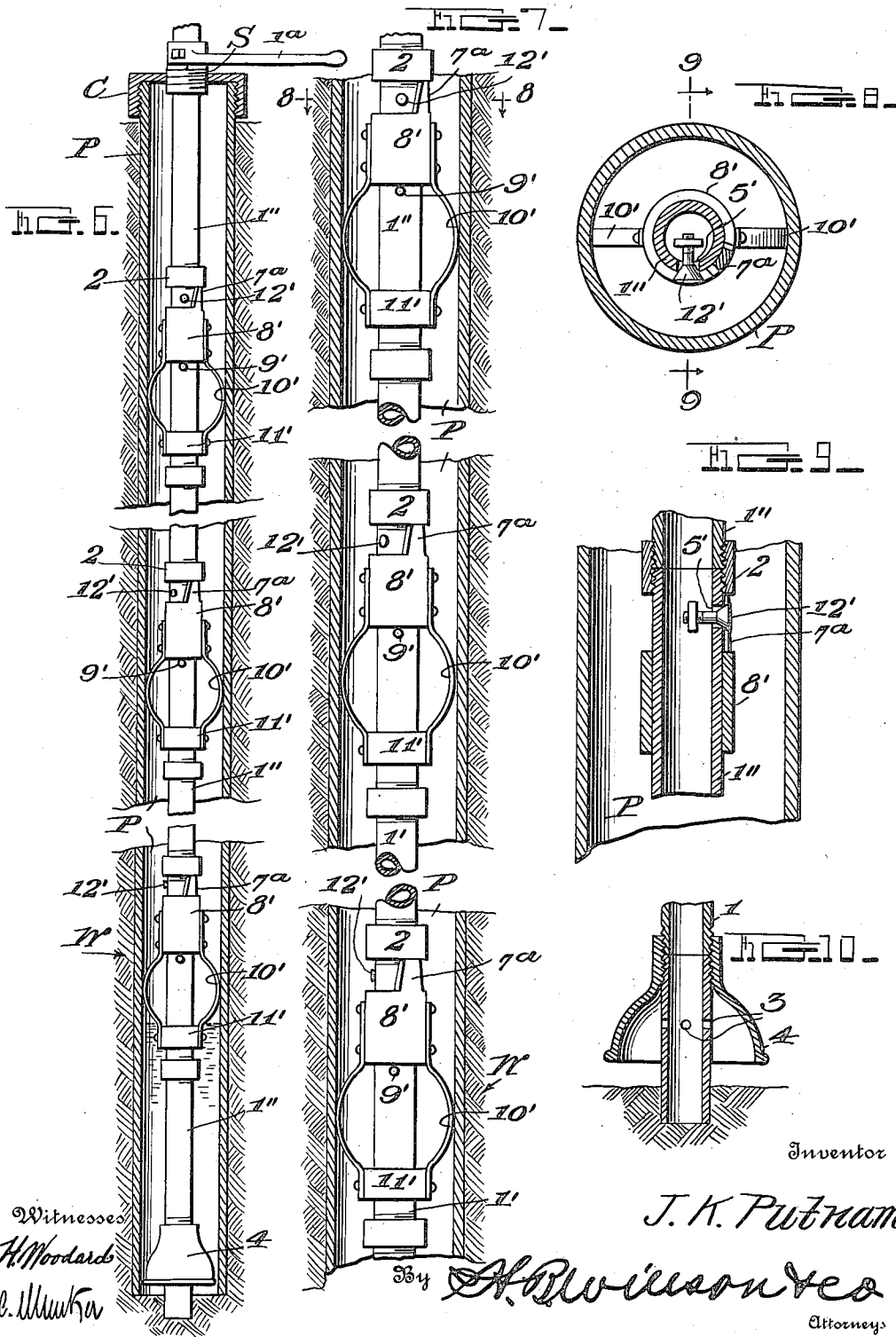


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PNEUMATIC FLUID LIFT.
APPLICATION FILED JULY 6, 1915.

1,193,609.

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JAMES K. PUTNAM, OF TULSA, OKLAHOMA.

PNEUMATIC FLUID-LIFT.

1,193,609.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, JAMES K. PUTNAM, a citizen of the United States, residing at Tulsa, in the county of Tulsa and State of Oklahoma, have invented certain new and useful Improvements in Pneumatic Fluid-Lifts; and I do 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.

My invention relates to improvements in pneumatic fluid lifts for blowing oil wells and removing various other liquids from other forms of wells or pits.

The primary object of the invention is to provide means whereby a rigid pipe, extending throughout the depth of the well, will operate a number of valves for closing and opening a number of ports in said pipe when turned, thereby controlling the pressure entering said pipe from the well or pit.

To the above end, I provide the above mentioned rigid pipe and form the same with a number of vertically spaced ports, provide valves for closing and opening said ports, circumferentially rotatable members upon said pipe, and means for yieldingly holding said members against rotation.

A secondary object of the invention is to construct the valves and the movable members, above mentioned, in the most simple manner consistent with the proper operation of the device.

Still another object is to provide a number of yielding leaf springs for yieldingly preventing movement of said members and to mount said springs in such a manner as to allow them to freely expand and contract for the purpose of adapting the invention to well tubing of different diameters.

With the above and minor objects in view, the invention resides in certain novel features of construction and combination herein described and claimed and shown in the drawings wherein:—

Figure 1 is a vertical section through a well and its tubing showing the application of one form of my invention thereto; Fig. 2 is an enlarged side elevation of a portion of the parts shown in Fig. 1, illustrating more clearly the positioning of the ports in respect to the circumferentially movable members, the port shown in this

figure, being open; Fig. 3 is a similar view with the ports closed; Fig. 4 is a horizontal section on the top line 4—4 of Fig. 3; Fig. 5 is a vertical section taken upon the line 5—5 of Fig. 4; Fig. 6 is a view similar to Fig. 1, showing a slightly different form of construction in which mechanically operated valves are employed; Fig. 7 is an enlarged side elevation of a portion of the parts shown in Fig. 6; Fig. 8 is a horizontal section on the line 8—8 of Fig. 7; and Fig. 9 is a vertical section upon the line 9—9 of Fig. 7. Fig. 10 is a detail vertical section through the bell or hood at the lower end of the pipe.

In the first five figures of the drawings, I have shown my invention as applied to a well W having the usual tubing or piping P and being substantially closed at its upper end by the usual cap C which is threaded onto the upper end of the pipe P and is provided with a central stuffing box S.

Depending through the stuffing box S, extending throughout the depth of the well and having its lower end embedded in the bottom thereof, is a pipe 1 which may be of any appropriate dimensions and which is preferably formed in a number of sections which are rigidly united by means of internally threaded sleeves 2. The pipe 1 is provided near its lower end, with a number of perforations 3 which communicate with the interior of a hood or bell 4, the latter being carried rigidly by said pipe and being preferably threaded thereon. Below each sleeve or joint 2, the pipe 1 is formed with a port 5 and adjacent said ports, stop pins 6 are disposed, said stop pins coacting with segmental extensions 7 which rise from the upper ends of a number of sleeves 8, the upper ends of said extensions contacting with the lower ends of the couplings 2 and being held against downward movement by means of pins 9 or other suitable means. As clearly shown in Fig. 1, the segmental extensions 7 increase in length from the lower to the upper end of the well, this construction becoming expedient in a manner to appear.

In the successful carrying out of the invention, it becomes necessary to yieldingly prevent movement of the sleeves 8. For this purpose I have provided a number of outwardly curved leaf springs 10 which have their upper ends rigidly secured to the sleeves 8 while their lower ends are united

with rings 11 which encircle the pipe 1 and are slidable thereon. Thus it will be seen that when the pipe 1 is in position in a well, the springs 10 are free to expand, this movement being freely allowed by the sliding engagement of the rings 11 with said pipe.

By reference particularly to Figs. 2 and 3, it will be seen that each stop pin 6 lies between the opposed ends of its respective upright extension 7 and that the space between said ends is sufficient to allow the ports 5 to be exposed when the pipe 1 is rotated in the proper direction, certain portions of said extensions 7 overlying the ports, when the pipe is rotated in the opposite direction. For the purpose of forming an effective closure for said ports, I have provided the extensions 7 with rubber valves 12 which are preferably inset in recesses 13 whereby they are held against dislocation.

With the parts as above described, the operation is as follows: A pipe 1 is inserted into the well to be blown and the cap C is threaded over the upper end of the pipe P, the latter projecting rotatably through the stuffing box S. If sufficient gas is trapped within the well, to raise the fluid therefrom, no other fluid pressure need be employed. If however, the supply of gas is not sufficiently strong to raise the fluid, air may be forced into the tubing at a proper pressure. Whether air or gas is employed, the operation of the device is precisely the same.

When now the fluid is to be extracted from the well, the pipe 1 is turned by means of a suitable handle 1' in such a direction as to cause the uppermost stop pin 6 to move from its normal position against one end 7' of the extension 7 and contact with the other end 7'' thereof, this movement exposing the uppermost port 5 and allowing the compressed air or gas, within the well, to escape through the upper end of the pipe 1. The outrush of said air or gas provided the same be powerful enough, now draws the fluid from the well and discharges the same at the upper end of the pipe 1 from which it may be conveyed to suitable reservoirs (not shown). If the pressure, coming through the uppermost port 5, is not powerful enough to effectually extract the fluid from the well, the pipe 1 is further rotated until the next port 5 is exposed, thus giving twice the amount of pressure. From this description, it will be seen that a continued turn of the pipe will open all of the ports, the uppermost opening first and the lowermost last. During this turning of the pipe 1, after the various stop pins 6 contact with the ends 7'' of the extensions 7, the sleeves 8 will be allowed to rotate with the pipe, the leaf spring 10 now sliding within the well. It may here be stated that the successive opening of the ports 5 is caused not only by the fact that the extensions 7 de-

crease in length as they near the bottom of the pipe, but by the fact that the space between the stop pins 6 and the ports 5 increases in the same proportion at which the length of said extensions decrease, thus causing a further turn of the pipe to open the port at the bottom, than at the top of the well.

In Figs. 6 to 9, the construction of the pipe 1'', and the arrangement of the ports 5' and stop pins 9', is practically the same as the form previously described. In this case however, the ports 5' are provided with inwardly closing valves 12' which include cone-shaped heads which are integrally joined with inwardly extending shanks, nuts being threaded on the inner ends of the shanks, which latter project loosely through the ports 5'. For the purpose of operating the valves 12' when the pipe 1' is turned, I provide a number of sleeves 8' which have upright extensions 7'', the width of said extensions increasing from the top of the pipe to the bottom thereof. The sleeves 8' are provided with springs 10' which are similar to the springs 10 and are secured at their lower ends to rings 11' similar to the rings 11.

It may here be stated that the valves 12' are cantod when the pipe is turned in a proper direction to cause the extensions 7'' to contact with the heads thereof, the varied widths of said extensions causing the valves to be successively opened.

It is to be understood that reversal of the above described movements of the pipe 1 and 1' will close the ports 5 and the valves 12' thus cutting off the supply of escaping air or gas and thereby preventing the discharge of fluid from the pipe 1.

From the foregoing description, taken in connection with the accompanying drawings, it will be seen that I have produced an extremely simple fluid pressure lift which will be highly efficient in operation and which needs no operating means other than the handle 1', attached to the top of the pipe 1.

I have described my invention with considerable minuteness but I do not wish to be limited to details of construction or arrangement of parts otherwise than as amplified in the appended claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. A pneumatic fluid lift including a revolutely mounted outlet pipe, continuing rigidly throughout the depth of the well and having a number of vertically spaced ports, valves for the ports, circumferentially revoluble members upon the pipe adjacent the ports for operating the valves, means for yieldingly locking said members against movement and means for rotating the pipe

whereby the ports may be opened and closed by the valves.

2. A pneumatic fluid lift including a revolubly mounted outlet pipe continuing throughout the depth of the well and having a number of vertically spaced ports, valves for the ports, circumferentially revoluble members on the pipe adjacent the ports, segmental extensions projecting from said members and lying in the lateral paths of the ports for operating the valves, means for yieldingly holding the members against movement, and means for rotating the pipe, whereby the ports may be opened and closed by the valves.

3. A pneumatic fluid lift including a revolubly mounted outlet pipe, continuing throughout the depth of the well and having a number of vertically spaced ports, valves for the ports, circumferentially revoluble members on the pipe adjacent the ports, segmental extensions projecting from said members and lying in the lateral paths of the ports for operating the valves, means for yieldingly holding the members against movement, stops in the swinging path of said segmental extensions, and means for rotating the pipe whereby the ports may be opened and closed by the valves.

4. A pneumatic fluid lift including a revolubly mounted pipe extending rigidly throughout the depth of the well and having a number of vertically spaced ports, sleeves encircling the pipe and having upright segmental projections lying in the paths of the ports, means for yieldingly holding the sleeves against rotation, and means for rotating the pipe whereby the ports may be opened and closed by the projections.

5. A pneumatic fluid lift including a revolubly mounted pipe extending rigidly throughout the depth of the well and having a number of vertically spaced ports, sleeves encircling the pipe and having upright segmental projections of varied lengths and lying in the planes of the ports, means for yieldingly holding the sleeves against rotation and means for rotating the pipe, whereby the ports may be opened and closed by said projections.

6. A pneumatic fluid lift including a revolubly mounted pipe extending rigidly throughout the depth of the well, and having vertically spaced ports, valves for the

ports, circumferentially movable members on the pipe and having segmental portions lying in the planes of the ports for operating the valves, rings loosely mounted on the pipe and spaced from the members, outwardly curved springs secured at their opposite ends to the rings and to said members and means for rotating the pipe.

7. A pneumatic fluid lift including a revolubly mounted pipe extending rigidly throughout the depth of the well and having vertically spaced ports, circumferentially movable members on the pipe and having segmental portions lying in the planes of the ports for controlling the latter, means for rotating the pipe and stops for limiting the amount of rotation thereof in respect to said members.

8. A pneumatic fluid lift including a revolubly mounted pipe extending throughout the depth of the well and having vertically spaced ports, sleeves rotatable upon the pipe and having upright segmental portions lying in the paths of the ports for controlling the latter, means for yieldingly holding the sleeves against rotation, means for rotating the pipe in the sleeves and stops on the pipe adapted to contact with the ends of the segmental projections to limit the rotary movement of the pipe in respect to the sleeves.

9. A pneumatic fluid lift including a revolubly mounted pipe extending throughout the depth of the well and including a number of sections each having a port, couplings uniting the meeting ends of the pipe sections, sleeves encircling the sections, segmental projections on one end of the sleeves in contact with the couplings and adapted to control the ports, stops carried by the pipe and contacting with the other end of the sleeves, means for yieldingly preventing movement of said sleeves, means for rotating the pipe within said sleeves, and stops on the pipe adapted to contact with the ends of the segmental projections and limit the movement of the pipe in respect thereto.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

JAMES K. PUTNAM.

Witnesses:

JAMES EARL SIMPSON,
A. F. STADLER.