

Aug. 27, 1957

J. P. GOULD

2,804,279

ADAPTER FOR HANDLING FLUID UNDER PRESSURE

Filed May 5, 1950

Fig. 1.

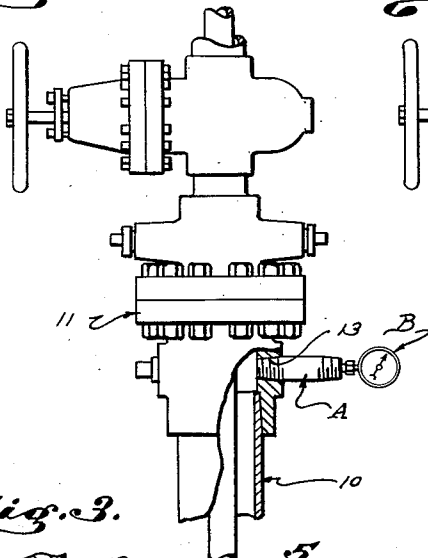


Fig. 2.

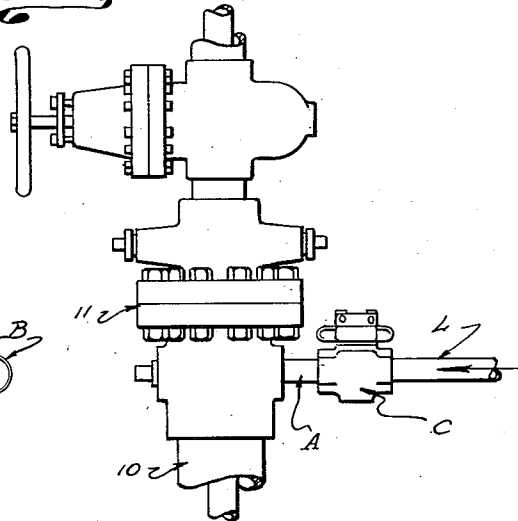


Fig. 3.

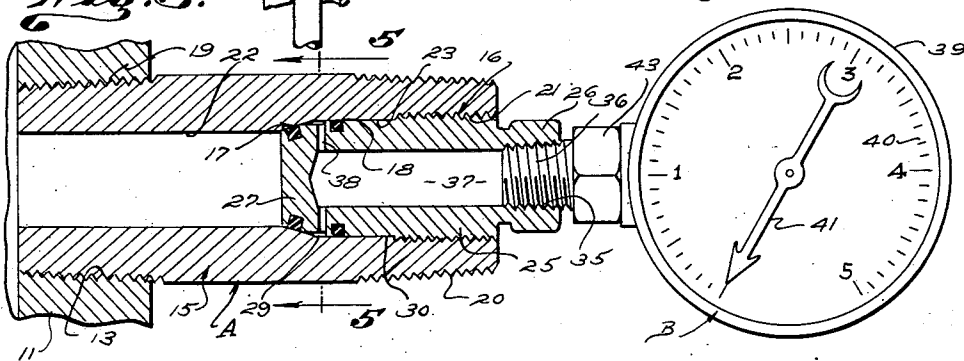


Fig. 4.

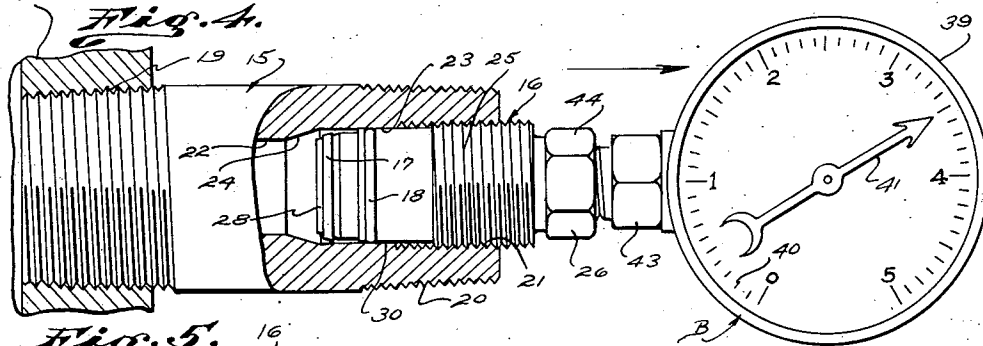


Fig. 5.

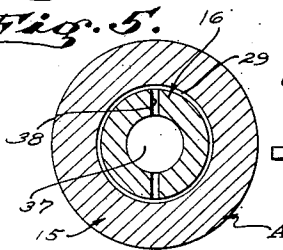
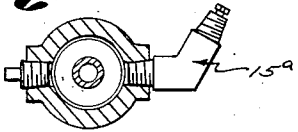


Fig. 6.



INVENTOR.

Jay P. Gould

BY

G. H. Hurdell
Attorney

1

2,804,279

ADAPTER FOR HANDLING FLUID UNDER PRESSURE

Jay P. Gould, Los Angeles, Calif.

Application May 5, 1950, Serial No. 160,222

2 Claims. (Cl. 251—351)

This invention has to do with an adapter for handling fluid under pressure and it is a general object of the invention to provide for the simple, safe, rapid handling of fluid under pressure or of equipment handling fluid under pressure to effect various results, as for example, gauging, flow, etc.

There are various situations where fluid under pressure is to be handled, as, for instance, selectively gauged or flowed. A typical situation arises in connection with an oil well where a casing is closed by a head and where, normally, the pressure in the casing and on the head is well pressure and rather high, for instance in the order of 500 to 10,000 pounds per square inch, and requires occasional measuring or gauging, and under certain circumstances or as conditions vary it may be desired to apply pressure to the casing, as, for instance, through the head, in excess of well pressure, to effect an operation such as is commonly referred to as "killing" the well. With methods and apparatus heretofore commonly employed the usual well head is equipped with an outlet duct or lateral fitting, and on such fitting there is permanently installed a high pressure valve controlling flow between the fitting and a bull plug, or the like, on which a gauge is installed. Such hook-up is suitable for gauging or determining the pressure on the head. When pressure is to be applied to the well or casing through the head the aforementioned valve is closed, the bull plug removed, and a fluid handling line applied to the valve, thus making it possible to thereafter open the valve and apply high pressure to the well through the line. The method and equipment just referred to is in most cases satisfactory. However, it is often cumbersome to manipulate and is costly. Moreover, the valve may, from infrequent use, become "frozen" closed, particularly the parts of the valve exposed to the oil.

An object of this invention is to provide apparatus suitable for normal use on a well head, or the like, and involving a flow handling base applicable to the head and a gauge carrier carried by and cooperating with the base to be operable between a closed position where flow through the base is effectively stopped and an open position where flow from the base is admitted to the carrier for communication to a gauge that may be applied to the carrier either permanently or temporarily.

Another object of this invention is to provide a structure or parts of the character hereinabove referred to which are simple and inexpensive of manufacture, easy and quick to operate and safe and dependable in action.

Another object of this invention is to provide various simple effective and dependable features of construction in apparatus of the character referred to serving to effect coupling of a tool with the gauge carrier of the adapter, etc.

The construction in which the invention is embodied may be considered as used on or in connection with a well head and it involves, generally, an adapter, a gauge, and a flow control. The adapter is applicable to the well head and involves a tubular base that can be applied to

2

the head to remain thereon as a fixed part. The base has a flow passage therethrough with an outwardly facing seat and it is provided at its outer end with means for the reception of a flow control. These may be separate threaded portions, for instance, an internal thread for the gauge carrier and an external thread for the flow control. The gauge carrier threaded to the base has a plug portion cooperating with the seat and is moved relative to the head by rotation or threading in the base. At its outer end the gauge carrier has a tool receiving part to facilitate its operation or rotation and it has threads for receiving the nipple of a pressure gauge or other like instrument. When the plug portion of the gauge carrier is seated there is no flow through the base, whereas when it is unseated there is flow or communication or pressure through the base and the carrier to the gauge.

The flow control is preferably in the nature of a plug valve, the body of which is applied directly to the outer end of the adapter base, the plug valve being applicable to the base when the gauge is removed from the gauge carrier.

The various objects and features of my invention will be fully understood from the following detailed description of typical preferred forms and applications of the invention, throughout which description reference is made to the accompanying drawings, in which:

Fig. 1 is a side elevation of a typical well head showing it on a casing with parts broken away to show in section and showing the adapter of the present invention in place and carrying a pressure gauge. Fig. 2 is a view similar to Fig. 1 showing the well head and a portion of the casing in elevation and a flow control applied to the adapter and coupling a flow line to the well through the adapter. Fig. 3 is an enlarged longitudinal detailed sectional view of the adapter with a gauge thereon, as shown in Fig. 1, and showing the gauge carrier of the adapter in a closed position. Fig. 4 is a view similar to Fig. 3, showing the adapter operated so that the gauge carrier is in an open position so that pressure from the well is communicated to the gauge. Fig. 5 is a detailed transverse sectional view taken as indicated by line 5—5 on Fig. 3, and Fig. 6 is a transverse sectional view of a head showing an adapter applied thereto, which adapter is of a form somewhat different from that illustrated in the other figures.

The adapter of this invention may be employed, generally, where fluid under pressure is being handled, and it is particularly useful in situations where operations such as flow and gauging are to be selectively performed. Further, the adapter of this invention can be varied widely in size or capacity and to accommodate pressures or pressure variations through a very wide range. It happens that an oil well where a casing is normally under pressure and is provided with a head presents a typical application of or situation in which the invention can be used to advantage and therefore I will, in this disclosure, make reference to this particular adaptation of the invention, it being understood that the broad aspects of the invention are to be in no way considered or construed as limited thereby.

In the drawings and for purpose of example a well casing 10 is shown equipped with a head 11 and in accordance with standard head construction a part thereof has a lateral opening 13 to which structure provided by this invention is applicable. In practice a head of compound or multiple construction can be employed and various parts of a single head may have openings 13 to which apparatus of the present invention is applied.

The present invention in a form suitable for the use referred to involves, generally, an adapter A normally serving to carry a gauge B. A flow control C that may be releasably attached to or carried by the adapter when

the gauge B is removed therefrom. A flow line L is applicable to the control C when the tool employed to install or handle the adapter is removed from the control.

The adapter, as provided by the present invention, involves, generally, an elongate tubular base 15, a gauge carrier 16 and spaced sealing means 17 and 18 acting or sealing between the base and carrier.

The base 15 of the adapter is provided at its inner end with means 19 for making connection with a pressure handling or carrying element such as a well head, or the like. In the case illustrated where there is a well head with a lateral opening 13 the means 19 preferably involves an external thread on the inner end of the base 15, so that the base has threaded engagement with the head, as shown throughout the drawings. The base of the adapter is provided at its outer end portion with means for making connection with the flow control C and for making connection with the gauge carrier of the adapter. In the particular form of the invention illustrated these are separate means, the means for carrying the control C being an external thread 20 on the outer end portion of the base and the means for carrying the carrier 16 being an internal thread 21 in the outer end portion of the opening that occurs through the base from one end to the other. The opening provided through the base 15 has an inner end portion 22 substantially smaller in diameter than the outer end portion 23 and a shoulder or seat 24 occurs between the portions 22 and 23. The particular seat shoulder illustrated in the drawings is inclined or tapered or conical in form, as clearly appears in Fig. 4 of the drawings.

The gauge carrier 16 of the adapter is an elongate part or element with a central portion externally threaded and engaged with the thread 21 in the base, an outer end portion or head 26 outward of the portion 25 and projecting beyond the outer end of the base, and an inner end portion or plug 27 slidably in the portion 23 of the base opening and having a tapered end 28 movable toward and from the seat 24 of the base. An annular recess 29 occurs on the plug portion of the gauge carrier between the tapered part 28 and the stem portion 30 which slides in the opening 23.

The seals or sealing means 17 and 18 are axially spaced and they are preferably annular seals or packing devices carried by the gauge carrier, one in a laterally opening groove in the tapered portion 28 thereof and the other in a groove in the stem portion 30 thereof, so that they occur at opposite sides of the annular recess 29. The seal 18 serves to maintain sealing engagement between the stem portion 30 and the wall of opening 23 at all times when the gauge carrier is in operating position in the base, whereas the sealing means 17 in the tapered portion of the carrier is movable into and out of sealing engagement with the seat 24. The seal 18 protects the threads 21 from the oil so that they will not become frozen, while the side wall of the groove at the inner side of the seal 17 will positively move the seal 17 away from the seat 24 on movement of the carrier away from the seat, should the seal 17 tend to adhere, or become frozen, to the seat from the action of the oil.

The gauge carrier is provided with means for holding or carrying the gauge B and in the case illustrated where the carrier has a projecting head portion 26 it is preferred to provide the head portion with an internal thread 35 to receive the projecting threaded nipple 36 of the gauge. A central longitudinal flow passage 37 is provided in the gauge carrier and extends from the head end to a point near the inner end portion of the carrier. Lateral ports 38 connect the passage 37 with the recess 29 so that when the gauge carrier is operated to a retracted or open position such as is shown in Fig. 4, the sealing means 17 is removed from the seat 24 and fluid pressure is communicated from the portion 22 of the base opening

through the recess 29, ports 38 and passage 37 to act on the gauge B.

The gauge or instrument B which may vary as circumstances require is shown as involving a case 39 with a face or dial bearing graduations 40 while a hand or indicator 41 cooperates with the graduations. The particular gauge illustrated being of typical construction has a threaded nipple or mounting element projecting from a polygonal collar 43 and it is through the nipple that the gauge is mounted on the outer end of the gauge carrier so the gauge receives pressure from the carrier.

The head portion of the gauge carrier 16 is preferably shaped or fitted to receive a suitable tool so that the carrier can be conveniently rotated as between positions such as are shown in Figs. 3 and 4, or in the course of its being applied to or removed from the base. In the particular case illustrated the exterior of the head 26 is polygonal in cross sectional configuration so it has tool receiving faces 44. In carrying out the present invention the gauge carrier is designed and maintained as small as possible, particularly as to diameter, and in the preferred form, as shown in the drawings, the head portion 26 is of limited size so that it is within the confines of the threaded portion.

A flow control means C such as may be employed in the present invention may vary widely in form and construction. However, it is preferred that it be in the nature of a plug valve. In accordance with conventional plug valve construction the plug is operable or rotatable as through engagement with a head on the exposed end of a plug so that the opening through the plug is movable into and out of register with the flow passage through the base 15.

The flow control C is applied to or mounted on the adapter as through the mounting means above described. Where the mounting means for the control C involves an external thread 20 on the outer end of the base of the adapter the valve may be mounted on the adapter by threading the valve onto the threaded portion 20 of the base. It is to be understood that when the flow control is thus applied to the base of the adapter the gauge B is removed or detached from the gauge carrier and in most instances the gauge carrier will have been operated to a closed position before the gauge is removed and it will be left in that position as the flow control is applied. The opening provided through the plug of the flow control when aligned with the flow passage through the base 15 forms an opening or passage through which the gauge carrier of the adapter can be applied to or removed from the base of the adapter.

The tool above referred to is used to facilitate operation of or complete removal or replacement of the gauge carrier of the adapter through the flow control C without allowing escape of fluid.

With the form of adapter shown in Figs. 1 to 4 of the drawings the various elements hereinabove described are maintained in axial alignment or on a single axis which is the axis of the opening 13 in the head. When space is limited or under certain conditions it may be desirable that the structure be such that the parts are at different or various angles relative to the head opening 13 when they are in operation or being operated. To gain such angular relationship the base of the adapter may be angularly shaped, as indicated in Fig. 6 of the drawings, and with an adapter base 15^a such as is shown in Fig. 6, it will be apparent that by setting such an adapter in various rotative positions or by varying the angle of such an adapter a very wide range of positions can be gained.

It is believed that the operation of the various parts of the adapter that I have provided will be fully understood from the foregoing description. In a typical situation under normal conditions the adapter will be in place on the head 11 and will be maintained in a closed position, that is the sealing means 17 of the gauge carrier

5

will be in or seated, as shown in Fig. 3. The gauge B may be maintained on the gauge carrier ready for operation whenever desired, or it can be applied when desired there to determine the pressure of fluid in the head, and assuming the gauge to be in place on the gauge carrier, as shown in Figs. 1, 2 and 3, a suitable tool is applied to the head 26 of the gauge carrier and the gauge carrier is operated relative to the gauge from the position shown in Fig. 3, to a position such as is shown in Fig. 4. With a reading obtained under such conditions the gauge carrier can be returned to the closed position shown in Fig. 3.

When it is desired to either repair or replace the gauge carrier or if it is desired to obtain flow from the well through the opening 13 or to apply pressure to the well through the opening 13, the gauge B having been removed, the flow control C is applied to the base 15 of the adapter, during which operation the gauge carrier is of course left in the closed or seated position, as shown in Fig. 3.

With the gauge carrier of the adapter removed and the control means C closed a line L can be applied to the control means and through such line and upon opening of the control means pressure can be taken from the well or it can be applied to the well, as circumstances may require.

Having described only typical preferred forms and applications of my invention, I do not wish to be limited to the specific details herein set forth, but wish to reserve to myself any variations or modifications that may appear to those skilled in the art and fall within the scope of the following claims.

Having described my invention, I claim:

1. An adapter for attachment to a container for high pressure fluid of the type tending to "freeze" the parts of the adapter together, including an elongate unitary base with an opening therethrough to receive said fluid and having its inner end portion smaller in diameter than its outer end portion and having an outwardly facing seat between and connecting said end portions, the base being externally threaded at both ends so that one end can be threadedly connected to said container and internally threaded at its outer end portion, an elongate unitary carrier with a middle portion externally threaded and engaged in the internally threaded outer end portion of the base, an instrument carrying head at the outer end of said carrier and projecting from the outer end of the base, said carrier having an imperforate closure portion at its inner end adapted to be moved toward and from the seat, said closure portion having a laterally opening

6

groove sealing means carried by the closure portion of the carrier in said groove and adapted to seal between the closure portion and seat when the closure portion is moved toward the seat, the side wall of the groove at the inner side of said sealing means positively moving said sealing means out of engagement with said seat on movement of the carrier away from said seat to prevent the sealing means from being pulled out of said groove, and sealing means carried by the carrier and normally sealing between the carrier and base outward of the closure portion and inward of the middle portion to prevent access of said fluid to said middle portion and the threads thereon to avoid corrosion and freezing of the engaged threaded parts, the head having its external surface provided with polygonal tool receiving parts of no greater dimension than the threaded outer end of said base, said external threads at the outer end of said base being adapted to receive a pressure-retaining enclosure having a tool movably mounted therein and adapted to releasably engage said head, the opening in the base having a portion with a smooth cylindrical wall slidably receiving the last mentioned sealing means and the carrier having a fluid passage therein extending from the outer end of the carrier to a point at one side of the carrier and between the two sealing means, the portion of said fluid passage within said head being internally threaded to receive an instrument.

2. An adapter according to claim 1, in which said first-mentioned sealing means is substantially enclosed on its sides and inner periphery by the sides and bottom of said groove whereby the pressure fluid, when said first-mentioned sealing means is out of engagement with said seat, contacts the outer periphery of said sealing means and tends to hold the latter in said groove.

References Cited in the file of this patent

UNITED STATES PATENTS

20,843	Ewing	July 6, 1858
486,722	Loss	Nov. 22, 1892
1,275,783	Steinmetz	Aug. 13, 1918
1,298,317	Ferrell	Mar. 25, 1919
1,442,226	Kraft	Jan. 16, 1923
1,701,691	Mueller et al.	Feb. 12, 1929
1,833,700	Wolf	Nov. 24, 1931
2,507,262	McGivern	May 9, 1950

FOREIGN PATENTS

157,189	Great Britain	1921
670,991	France	Aug. 26, 1929