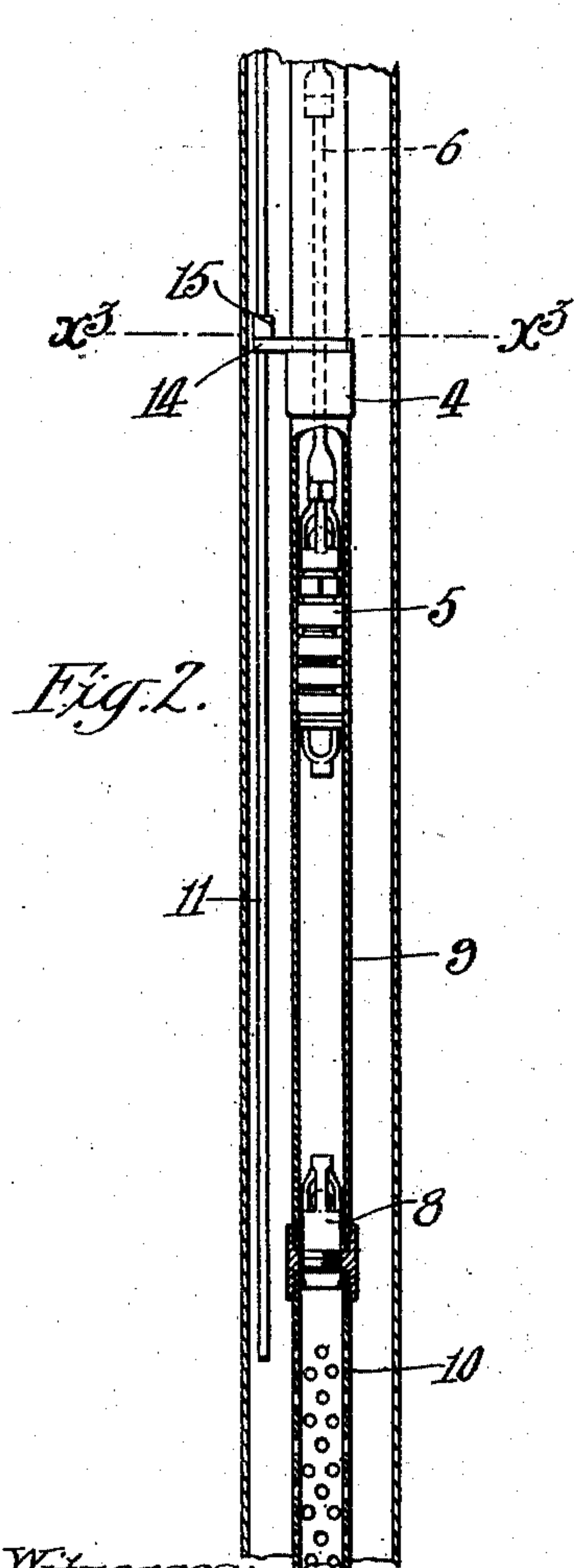
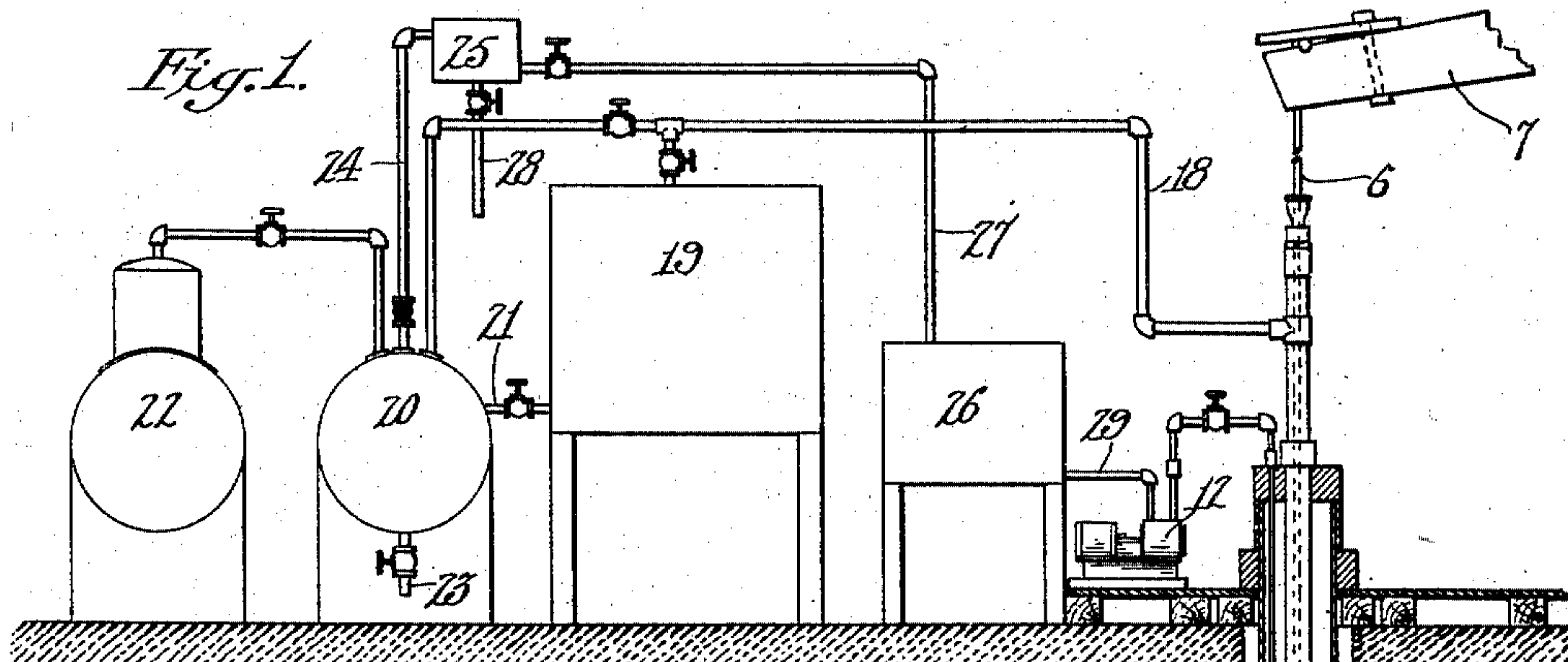


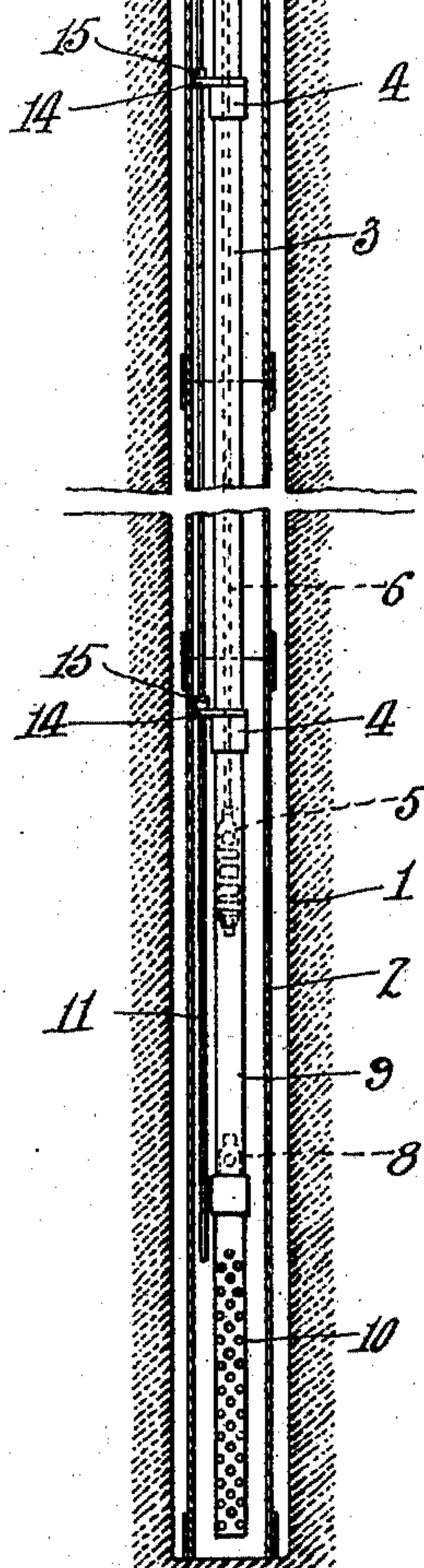
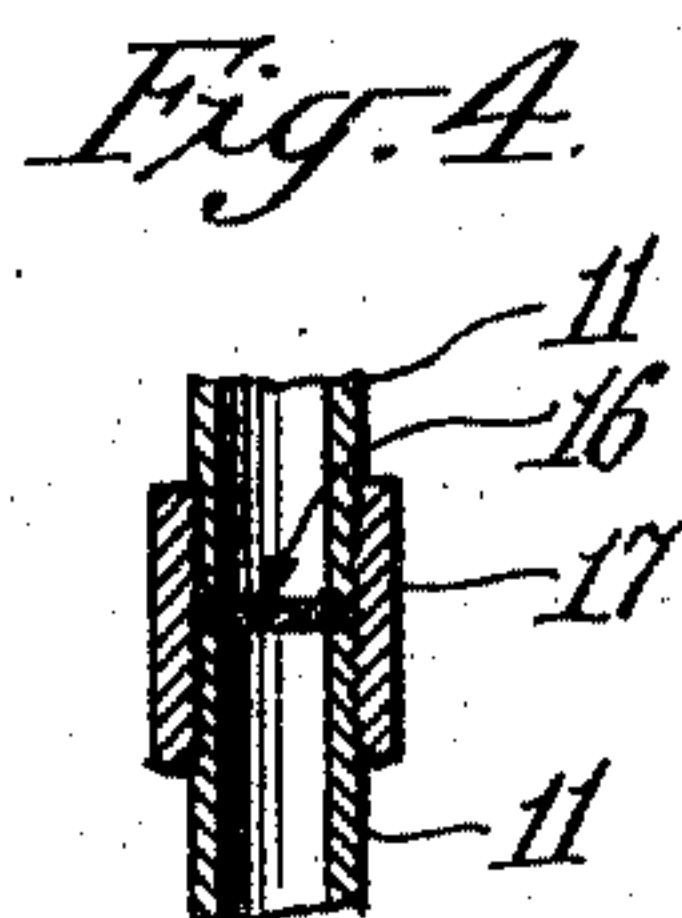
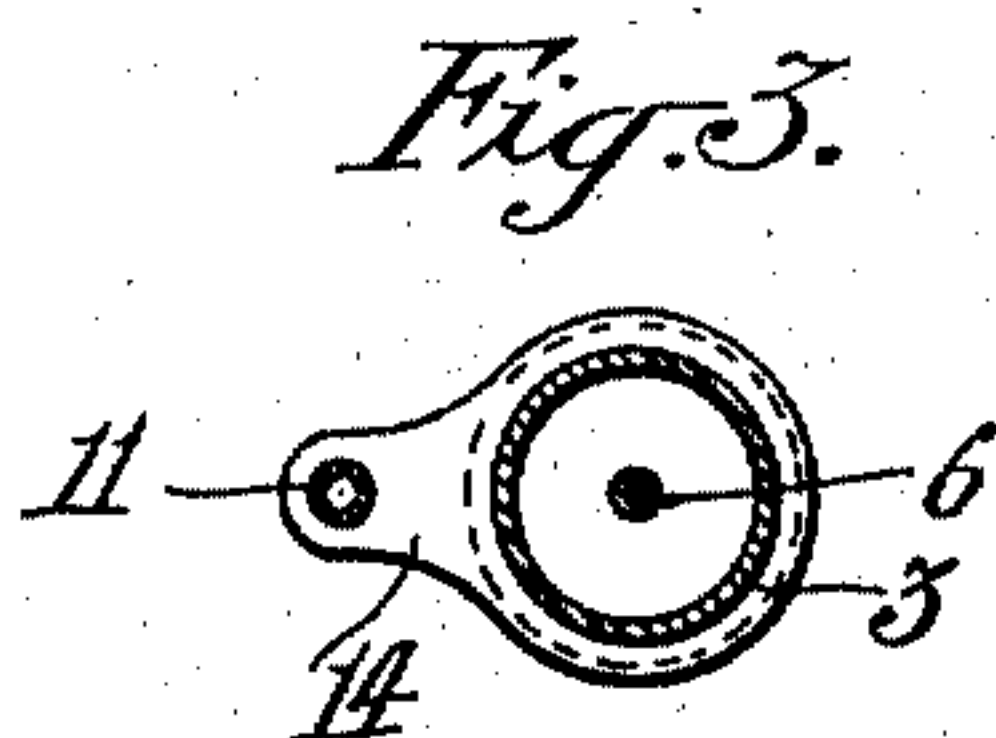
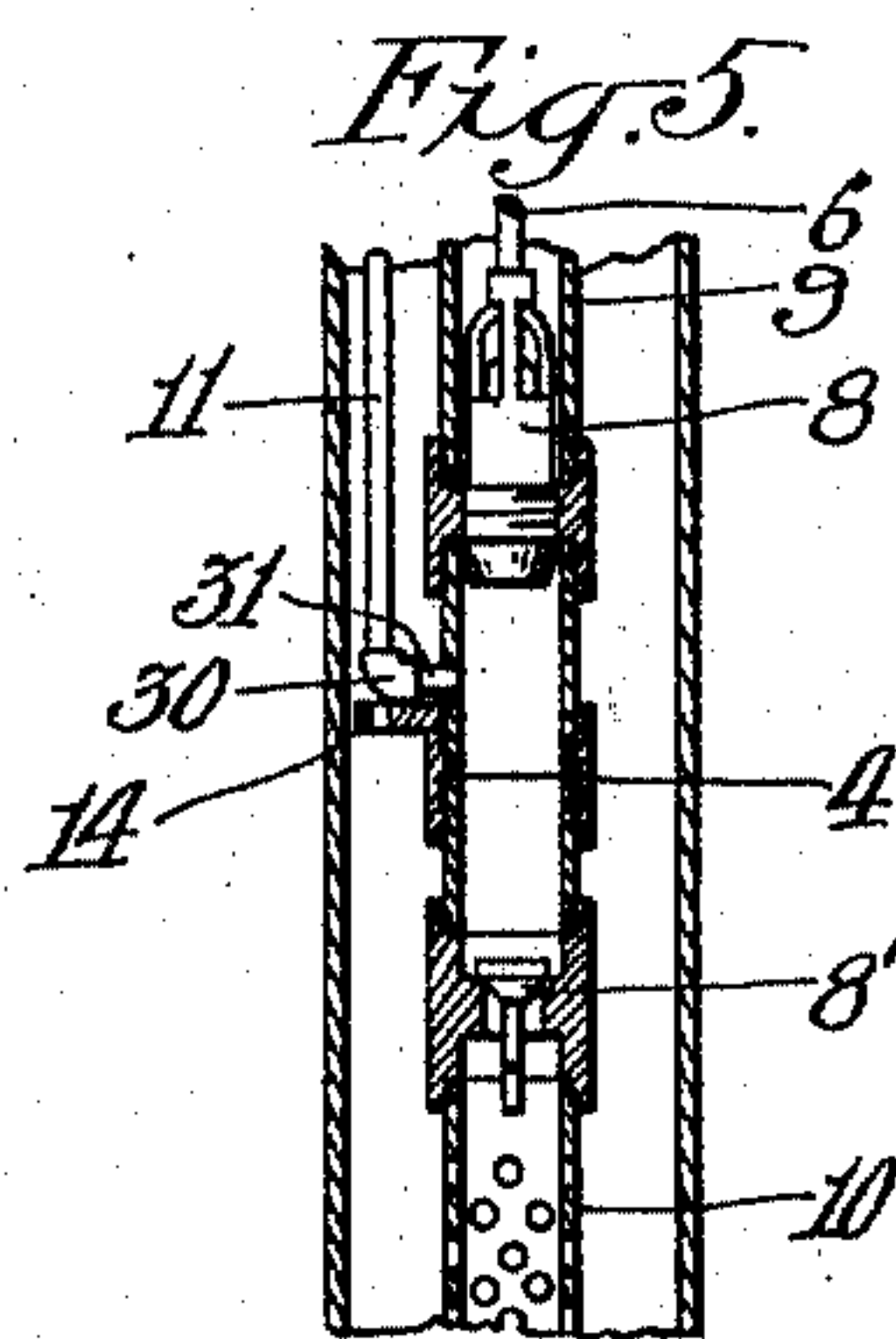
A. SATTLER.
METHOD OF AND APPARATUS FOR PUMPING OIL WELLS.
APPLICATION FILED JAN. 16, 1908.

966,772.

Patented Aug. 9, 1910.



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UNITED STATES PATENT OFFICE.

ANDREW SATTLER, OF CARPINTERIA, CALIFORNIA.

METHOD OF AND APPARATUS FOR PUMPING OIL-WELLS.

966,772.

Specification of Letters Patent.

Patented Aug. 9, 1910.

Application filed January 16, 1908. Serial No. 411,196.

To all whom it may concern:

Be it known that I, ANDREW SATTLER, a citizen of the United States, residing at Carpinteria, in the county of Santa Barbara and State of California, have invented a new and useful Method of and Apparatus for Pumping Oil-Wells, of which the following is a specification.

In pumping the California oils from wells great difficulty has been experienced owing to their extreme thick, viscous nature caused by the presence of such excessive quantities of asphaltum as are found in many of the wells, and also to the presence of so much sand which is mixed or commingled with the oil. In pumping such oils it has been found that the movement of the oil is so slow and sluggish that it is very difficult to get it into the pump barrel, even when the barrel has been submerged to a considerable depth, and after it has been drawn into the pump further difficulty has been encountered in forcing it past the valves and up through the tubing and, especially, past the joints or couplings of the sucker rod. On account of these difficulties, many good wells are standing idle to day owing to the fact that the cost of pumping exceeds the value of the product, or leaves such a narrow margin that it does not pay to operate the wells.

I have discovered that by introducing a very small quantity of lubricant, as it were, into the crude oil the latter will be so cut chemically, or rendered liquescent that it can be readily drawn into the pump and easily raised to the surface. I have further found that ordinary distillate, costing from two to five cents a gallon, makes a very efficient lubricant even when introduced in a very small quantity compared with the amount of oil that can be readily pumped thereby, thus permitting of oil, worth from sixty to ninety cents a barrel, being pumped out of an otherwise unprofitable well at an expenditure of only a few cents. This lubricant may be applied in any desired manner, but I preferably introduce it upon the exterior of the pump tube, as by means of an extra pipe of exceedingly small diameter, which can be inserted into the well to any desired depth alongside of the pump tubing. In this manner the lubricant can be delivered to the crude oil just as it is entering the lower end of the pump, as through the ordinary perforated strainer, which will cause it to be so thoroughly mixed or commingled with

the crude oil that said oil will readily pass up through the valves of the pump and can be lifted up through the pump tubing with great ease and rapidity. I have further found that by introducing a stream of water into the pump barrel that any sand or sediment that may have become packed therein or in the tubing above the pump may be readily forced or washed out at the top of the well and the pump thereby cleansed and restored to perfect working order without the great expense of having to remove the pump and its accessories, as must be done to day. The water can be introduced through an additional pipe in the same manner as the lubricant, or the same pipe can be utilized for both, the necessary arrangement being made at the lower end for delivering the water to the pump barrel and the oil to the intake as may be desired.

Another object of the invention is to separate the lubricant or distillate from the crude oil after it has been drawn out of the well and then using the lubricant to discharge more oil in the same manner as it was done originally, thereby permitting of the same distillate being used over and over again, which, necessarily, reduces the cost of the process of pumping to a minimum.

In the accompanying drawings which illustrate the invention; Figure 1 is a vertical, sectional view of an oil well provided with my apparatus adapted to be used in accordance with my method or process. Fig. 2 is a vertical, sectional view of the lower end of a well casing with my apparatus in position therein. Fig. 3 is a transverse, sectional view on the line x^3-x^3 of Fig. 2. Fig. 4 is a vertical, sectional view of one of the joints of the delivery pipe showing the use of the strainer. Fig. 5 is a broken, vertical, sectional view of the pumping mechanism, showing the method of connecting the water supply pipe thereto.

Referring more particularly to the drawings, which are for illustrative purposes only and, therefore, are not drawn to any particular scale; 1 indicates an oil well pump of any ordinary size and depth in which is inserted, in the usual manner, the casing 2.

Located within the casing 2 is the ordinary pump tubing 3 which is connected at its joints by couplings 4 and within which is reciprocally mounted the usual piston and sucker rod 6, the latter being operated

in the usual manner by a walking beam 7. An ordinary standing valve 8 is located at the lower end of the pump barrel 9 and an ordinary perforated strainer 10 is preferably secured to the lower end of the standing valve 8 in the ordinary manner.

When distillate is introduced by means of the pipe, as shown at 11, the upper end of the pipe may be connected with a pump 12, when force is needed in addition to gravity to cause the distillate to be carried down into the crude oil in the well. In the drawings, the lower end of the pipe 11 is shown as terminating adjacent to the upper holes in the strainer 10, although it may be made to terminate at any other point and still come within the spirit of my invention.

As the amount of distillate necessary to lubricate the thickest and lowest grade of oil is very small, it can be successfully delivered through pipe of extremely small caliber, three-fourths of an inch having been found sufficient to cause wells that could not otherwise be pumped with profit to be pumped as easily as though the crude oil were of an exceedingly high grade. In order to prevent such a frail pipe from being broken or damaged when used in connection with such heavy and cumbersome material as the pump casing, etc., I have found it desirable to provide braces or stays at intermediate points down the length of the well tubing, as, for instance, by providing each coupling 4 with a laterally extending arm or bracket 14. The outer end of each bracket is perforated through which the pipe 11 extends and the pipe sections are preferably made of the same length as the tube sections so that the couplings 15 of the pipe can rest upon the brackets 14 and thereby take the great strain off of the pipe sections which must result when the well is of a depth of thousands of feet. In this manner by arranging the arms in alignment with each other and forming the perforations therein only large enough to permit of the passage of the pipe sections, the pipe may be located very close to the tubing and thus permit of a pump of comparatively large caliber or capacity being inserted into a casing of comparatively small diameter or area.

At the top of the well where the pipe 11 is connected with the pump 12 a strainer 16 is preferably inserted where the ends of two sections are joined or connected by the coupling 17, as shown in Fig. 4. This will prevent any large particles of matter being carried down into the distillate pipe which might obstruct or clog up the pipe so as to prevent the distillate or lubricant being delivered to the oil at the lower end of the pipe.

When the crude oil is delivered at the top of the well it preferably passes through a pipe 18 into a tank 19, or directly into a

still 20. If the still is of sufficient capacity, the oil is passed directly thereinto and the tank is only used for surplus oil and from which the oil can be fed to the still as needed, through a pipe 21.

The still is heated in the ordinary manner by a steam boiler 22 and the treated oil is discharged from the pipe 23 into any suitable receptacle or reservoir, not shown. During the process of distillation of the crude oil the heat from the steam boiler is sufficient to volatilize the distillate which has been used as the lubricant for pumping the crude oil, as above described, which distillate and any other light oil which may be in the crude oil is driven off from the still through a pipe 24 into a condenser 25 from which it may be delivered to the tank 26 through a pipe 27 or through a pipe 28 into any other receptacle, not shown. From the tank 26 the distillate passes into the pump 12 through the pipe 29 from whence it is again passed down the pipe 11 in the same manner as heretofore described.

From the above description, it is evident that by means of my method and improved apparatus oil of such heavy nature as is impossible to be pumped in any other manner can be readily and cheaply pumped at a cost that is insignificant compared with the value of the oil that can be secured. It also avoids the necessity of again treating the oil at the top of the well, as by heating it in order to get it into the still as must be done where the oil has been heated in the well by the introduction of steam to render it more liquescent, as heretofore done.

When it is desired to cleanse the pump and tubing from the accumulation of sand or other sediment, a stream of water or other thin fluid is preferably introduced into the pump barrel between the piston 8 and a valve 8', as shown in Fig. 5. In this construction, the lower end of the pipe 11 is provided with an L coupling 30 and a nipple 31 which communicates with the interior of the pump barrel 9. A bracket 14 is preferably located directly below the lower end of the pipe 11 and nipple 31 to prevent the latter from being broken off when the pump tubing is being introduced into the well.

When using this structure the upper end of the pipe 11 can be connected with the pump 12 in the same manner and the pump may be provided with water instead of distillate which will thereby be forced down into the pump barrel with such force and volume as will cause all of the oil, sand and sediment therein and within the pump tubing to be forced out of the tubing of the well and the pump thereby again placed in order without the necessity of lifting the same out of the well as has been necessary with structures heretofore used. Instead of using water, distillate could be used in the

same manner, as there is substantially no loss of the distillate when run through the tanks and still as heretofore described, but it is more desirable to use the water. After the pump and tubing have been cleansed in this manner the pump is operated in the same manner as before which will soon discharge the cleansing element and will begin to pump the crude oil in the same manner, as when the pump was ordinarily operated in the well.

Having described my invention, I claim;

1. The herein described method of pumping oil wells, which consists in commingling a lubricant with the crude oil, then pumping said treated oil from the well, then distilling the same and driving off such lubricant, condensing said lubricant, and then again using said lubricant for successively introducing it into the well and commingling it with additional crude oil.

2. The herein described process of pumping oil wells, which consists in introducing

a sufficient quantity of a material having less viscosity than the crude oil to render the oil so liquescent as to permit of its being forced out of the well together with such sediment as may have collected in the pump, then forcing said oil and sediment out of the well, and then operating the pump in the usual manner.

3. In an apparatus for pumping oil wells, a pump, a still connected therewith, a tank connected with the still adapted to receive the lighter portion of the oil, a pump connected with said tank and a pipe connected with said last mentioned pump extending down into the well in position to deliver said lighter oils to the crude oil in the well.

In testimony whereof, I have hereunto set my hand at Carpinteria California this 6th day of January 1908.

ANDREW SATTLER.

In presence of—

P. C. HIGGINS,

E. P. STEVENS.