, and movable to permit closure of said valve, and a third pipe connected to and extending upwardly from said valve body and spaced about said string, said third pipe having a discharge opening and being sealed to said string above said discharge opening.

5. The combination of a casing, a valve body connected to said casing, a valve in said body, a section of tubing in said casing and supported beneath the path of movement of said valve, a first pipe supported stationarily above the path of movement of said valve, a second pipe connecting said tubing and said first pipe, said second pipe being movable to permit closure of said valve, and a third pipe connected to and extending upwardly from said valve body and spaced about said second pipe, said third pipe having a discharge opening, the space between said third pipe and said second pipe being sealed above said opening.

6. The combination of a casing, a valve body connected to said casing, a valve in said body, a tubing in said casing and supported beneath the path of said valve, a first pipe stationarily supported above the path of said valve, a second pipe connecting said tubing and said first pipe, and a third pipe connected to and extending upwardly from said valve body, spaced about said second pipe, and having a discharge opening, said second pipe being connected by threads to said first pipe and by threads to said third pipe, the latter of said threads being above said discharge opening, the pitch of said threads being substantially the same so that said second pipe may be rotated to move it out of the path of said valve to permit said valve to be closed.

JAMES H. HOWARD.