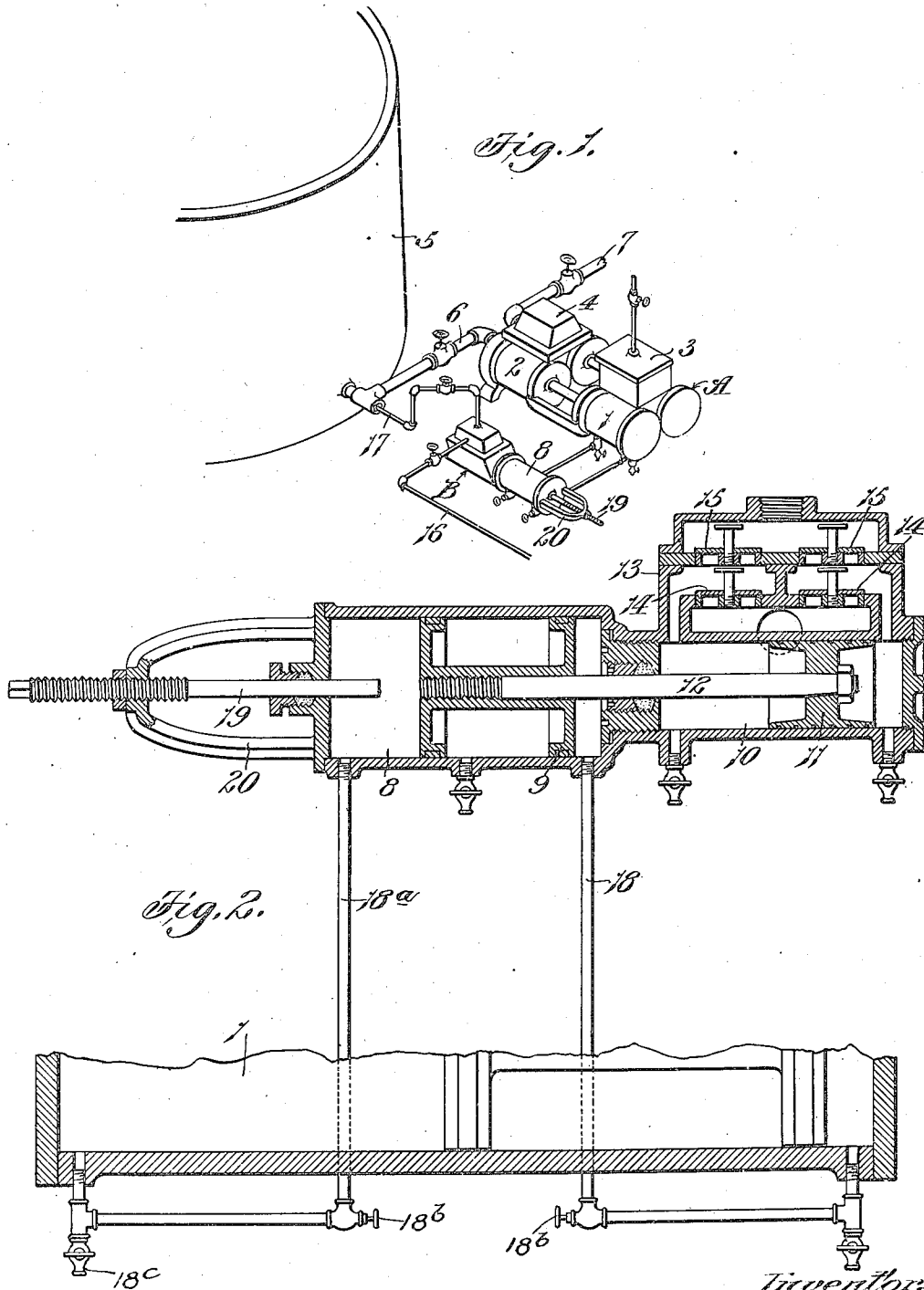


W. S. BARNICKEL.
PUMPING APPARATUS.
APPLICATION FILED AUG. 5, 1918.

1,375,200.

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PUMPING APPARATUS.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, WILLIAM S. BARNICKEL, a citizen of the United States, residing at St. Louis, Missouri, have invented a certain new and useful Improvement in Pumping Apparatus, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to apparatus of the type that are used for simultaneously pumping two or more streams of liquid of different volumes.

One object of my present invention is to provide a pumping apparatus of the general type referred to which is so constructed that it can be adjusted easily to vary the volume of one of the streams of liquid without varying the volume of the other stream or streams pumped by the apparatus.

Another object is to provide a pumping apparatus of the general type referred to which is so constructed that it can be successfully used for simultaneously pumping two streams of liquid, the volume of one of which is infinitesimally small as compared with the volume of the other stream.

Another object is to provide a pumping apparatus of the kind referred to which is so constructed that the means which pumps the small stream can be adjusted easily while the apparatus is in operation so as to increase or diminish the volume of the small stream without interfering with or changing the operation of the means that pumps the large stream.

Another object is to provide a pumping apparatus that consists of a proportional pump and a main pump combined in such a manner that the operating medium used to actuate the main pump is also used to actuate the proportional pump, and furthermore, is controlled solely by the governing device on the main pump that controls the supply of operating medium to said main pump.

And still another object is to provide a proportional pump of novel construction that can be easily combined with various types of pumps operated by steam or other expansible mediums without mechanically connecting the piston of the proportional pump with the piston or other moving part of the pump with which it is combined.

Other objects and desirable features of my invention will be hereinafter pointed out.

Figure 1 of the drawings is a perspective view of a multiple stream pumping apparatus constructed in accordance with my invention; and

Fig. 2 is a vertical sectional view of the proportional pump and part of the main pump with which it is used.

My apparatus can be used in numerous arts for handling various kinds of liquids, but it is particularly adapted for use in an oil treating apparatus of the kind described in my pending application Serial Number 248,422, filed August 15, 1918, owing to the fact that it is capable of drawing an infinitesimally small quantity of liquid from a source of supply and introducing it into a relatively great quantity of liquid that is drawn from a separate source of supply. It is also particularly adapted for use with an oil treating apparatus of the kind referred to, owing to the fact that the proportional pump which forms part of my present apparatus is of such design that it can be easily hooked up with or combined with pumps of the kind generally used in the oil fields for pumping oil through pipe lines. While I have herein illustrated my invention embodied in an apparatus provided with means for pumping two streams of liquid of different volumes, I wish it to be understood that it is immaterial, so far as my invention is concerned, whether the apparatus is constructed to handle two streams or more than two streams.

Referring to the drawings which illustrate the preferred form of my invention, A designates a pump that I will designate as the main pump and B designates a proportional pump that is combined with the main pump A in such a manner that the operating medium used to actuate the pump A is also used to actuate the proportional pump B, and furthermore, is governed by the device on the pump A that controls the admission and exhaust of the operating medium to and from the operating cylinder of said main pump A. The pump A preferably consists of a duplex steam pump that comprises operating cylinders 1, pumping cylinders 2, a steam chest 3 provided with a D-valve of conventional form for governing the admission of steam to and from the operating cylinders and a valve

casing 4 provided with two sets of inlet valves and exhaust valves, said pump A being used for drawing a stream of liquid of relatively great volume from a supply tank 5 through an inlet pipe 6 leading from said supply tank to the inlet of the pumping cylinders of the pump A and then forcing said stream through a discharge line 7. The proportional pump B is of the same general construction as the main pump A; but it is infinitesimally small as compared with the pump A. For example, the proportional pump can have a $1\frac{1}{4}$ inch bore and a $2\frac{1}{2}$ inch stroke and the main pump A a 6 inch bore and a 10 inch stroke. The respective sizes of the pumps A and B, of course, are immaterial, but the point that I desire to emphasize is that the proportional pump may be made small enough so that it will handle only a fraction of the quantity of liquid handled by the pump A.

The proportional pump B comprises an operating cylinder 8 provided with a piston 9, a pumping cylinder 10 provided with a piston or plunger 11 which is connected by means of a rod or stem 12 to the piston 9 of the operating cylinder and a valve casing 13 mounted on the pumping cylinder 10 and provided with a pair of inlet valves 14 and a pair of discharge valves 15, said valve casing having an inlet pipe 16 that leads from a supply of liquid and a discharge pipe 17 that leads to the inlet pipe 6 through which the liquid from the supply tank 5 is drawn into the pumping cylinders of the main pump A. The opposite ends of the operating cylinder 8 of the proportional pump are connected by means of pipes 18 and 18^a to the opposite ends of one of the operating cylinders 1 of the main pump A, so as to cause steam to be admitted to and exhausted from the operating cylinder 8 of the proportional pump when steam is admitted to and exhausted from the opposite ends of the operating cylinders of the main pump A by means of the D-valve arranged in the valve chest 3 of the main pump. By combining the proportional pump B with the main pump A in this manner I obtain simultaneous operation of both pumps without the aid of any mechanical connection between the pistons or other moving parts of the pumps. Furthermore, I insure a uniform quantity of liquid being drawn into and discharged from the pumping cylinder of the proportional pump at each cycle of operations of the apparatus, which quantity of liquid bears a certain definite or fixed relation to the quantity of liquid handled by the main pump A at each cycle of operations of the apparatus. In order that the apparatus may be adjusted so as to vary the size or volume of one of the streams handled by the apparatus without varying the size or volume of the other stream, I

have provided the proportional pump with an adjustable means that can be set in various positions so as to increase or decrease the stroke of the pistons in the operating cylinder and pumping cylinder of the proportional pump without changing the stroke of the pistons in the operating cylinders of the main pump A. Said means preferably consists of an adjustable stop 19 that projects inwardly through a stuffing box in the head of the operating cylinder 8 of the proportional pump B, said stop being adjustably mounted in a yoke 20 mounted on the head of the cylinder 8. By adjusting the stop 19 inwardly the stroke of the pistons in the operating cylinder and pumping cylinder of the pump B can be reduced so as to diminish the quantity of liquid drawn into and discharged from the pumping cylinder of the proportional pump B at each cycle of operations of the apparatus, and by moving said adjustable stop in the opposite direction the stroke of said pistons can be increased so as to increase the supply of liquid drawn into and discharged from the pumping cylinder of the proportional pump. A means of the construction above referred to for varying the volume of the stream of liquid handled by the proportional pump is of simple design; it is efficient and it enables the proportional pump to be adjusted while the apparatus is in operation. It is, of course, obvious that any change in the adjustment of the proportional pump has absolutely no effect on the quantity of liquid handled by the main pump A.

When the apparatus is in operation the main pump A will draw a definite quantity of liquid from the source of supply contained in the tank 5 at each cycle of operations of the apparatus, and the proportional pump will draw a definite quantity of liquid through the supply line 16 and introduce it into the stream of liquid flowing through the discharge pipe 6 leading from the supply tank 5. If the position of the stop 19 is not changed the volume of the two streams handled by the main pump A and the proportional pump B will remain constant, thereby causing a definite quantity of liquid from one source of supply to be introduced into a definite quantity of liquid drawn from a separate source of supply at each cycle of operations of the apparatus. If it is desired to vary the volume or the quantity of liquid handled by the proportional pump B either to increase or diminish same, this can be effected easily by simply adjusting the stop 19 in the proper direction, and furthermore, without the necessity of shutting down the apparatus while the adjustment is being made. It is, of course, immaterial whether or not the discharge pipe from the proportional pump leads into the inlet pipe through which liquid is drawn into the

pumping cylinder of the main pump, as my broad idea consists of a proportional pumping apparatus provided with independently-operating means, actuated by the same operating medium, for simultaneously pumping two or more streams of liquid from the same or from different sources of supply. The relative capacities of the main pump and the proportional pump are, of course, immaterial, but one desirable feature of a pumping apparatus of this construction is that the means which handles one of the streams can be infinitesimally small as compared with the means that handles the other stream. Consequently, the apparatus herein illustrated is particularly adapted for use in an oil treating apparatus of the kind described in my pending application previously referred to, owing to the fact that it is sometimes necessary to mix the treating solution with the oil being treated in proportions of about six barrels of treating solution to one thousand or two thousand barrels of oil. Another characteristic of the proportional pumping apparatus herein illustrated which makes it particularly adapted for use with an oil treating apparatus, is that the proportional pump B can be easily combined with or hooked up with pumps of the kind that are generally used in the oil fields for forcing oil through pipe lines, owing to the fact that there is no mechanical connection between the pistons or moving parts of the respective pumps. The pipes 18 and 18^a that connect the operating cylinder 8 of the proportional pump with the opposite ends of one of the operating cylinders of the main pump are preferably provided with valves 18^b, so as to enable the proportional pump to be cut out of service in case it is desired to use the main pump independently of the proportional pump. The horizontal branches of said pipes are also provided with drain cocks 18^c, as shown in Fig. 2, so as to enable the cylinders of both pumps to be drained when the apparatus is not in use.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. A pumping apparatus, comprising a reciprocating proportional pump provided with means for enabling the volume or quantity of the stream pumped by same to be increased or diminished, a main pump of the reciprocating type, and conduits separate

and distinct from the supply and exhaust pipes of said main pump that lead from the opposite ends of the cylinder of said proportional pump to the corresponding ends of the cylinder of the main pump.

2. A pumping apparatus, comprising a main steam pump provided with an operating cylinder and a piston reciprocatingly mounted in said cylinder, a valve for controlling the admission and exhaust of the steam to and from said cylinder, a proportional pump comprising an operating cylinder and a pumping cylinder, and means separate and distinct from the supply and exhaust pipes of said steam pump for establishing connection between the opposite ends of the cylinder of the steam pump and the corresponding ends of the operating cylinder of the proportional pump.

3. A pumping apparatus, comprising a main steam pump provided with an operating cylinder and a piston reciprocatingly mounted in said cylinder, a valve for controlling the admission and exhaust of the steam to and from said cylinder, a proportional pump comprising an operating cylinder and a pumping cylinder, means separate and distinct from the supply and exhaust pipes of said steam pump for establishing connection between the opposite ends of the cylinder of the steam pump and the corresponding ends of the operating cylinder of the proportional pump, and an adjustable means for governing the stroke of the piston in the operating cylinder of the proportional pump.

4. A pumping apparatus composed of a proportional pump comprising an operating cylinder and a pumping cylinder, an inlet valve and a discharge valve for said pumping cylinder, pistons in said cylinders mechanically connected together, an actuating pump combined with said proportional pump and provided with a cylinder to which an operating medium is supplied and exhausted, and conduits separate and distinct from the supply and exhaust pipes of the actuating pump that connect the opposite ends of the cylinder of said actuating pump with the opposite ends of the operating cylinder of the proportional pump for admitting and exhausting the operating medium to and from the operating cylinder of said proportional pump.

WILLIAM S. BARNICKEL.