May 17, 1932. D. R. GILES 1,858,241

VELOCITY RETARDING DEVICE FOR FLUID CONVEYING PIPE LINES

Filed Feb. 12, 1931 2 Sheets-Sheet 1

FIG. 1.

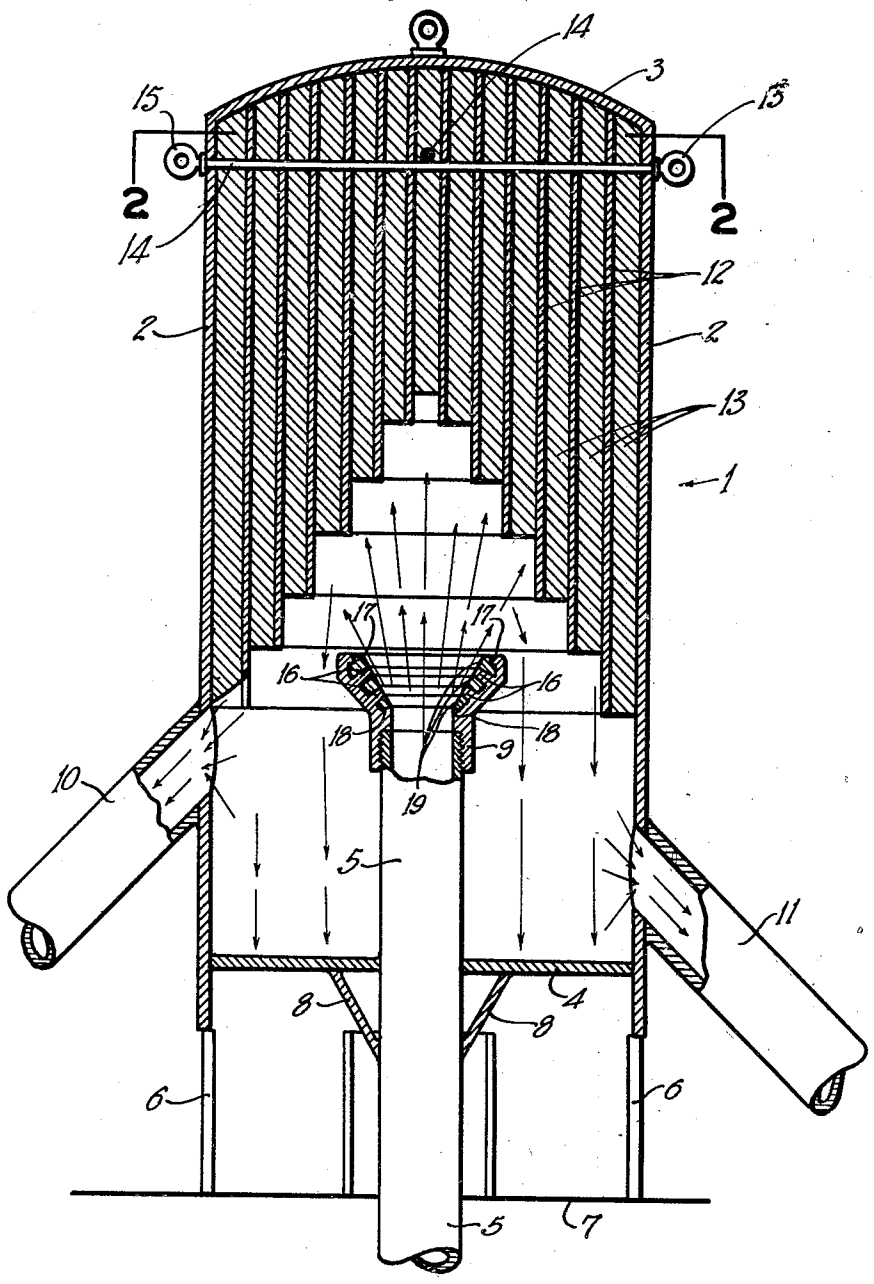

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FIG. 2.

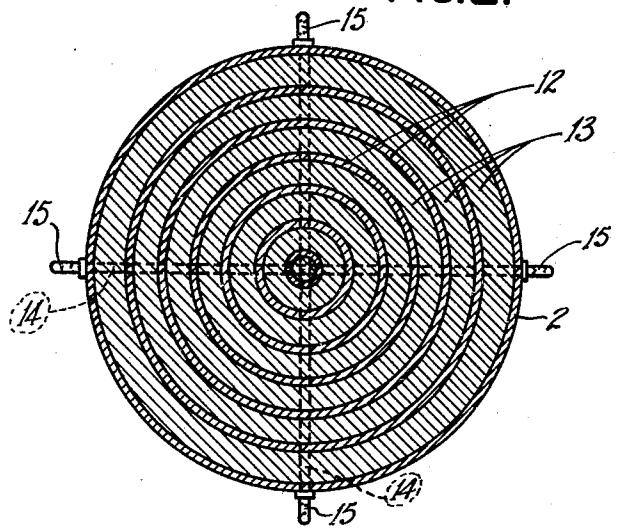
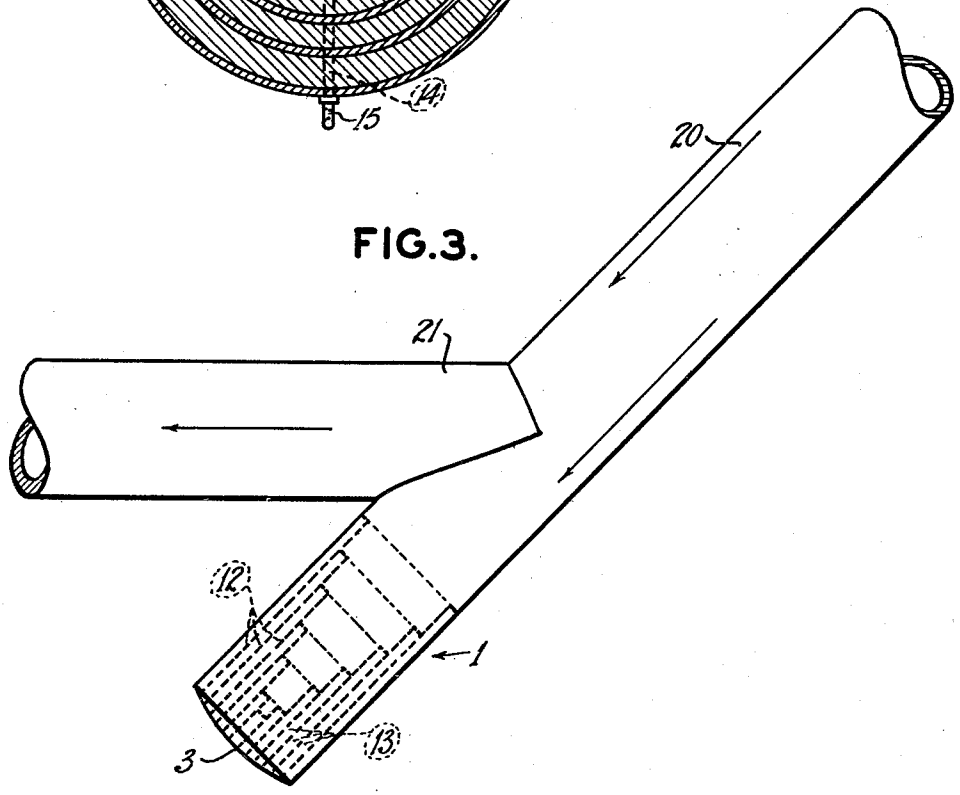


FIG. 3.



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Patented May 17, 1932 1,858,241

UNITED STATES PATENT OFFICE

DEAN R. GILES, OF KANSAS CITY, MISSOURI, ASSIGNOR OF TWENTY-FOUR AND ONE-HALF PER CENT TO JAMES S. BRYAN AND TWENTY-FOUR AND ONE-HALF PER CENT TO FRANK HEENAN, BOTH OF OKLAHOMA CITY, OKLAHOMA

VELOCITY RETARDING DEVICE FOR FLUID CONVEYING PIPE LINES

Application filed February 12, 1931. Serial No. 515,321.

My invention relates to apparatus for retarding the velocity of flowing fluids in pipe lines, and more particularly to apparatus for retarding the flow of oil and gas wells.

At the present time much difficulty is encountered in controlling oil and gas flow from some oil and gas wells due to extreme high pressure and high velocity of the oil or gas, or both, at the surface of the earth. This difficulty is increased by the usual presence of sand or other extraneous gritty material which is carried by the flowing fluid, and which frequently cuts away the valves and other fittings being used to control the flow of the fluid.

When the control gates or valves have once been cut away, it is an extremely dangerous and costly operation to again bring the well under control. A high pressure well, while running wild, is a menace to the entire community as a fire hazard.

The objects of my invention are to provide a device of this class which is new, novel, practical and of utility; which may be placed upon the upper end of a well casing, and when in position will receive the force of the flowing fluid and retard its velocity so that thereafter it may be more easily controlled by other mechanism; which will tend, to a great extent, to separate from the fluid the extraneous, gritty substances carried thereby; which will utilize a portion of such extraneous substances as a means for preventing, to a great extent, the cutting away of the device at the point receiving the impact of the fluid; which will be strong and durable; and, which will be efficient in accomplishing all the purposes for which it is intended.

Applicant's device consists substantially of a cylindrical tank having both ends closed, and adapted at one end to be attached axially to a pipe which extends a desired distance into the tank from the end at which it enters. The end opposite to the intake end is provided with a baffle structure which receives the impact of the fluid, and the outlets of the tank are so positioned that in order for the fluid to pass out of the tank it must travel toward the intake end to a point behind the inlet end of the pipe.

The baffle structure is composed of alternating annular layers having their edges presented to the incoming fluid. These layers are composed of a hard metal such as steel, on one hand, and therebetween the other layers are composed of some desirable material which is comparatively soft, such as lead or asphalt. When presented to the action of the fluid, the steel layers will be partially worn away and the soft layers will be battered over their worn edges thus protecting the hard layers against further wear, and at the same time, the surface of the soft material will retain a portion of the extraneous gritty substances carried by the fluid and will use this material as a means of receiving the impact of the fluid. The hard layers will then act only as a reinforcing means for holding the soft layers in position.

With these and other objects in view as will more fully appear, my invention consists in the construction, novel features, and combination of parts hereinafter more fully described, pointed out in the claims hereto appended, and illustrated in the accompanying two-sheet drawings, of which:

Figure 1 is a vertical sectional view of a preferred embodiment of the invention;

Fig. 2 is a transverse sectional view taken along the line 2—2 of Fig. 1; and,

Fig. 3 is a plan view of a slightly different embodiment of the device.

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

It is understood that various changes in the form, proportion, size, shape, weight and other details of construction, within the scope of my invention may be resorted to without departing from the spirit or broad principle of my invention and without sacrificing any of the advantages thereof; and it is also understood that the drawings are to be interpreted as being illustrative and not restrictive.

One practical embodiment of the invention as illustrated in the drawings comprises:

A cylindrical metal housing or tank 1, having an annular side wall 2, a closed top 3, and a closed bottom or floor 4. When positioned for use as a means for retarding the

velocity of a fluid escaping from a well, said tank 1 will be placed in a vertical position as illustrated in Fig. 1 with the upper end of the producing well casing 5 projecting upwardly through the axial center of said bottom 4 to a considerable distance thereabove. At the point at which said casing 5 coincides with said bottom 4, a welded connection will be made to insure against the escape of the fluid through said bottom 4 and around said casing 5. The weight of said tank 1 will be supported by any type of base 6 resting or attached upon the derrick floor 7. Braces 8 may be provided if desired. The upper end of said casing 5 is provided with a flared nozzle 9, the exact structure and office of which will be more fully described hereinbelow. A fluid outlet pipe 10 is rigidly attached by welding or the like to said wall 2, at a desired distance above said floor 4 and preferably below the top of said nozzle 9. A sand outlet pipe 11 is also provided upon said wall 2 at a point above said floor 4 and preferably below said outlet pipe 10.

The baffle structure above mentioned is provided within the upper portion of said tank 1, and comprises a plurality of steel or hard metal rings or sections of pipe 12, which are graduated in diameter and in length. The pipe smallest in diameter, which is also the shortest, is positioned centrally and axially in said tank 1. The pipe 12 which is next larger in diameter is also next longer, and is placed around the smallest and shortest pipe in spaced relation thereto. All of said pipes 12 are positioned in a manner similar to that described with reference to the smallest two, and are held in their spaced relation by annular layers 13 of lead, asphalt or the like which is put in place while in a liquid or plastic state. It may be understood that said pipe sections 12 and said layers 13 will be installed within said tank 1 with said tank in an inverted position and before said bottom 4 has been installed. Said pipe sections 12 and layers 13 are held rigidly in position within said tank 1 by a pair of transverse tie rods 14, the outer ends of which are provided with eyes 15. Said eyes 15 act as a means for receiving guy-ropes or cables, not shown, for anchoring said tank 1 to said floor 7 against the upward pressure of the flowing fluid.

The outwardly flared upper portion of said nozzle 9 is provided on its inner face with a plurality of perpendicular annular projections 16, and the extreme upper edge is turned inwardly as shown at 17 to form a horizontal shoulder. At a point slightly below the lowermost one of said projections 16 the inner surface of said flared portion is provided with an annular floor or seat 18. The office of said projections 16, shoulder 17, and annular seat 18, is to receive and hold in place a filler 19, of some comparatively soft material such as lead, babbitt, asphalt or the like, which acts as a means for preventing the abrasive force of the fluid from cutting away said nozzle 9. The office of the entire nozzle 9 is to prevent the cutting away of the upper end of said casing 5.

In installation, said bottom 4 will be placed over the upper end of said casing 5, before said nozzle 9 is installed. Said bottom 4 will then be welded or otherwise attached hermetically to said wall 2.

In operation, the ends of said pipe sections 12 and said layers 13 will receive the impact of the fluid released through said nozzle 9. When first put into use, the exposed portions of the lower ends of said pipe sections 12 will be cut away by the fluid, but the softer layers 13 will thereafter be battered over the lower ends of said pipe sections 12 and will thereafter receive the brunt of the wear.

As indicated by the arrows in Fig. 1, the fluid will strike the baffle structure and must necessarily back up in order to escape through said outlet pipe 10. When the velocity of the fluid is decreased by said baffle structure, the fluid will necessarily drop some of the extraneous gritty materials which it has previously carried. These materials will be deposited upon said bottom 4, and will flow by gravity into said outlet 11. It may be found desirable to locate said outlet 11 even with the upper surface of said bottom 4 in order to carry off more easily said extraneous material. It is understood that normally said outlet pipe 11 will be closed at a desired distance from said tank 1 by any suitable means such as a gate valve or the like, and will be opened only when it is desired to blow out the sand or other matter collected upon said floor 4 or within said pipe 11.

The action of the fluid upon the bottom of the baffle structure after said pipe sections 12 have been covered by the battered material of said layers 13, will be such that a considerable portion of the extraneous materials carried by the fluid will be imbedded in and retained upon the surface of the said soft material. This then will provide the wearing surface of the baffle structure with a hard gritty coating of the said extraneous material which will offer a great resistance to further abrasive action of the fluid.

In Fig. 3 is shown an embodiment of the device adapted for use where angles occur in pipe lines. In this figure two pipes 20 and 21 are shown converging at an angle. Said tank 1, houses the baffle structure described above, and is shown as made integral with said pipe 20 at a point slightly past or at the point of juncture of said pipes 20 and 21. When the device is installed in this manner, the fluid will strike the baffle structure and must necessarily back up in order to escape through said pipe 21.

Obviously, the invention is susceptible of

embodiment in forms other than that which is illustrated in the accompanying drawings and described herein, and applicable for uses and purposes other than as detailed, and I therefore consider as my own all such modifications and adaptations or other uses of the form of the device herein described as fairly fall within the scope of my invention.

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

1. A device of the class described, embodying a housing for receiving a high velocity and high pressure fluid, a baffle structure for receiving the impact of such fluid consisting of a plurality of alternating layers of hard metal and a comparatively soft semi-pliable substance, said layers disposed within said housing in a manner presenting their edges to the incoming fluid.

2. A device of the class described, embodying a housing for receiving a high velocity and high pressure fluid, a baffle structure for receiving the impact of such fluid consisting of a plurality of alternating layers of hard metal and a comparatively soft semi-pliable substance, and means for holding said layers within said housing in such a manner as to present their edges to the incoming fluid.

3. A device of the class described, embodying a housing for receiving a high velocity and high pressure fluid, an inlet pipe for said fluid extending into said housing and releasing said fluid at a point away from the housing walls, a flared nozzle on the end of said inlet pipe, means carried by said nozzle for preventing abrasive action of said fluid upon the end of said inlet pipe, and a baffle structure for receiving the impact of said fluid, consisting of a plurality of alternating layers of hard metal and a comparatively soft semi-pliable substance, said layers disposed within said housing in a manner presenting their edges to the incoming fluid.

4. Organization as described in claim 3, in which the layers are arranged so that those receiving the greatest impact are farthest from the end of said inlet pipe, and in which the distance between the end of the inlet pipe and the edges of the other layers is decreased in ratio to the decrease in the force of the impact.

5. A device of the class described, embodying a housing for receiving a high velocity and high pressure fluid, an inlet pipe for said fluid extending into said housing and releasing said fluid at a point away from the housing walls, a flared nozzle on the end of said inlet pipe, and means carried by said nozzle for preventing abrasive action of said fluid upon the end of said inlet pipe, said means consisting of alternating layers of hard metal and a comparatively soft semi-pliable substance.

6. A device of the class described, having in combination, a housing for receiving a high velocity and high pressure fluid, an inlet pipe for said fluid extending into said housing and releasing said fluid at a point away from the housing walls, a flared nozzle on the end of said inlet pipe, means carried by said nozzle for preventing abrasive action of said fluid upon the end of said inlet pipe, and a baffle structure for receiving the impact of said fluid, consisting of a plurality of alternating layers of hard metal and a comparatively soft semi-pliable substance, said layers disposed within said housing in a manner presenting their edges to the incoming fluid.

7. In a device of the class described, the combination with a housing for receiving a fluid, of a baffle structure for receiving the impact of such fluid, comprising a plurality of alternating layers of hard metal and a comparatively soft semi-pliable substance, said layers disposed within said housing in a manner presenting their edges to the incoming fluid.

8. In a device of the class described, the combination with a housing for receiving a fluid, of a baffle structure for receiving the impact of such fluid, comprising a plurality of alternating layers of hard metal and a comparatively soft semi-pliable substance, said layers disposed within said housing in a manner presenting their edges to the incoming fluid, and means for rigidly positioning said baffle structure within said housing.

9. In a device of the class described, the combination with a cylindrical housing having an axially located inlet pipe for high pressure and high velocity fluid extending thereinto away from its walls, and having outlets behind the end of said pipe, of a flared nozzle on the end of said inlet pipe, and a baffle structure for receiving the impact of said fluid consisting of a plurality of alternating layers of hard metal and a comparatively soft semi-plastic substance, said layers disposed within said housing in a manner presenting their edges to the incoming fluid.

10. In a device of the class described, the combination with a cylindrical housing having an axially located inlet pipe for high pressure and high velocity fluid extending thereinto away from its walls, and having outlets behind the end of said pipe, of a flared nozzle on the end of said inlet pipe, means carried by said nozzle for preventing abrasive action of said fluid upon the end of said inlet pipe, and a baffle structure for receiving the impact of said fluid consisting of a plurality of alternating layers of hard metal and a comparatively soft semi-plastic substance, said layers disposed within said housing in a manner presenting their edges to the incoming fluid.

DEAN R. GILES.