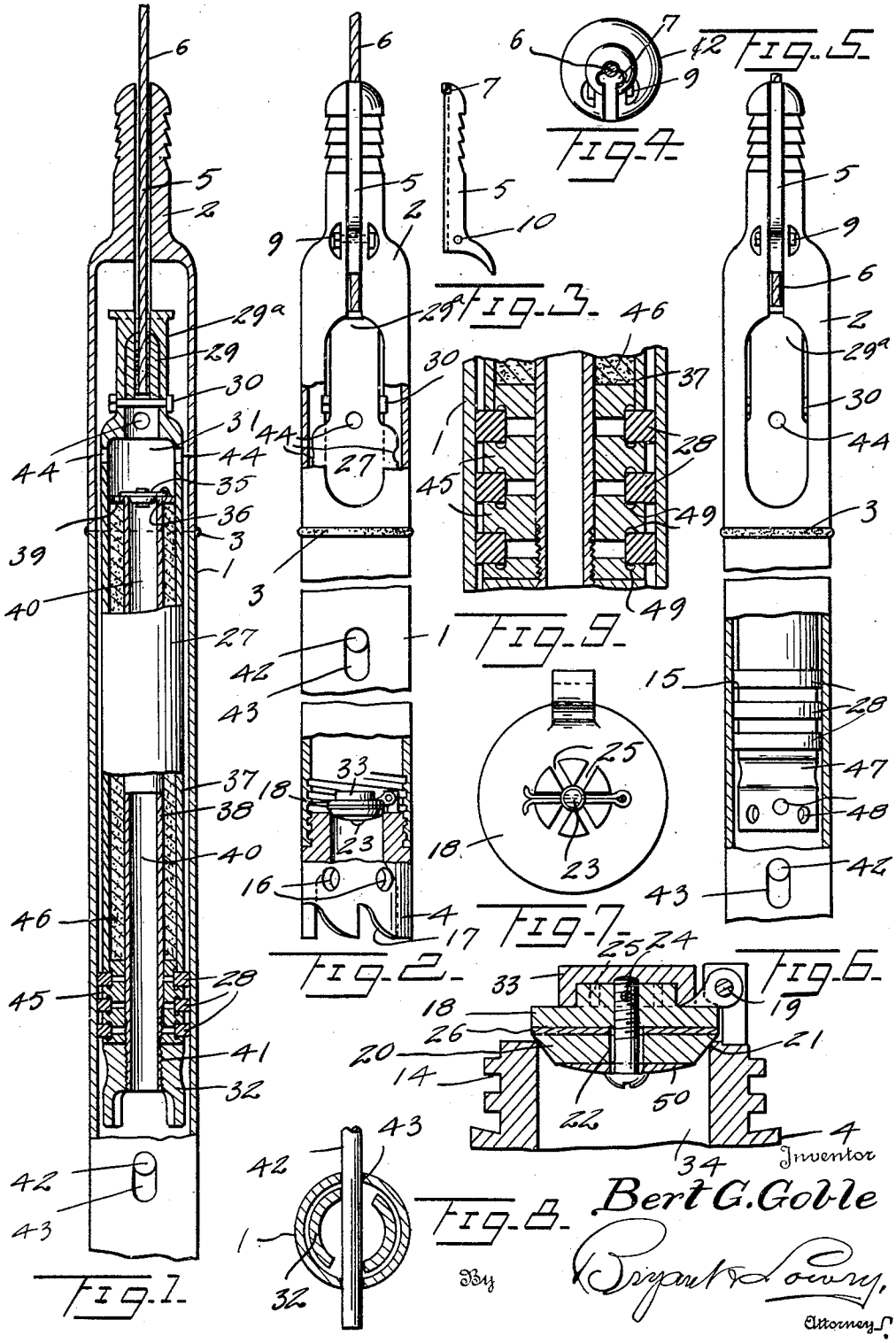
July 27, 1943. B. G. GOBLE 2,325,503

COMBINATION SAND PUMP AND BAILER

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COMBINATION SAND PUMP AND BAILER

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Fig. 10.

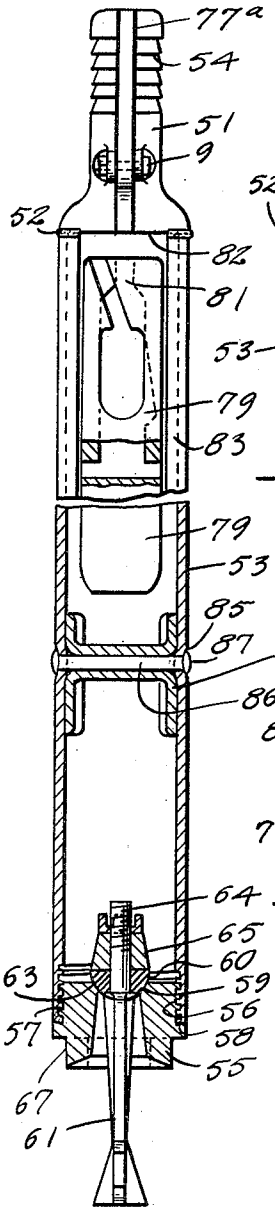


Fig. 11.

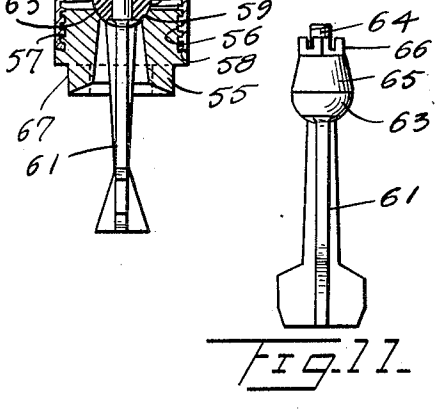


Fig. 12.

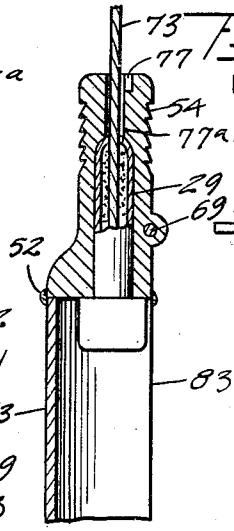


Fig. 13.

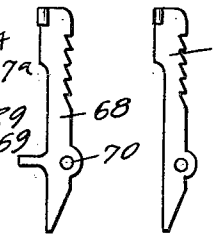


Fig. 14.

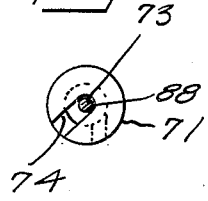


Fig. 15.

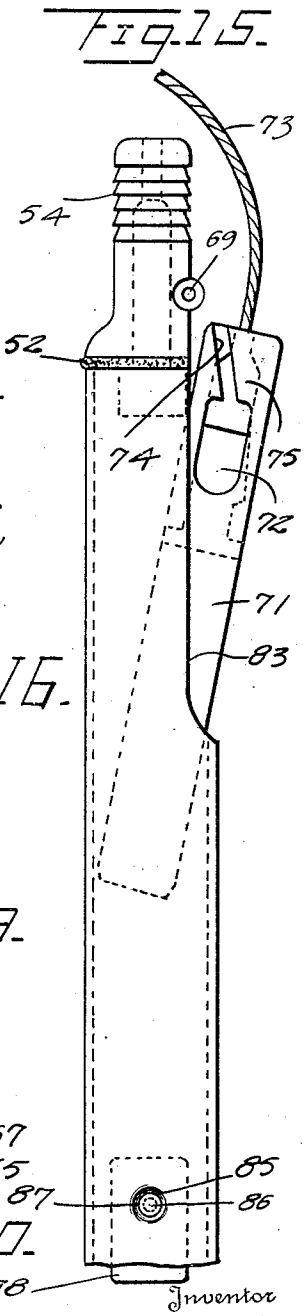


Fig. 16.

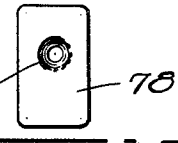


Fig. 18.

Fig. 19.

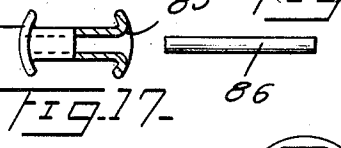


Fig. 17.



Fig. 20.

Inventor

Bert G. Goble

By Bryant Lowry.

Attorney

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UNITED STATES PATENT OFFICE

2,325,503

COMBINATION SAND PUMP AND BAILER

Bert G. Goble, Tulsa, Okla.

Application January 2, 1941, Serial No. 372,790

7 Claims. (Cl. 166—19)

This invention relates to a sand pump and bailer used in drilling and cleaning out oil wells, and is of such construction that it may be quickly changed from one to the other without the necessity of tying any knots, cutting line, or rebabbitting. It is desirable to change from bailer to a pump when drilling a well. It is desirable to have a sand pump that has suction enough to fill tube and save time when limey sands are drilled. Sand is heavier and much harder to lift than water or oil.

Sand pumps now in use have steel plungers with about ⅛" clearance and do not have much suction, whereas the plunger in this invention has rubber or pliable washers that can be adjusted to a tight fit and set up an opposing force and create a great suction, and also eliminate sticking, which is present when two steel surfaces have a little sand therebetween.

Sand pumps and bailers on market leak badly when trying to lift water or oil without sand or mud. I have greatly improved this by a leak-proof self-adjusting valve with rubber facing and also adjustable plunger valve to create greater suction by seal-proof valve and special double thread screw bottom.

All sand pumps on market have a sliding valve on top of plunger that sticks badly. I eliminate the sliding valve and use a valve that cannot stick, and which fits tight and creates a perfect vacuum. No difference how tight the plunger is there cannot be any suction with valve on top partly open and not tight.

The rubber washers were referred to in application for patent, Serial No. 177,975, dated December 3, 1937, numeral 90 and 91.

The principal object of my improved pump is to make a pump the plunger of which can be removed from the enclosing tube easily right on the job on which pump is being used.

Another important object of my pump is to have an adjustable sucker on plunger that can be adjusted to any desired size smaller than the inside diameter of the enclosing tube, or even to touch the enclosing casing, or even have pressure on the enclosing casing.

Another object of my invention is to arrange a pump in which swivel on end of sand line may turn and also save cutting and rebabbitting cable when moving from job to job and which can be easily detached from pump to other tools.

Another very important object of my invention is to make a sand pump that when the pump comes out of the hole with bottom of pump filled with sand that the sand can drop down vertically in its full size bulk, and is not held up by ring inside of casing as on old style pumps in which the sand must be worked down out of center in small quantities and then sand around sides of casing can drop down by moving horizontally before dropping down vertically.

Another object is to have interchangeable mandrel that can be easily changed from sand pump to bailer, and also to attach to jars on bailer, and at same time eliminate the chance of sand line kinking and snapping off when tied on without swivelling.

Another object is to have bailer with swivelling mandrel on sand line that can be used with either jars or without jars.

Another object is to make bailer jars that are easily attached and detached so that sand line swivels in jars.

Another object is to make jars for bailer retain mandrel without the use of bolt or any kind of a fastener by use of angle slot.

Other objects will appear, or become obvious, or will suggest themselves during the description of my sand pump shown in accompanying drawings, in which:

Fig. 1 is a part elevation, and part section, of upper portion of sand pump constructed according to my invention.

Fig. 2 is upper portion of sand pump broken and lower portion in part elevation and part in section.

Fig. 3 is a brass liner detachably filled into neck of sand pump.

Fig. 4 is a top view of sand pump with liner installed.

Fig. 5 is upper portion of sand pump, showing detail of adjustable washers and adjusting nut with holes for adjusting.

Fig. 6 shows section of special designed threads and self-adjusting clapper valve.

Fig. 7 shows grooves in top of clapper valve for cotter pin in bolt.

Fig. 8 shows section at line AA to hold nut on plunger through wash hole AA.

Fig. 9 shows detail section at line BB showing casing, end of plunger in pipe construction, and flexible washers.

Fig. 10 shows upper portion of bailer in elevation and lower portion broken away in section.

Fig. 11 shows side elevation of dart.

Fig. 12 shows section of top of bailer and mandrel.

Fig. 13 shows brass liner to be used when jars are not desired.

Fig. 14 is side view of brass liner used when jars are attached.

Fig. 15 shows a view of bailer with jars about to be installed.

Fig. 16 is a top view of jars.

Fig. 17 is part top view of casting to stop jars with showing in section.

Fig. 18 is side view of stop for jars.

Fig. 19 is pin to be riveted to casing for jar stop.

Fig. 20 is a bottom view of Fig. 10.

Referring to the drawings more in detail, 1 is main casing or tube that may be of desired length and weight, with the upper end of the casing being welded to the top section 2 at 3, while the bottom of casing 1 is screwed to bottom section 4. The brass liner 5 associated with the top section 2 is used to hold the sand line 6 in position as the sand line slides up and down the length of casing. The liner 5 has an arcuate T-head shown at 7 traversing its upper end and into the recesses 8 in the upper end of the top section 2 as shown in Fig. 4 and is held in position by bolt 9 placed through hole 10. The mandrel 29 can be easily attached and detached from the sand line 6 to change to bailer. Liner 5 is held in position at its upper end by the arcuate arm 7 which fits down into recess 8 in top of 2, thereby eliminating the use of a bolt at the top which would be an obstruction to the running of a fishing tool down over the neck of top section 2. The bottom section 4 is detachably held onto the lower end of casing 1 by threads 11, on which both upper and lower portion of threads are shaped with several degrees under the horizontal to strengthen the female portion of the casing 1 as it is necessary to have opening of casing full size in order to install the plunger and eliminate retarding of sand dropping out when bottom is detached as in pumps now in use. The threads 11 and 12 are cut a few degrees off of the 90 degrees to strengthen the female portion of the casing 1 at the threads 12 by cutting the point of the threads several degrees off of right angle as shown so that when pressure is applied to the male and female joint at 13 the pressure of thread on male at 14 pulls the box of coupling together as indicated and strengthens it instead of putting a strain outward as on ordinary pipe threads. By using this kind of a thread a much thinner wall may be used on the casing 1, which is a real advantage as the plunger rubbers should be about as large as the inside of casing 1 as shown at 15.

The detachable bottom section 4 has double threads so that it will screw on and off faster and the threads may be tightened and loosened by putting bar in hole 16 and tapping with hammer. When spudding with the sand pump the spiral bottom at 17 helps to tighten bottom when dropping into sand real hard. The clapper valve 18 is pivoted onto 14 by means of rivet 19, and has a disc rubber block 20 on a radius as a portion of a ball and the valve seat 21 is cut on the same radius as rubber block 20 so that this valve has an action same as ball and seat and always fits. Another advantage of the rubber valve is that if grains of fine sand lodge on valve seat 21 the rubber block 20 will press over and seal off fluid proof whereas a steel face will leak.

This clapper valve has further adjustable features, the rubber block 20 having a hole 22, larger than the bolt 23, and the bolt 23 can be held stationary at any desired position by use of cotter-pin in holes 24 and held by slots 25, and thus the rubber block 20 may be loose enough to slide in any direction as indicated at arrows to fit seal 21. Further adjustment may be easily made by attaching or detaching washers 26 so if valve does not hit squarely over seat the flexible block may easily adjust itself to fit in all directions, and also allow for wear. This adjustability and spherical face make a perfect fit, allowing for wear, and also by making contacting surface on a steep angle the weight of valve wedges into a fitting position. When rubber block is worn, other rubber blocks may be substituted.

The plunger 27 is used for weight as well as to carry rubber washers 28. The sand line 6 is babbitted into the mandrel 29 that is retained in position by the mandrel retainer 29a. The mandrel 29 may be attached or detached by removing the bolt 9 and then liner 5 and remove the bolt 30 and then drop the mandrel 29 down into the space 31 and remove mandrel. The plunger 27 drops to the bottom and spider nut 32 is stopped on top of bumpers 33 to keep plunger from jamming up valve 18. If there is fluid in the oil well the fluid passes through the clapper valve 18 and up through the hole 34 and raises the valve 18.

With the bottom 4 set on bottom section of well and plunger 27 at the bottom, an upward pull on sand line raises the plunger 27 and leaves casing 1 set on bottom, the valve 35 closing airtight on seat 36 to create a vacuum. No matter how tight washers 26 squeeze against walls, if valve 35 is not tight the plunger cannot create perfect suction. The plunger 27 is constructed principally by two pieces of pipe, outside 37 and inside 38 with ends welded and lead 46 poured in holes 39 to fill space between pipe. This makes inexpensive construction, and lead 46 gives more weight in less space than if steel, and most weight with least space is desirable. Pipe construction gives good smooth hole 40 for fluid to pass through. The inside pipe extends below outer pipe and provides a support for pliable washers 28 and spacing washers 45 and threads 41 for adjusting pliable washers 28, by placing bar 42 into wash holes 43 and allowing spider nut 32 to drop down over 42, and then putting any ordinary pipe into holes 44 and turning any fraction, washer may be adjusted very quickly without taking pump down and as tight as desired even to an opposing force, or as loose as desirable. These washers are made to serve as a wiper and clean the surface ahead of them and eliminate sticking of plunger and same time cause much more suction than a loose metal plunger. As shown in Fig. 5, the plunger may have a hollow adjusting nut 47 with holes as at 48 but not as desirable as spider nut 32.

When pliable washers 28 contact a nearly dry or rough surface of enclosing tube there is a tendency to pull the washers outward, so we make a groove 49 on inner portion of washers 45 to hold washers toward center. The washer 50 is to give head of bolt 23 substantial surface, and serves as adjusting plate on washer 20.

The bailer may be used with or without jars. Fig. 10 shows upper portion of bailer in plain view, and center and bottom in section. The neck and upper casting and neck 51 is welded onto main tube at 52. The tube casing 53 is threaded at bottom of tube. The neck has teeth 54 to engage fishing tools. The bottom casting 55 is threaded 56. Main tube 53 has threads 57 to receive 56. Upper part of 55 has valve seat on

radius. This affords proper seating and is fluid tight even when dart 59 does not land vertical. To use bailer without jars insert mandrel 29 and bronze casting 68 and put bolt 9 through holes 69 and 70 and bailer is ready for use with swivelled sand line. To change and use jars remove bolt 9 out of 69 and 70 and remove mandrel 29 and insert mandrel 29 into top of jars 71 at recess 72 and pull sandline over into slot 74 and then let it come back into position 75 and jars are ready to insert into bailer as shown in Fig. 15, and the mandrel and sand line cannot become detached until jarts are removed from tube and mandrel dropped down to certain place and sand line pulled to one side. When jars are inserted into tube 53 insert 76 into top recess 77 and 77—A and push down and insert bolt 9 and top is ready to use jars with a swivel in the jars as shown at 71. Bottom casting has a closely fitted joint at 58 to keep 55 from unscrewing, and 55 has valve seat at top on a radius as shown at 59 to match radius on valve 60 to make a leak-proof valve. The dart 61 has a shoulder 62 to support the rubber 63 and also has a bolt 64 on upper portion to receive rubber 63, a heavy washer 65 is held to any desired tightness by use of nut 66. When bailer is set on bottom the dart is raised up and allows fluid to run into tube, and when bailer is raised off bottom the rubber 63 drops into seat 56. Bottom of 55 has an octagon 67 to hold same to set up joint 58, when 61 drops down into seat with radius to match radius on rubber it does not matter if 61 is not vertical.

Part of the tube 53 is cut out as shown at 83 to allow for inserting jars and also jar stop. When jars are ready for use mandrel 29 will work at top of opening as shown at 81, the tube 53 being cut away at top as shown at 82 and bottom of opening at 83 to allow to insert or remove jars at will.

The length of the stroke of jars is determined by spacing the jar stop 78 as far below bottom of jars as desired. These may be put in opening 82 and 83 and pushed down to desired stroke of jars and then 53 is indented as at 84 to fit cove 85 in stop, then drill holes in walls of 53 and insert rivet 86, then rivet ends as shown at 87 and jar bailer is ready to operate. 88 in Fig. 16 shows position of sand line when in operation in jars.

What I claim as new and novel is:

1. In a sand pump and bailer, a cylindrical casing, a clapper valve at the lower end of the casing, a plunger reciprocable in the casing, the casing having a reduced neck portion at its upper end, a sand line extending through the neck portion and attached to the plunger, a liner fitted in the neck of the tube for holding the sand line in position and cross bolts extending through the liner and casing for holding the liner in position, said plunger comprising concentric pipe sections with the inner section extending below the outer section, expanding washers and spacers surrounding the lower extended end of the inner pipe section and underlying the lower end of the outer pipe section and an adjusting nut threaded on the lower end of the inner pipe section engageable with the expanding washers and spacers.

2. In a sand pump and bailer, a cylindrical casing, a clapper valve at the lower end of the casing, a plunger reciprocable in the casing, the casing having a reduced neck portion at its upper end, a sand line extending through the neck portion and attached to the plunger, a liner fitted in the neck of the tube for holding the sand line in position and cross bolts extending through the liner and casing for holding the liner in position, a mandrel and retainer therefor interposed between the plunger and sand line, a valve carried by the upper end of the plunger and leg connections between the mandrel retainer and plunger disposed laterally of the valve, said plunger comprising concentric pipe sections with the inner section extending below the outer section, expanding washers and spacers surrounding the lower extended end of the inner pipe section and underlying the lower end of the outer pipe section and an adjusting nut threaded on the lower end of the inner pipe section engageable with the expanding washers and spacers.

3. In a sand pump and bailer, a cylindrical casing, a clapper valve at the lower end of the casing, a plunger reciprocable in the casing, the casing having a reduced neck portion at its upper end, a sand line extending through the neck portion and attached to the plunger, a liner fitted in the neck of the tube for holding the sand line in position, cross bolts extending through the liner and casing for holding the liner, in position, a mandrel and retainer therefor interposed between the plunger and sand line, a valve carried by the upper end of the plunger and leg connections between the mandrel retainer and plunger disposed laterally of the valve, flexible washers on the outer side of the plunger adjacent the lower end thereof and a restricted fluid conduit through the center of the washers and the plunger.

4. In a sand pump and bailer, a cylindrical casing, a clapper valve at the lower end of the casing, a plunger reciprocable in the casing, the casing having a reduced neck portion at its upper end, a sand line extending through the neck portion and attached to the plunger, a liner fitted in the neck of the tube for holding the sand line in position, cross bolts extending through the liner and casing for holding the liner in position, said plunger comprising concentric pipe sections with the inner section extending below the outer section, expanding washers and spacers surrounding the lower extended end of the inner pipe section and underlying the lower end of the outer pipe section and an adjusting nut threaded on the lower end of the inner pipe section engageable with the expanding washers and spacers, and a ballast fitting for the space between the pipe sections of the plunger.

5. In a sand pump and bailer, a cylindrical casing, a clapper valve at the lower end of the casing, a plunger reciprocable in the casing, the casing having a reduced neck portion at its upper end, a sand line extending through the neck portion and attached to the plunger, a liner fitted in the neck of the tube for holding the sand line in position, cross bolts extending through the liner and casing for holding the liner in position, a mandrel and retainer therefor interposed between the plunger and sand line, a valve carried by the upper end of the plunger and leg connections between the mandrel retainer and plunger disposed laterally of the valve, said plunger comprising concentric pipe sections with the inner section extending below the outer section, expanding washers and spacers surrounding the lower extended end of the inner pipe section and underlying the lower end of the outer piper section and an adjusting nut threaded on the lower end of the inner pipe section engageable with the expanding washers and spacers, and a ballast

fitting for the space between the pipe sections of the plunger.

6. In a sand pump and bailer, a cylindrical casing, a clapper valve at the lower end of the casing, a plunger reciprocable in the casing, the casing having a reduced neck portion at its upper end, a sand line extending through the neck portion and attached to the plunger, a liner fitted in the neck of the tube for holding the sand line in position and cross bolts extending through the liner and casing for holding the liner in position, said plunger comprising concentric pipe sections with the inner section extending below the outer section, expanding washers and spacers surrounding the lower extended end of the inner pipe section and underlying the lower end of the outer pipe section and an adjusting nut threaded on the lower end of the inner pipe section engageable with the expanding washers and spacers, said casing having opposite wash holes therein and upwardly positioned diametrically opposite openings and means insertable through said holes and openings and engageable with the adjusting nut and upper end of the plunger for moving the nut toward and away from the lower end of the outer pipe section for adjusting the expanding washers without removing the plunger from the casing.

7. In a sand pump and bailer, a cylindrical casing, a clapper valve at the lower end of the casing, a plunger reciprocable in the casing, the casing having a reduced neck portion at its upper end, a sand line extending through the neck portion and attached to the plunger, a liner fitted in the neck of the tube for holding the sand line in position and cross bolts extending through the liner and casing for holding the liner in position, a mandrel and retainer therefor interposed between the plunger and sand line, a valve carried by the upper end of the plunger and leg connections between the mandrel retainer and plunger disposed laterally of the valve, said plunger comprising concentric pipe sections with the inner section extending below the outer section, expanding washers and spacers surrounding the lower extended end of the inner pipe section and underlying the lower end of the outer pipe section and an adjusting nut threaded on the lower end of the inner pipe section engageable with the expanding washers and spacers, said casing having opposite wash holes therein and upwardly positioned diametrically opposite openings and means insertable through said holes and openings and engageable with the adjusting nut and upper end of the plunger for moving the nut toward and away from the lower end of the outer pipe section for adjusting the expanding washers without removing the plunger from the casing.

BERT G. GOBLE.