Sept. 11, 1923. 1,467,512

E. A. STARKE

APPARATUS FOR SAVING GAS AND OIL FROM PRODUCING WELLS

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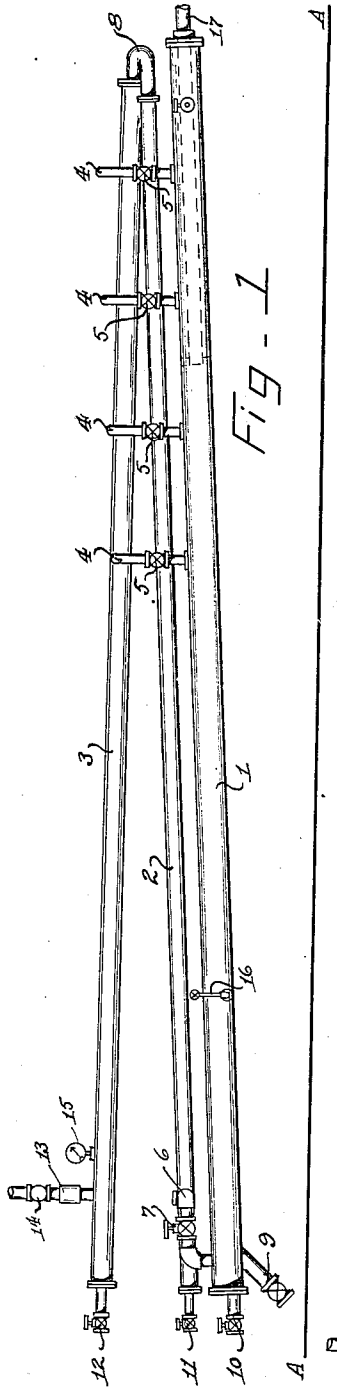


Fig. 1

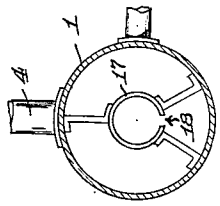


Fig. 5

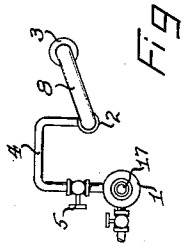


Fig. 4

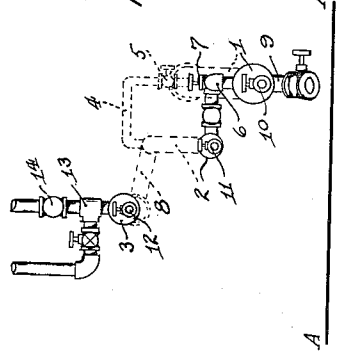


Fig. 3

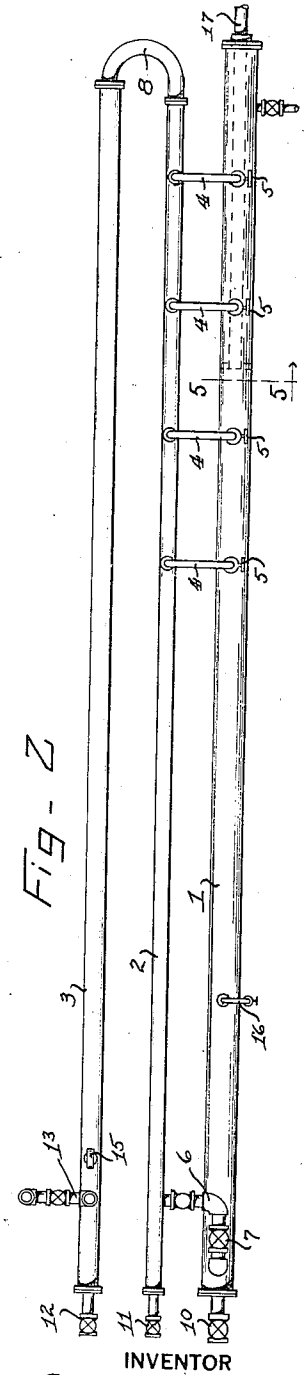


Fig. 2

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UNITED STATES PATENT OFFICE.

ERIC A. STARKE, OF BERKELEY, CALIFORNIA.

APPARATUS FOR SAVING GAS AND OIL FROM PRODUCING WELLS

Application filed November 27, 1922. Serial No. 603,455.

To all whom it may concern:

Be it known that I, ERIC A. STARKE, a citizen of the United States, residing at Berkeley, in the county of Alameda and State of California, have invented certain new and useful Improvements in Apparatus for Saving Gas and Oil from Producing Wells, of which the following is a specification.

My invention relates to apparatus for separating the gas from the oil, and saving both in connection with producing wells in which both oil and gas occur.

My present invention particularly relates to and consists in improvements upon that apparatus previously patented by me under No. 1,040,806, dated October 8th, 1912, to which patent reference is hereby made.

These improvements comprise a novel relative arrangement and connection of the separating members, and a novel means for introducing the well product.

The objects of said improvements are to provide for a more effective separation, and to introduce the well-product under conditions which conduce to an immediate and quiet initiation of the operation, by avoiding the tendency of the entering product to swirl, due to its high pressure, which tendency may result in such violent agitation as to cause in some cases an emulsification of the gas and oil prohibitive of separation.

In the accompanying drawings which illustrate my improved apparatus—

Fig. 1 is an elevation of the apparatus.

Fig. 2 is a plan of the same.

Fig. 3 is an elevation of the outlet end.

Fig. 4 is an elevation of the inlet end.

Fig. 5 is a cross section, enlarged, on the line 5—5 of Fig. 2.

1 is a relatively long, recumbent conduit, say, for example, a 10 inch pipe, constituting the initial separating member. As shown in Fig. 1, this pipe lies at a slight inclination to the horizontal, indicated by the ground line A—A.

2 is a second relatively long recumbent conduit lying to one side of the first conduit and at an inclination to the horizontal in the same direction. This conduit may for the sake of example, be a pipe 4 inches in diameter, and said pipe constitutes an auxiliary separating member.

3 is a relatively long recumbent conduit, say, for example, a pipe 6 inches in diameter. It lies to one side of the other conduits, but at an inclination to the horizontal reversed to their inclination. It constitutes both a final separating member and the gas receiver pipe.

Pipes 4 connect the separating pipes 1 and 2, at intervals from their higher end for a portion of their length. These pipes lead from the upper cross sectional area of pipe 1, into the upper cross sectional area of pipe 2, and are subject to control by means of valves 5.

There is also a connection between the pipes 1 and 2, near their lower ends, by means of the pipe 6, controlled by a valve 7. This connection may be used to return oil from pipe 2 to pipe 1.

The lower end of the gas receiver pipe 3 connects with the higher end of the auxiliary separating pipe 2, by means of a bend 8.

The outlet end of pipe 1 has a controllable bottom discharge 9 and a controllable end discharge 10. The outlet end of pipe 2 has a controllable end discharge 11. The outlet end of receiver pipe 3 has a controllable end discharge 12. All these discharges lead to oil storage tanks, not shown, or other suitable destination for the oil. The gas receiver pipe 3 is provided near its outlet end with a controllable pipe 13 leading to a gas main, not shown, and said pipe 13 is fitted with a safety valve 14.

15 is a pressure dial in the receiver pipe 3, and 16 is a reading glass in the separator pipe 1. 17 is the supply pipe which leads from the well, not shown, and with which it is tightly connected, and enters tightly into the receiving end of the main separating pipe 1. The portion of the supply pipe 17 which lies within the separating pipe 1, and extends a distance to be determined by experience, has a continuous longitudinal slit 18 in its bottom, as shown in Fig. 5.

The use of the apparatus is as follows:— The oil and gas issuing from the well pass through the supply pipe 17 into the main separating pipe 1, under the pressure of the well. I have found in practise that when, as formerly, the delivery of the well product was wholly from the end of the supply pipe, the product would whirl and often with sufficient violence to emulsify the gas and oil, thus producing a zone of activity for a considerable distance, and thereby materially reducing the effective length of the pipe. But by employing the bottom slitted

supply pipe 17, as herein shown, the velocity of the entering product is so reduced, that while the gas passes readily through the supply pipe, a considerable portion of the liquid and solid components, such as sand pass through the slit and break up the swirling tendency, so that a condition of relative quiet is gained much sooner than would be possible otherwise. I have, in practice, found this slitted supply pipe very effective, and in this connection wish to point out that such a feed pipe is available in the separating art whether used with an apparatus such as here shown and with the particular product herein described, or in connection with the separation of other aggregates of a gaseous, liquid and solid nature.

The separation of the gas from the oil and the other components such as sand takes place in the attenuated chamber of the pipe 1, supplemented by a like effect in pipes 2 and 3 and from these pipes the separated materials may be continuously withdrawn, as in my former patented device. But in the present improved arrangement, I find the result is heightened, both by having the connections 5 between the pipes 1 and 2 extend only for a portion of their length, instead of, as formerly, for their entire length, thus providing greater zones of quiet; and by having the gas receiving pipe at an inclination to the reverse of the other pipes, which arrangement gives the gas a greater freedom of flow to its discharge.

I claim: —

1. An apparatus for the described purpose, comprising a recumbent separating pipe; a supply pipe leading from a source of aggregate under pressure, and fitting tightly through one end of the separating pipe, said supply pipe extending within said separating pipe and being longitudinally slitted in the bottom of its said extending portion; a delivery pipe leading from the upper cross sectional area of said separating pipe for carrying off the gaseous component of the aggregate; and means for discharging the liquid component from the lower cross sectional area of said separating pipe.

2. An apparatus for the described purpose, comprising a plurality of recumbent separating pipes, lying at an inclination in the same direction; a plurality of pipes connecting successively the upper cross sectional areas of said pipes, at intervals throughout a portion of the length of said separating pipes at their higher ends, for passing the gaseous component from one separating pipe to the next; a final recumbent pipe lying at an inclination the reverse of that of the separating pipes and connected at its lower end with the higher end of the last of said separating pipes, for receiving the gaseous component therefrom, a supply pipe leading from a source of aggregate under pressure and fitted tightly through to the higher end of the first of said separating pipes; and means for discharging the liquid component of the aggregate from the lower cross sectional areas of said recumbent pipes.

3. An apparatus for the described purpose, comprising a plurality of recumbent separating pipes, lying at an inclination in the same direction; a plurality of pipes connecting successively the upper cross sectional areas of said pipes, at intervals throughout a portion of the length of said separating pipes at their higher ends, for passing the gaseous component from one separating pipe to the next; a final recumbent pipe lying at an inclination the reverse of that of the separating pipes and connected at its lower end with the higher end of the last of said separating pipes, for receiving the gaseous component therefrom; a supply pipe leading from a source of aggregate under pressure and fitted tightly through the higher end of the first of said separating pipes, said supply pipe extending within said first separating pipe and being longitudinally slitted in the bottom of its said extending portion; and means for discharging the liquid component of the aggregate from the lower cross sectional areas of said recumbent pipes.

In testimony whereof I have signed my name to this specification.

ERIC A. STARKE.