Aug. 16, 1938.

C. BAKER

2,127,019

WELL CLEAN-OUT TOOL

Filed July 14, 1937

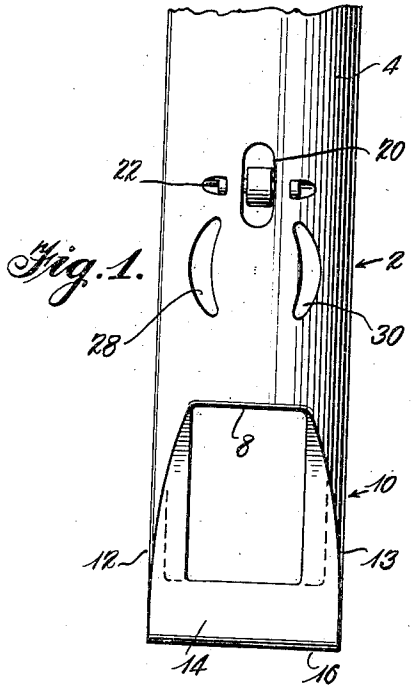


Fig. 1.

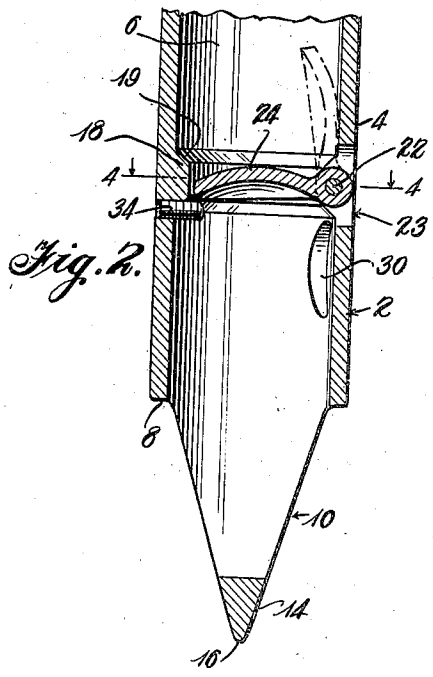
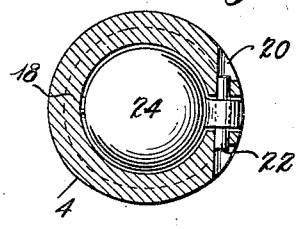


Fig. 2.

Fig. 4.



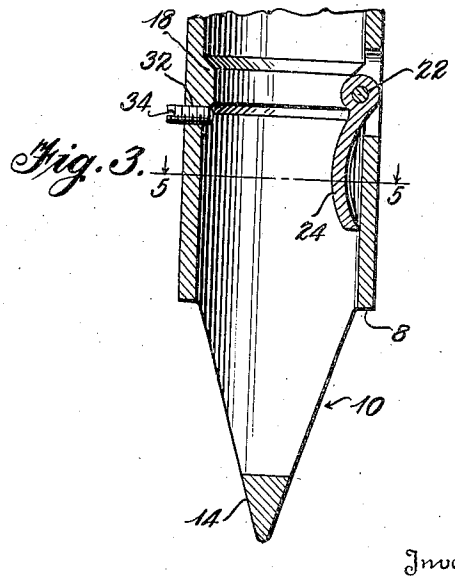
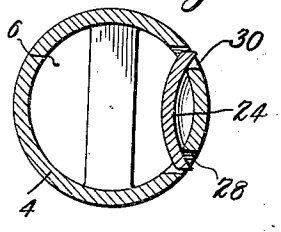


Fig. 3.

Fig. 5.



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WELL CLEAN-OUT TOOL

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Application July 14, 1937, Serial No. 153,680

6 Claims. (Cl. 166—19)

This invention relates to sand pump or well clean-out tools and more particularly, but not by way of limitation, to a sand pump or clean-out tool for oil wells and the like.

Heretofore in well clean-out tools such as that disclosed in the patent to Taylor No. 2,061,489 issued Nov. 17, 1936, the clapper valve for releasing the trapped sediment is hinged immediately adjacent or substantially flush with the lower end of the circular casing of the tool. The threaded screw for controlling the opening and closing of the clapper valve is likewise disposed adjacent to the lower end of the casing at a point diametrically opposite the hinged connection for the clapper valve.

In the drilling of an oil well, materials such as pipe, fishing tools, wire line, and nitro glycerine containers are usually lost in the well and have to be cleaned out of the well along with the sand, rock and other debris before further drilling can be done. In order to remove the materials, they have to be broken or chopped up into sizes small enough to enter the chambered portion of the tool casing. It has been found from experience that the reciprocation of the tool and casing in the debris dislodging and chopping up operation the hardened materials supra in addition to engagement by the V-shaped chisel like cutter of the tool are also engaged by the lower end of the tool casing. The reciprocation is usually through a distance of approximately 50 feet in order to provide the necessary force to efficiently break up the hardened materials. Therefore, the constant engagement of the lower end of the casing under such terrific force with the hardened materials causes this portion of the casing to become distorted, chipped, flattened or bent out of shape to the detriment of the hinged connection and threaded control screw for the clapper valve. It will be obvious that upon distortion of the lower end of the casing by the debris dislodging operation the hinged connection and threaded screw will become distorted whereby an efficient operation of the valve and screw is greatly decreased. In fact, it has been found that after a few hours' use the hinged connection for the valve and the screw become so distorted that they will not function under any condition.

This inefficient operation of the clapper valve and control screw necessitates the pulling of the tool out of the well hole, and repairing it or replacing with another tool. It is not uncommon that the tool will be beyond repair, and it is very seldom that an extra tool of the same size is readily obtainable. Consequently, the drilling operation must be suspended until another tool can be obtained. In many instances the drilling is done in an oil field remote from the tool supply house, and it takes several days to replace the damaged tool. This obviously necessitates an economic loss not only in the replacement of the tool, but in the suspension of the drilling operation.

Furthermore, the configuration of clapper valves in the ordinary well clean-out tool is such that the size of the opening created by the valve with respect to the casing is limited.

In such instances the size of the broken material and sediment that can be trapped in the casing is also limited due to the limited opening in the tool casing.

It is therefore an important object of this invention to provide a well clean-out tool for dislodging debris and the like, with hinged movable means so positioned in the tool casing that upon operation of the tool into an engagement with the debris, the hinged movable means will not be distorted and thus rendered inoperative.

It is a further object of this invention to position the hinged connection and control screw for a clapper valve in a well clean-out tool casing away from the lower end of the tool casing in order that upon any distortion of the lower end of the tool casing by engagement with the debris to be removed will not effect the efficient operation of the valve or screw under any operating conditions.

It is an additional object of this invention to provide the casing of a well clean-out tool with substantially curved and longitudinally extending slots disposed below the hinged connection of a concavo-convex clapper valve for receiving the curved edges of the concavo-convex clapper valve, whereby the opening created by the clapper valve in downward position will conform with the opening created by the concavo-convex valve in upward position and thus allow for an efficient release of hard sediment trapped in the valve.

Still another object of this invention is to provide a clean-out tool for oil wells and the like, which is simple in operation, durable, and economical to manufacture.

In the drawing:

Fig. 1 is a vertical elevational view of the tool showing the curved slots disposed in the wall of the tool casing.

Fig. 2 is a cross-sectional elevational view of the tool showing the control screw preventing release of the clapper valve.

Fig. 3 is a view similar to Fig. 2 showing the clapper valve in released position.

Fig. 4 is a view taken on lines 4—4 of Fig. 2 showing the hinged connection for the clapper valve.

Fig. 5 is a view taken on lines 5—5 of Fig. 3 showing the outer edges of the clapper valve extending into the curved slots in the casing.

Referring to the drawing in detail, and more particularly Figs. 1 and 2, the well clean-out tool 2 comprises a cylindrical casing 4 which is provided with a recessed chamber 6, for receiving the dislodged or broken up debris present in the well hole. The casing 4 has a lower edge or end section 8 and extending from this edge is a tool or chisel like member 10. The member 10 is formed integral with the casing 4 by cutting away part of the casing to form a pair of downwardly extending diametrically opposed V-shaped legs 12 and 13 which are symmetrical with the outer periphery of the casing 4. A cutter 14 for the member 10 extends transversely between and merging out of the extreme lower portion of the legs 12 and 13 as an integral part of the member 10. See Figs. 1, 2, and 3. The cutter 14 is also V-shaped and is provided with a lower cutting edge 16.

It will be apparent that upon reciprocation of the tool 2 in any conventional manner the cutter 14 operates to break or chop up any debris that is present in the well hole into smaller sizes in order that they may enter the chamber 6 of the casing 4. The broken material or sediment is pulled into the chamber 6 of the casing 4 by suction created from a pump (not shown) to which the casing 4 is attached.

An annular flange 18 with angled sides 19 (Figs. 2 and 3), is disposed on the inner periphery of the casing 4 and at a point substantially away from the lower end 8 of the casing 4. The flange on one side thereof is provided with an aperture 20, (Fig. 4), in which is pivotedly mounted, the boss 22 to provide a hinged connection 23 for the clapper valve 24. The clapper valve, (Figs. 2 and 3), is shown in cross-section of a concavo-convex configuration and has its outer periphery conforming with the outer circular edge of the annular flange 18. It is apparent that hinging the clapper valve to the flange 18, will allow full rotation of the valve between its upper and lower points, thus providing a maximum aperture for the passing of the debris. It is not necessary that the flange 18, extend completely around the inner circumference of the casing 4, but may be disposed only partially around the circumference, thus providing a still larger opening and valve in the casing 4. The clapper valve 24 is swingable upwardly and downwardly within the chamber 6, and by having the concavo-convex configuration the valve in its upward position (Fig. 2) is adapted to lie in a substantially flush position against the inner periphery of the casing 4. This provides for a larger opening in the casing to allow for larger pieces of the broken up material to enter the chamber 6. The angled sides 19 of the flange 18 allows the convex portion of the valve 24 to be rotated to substantially flush position against the inner wall of the casing 4. See dotted lines, Fig. 2.

The casing 4 has a pair of curved or half-moon slots 28 and 30 disposed below the hinged connection 23. These slots extend substantially longitudinal of the casing and are for the purpose of receiving segmented portions of the periphery of the clapper valve, in its downward or releasing position.

It will be apparent that these slots are necessary. Otherwise, the concavo-convex valve in its downward position would create an opening in the chamber 6 smaller than the opening created by the valve in its upward position. In such an instance the larger sized materials that enter the larger opening provided by the valve in its upward position could not be released through the smaller opening that would be provided by this valve in its downward position. The curved slots by receiving portions of the outer periphery of the valve 24 provide for a uniform sized opening of the valve in both upward or downward positions.

A threaded recess 32 is provided in the casing 4 immediately adjacent the under side of the annular flange 18, and at a point diametrically opposite the hinged connection 23 of the pivoted valve 24. The threaded recess 32 is adapted to receive a threaded bolt or screw 34. The bolt 34 is capable of inward and outward movement to control the operation of the valve. The bolt 34 upon being threaded a substantial distance into the casing 4 will contact the outer edge of the valve 24 to prevent the valve 24 from swinging downwardly to its lower position and discharging any material accumulated in the chamber 6. Upon withdrawal of the tool 2, the bolt 34 is unscrewed thus allowing the valve 24 to swing downward and release the accumulated material in the chambered casing 4.

The positioning of the bolt 34 and the hinged connection 23 for the valve 24 at a point in the casing 4 substantially away from the lower edge 8 of the casing eliminates any possibility of the bolt 34 or boss 22 becoming inoperative due to the lower edge 8 becoming distorted upon engagement with the hard material by reciprocation of the tool 2 in the well hole.

It will be apparent that under certain conditions the debris in the well hole is nothing more than sand or small particles of sediment. Under such conditions the necessity of a tool for breaking up the sediments would be eliminated, therefore the V-shaped tool portion 10 can be eliminated from the lower part of the casing 4 thus leaving the casing and valve free to clean out the sand or small particles from the well hole in the usual manner.

From the foregoing it will be apparent that a well clean-out tool is provided which is simple in construction and wherein dislodged material in the well hole will be trapped in the tool casing by a clapper valve which will not be subjected to the possibility of being damaged upon reciprocation of the tool in the well hole and thus prevent swinging movement from one position to the other. Furthermore, the inclusion of the curved slots to provide for uniformity in the opening created by the concavo-convex valve provides a simple construction by which larger sized pieces of sediment can be loaded or trapped in the casing.

Changes may be made in the combination and arrangement of parts as heretofore set forth in the specification and shown in the drawing, it being understood that any modification in the precise embodiment of the invention may be made within the scope of the following claims without departing from the spirit of the invention.

I claim:

1. In combination with a well clean-out tool,

a chambered casing having a lower edge portion, and a V-shaped cutting tool extending downwardly from the lower edge portion of the casing, a projecting flange carried by the inner wall of the chambered casing, said flange being positioned at a point substantially away from the lower edge portion of the casing, a concavo-convex clapper valve hinged to the flange and adapted to be swingable upwardly and downwardly in the casing, said valve in its upward position adapted to lie flush against the inner wall of the casing, a pair of curved recesses disposed in the casing at a point below the hinged connection for the valve, said recesses adapted to receive the outer periphery of the valve in its downward position whereby a uniform opening is provided by the valve in both upward and downward positions.

2. In combination with a well clean-out tool, a chambered casing having a lower edge portion, and a V-shaped cutting tool extending downwardly from the lower edge portion of the casing, a projecting flange carried by the inner wall of the chambered casing, said flange being positioned at a point substantially away from the lower edge portion of the casing, a concavo-convex clapper valve hinged to the flange and adapted to be swingable upwardly and downwardly in the casing, said valve in its upward position adapted to lie flush against the inner wall of the casing, a pair of curved recesses disposed in the casing at a point below the hinged connection for the valve, said recesses adapted to receive the outer periphery of the valve in its downward position whereby a uniform opening is provided by the valve in both upward and downward positions, means positioned diametrically opposite the hinged connection for the valve for controlling the swingable movement of the valve.

3. In combination with a well clean-out tool, a chambered casing having a lower edge portion, a concavo-convex clapper valve hinged in the casing at a point substantially away from the lower edge portion of the casing and adapted to be swingable upwardly and downwardly in the casing, said valve in its upper position adapted to lie flush against the inner wall of the casing, a plurality of curved recesses disposed in the casing at a point below the hinged connection for the valve, said recesses adapted to receive the outer periphery of the valve in its downward position whereby a uniform opening is provided by the valve in both upward and downward positions.

4. In combination with a well clean-out tool, a casing having a lower edge portion, and a V-shaped cutting tool extending downwardly from the lower edge portion, a concavo-convex clapper valve hinged in the casing at a point substantially away from the lower edge portion and adapted to be swingable upwardly and downwardly in the casing, said valve in its upper position adapted to lie flush in the inner wall of the casing, a pair of curved recesses disposed in the casing at a point below the hinged connection, said recesses adapted to receive the outer periphery of the valve in its downward position to assure a uniform opening in the casing by the valve in both upward and downward positions.

5. In combination with a well clean-out tool, a casing having a lower edge portion, and a V-shaped cutting tool extending downwardly from the lower edge portion, a concavo-convex clapper valve hinged in the casing at a point substantially away from the lower edge portion and adapted to be swingable upwardly and downwardly in the casing, said valve in its upper position adapted to lie flush in the inner wall of the casing, a pair of curved recesses disposed in the casing at a point below the hinged connection, said recesses adapted to receive the outer periphery of the valve in its downward position to assure a uniform opening in the casing by the valve in both upward and downward positions, means in the casing for controlling the swinging movement of the valve.

6. In combination with a well clean-out tool, a casing having a lower edge portion, a swingable concavo-convex clapper valve hinged in the casing at a point substantially away from the lower edge point of the casing, a plurality of curved recesses disposed in the casing at a point below the hinged connection for the valve, said recesses receiving the outer periphery of the valve in its downward position to assure a uniform opening in the casing.

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