Feb. 10, 1931. A. L. RODGERS 1,791,874

SPECIAL FITTING AND PLUG MAGAZINE FOR CEMENTING OIL AND GAS WELLS

Filed Feb. 21, 1927

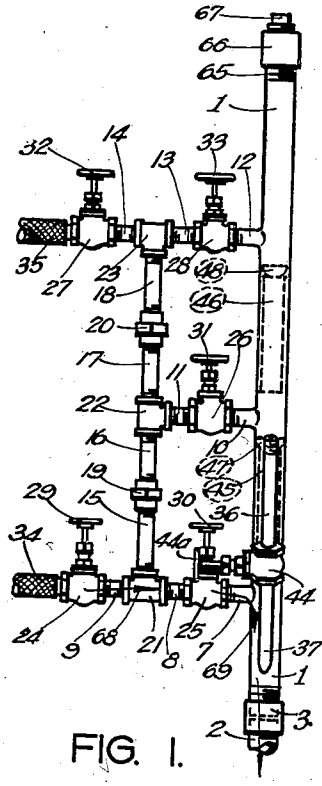


FIG. 1.

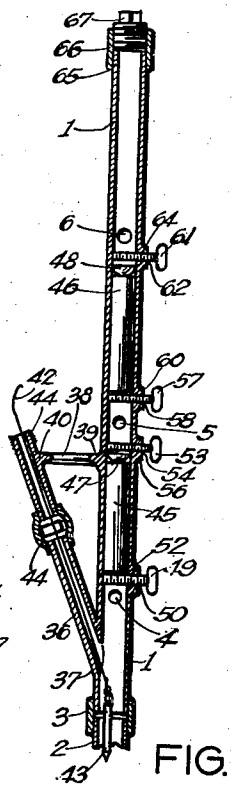


FIG. 3.

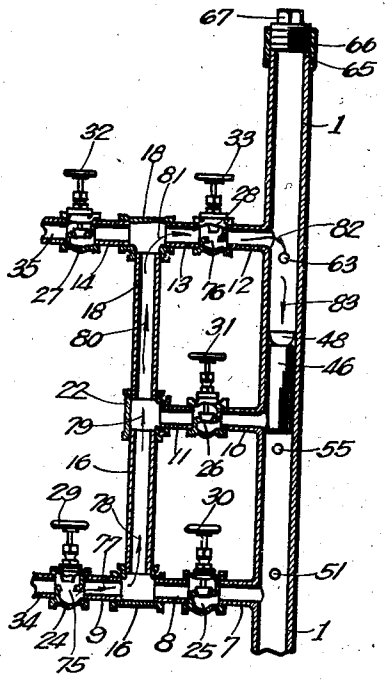


FIG. 4.

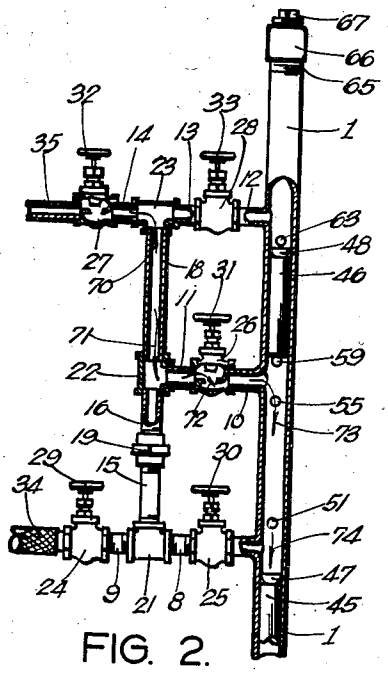


FIG. 2.

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UNITED STATES PATENT OFFICE

ARTHUR L. RODGERS, OF OKLAHOMA CITY, OKLAHOMA, ASSIGNOR OF ONE-EIGHTH TO J. W. TANNER, ONE-HALF TO WILLIAM O. HARRIS, AND THREE-EIGHTHS TO LOYAL J. MILLER, ALL OF OKLAHOMA CITY, OKLAHOMA

SPECIAL FITTING AND PLUG MAGAZINE FOR CEMENTING OIL AND GAS WELLS

Application filed February 21, 1927. Serial No. 170,021.

My invention relates to a special fitting and plug magazine for cementing oil and gas wells.

The object of my invention is to provide a device of the character described which will be new, novel and of utility, which will be easily manufactured and constructed, easily applied and attached to the casing of a well and cheaply maintained, which will be strong and durable, which will be efficient in producing the results for which it is intended, that will save much time in the cementing of wells over the present system now in use, which will prevent the crushing of the casing in many of the wells and thereby prevent the loss of the wells, where the pressure is great against the casing and the time necessary to cement the same is long; that will decrease the danger to workmen in cementing the wells by reducing the amount of mud, oil and slime around the platform and derrick while the cementing is being done.

Other objects, and the new and novel features of the invention will be further shown by the specification, claims and one sheet accompanying drawing, reference to which is now made, and of which,

Figure 1 is an elevational view of the device showing the plugs dotted-in; Figure 2 is an elevational view, showing in section a portion of the magazine chamber, and the open valves in section in the running in of the cement, and arrows showing the direction of the running in of the cement; Fig. 3 is a sectional view through the magazine chamber showing the plugs held in place by set-screws, and a section of the opening for the measuring line; Fig. 4 is a sectional view through the valves and the magazine chamber showing some of the valves open in the forcing of the cement downward and the other valves closed.

Like characters of reference designate like parts in all the figures.

The present manner in common use of cementing an oil or gas well is practically as follows: From an 8 to a 2 inch swage is used having a T at its top. For the purpose of giving the cement greater opportunity to work, the well is first cleaned. The casing is first lowered into the well until the lower end of the casing strikes the bottom of the well. The mud hose is then connected at the top from the rig. The pump is then turned on the line and the water pumped into the well, and the well is cleaned out by the forcing of the water, etc., into and out of the well. After the well is cleaned the swage is then removed from the top, which requires considerable time, and a plug is placed in the head of the casing, after the placing of the plug the swage is then replaced at the top of the casing requiring additional time to be spent thereat. This manner of cleaning out makes the rig, platform and the different parts of the rig on which the workmen are required to work very wet, muddy and slimy, so that it is almost impossible to get a safe and sure footing, and makes it dangerous to those required to work on that part of the job.

One plug only may be used. If two plugs are used the cement line or equipment is then connected at the top of the casing and the cement is pumped downward into the casing driving the first plug above mentioned before it. When this is accomplished it then becomes necessary to break all connections and remove the swage and T requiring considerable time; a second plug is then put in the casing at the top. It is now necessary to again make up all the connections requiring additional time for this. The second plug is then forced down into the well thereby forcing the cement out of the casing and into the surrounding places needing the cement until the second plug is seated over the first plug. The above describes the process necessary for the accomplishing of one cementing, and with each place this whole process must be repeated. The whole process under the present method consumes from two to four hours each cementing. The length of time required to use my invention for such purpose is only 35 to 40 minutes, and under favorable circumstances will be shorter than that.

The difference between the old method as given above and as now in use, and the method under which my device will be shown

operative, will be shown as hereinafter described as constructed and operative, one embodiment of which is:

I provide a vertical section 1 of metallic casing, of the preferred size of the metallic casing 2 in the well, unless it is desired to fit a larger or a reduced sized casing under certain circumstances. The casing of my device is connected to the casing 2 in the well by a coupling 3; connecting said casing 1 on one side at alined perforations 4, 5, 6, are sections 7, 8, 9, 10, 11, 12, 13 and 14 preferably composed of smaller tubular pipes; said sections 7, 8, 9, being alined with each other, sections 10, 11, being alined together, and sections 12, 13, 14, being alined with each other; sections 7, 10, 12, are brazed or welded at their inner ends at and surrounding alined perforations 4, 5, 6, to said casing 1, and all of said sections are disposed at right angles to said casing 1. The preferred sizes of these and other tubular pipes herein described are two inches in diameter other than their connections connecting them. I provide sections 15, 16, 17, and 18 with threaded ends constituting, with their connections, a vertical tubular pipe parallel with said casing 1; the upper end of section 15 and the lower end of section 16 are connected medially by a union 19 similarly threaded, and sections 17 and 18 are similarly connected by a similar connection 20. A T 21 connects the lower end of section 15 and at right angles thereto sections 8 and 9 medially; a second T 22 connects the upper end of section 16 and the lower end of section 17 medially, and section 11 at right angles thereto; a third T 23 connects sections 13 and 14 medially, and the upper end of section 18 at right angles thereto. A globe valve 25 connects medially sections 7 and 8; a similar globe valve 24 medially connects the outer threaded portion of section 9 and the water hose 34; a similar globe valve 26 connects medially sections 10 and 11; a similar globe valve 28 connects medially sections 12 and 13; a similar globe valve 27 connects medially the outer threaded end of section 14 and the cement hose connection 35. These valves may be of any make of known valves suitable for such use, but the preferred valve is what is known as a globe valve. Each of said valves 24, 25, 26, 27 and 28 have the usual thumb-screw shut-off and opening cock, as shown at 29, 30, 31, 32 and 33.

I also provide a metallic measuring line carrier pipe 36 to be brazed or welded at its lower end 37 to the casing 1, slightly above its lower end, and extending upwardly and outwardly therefrom, having a bracing arm 38 brazed or welded at its respective ends 39, 40, to the casing 1 and said pipe 36. Its outer end 41 is threaded to receive such connection as is desired to be placed thereon for the measuring line 42, said measuring line having a plummet 43 on the end thereof. A gate valve 44 having a set-screw 44*a*, connects medially the sections of the line measuring carrier 36. I also provide for the use of a plug 45 and a second plug 46. The form of the plug is not claimed as a part of this invention, per se, but any known style of plug may be used. The preferred style, however, is such as has a washer or cup shaped top such as is shown at 47 and 48. A thumb-screw with head 49 and screw portion 50 fitting through perforations 51 in said casing at boss 52, when closed, prevents plug 45 from being lowered into the casing, and, when opened allows it to be lowered therein. A similar thumb-screw head 53 and threaded portion 54 fitting through perforations 55 at boss 56, when closed, prevents said plug 45 from ascending in said casing 1, and, when opened, permits the plug 46 when it is desired to have same lowered to be lowered in said casing. A similar thumb-screw head 57 and threaded portion 58 fitting through perforation 59 in said casing 1 at boss 60, when closed, prevents plug 46 from descending in said casing 1 to and in said casing 2, and, when opened, permits it to be lowered therein. A similar thumb-screw head 61 and threaded portion 62 fits through perforation 63 in said casing 1 at boss 64 and, when closed, prevents plug 46 from ascending in casing 1, and, when opened, permits both plugs 45 and 46 to be lowered therein. At the top of casing 1 is provided a threaded portion 65 with a collar 66 thereon and a plug 67 therein through which end, when open, to admit of the insertion of said plugs and when closed to permit of the forcibly sending into the casing of the well water, cement, plugs and the like.

It will be observed by those familiar with the art to which my invention pertains that the device can be easily operated as follows: The casing 2 is lowered into the well until its lower end rests on the bottom of the well, or the place that it is desired to cement. The device, or magazine, after being placed together as is described above, forming a unit, is then connected with the top of the casing 2 by placing the lower end of the casing 1 thereon and tightening the coupling 3 thereabout. For the purpose of cleaning out the well threaded plug 67 in collar 66 is closed and set-screws 49, 53, 57 and 61 are all closed, as are also all valves 24, 25, 26, 27 and 28. The water or mud hose 34 is connected to the outer connection of valve 24 and said valve is opened by the unscrewing of the set-screw 29. The pump of the rig is then started and the contents of the water or mud line is moved along the line as indicated by arrows 68 and 69, and the well is cleaned out in the usual way. After the well is cleaned out and it is desired to run the cement, valves 25 and 24 are closed by shutting off respectively

screw-heads 29 and 30. It will now be observed valves 25, 24 and 28 and set-screws 57 and 61 are all closed. The cement hose 35 is then attached to the outer end of the valve 27. Valves 27 and 26 are then opened by unscrewing set-screws 32 and 31 and set-screw 49 below and above plug 45 is opened. This leaves closed valves 24, 25 and 28 and set-screws 53, 57 and 61. The cement line is then turned on and the force of the pump, steam, or whatever force is used on the job, placed behind the cement line; this forces the cement and water in such proportion as is desired to be used to travel along the line as indicated by arrows 70, 71, 72, 73 and 74 forcing plug 45 to the place desired for the beginning of the cementing. After the cement has been run valves 26 and 27 are closed by set-screws 31, 32, and valves 24 and 28 are opened by set-screws 29 and 33 and set-screws 53 and 57 are opened thereby releasing plug 46. This permits plug 46 to descend into the casing 1. As soon as plug 46 has been lowered sufficiently to clear the bottom 37 of the measuring line carrier 36, set-screw 44*a* is unscrewed opening gate valve 44, and plummet 43 on measuring line 42 is allowed to be lowered into the casing above plug 46. This runs the line on top of the plug 46 and permits it to be done without breaking any connections at all, and the consequent making up of them after such breaking. After plug 46 has been lowered into the casing 1 valves 25, 26 and 27 are closed, and valves 24 and 28 are opened, as are also set-screws 49, 53, 57, and the water is turned on through hose 34 passing through opening 75 in valve 24 and opening 76 in valve 28 along the line indicated by the arrows 77, 78, 79, 80, 81, 82 and 83 and forcing plug 46 down into the casing 2 to the top of the place where the cementing has been done. After a run of cementing has been completed the device can then be disconnected from the casing 2 and all of the valves and all of the set-screws opened and a connection made with the water hose line and cleaned out for the next run, thus preventing any of the cement from clinging to or injuring any parts of the device.

From the description and the accompanying one sheet drawing and the specification and claims, the advantages of construction, application and manufacture will be apparent to those skilled in the art to which my invention pertains. I have entered into a detailed description of the construction and relative parts and arrangement of the parts embraced in the present and preferred embodiment of my invention in order to impart a full, clear and exact understanding of the said embodiment. I do not desire, however, to be understood as confining myself to the specific construction and relative arrangement of the parts inasmuch as in the future practice of the invention various changes and modifications may be made such as fall within the scope of my invention as defined in the appended claims, without departing from the principle of the invention.

Having thus described the invention, what is claimed and desired to be secured by Letters Patent, is:

1. A device as described, comprising a vertical tubular member, its upper end being adapted to be closed and opened, its lower end adapted to connect the casing in a well, said member having three alined perforations in one of its sides connecting three horizontal tubular pipes at right angles thereto, each of said pipes having therein a globe-valve, and each being at its outer end joined to a T, a plurality of nipples forming with said T's and a plurality of unions therebetween a second vertical tubular member; the upper one of said T's connecting a cement line, the lower one of said T's connecting a mud and water line; a plurality of plugs adapted to be held in said first tubular member and to be consecutively released therefrom into said casing, and an outwardly and upwardly extending tubular pipe its lower end connecting the lower portion of said first vertical member, its upper end rigidly braced to said first vertical member, said pipe adapted to house and have inserted therein a measuring line bearing a plummet, and having centrally therein a gate valve, all as and for the purposes specified.

2. In a device, as described, the combination with a magazine adapted to be secured to and form a continuation of a well casing having means for supporting a plurality of plugs therein for consecutive discharge into said casing, and means for selectively introducing material under pressure to said magazine at the upper surface of each of said plugs, of an upwardly and outwardly extending tubular member its lower end connecting the side of the lower portion of said magazine, said tubular member adapted to receive therethrough a measuring line bearing a plummet for introducing said line into said casing for measuring depth, and a valve within said tubular member.

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