No. 666,842.

Patented Jan. 29, 1901.

H. L. ARNOLD.

FLUID SUPPLY PUMP.

(Application filed July 5, 1900.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1.

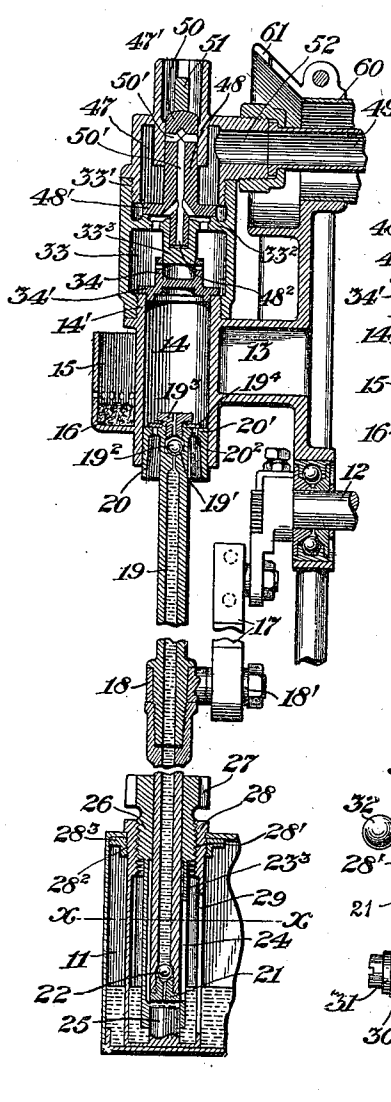

Fig. 2.

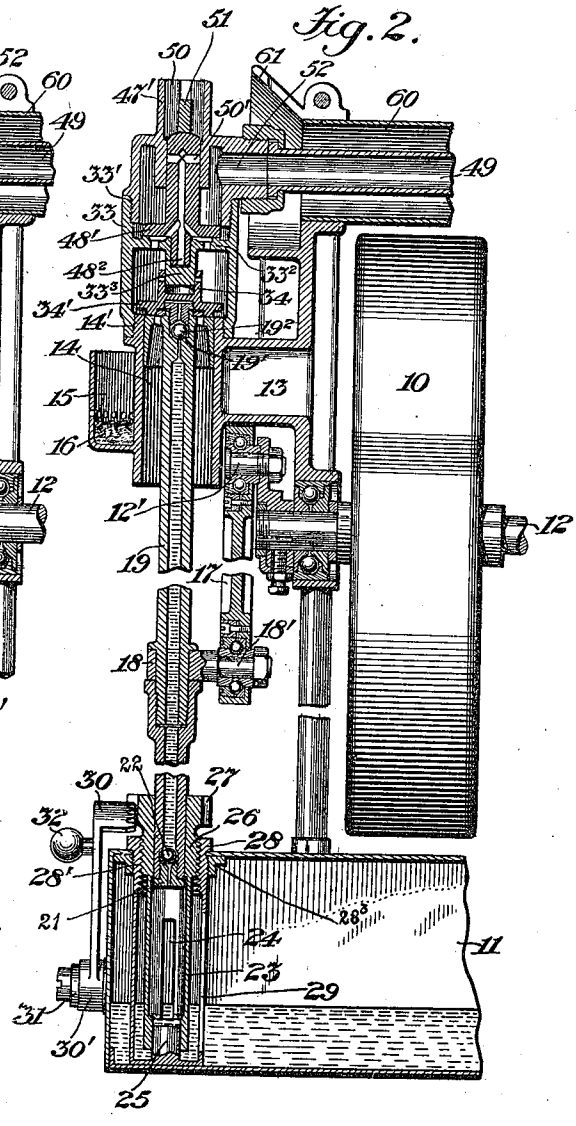

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Fig. 3.

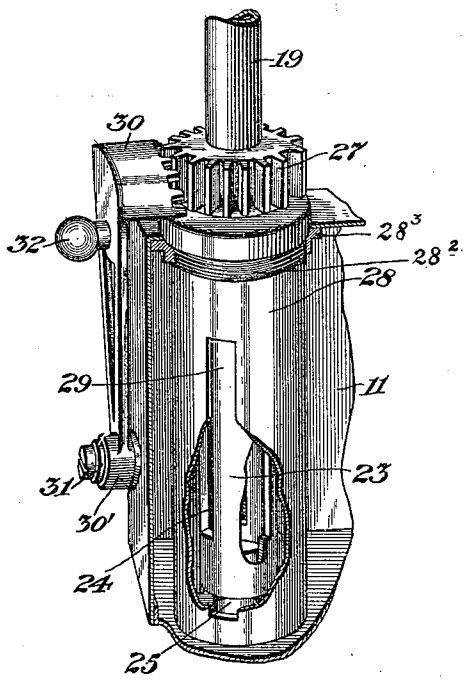


Fig. 4.

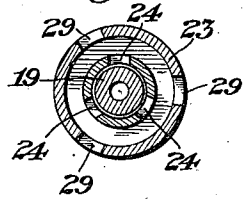


Fig. 5.

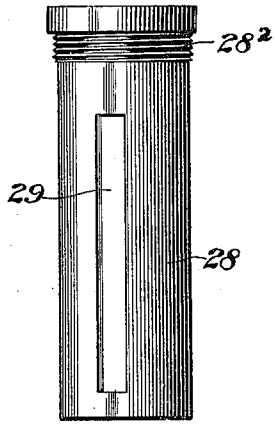
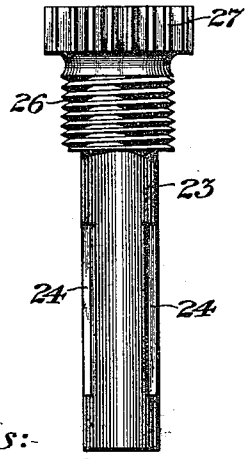


Fig. 6.



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UNITED STATES PATENT OFFICE.

HORACE L. ARNOLD, OF NEW YORK, N. Y.

FLUID-SUPPLY PUMP.

SPECIFICATION forming part of Letters Patent No. 666,842, dated January 29, 1901.

Original application filed February 17, 1900, Serial No. 5,576. Divided and this application filed July 5, 1900. Serial No. 22,543. (No model.)

To all whom it may concern:

Be it known that I, HORACE L. ARNOLD, a citizen of the United States, residing in the city of New York, borough of Brooklyn, county of Kings, State of New York, have invented certain new and useful Improvements in Fluid-Supply Pumps, of which the following is a specification.

This invention relates to feed-pumps for supplying regulable charges of material, and is shown employed in connection with what are known as "combustion-engines," although it is not limited to such use.

Primarily the object of the invention is the provision of a pump the action of which may be regulated with precision, so that any desired quantity of material may be supplied thereby.

A further object of the invention is the provision of a feed-pump consisting of a cylinder and its plunger, one of said parts being adjustable with relation to the other to vary the amount of material delivered by the pump.

A further object of the invention is the provision of a feed-pump the reciprocatory plunger of which is driven by the crank-shaft of an engine, a pump-cylinder having a suitable slot or port to permit the entrance of material, a stationary plug or piston mounted within said cylinder, and means for adjusting the cylinder over said plug, whereby a charge of fixed quantity regulable to the proportions desired may be delivered by the pump.

A further object of the invention is the provision of means for adjusting the pump-cylinder with reference to the stationary plug or piston.

A further object of the invention is the provision of a tubular plunger driven by the crank-shaft of an engine and equipped with suitable valves and in connection with said plunger a slotted pump-cylinder and means for adjusting said cylinder so that the amount of material delivered through the plunger may be regulated as desired.

My invention is shown applied to the form of combustion-motor illustrated and described in my application filed February 17, 1900, Serial No. 5,576, of which the present application is a division.

In the accompanying drawings, in which like numerals designate like parts throughout the several views, Figure 1 is a longitudinal vertical section of part of a combustion-motor of the type mentioned in my application aforesaid, showing my invention applied thereto and the piston at about the limit of its downward stroke. Fig. 2 is a view similar to Fig. 1 of the vaporizing and combustion devices of the motor, showing a fly-wheel and an engine crank-shaft in elevation, the parts being represented with the piston at the limit of its upward stroke within the charge-compressor cylinder. Fig. 3 is a perspective view of the pump-cylinder, showing a portion of the tank in which the material to be delivered by the pump is contained in section. Fig. 4 is a cross-section of the pump-cylinder, the tubular plunger, and the well surrounding said cylinder, taken on line $x\,x$, Fig. 1, looking upward. Fig. 5 is a side elevation of the slotted well in which the pump-cylinder is located detached. Fig. 6 is a side elevation of the pump-cylinder detached.

My invention may be applied to any suitable motor, as above stated, and the fly-wheel of a motor to be employed in connection therewith is designated by the numeral 10 and the crank-shaft of the engine on which said fly-wheel is mounted by the numeral 12.

Connected to a part of the frame 13 of the motor or constituting an integral portion thereof is a charge-compressor cylinder 14, shown as provided on its exterior surface with a brazier or igniting device 15, in which a wick of asbestos or other material 16 may be placed, said wick being charged with combustible material, so that upon the ignition thereof the flame generated will heat the charge-compressor cylinder to the desired degree. Any other form of charge-igniting device may, however, be substituted for the brazier and wick shown.

Sleeved on the crank 12′ of shaft 12 is a pitman 17, having a ball-bearing connection with the stem 18′ of a cross-head 18, movable back and forth in ways, (not shown,) and attached in the exemplification of the invention shown to a tubular pump-plunger 19, provided at one end with a piston 20, the head 20′ of which is perforated at 20^2 for a purpose hereinafter de-

scribed. At its opposite end the tubular plunger 20 is provided with a perforated head 21, in a seat of which a ball-valve 22 is placed, said valve opening upward, and the plunger reciprocates in a pump-cylinder 23, provided with a series of slots 24, and fitted at its lower end over a stationary plug 25, located in the bottom of a chamber or well 28, secured to the tank 11. At the end opposite to said stationary plug the pump-cylinder is enlarged and exteriorly threaded at 26 and is provided with a gear 27 of any desired kind. The chamber or well 28 has a series of slots 29 for the admission of material from the tank, and at its upper end this well 28 is internally threaded at 28′ to receive the externally-threaded portion 26 of the pump-cylinder 23, and is externally threaded at 28^2 to receive a flanged nut 28^3, by means of which it is secured to the tank.

As a convenient device for actuating the gear 27 I have provided a sector 30, the hub 30′ of which is pivotally secured on a stud 31, projecting from the tank 11, a suitable handle 32 being attached to said sector for manipulating the same. Any suitable means may, however, be employed for actuating the geared segment.

By adjusting the cylinder 23 over the plug 25 in an upward direction a larger space or pocket is formed between the end of the plunger 19 and the top of the plug 25, and consequently more material will be delivered to the charge-compressor cylinder 14, and when this cylinder is lowered a smaller pocket is formed, and therefore a charge of less quantity will be delivered. It will be noticed that the slots 24 of cylinder 23 terminate some distance from the lower end of said cylinder, thereby leaving an unbroken cylindrical portion surrounding the plug and which when the cylinder is adjusted constitutes a pocket of the desired size between the end of the plug and the lower end of the plunger 19 when the latter is in its lowest position, all material except that retained in said pocket escaping when displaced by the plunger through the slots 24. In this way a fixed charge of the desired quantity, variable at will, may be added to the column in the tubular plunger, and as the column is augmented in the manner described it is obvious that a like charge will be delivered through the plunger into the cylinder 14 at each downward stroke of the piston.

At its upper end the tubular plunger 19 is provided with a seat 19′ for the reception of a ball or other desired kind of valve 19^2, which opens upward, and surrounding the stem of the flanged head 19^3 of the plunger is a disk-shaped valve 19^4, which on the downward stroke of the plunger will permit the entrance of air through the ports or openings 20^2 of the head thereof into the cylinder, said valve on the upward stroke of the plunger to compress the charge being forced downward tightly to close the openings in the charge-compressor piston 20.

At its upper end the charge-compressor cylinder 14 may be in communication with any suitable means for completing the combustion of the charge and for conveying the pressure generated by such combustion through a suitable conduit to the cylinder of an engine. In the present case the means for accomplishing this purpose are the same as those set forth in the application above mentioned and will now be briefly described.

At its upper end the charge-compressor cylinder 14 is threaded at 14′, and to this threaded portion a chamber 33 is secured, having an upper internally-threaded end 33′, an intermediate perforated diaphragm 33^2, and a plug or piston 33^3, projecting downward from said diaphragm. Fitted over this plug or piston is a valve 34, a flanged portion 34′ of which normally rests upon the upper end of the charge-compressor cylinder, and this valve is chambered out where it fits over the piston 33^3, and the two combined constitute a dash-pot for cushioning the stroke of the valve and absorbing the shock thereof.

Threaded into the upper end of the combustion-chamber and pressure-receiving chamber 33 is a chamber 47, and within this chamber 47 is a loaded pressure-valve 48, having a face 48′ normally resting upon a seat of the diaphragm 33^2, which valve obstructs the passage of gas under pressure from the chamber 33 to a motor-supply pipe 49 until the gas in said chamber 33 obtains sufficient tension to open the valve 48, whereby there is pressure established in the charge-compressor cylinder 14 sufficient to insure the combustion of a charge.

To economize construction, the pressure-valve 48 is formed with an extension constituting a piston safety-valve 50, having ports 50′, and said valve may be loaded by any desired means—for instance, by a lever 51—to which a spring or weight (not shown) may be applied. Ports 50′ of the valve 50 place it in communication between the gas under tension and the atmosphere when the valve is sufficiently opened, and it is to be understood that the ports will be so proportioned that valve 48 may open to establish communication between the chamber 47 and the motor-supply pipe 49 without release of the gas under pressure from chamber 47, but when the pressure increases beyond the desired limit an additional opening movement of the valve will take place, which will bring the safety-valve 50 into action and permit the gas to escape through the ports thereof until the normal pressure for which the valve is set is reestablished. At its lower end valve 48 is provided with a perforated stem 48^2, which is received in a socket of the piston 33^3.

The chamber 47 has a cylinder 47′ for receiving the stem of the safety-valve 50, and has at one side a passage 52, communicating

with the motor-supply pipe 49. This supply-pipe 49 may be mounted within a tube 60, having a flared end 61, said tube being located at the top of the motor-frame, and through it currents of air will pass for the purpose of surrounding and cooling said pipe, and at its other end the pipe 49 will be placed in communication with a port leading to the cylinder of the motor. (Not shown.)

If an excess of fluid is being supplied, causing too great a speed of the motor, the feed-pump is adjusted to deliver less fluid to the charge-compressor cylinder, and if not enough fluid is being fed to said cylinder an adjustment is made to cause more fluid to be delivered thereto, the only essential condition being that the pump-plunger shall not be heated to such a degree that vaporization of the fluid in the reservoir or tank and its immediate accessories will take place.

It will be seen that in the construction described a long slender column of the fluid to be vaporized is supported within the feed-pump plunger, and it is immaterial at what point in said column vaporization of the fluid begins before the fluid is augmented by an increment variable at will.

By locating the feed-pump in the fluid-receptacle the strokes of the plunger thereof agitate and mix the fluid to be vaporized, so that there is no tendency to deliver either the lighter or the heavier parts of said fluid separately to the charge-compressor cylinder and combustion-chamber.

After a charge delivered by the pump-plunger has been consumed the charge-compressor cylinder 14 is maintained at a temperature sufficient to cause the ignition of succeeding charges, and when the liquid fuel first placed in the brazier is exhausted ignition will continue to take place without the necessity of any special device for this purpose, said brazier ignition being suitable for a motor-cycle or motor-bicycle, as it demands no attention after starting, and the driver or rider is left free for other duties.

Many details of the invention could be variously modified, and it is not limited to the vertical disposition of the parts shown and described, for they may be arranged horizontally or in any other desired manner. Neither is the invention limited to the specific construction of the feed-pump or fluid-supply devices, for many modifications could be made therein without departure therefrom.

Having thus described my invention, I claim—

1. A pump comprising a pump-cylinder provided with a slot between the extremes of movement of the face of the pump-plunger; a tubular pump-plunger coöperating therewith; means for adjusting one of said parts with relation to the other, whereby the amount of material delivered by the pump may be regulated as desired; a valve in said plunger; and a fixed plug entering one end of the pump-cylinder.

2. The combination, with a slotted fluid-well, of a pump-cylinder having longitudinal slots in its sides communicating with said well; a tubular plunger; valves adjacent to the ends of said plunger; means for adjusting the pump-cylinder; and a plug projecting from the well, and over which said cylinder may be adjusted.

3. The combination, with an internally-threaded fluid-well, of a tubular pump-plunger; valves in said plunger; a slotted externally-threaded pump-cylinder carrying a gear; a stationary plug projecting from the well and fitting the bore of said cylinder; a fluid-receptacle; and a gear pivoted to said receptacle and in engagement with the gear of the pump-cylinder.

4. The combination, with a pump-plunger, of an open-ended cylinder provided with slots between the extremes of movement of the face of the pump-plunger; a fluid-well in which the cylinder is adjustably mounted; means for adjusting the pump-cylinder with relation to said well; and a stationary plug projecting from the well and fitting the end of said cylinder.

5. The combination, with a fluid-receptacle, of a slotted well having a closed bottom, said well being internally threaded at its upper end; a stationary plug projecting from the bottom of said well; a cylinder threaded to engage the well and provided with slots between the extremes of movement of the face of the pump-plunger; a tubular pump-plunger coöperating with the cylinder and plug; and a valve in said plunger.

6. The combination, with a fluid-receptacle, of a slotted well threaded at one end and having at its opposite end a stationary plug; a cylinder also threaded and inserted in the well, said cylinder being provided with slots between the extremes of movement of the face of the pump-plunger; a coacting pump-plunger; valves in said plunger; and means for rotating and thereby adjusting the cylinder with respect to the well to vary the amount of fluid delivered by the pump.

7. The combination, with a slotted pump-cylinder, of a coacting plunger having a longitudinal delivery-duct; a stationary solid plug fitting the lower end of said cylinder; a valve near one extremity of said duct; a valve near the other extremity of said duct; and a chamber for receiving the charge delivered by the pump.

8. The combination, with an internally-threaded well, of a pump-cylinder in threaded adjustment with said well, said cylinder being provided with slots between the extremes of movement of the face of the pump-plunger; gears for adjusting one of said parts with reference to the other; a fluid-receptacle on which one of said gears is movably mount-

ed; and a tubular plunger coöperating with the pump-cylinder.

9. The combination, with a fluid-receptacle, of an internally-threaded well having a longitudinal opening; a plug in said well; a pump-cylinder; a valved pump-plunger coöperating with said pump-cylinder; a threaded connection for adjusting the pump-cylinder; a gear; and means for actuating said gear.

10. The combination, with a fluid-well, of an adjustable pump-cylinder in said well and having slots communicating therewith; a chamber; a tubular connection leading from the pump-cylinder to said chamber; and valves in said connection.

11. The combination, with a fluid-well, of an adjustable pump-cylinder in said well, said cylinder having slots communicating with the well; a tubular plunger carrying a valve at each end; means for reciprocating said plunger; a pump-cylinder in which the plunger works; and a stationary plug projecting within one end of said pump-cylinder.

12. The combination, with a fluid-supply tank, of a well detachably connected to said tank, said well having slots; a pump-cylinder in threaded engagement with the well and carrying a gear; a sector journaled on a stud projecting from the fluid-supply tank and in engagement with said gear; means for actuating said sector; a stationary plug projecting within the lower end of the pump-cylinder; a tubular plunger; valves located in each end of said plunger; a crank-shaft; and means connecting said crank-shaft with the plunger.

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