

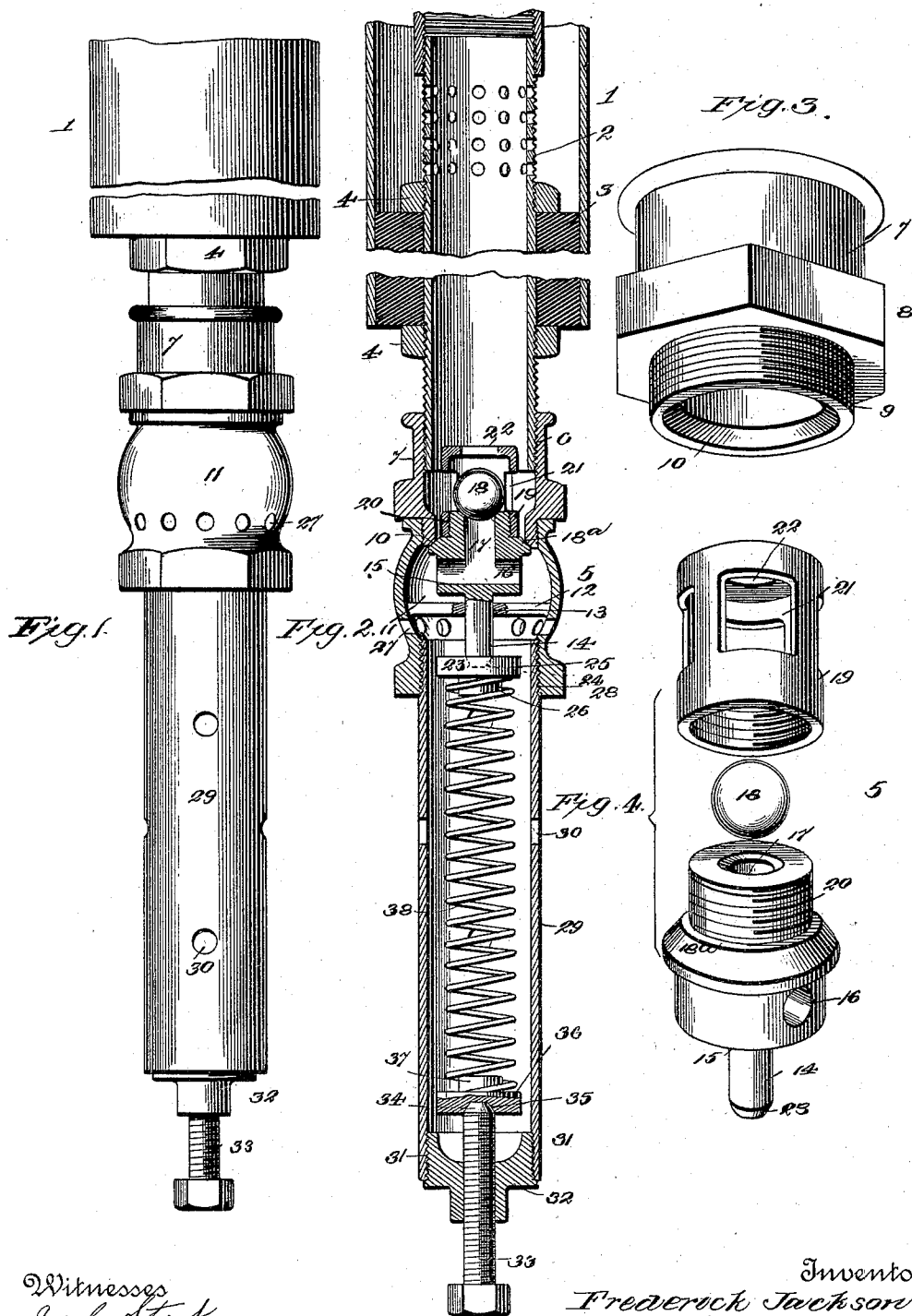
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F. JACKSON.
SWAB VALVE.

(Application filed Aug. 28, 1897.)

(No Model.)



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UNITED STATES PATENT OFFICE.

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SWAB-VALVE.

SPECIFICATION forming part of Letters Patent No. 611,486, dated September 27, 1898.

Application filed August 28, 1897. Serial No. 649,882. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK JACKSON, a citizen of the United States, residing at Karns City, in the county of Butler and State of Pennsylvania, have invented certain new and useful Improvements in Swab-Valves; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to an improvement in oil-well apparatus, and refers particularly to swabs and valves for the same.

The invention consists, essentially, of a compound valve located within a casing containing a seat, the said valve having an opening extending upwardly therethrough and presenting at the upper part thereof a freely-gravitating supplemental valve, the lower portion of the entire valve being engaged by an adjustable spring, which is intended to be regulated to vary the resistance of the valve as an entirety proportionately to the weight of the column of fluid above the same, which may be contained in an ordinary casing of a well.

The invention further consists in the details of construction and arrangement of the several parts, which will be more fully hereinafter described and claimed.

It will be understood by those skilled in the art that a swab is employed for cleaning out a well and relieving it of water or other material that may be detrimental and offer a resistance with oftentimes dangerous results to subsequent operations, and particularly in what is known as "shooting" a well. The disadvantages heretofore encountered in this operation of swabbing and cleaning an oil-well have been numerous, and among the most troublesome and expensive is a gathering or institution of a column of fluid above the swab-valve having an excessive weight which is too great to be drawn upwardly under the ordinary circumstances and has led to the breaking of the cable or the loss of the swab, in view of the fact that in the previous constructions no relief was afforded through the valves.

The object of the present invention is to avoid an excess of weight of fluid above the valve by arranging a relief, which is adjusted proportionately to the column of liquid to

be raised, whereby when the said column from any cause will exceed in weight the degree of adjustment of the valve the latter will automatically open and remain open until the excess has passed below the valve, and when the normal point is reached said valve will be automatically closed and the swab may be removed or drawn upwardly through the casing without injury to the apparatus or the loss of the swab.

In the accompanying drawings, Figure 1 represents an external view of a valve embodying the invention. Fig. 2 represents a central vertical section through the same. Fig. 3 represents an enlarged detail view of the upper portion of the valve-casing. Fig. 4 represents an enlarged detail perspective view of the valve, its seat, and cage.

Referring to the drawings, wherein similar numerals of reference are employed to indicate corresponding parts in the several views, the numeral 1 designates the casing of a well in which the swab has movement, the said well-casing entirely inclosing the swab, and the latter is provided with an interior perforated cylinder having a rubber gasket or tube 3 surrounding the same and held in place by upper and lower lock-nuts 4. The rubber tube or gasket closely engages the casing 1, and all of the parts as thus far described are well known in the art to which they appertain. In this instance, however, the lower end of the cylinder 2 is screw-threaded, as at 6, to receive the improved valve 5, which is attached thereto. The valve 5 is surrounded by a casing 7, which is attached to the said cylinder and provided externally with a plurality of angular sides 8 for the application of a wrench to the same to turn the said casing and secure it firmly in position on the said cylinder. The lower portion of the casing 7 is screw-threaded externally, as at 9, and beveled internally, as at 10, the former construction being for the attachment of the valve-globe 11, which is screw-threaded internally at its upper end to engage the said screw-threads 9. The beveled portion of the casing forms a seat for a purpose which will be hereinafter set forth.

The valve-globe is provided with a horizontally-disposed guide-bridge 12, formed with a central vertical passage 13, through which movably projects a stem 14, depending from the lower portion of the compound

valve 15. This valve is formed with a plurality of radiating passages 16 immediately above the stem 14, which open into the globe 11 and have intersecting and in communication therewith a vertical passage 17, the material around the latter at the upper termination thereof being beveled to form a seat for a freely-gravitating ball 18. The said ball 18 is held in proper position above the valve-seat by a cage 19, which is internally screw-threaded at its lower end to engage a vertical screw-threaded annular flange 20 surrounding the said seat. Said valve is further provided with an annular beveled flange 18^a, which is adapted to become seated on the valve-seat 10, heretofore set forth. From the foregoing it will be observed that the ball 18, serving as a supplemental valve, prevents the downward passage or flow of the liquid from above through the valve proper.

The cage 19 has a plurality of side openings 21 and a top opening or seat 22. The lower end of the stem 14 is beveled, as at 23, so as to firmly seat it in a tapering recess 24, formed in a disk 25. The said disk 25 has projecting from the under side thereof a central stud or enlargement 26, the use of which will be hereinafter more particularly described. The said globe 11 is also provided with a plurality of apertures 27, arranged below the horizontally-disposed guide-bridge 12 to permit the entrance of liquid into said globe. The lower portion of the globe is screw-threaded internally, as at 28, to receive the upper end of the tube 29, also apertured, as at 30, to permit liquid to pass into the same. The lower end of said tube is internally screw-threaded, as at 31, and is closed by a nut 32, in which is mounted an adjusting-bolt 33. The upper end of the bolt 33 is beveled, as at 34, in a manner similar to the stem 14, so as to become firmly seated in a tapering recess 35, formed in the disk 36 similar to the disk 25, and said disk 36 has also projecting upwardly therefrom a central stud 37. Between the said disks and bearing against the same at its opposite ends is a coil-spring 38, which surrounds the central studs 26 and 37. Primarily, or when commencing to swab a well, the spring 38 is adjusted to a predetermined tension by moving the screw 33 inwardly to increase the tension or outwardly to decrease said tension. The tension of the spring in either event will act upon the compound valve and continuously hold it to its seat so long as the weight of the column of fluid above the swab and in the casing is less than the amount of resistance offered by the tension of said spring. Should the weight of the column of liquid above the valve become excessive or greater than the tension of the spring, the resistance of the valve will consequently be overcome and it will open, permitting the surplus fluid over and above the predetermined weight to pass downwardly through the said valve and permit the swab as an entirety to be drawn upwardly through the cas-

ing without losing any of the parts thereof or of injuring the cable or other mechanism. During the operation of the swab in the casing in cleaning out a well the liquid passes through the tube 29, as well as through the globe 11, and passes upwardly also through the passages 16 and 17 and raises the ball 18 from its seat. This operation becomes successive and continuous so long as the weight of the column of liquid above the swab and valve is proportionate to the tension exerted by the spring 38, and by this means the well can be relieved of liquid or other material which would interfere with subsequent operations in connection therewith.

The upper end of the cylinder 2 is closed by what is known as a "sub," and the liquid is forced to pass through the perforations of said cylinder above the rubber tube or gasket 3, upon which the weight of the elevated column of liquid rests.

It will also be seen that the valve combines in one structure a compound duplex formation, and after the stem 14 is mounted in the guide-bridge the globe and valve as an entirety may be placed in proper position relatively to the casing 7 without further adjustment.

All the parts of the device are removable and interchangeable, so that they may be replaced if broken or injured.

Numerous other advantages will appear from time to time, aside from those set forth, and it is obviously apparent that many minor changes in the proportions, dimensions, and details of construction might be made and substituted for those shown and described without in the least departing from the nature or spirit of the invention.

Having thus described the invention, what I claim as new is—

In an oil-well swab-valve, the combination with a swab proper, of a valve-casing secured to the lower end of the same, a compound valve mounted in said casing and comprising a lower valve normally held closed against the seat above the same, and a gravitating valve on the said lower valve and opening into and from the said lower valve and preventing a downward flow of a predetermined weight of fluid above the valve, a tube connected to the lower end of the valve-casing, a coil-spring mounted in said tube and engaging the bottom of the lower valve, and having a resistance sufficient to overcome the predetermined weight of a column of liquid above the said valve, and devices for adjusting the tension of said spring and engaging the lower termination of the latter, substantially as described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

FREDERICK JACKSON.

Witnesses:

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