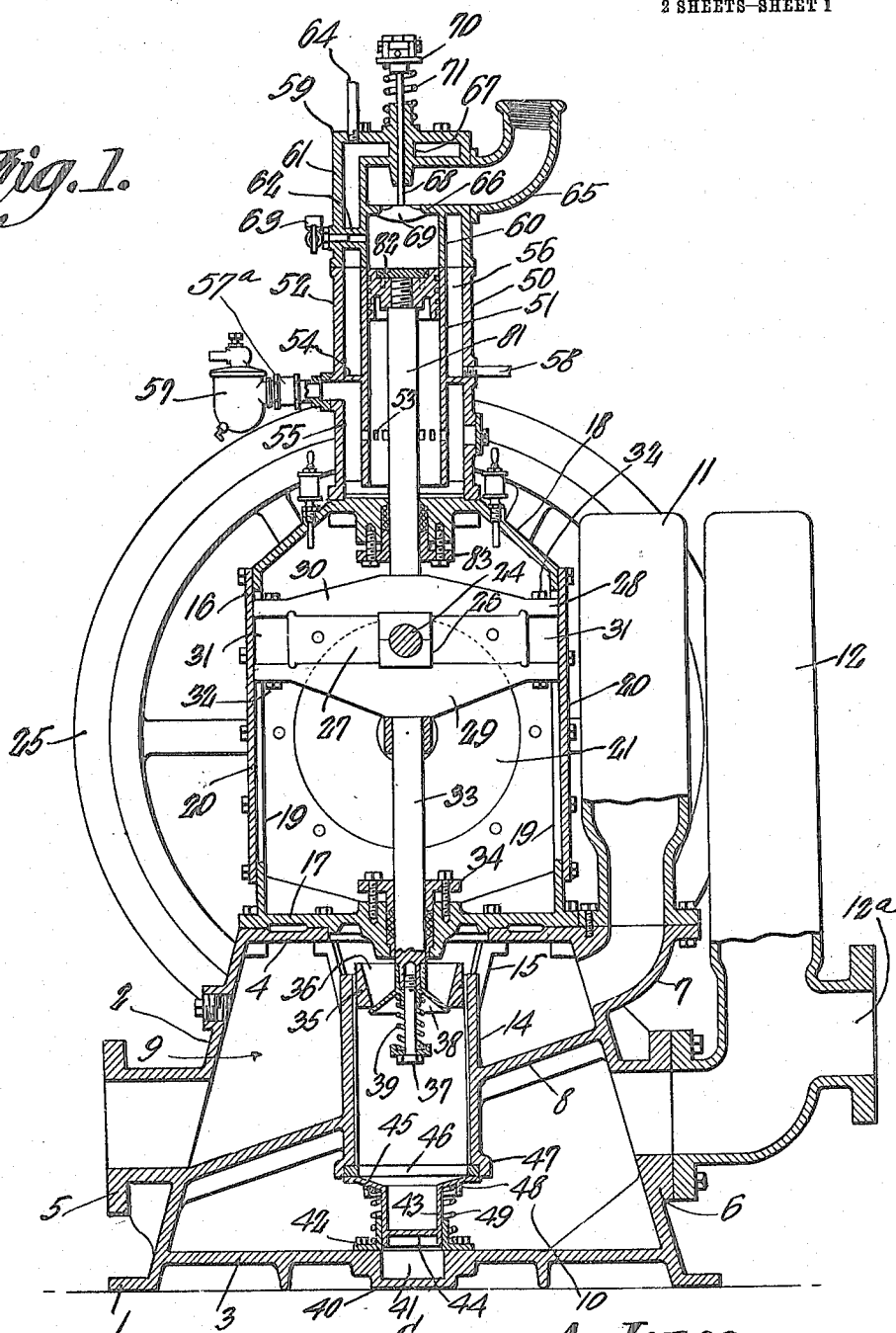


INTERNAL COMBUSTION PUMPING ENGINE.

1,135,587.

Patented Apr. 13, 1915.

2 SHEETS—SHEET 1



J. P. Gorman
to
J. H. W. Shaw.

George A. Jones

Inventor

by

Cashworth

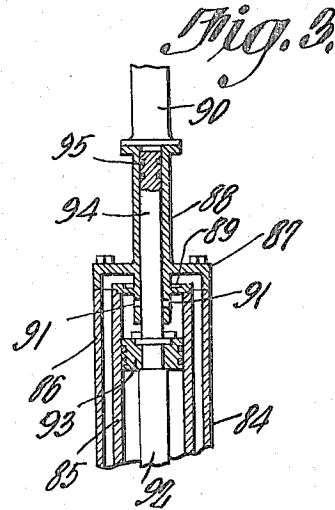
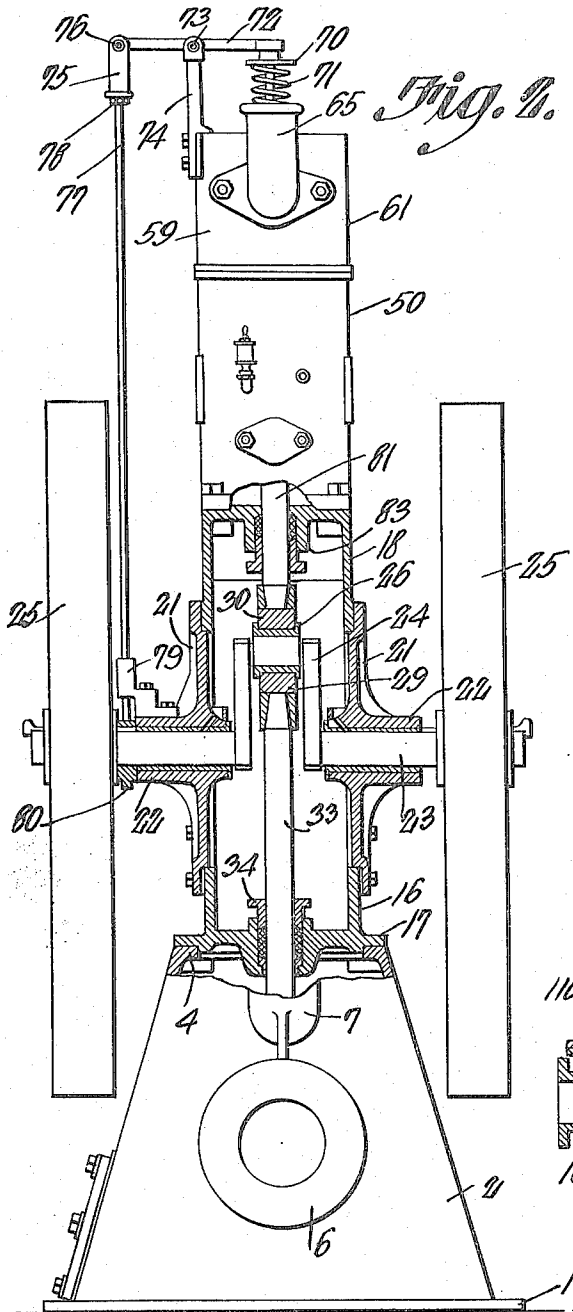
Attorneys

G. A. JONES.
INTERNAL COMBUSTION PUMPING ENGINE.
APPLICATION FILED AUG. 24, 1912. RENEWED FEB. 9, 1915.

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2 SHEETS—SHEET 2.



UNITED STATES PATENT OFFICE.

GEORGE A. JONES, OF SEATTLE, WASHINGTON.

INTERNAL-COMBUSTION PUMPING-ENGINE.

1,135,587.

Specification of Letters Patent.

Patented Apr. 13, 1915.

Application filed August 24, 1912, Serial No. 716,855. Renewed February 9, 1915. Serial No. 7,117.

To all whom it may concern:

Be it known that I, GEORGE A. JONES, a citizen of the United States, residing at Seattle, in the county of King and State of Washington, have invented a new and useful Internal-Combustion Pumping-Engine, of which the following is a specification.

One object of the present invention is to provide a novel structure in which an engine of the internal combustion type is directly connected with a pump, novel means being interposed between the engine and the pump for regulating and controlling the action of the engine and of the pump.

A further object of the invention is to improve generally, the pumping portion of the mechanism, and to adapt the same for connection with an internal combustion engine.

With the foregoing and other objects in view, which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of invention herein disclosed can be made within the scope of what is claimed without departing from the spirit of the invention.

In the drawings,—Figure 1 shows the invention in vertical longitudinal section; Fig. 2 is an elevation, the view point in Fig. 2 being at right angles to the view point in Fig. 1, parts in Fig. 2 being broken away and sectioned; Fig. 3 is a sectional view showing a modified engine detail; and Fig. 4 is a sectional view showing a modified pump detail.

The device herein disclosed comprises, broadly speaking, a pump, an engine, and a frame interposed between the pump and the engine, the frame supporting mechanism whereby the engine is operatively connected with the pump.

In carrying out the invention there is provided a base, which is denoted generally by the numeral 1, the base 1 including a casing 2 having a bottom 3 and a top 4. An inlet pipe 5 communicates with one side of the casing 2, and an outlet pipe 6, oppositely disposed with respect to the inlet pipe 5, communicates also with the casing. Communicating with the casing 2, and located above the outlet pipe 6, is an auxiliary pipe 7. A partition 8 extends transversely of the casing 2, and divides the casing into an

intake compartment 9 and an outlet compartment 10. The partition 8 is diagonally disposed, and extends across the casing, from a point below the intake pipe 5, to a point between the pipes 6 and 7. A vacuum chamber 11 is secured to and communicates with the pipe 7, and an air chamber 12 is secured to and communicates with the pipe 6, the air chamber 12 having an outlet 12^a. The pump cylinder is denoted by the numeral 14, and preferably is fashioned integrally with the partition 8, the pump cylinder being open at both ends. The upper end of the pump cylinder 14 may be connected by means of legs 15 with the top 4 of the base.

Superposed upon and secured to the top 4 of the base 1 is a frame, denoted generally by the numeral 16. The frame comprises a bottom 17 and a top 18. The frame 16 is vertically slotted to form guides 19, and over the guides 19 are secured closure plates 20. Side plates 21 are secured to the frame, at right angles to the closure plates 20, the side plates 21 carrying bearings 22, in which is journaled for rotation a shaft 23, having a crank 24, and terminally provided with one or more fly wheels 25.

The crank 24 is engaged within a boxing 26, mounted to slide in a slot 27 formed in a cross head 28. The cross head 28 is terminally mounted for reciprocation in the guides 19, and is a composite structure. The cross head 28 comprises a lower member 29 and an upper member 30, between the ends of which, spacing blocks 31 are placed, there being securing elements 32 extended through the ends of the members 29 and 30 of the cross head 28, and through the spacing blocks 31, so as to cause the cross head to be a rigid structure. The spacing blocks 31 reciprocate in the guides 19, and thus the bearing areas of the cross head 28 are increased.

Secured to the lower member 29 of the cross head is a pump rod 33, which operates in a gland 34 carried by the bottom 17 of the frame 16. The lower end of the pump rod 33 is connected with a pump piston 35 which reciprocates in the pump cylinder 14. There is an opening 36 through the pump piston 35, and a spindle 37 protrudes from the end of the pump rod 33. The spindle 37 may be a bolt, one end of which is threaded into the pump rod. Mounted to slide upon the spindle 37 is a valve 38 which is con-

strained by means of a spring 39, to bear against the lower face of the pump piston 35, one end of the spring 39 abutting against the valve 38, and the other end of the spring 5 abutting against a head which is held upon the lower end of the spindle 37.

In the bottom 3 of the base 1 there is a depending boss 40, being provided in its upper face with a recess 41, about which is 10 secured a collar 42. A tubular valve 43 is mounted to slide in the collar 42, the valve being adapted to travel into the recess 41. Extended across the tubular valve 43, intermediate its ends, is a diaphragm 44. At 15 its upper end, the tubular valve 43 is equipped with a laterally projecting head 45, carrying a packing ring 46, seating within an outstanding flange 47 upon the lower end of the pump cylinder 14. Depending 20 from the head 45 is a lip 48, within which is disclosed one end of a spring 49, bearing against the head 45, the lower end of the spring 49 surrounding, and bearing against, the collar 42. The spring 49 serves to thrust 25 the valve 43 toward the pump cylinder 14, and to cause the packing ring 46 to be engaged within the flange 47 of the pump cylinder, a yieldable closure for the lower end of the pump cylinder being thereby pro- 30 vided.

The engine cylinder is denoted generally by the numeral 50, and is mounted upon, and secured to, the top 18 of the frame 16. The engine cylinder 50 comprises an inner 35 wall 51 and an outer wall 52, the lower end of the inner wall 51 being spaced apart from the lower end of the outer wall 52, as will be most clearly understood when Fig. 1 is examined. In the inner wall 51 there 40 are a plurality of ports 53, the walls 51 and 52 being connected, above the ports 53, by a web 54, the web 54 serving to divide the space between the walls 51 and 52, into a compression chamber 55 and a water jacket 45 56. A carbureter 57, of any suitable type, and including a check valve 57^a communicates with the compression chamber 55. Entering the outer wall 52 of the cylinder 50, above the diaphragm 54, is a water out- 50 let 58.

Superposed upon the cylinder 50 is a cylinder head, which is denoted generally by the numeral 59. The cylinder head 59 comprises an inner wall 60 and an outer wall 55 61, the space between the walls 60 and 61 constituting a continuation of the water jacket. The walls 60 and 61 are united by a tubular connection 62, carrying a pet- 60 cock 63. Entering the head 59 is the inlet 64 to the water jacket. An exhaust pipe 65 extends transversely of the walls 60 and 61 and enters the cylinder head 59. In the bottom of the exhaust pipe 65, and opening within the contour of the inner wall 60 is a 65 seat 66. A bearing 67 is formed integrally

with the upper portion of the cylinder head 59, the bearing 67 receiving slidably a valve stem 68, carrying at its lower end, an ex- 70 haust valve 69, adapted to register in the seat 66. At its upper end, the stem 68 is equipped with a head 70, and a compression spring 71 bears against the head 70 and 75 against the upper portion of the cylinder head 59, so as to maintain the exhaust valve 69 seated. A lever 72 is fulcrumed intermediate its ends, as indicated at 73, upon a 75 bracket 74, secured to the cylinder head 59, one end of the lever 72 being adapted to bear upon the head 70 carried by the upper 80 end of the valve stem 68. A yoke 75 is pivoted as indicated at 76 to the free end of the lever 72, and into the yoke 75 is threaded a rod 77, the rod being held in place by lock 80 nut 78 which engages the lower end of the yoke 75. The lower end of the rod 77 is 85 mounted to slide in a guide 79, carried by one of the bearings 22. The lower extremity of the rod 77 bears against an eccentric 80 which is carried by the shaft 23, and in this 90 connection it may be denoted that the spring 71, in addition to maintaining the exhaust valve 69 closed, also serves to thrust the lower end of the rod 77 into the bath of the eccentric 80.

A piston rod 81 operates within the in- 95 ner wall 51 of the cylinder 50, the piston rod bearing at its upper end, a piston head 82. The piston rod 81 passes through a packing gland 83 carried by the top 18 of 100 the frame 16, the lower extremity of the piston rod 81 being secured to the upper member 30 of the cross head 28.

The operation of the structure as thus far described is as follows:—When the piston 105 head 82 of the engine moves upwardly, the charge will be sucked from the carbureter 57 into the compression chamber 55, and into the space below the piston head 82 within the inner wall 51 of the cylinder. Pre- 110 supposing that a charge has been trapped in the cylinder, between the piston head 82 and the exhaust valve 69, which is closed, it will be seen that when this charge is exploded, by any suitable means, the piston 115 head 82 will be forced downwardly. As the piston head 82 moves downwardly, the fresh charge which has been trapped by the check valve 57^a, will be compressed in the chamber 55 and in the lower end of the cylinder, below the diaphragm 54. When the 120 piston head 82 moves to a position below the ports 53, the compressed charge will flow, from the chamber 55, through the ports 53, and within the inner wall 51, above the piston head 82. The cam 80 is so positioned on 125 the shaft 23 that when the piston head 82 is near the lower end of its travel, the rod 77 will be operated, actuating the lever 72 through the medium of the yoke 75, the lever 72 engaging the valve stem 68 130

and opening the exhaust valve 69. The exploded charge will then flow through the valve seat into the exhaust pipe 65, the new charge serving to scour out the explosive one.

It will be obvious that when the cycle of the engine is consummated in the above described manner, motion will be transmitted to the cross head 28, through the medium of the piston rod 81. When the cross head 28 moves downwardly, the piston rod 33 will move downwardly, causing a depression of the piston 35 within the pump cylinder 14. During this operation, the spring 39 will maintain the valve 38 closed and the fluid will be sucked through the inlet pipe 5 into the intake compartment 9. As the pump piston 35 thus moves downwardly, the fluid which is within the cylinder 14 below the piston will be thrust downwardly, causing an unseating of the tubular valve 43, the ring 46 being withdrawn from the flange 47 of the pump cylinder, whereupon fluid will pass into the outlet compartment 10. When the pump piston 35 moves upwardly, the valve mechanism 43—46 will close, under the action of the spring 49, and the valve 38 will open, compressing the spring 39, and permitting the water or other fluid to pass through the opening 36 in the pump piston 35 and into the pump cylinder 14, whereupon the cycle of the pump, above described, will be complete. As will be understood readily, the air chamber 12 serves to maintain an uninterrupted flow through the discharge pipe 12^a, the vacuum chamber 11 serving to maintain an ample supply of fluid in the compartment 9 at all times in order to refill the cylinder 14 rapidly.

It is to be observed that the rod 81 of the engine, the cross head 28 and rod 33 of the pump constitute a rigid structure whereby the power of the engine may be applied directly to the pump piston. When the cross head 28 moves to and fro in the guides 19, the box 26 will slide in the slot 27, motion being thus imparted to the crank 24 and to the shaft 23 and the fly wheels 25, thereby offsetting any tendency to pound, the inertia of the parts 25, 23, 24 and 26 serving to elevate the pump rod 33 and associated parts.

In Fig. 3 of the drawings, a slight modification in the engine is shown. Referring to Fig. 3, the cylinder is denoted by the numeral 84, the same comprising an inner wall 85 and an outer wall 86. The cylinder head is denoted by the numeral 87, and is equipped with a tubular bearing 88, carrying an auxiliary head 89 which constitutes a closure for the upper end of the inner wall 85. Secured to the upper end of the tubular bearing 88 is an exhaust pipe 90. In the tubular bearing 88, below the auxiliary head 89, are one or more ports 91. The piston rod is denoted by the numeral

92 and carries a piston head 93 which reciprocates within the inner wall 85 of the cylinder. The piston rod 92 is equipped with an extension 94 which slides in the tubular bearing 88, the upper end of the extension 94 being suitably packed, as indicated at 95.

In practical operation, referring particularly to the structure shown in Fig. 3, it will be seen that when the piston rod 92 and the head 93 move upwardly, the charge will be compressed between the piston head 93 and the auxiliary head 89 of the cylinder, the ports 91 being closed by the extension 94 of the piston rod 92. When, however, the piston head 93 and the rod 92 move downwardly to such an extent that the upper end of the extension 94 is located below the ports 91, the ports will be opened, whereupon the exploded charge will pass outwardly, through the ports 91 into the tubular bearing 88, and thence, above the upper end of the extension 94, into the exhaust pipe 90. In Fig. 4 of the drawings a modified pump detail is shown. Referring to Fig. 4, the base of the pump is indicated by the numeral 96, the same carrying a casing 97, provided with a top 98, the top 98 being formed integrally with a tubular bearing 99, connected with a platform 100 which is extended entirely across the interior of the casing 97. The platform 100 is provided with an opening 101, controlled by a downwardly opening valve 102, mounted to slide upon a spindle 104, the upper end of which is connected with a spider 105, there being a spring 103 abutting against the head formed at the lower end of the spindle 104, and against the lower face of the valve 102, to maintain the same normally closed. There is another opening 106 in the platform 100, the opening 106 being controlled by an upwardly moving valve 107, spring-constrained and mounted in the manner hereinbefore set forth in connection with the valve 102. A T 108 is connected with one side of the casing 97, and another T 109 is also connected with the casing, the T 109 being located adjacent the opening 106, and the T 108 being located adjacent the opening 101. The T 108 supports and communicates with a vacuum chamber 110, and the T 109 supports and communicates with an air chamber 111. Mounted upon the top 98 of the casing is a frame 112, carrying a packing gland 113 in which a piston 114 reciprocates. The piston 114 is shown as a solid structure, this form of pump being adapted for use where there is considerable floating material in the liquid, the device being adapted for use as a sand pump, as a bilge pump, and under like circumstances.

It will be understood, of course, that the structure shown in Fig. 4 is operatively connected, in the manner hereinbefore described,

with the cross head 28, and at this point it may be stated that the structure shown in Fig. 3 may be combined with the structure shown in Figs. 1 and 2, or with the structure shown in Fig. 4.

The operation of the device as set forth in Fig. 4 is as follows: When the piston 114 moves upwardly, the fluid will be sucked inwardly through the T 108, the valve 102 opening so as to permit the fluid to pass into the space beneath the platform 100. When the piston 114 moves downwardly, the valve 102 will close, and the valve 107 will open, the fluid passing into the T 109, and thence out into the distributing system.

The functions of the vacuum and air chambers 110 and 111, in their respective locations, will be clearly understood when Fig. 4 is examined.

Having thus described the invention, what is claimed is:—

In a device of the class described, a casing having an inlet and an outlet; an air chamber communicating with the casing above the outlet; a partition extended across the

casing from a point below the inlet to a point between the outlet and air chamber, the partition being inclined throughout its entire extent thereby to define a tapered suction chamber, the smaller end of which is adjacent the air chamber, and to define a tapered discharge chamber, the enlarged end of which is adjacent the outlet; a pump cylinder mounted in the partition and opening into the suction chamber and the discharge chamber; a valve supported in the outlet chamber and yieldingly constrained to bear upon one end of the cylinder; a piston slidable in the cylinder; and a valve supported by the piston and adapted to close in the same direction as the first specified valve.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

GEORGE A. JONES.

Witnesses:

J. G. SAFTIG,

JAMES B. METCALFE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."