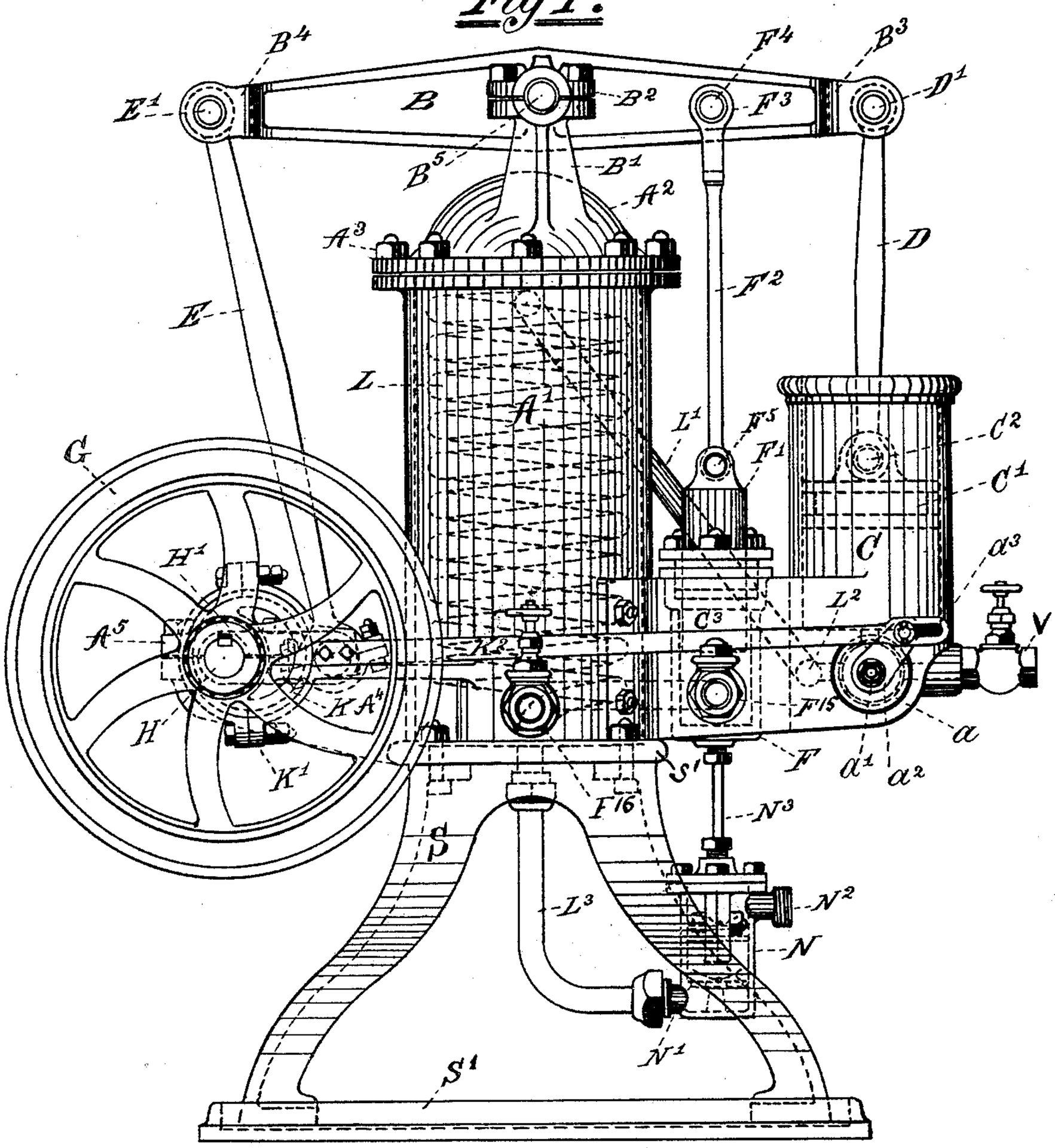
(No Model.) 4 Sheets—Sheet 1.

J. A. GROSHON.

PUMPING ENGINE.

No. 462,218. Patented Oct. 27, 1891.

Fig 1.



WITNESSES:

Richard A. Healy

H. F. Dunbar

INVENTOR:

John A. Groshon

by Joseph R. Lacy

Atty.

(No Model.)

4 Sheets—Sheet 2.

J. A. GROSHON.

PUMPING ENGINE.

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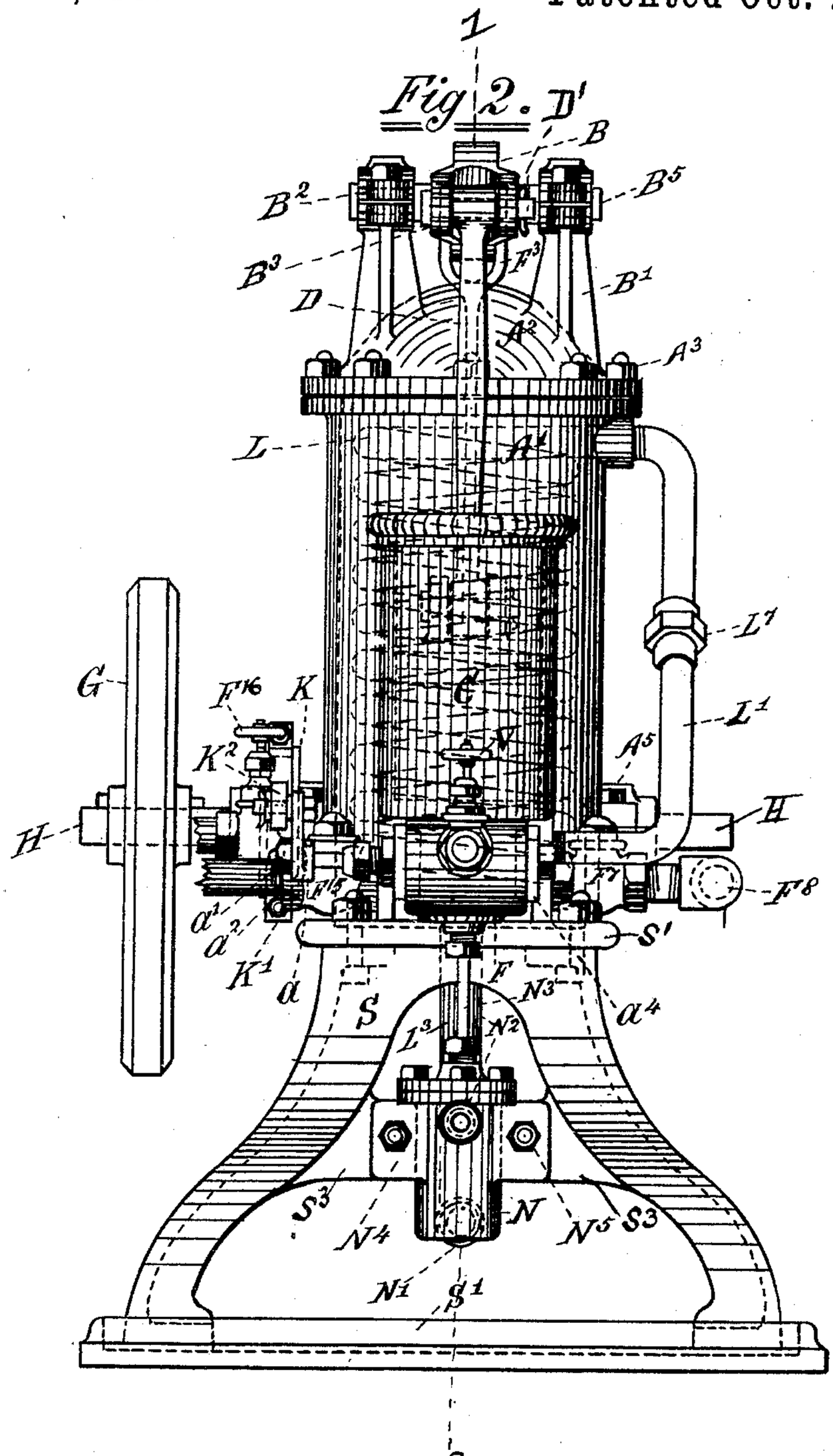

2

WITNESSES:

Richard A. Hoke

A. F. Dunbar

INVENTOR:

John A. Groshon

by Joseph F. Coy

Atty.

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J. A. GROSHON.

PUMPING ENGINE.

No. 462,218. Patented Oct. 27, 1891.

Fig 3.

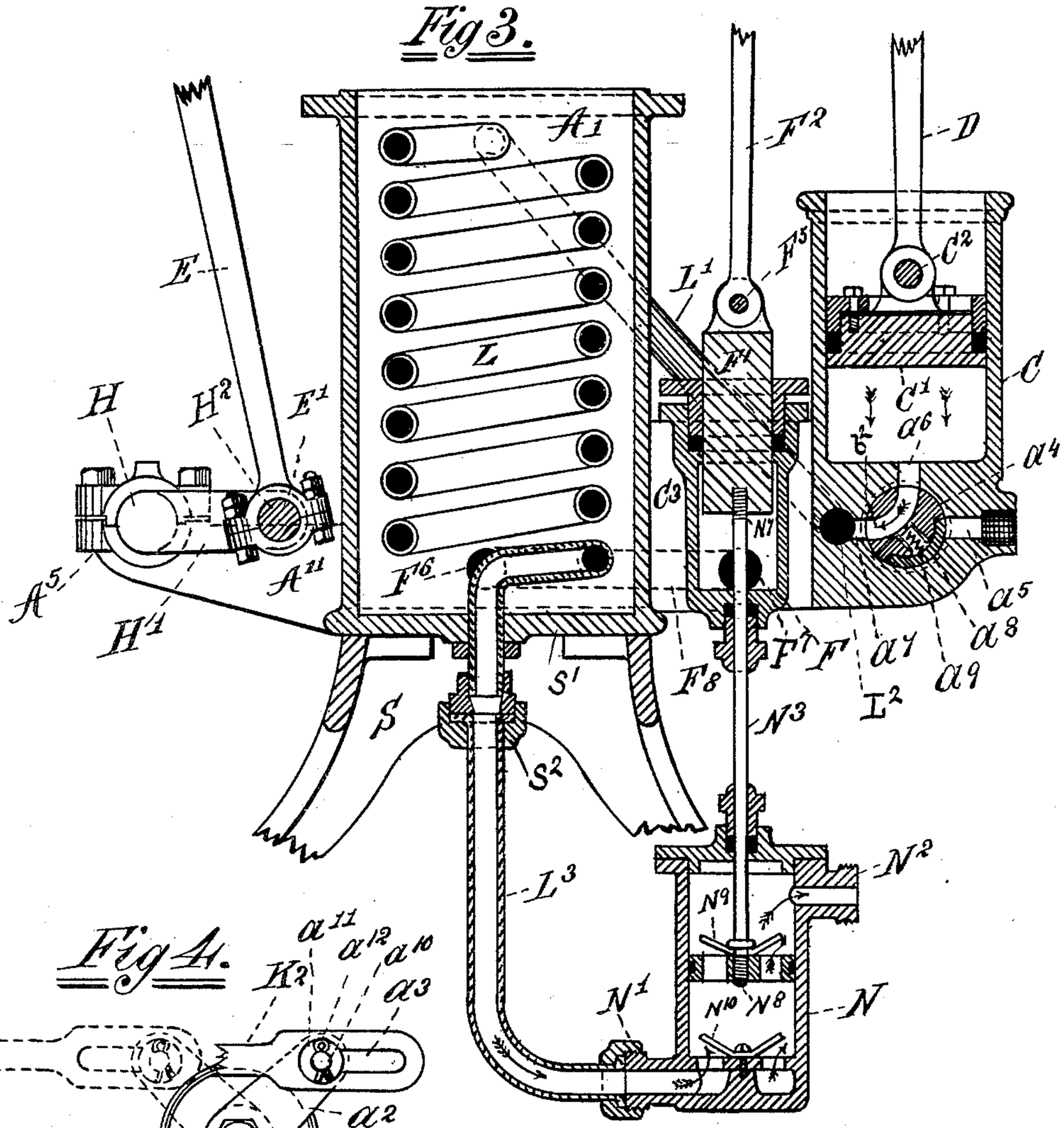


Fig 4.

WITNESSES:

Richard A. Healy

H. F. Durban

INVENTOR:

John A. Groshon

by Joseph R. Levy

Atty.

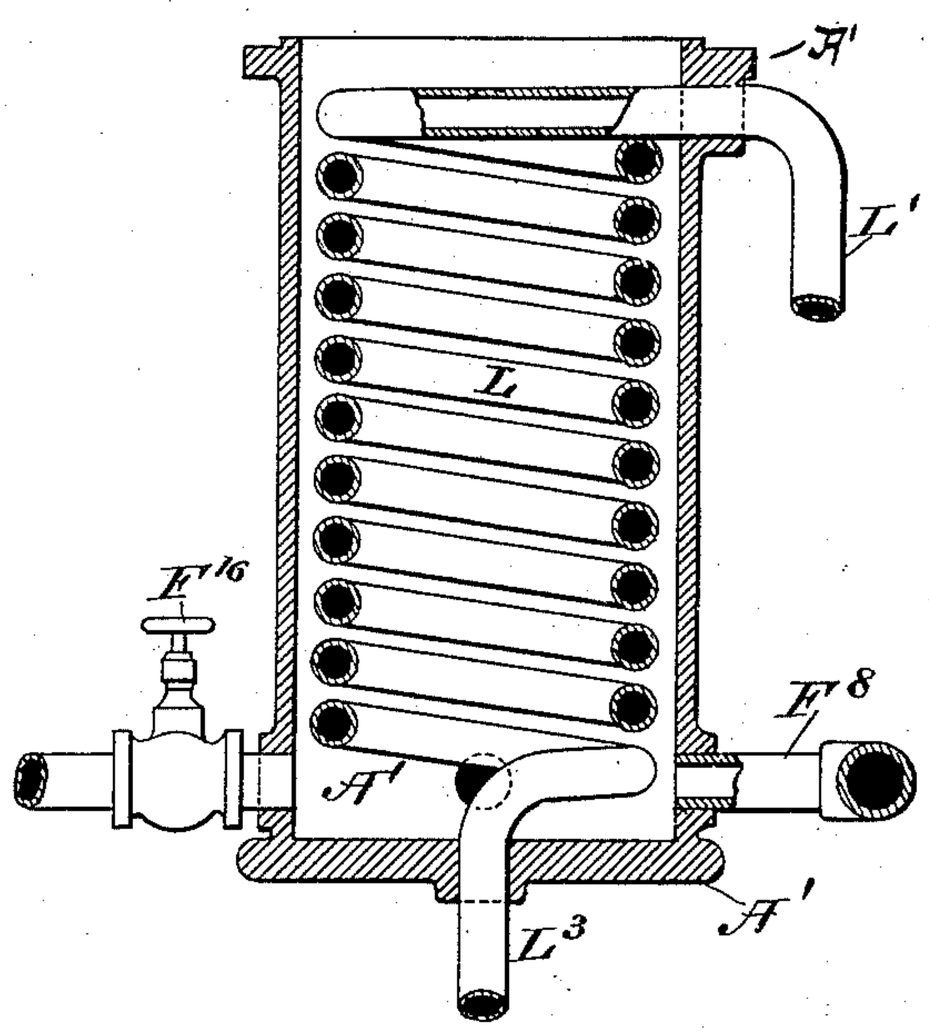
(No Model.) 4 Sheets—Sheet 4.

J. A. GROSHON.

PUMPING ENGINE.

No. 462,218. Patented Oct. 27, 1891.

Fig. 5.



ATTEST:
Herbert F. Dunbar
B. T. Vetterlein

INVENTOR:
John A. Groshon
by Joseph L. Levy
atty

UNITED STATES PATENT OFFICE.

JOHN A. GROSHON, OF NEW YORK, ASSIGNOR TO MARGARET H. HEATH, OF YONKERS, NEW YORK.

PUMPING-ENGINE.

SPECIFICATION forming part of Letters Patent No. 462,218, dated October 27, 1891.

Application filed December 13, 1890. Serial No. 374,650. (No model.)

To all whom it may concern:

Be it known that I, JOHN A. GROSHON, a citizen of the United States, residing in New York, county of New York, and State of New York, have invented certain new and useful Improvements in Pumping-Engines, of which the following is a specification.

My invention has special reference to the class of pumping devices which are known as "domestic pumping-engines." The class of steam pumping-engines which are generally used at the present time for pumping water in private houses are of the class which require a steam-generator having a pressure ranging much above the atmosphere, and as a result explosions are likely to occur when operated by house servants. The attendance of a person skilled in the management of boilers and engines is necessary in order to avoid the risk of explosion and derangement of the machinery. In my engines these disadvantages are in a measure entirely removed, as it is the intention in my device to use a pressure of steam but substantially above one atmosphere, or of a sufficient steam-pressure to displace the atmosphere and no more. When placed in the hands of a person skilled in the management of boilers and engines, a steam-pressure much above the atmospheric pressure may be employed, thus greatly increasing the power and rendering the engine double-acting, which then may be used not only for pumping operations but for general power purposes, such as the running of machinery.

My device will enable the house domestic or person not specially skilled in the art of managing boilers or engines to assume control of both the generator and engine. Therefore my invention consists in a pumping-engine that will utilize and can be operated through the instrumentality of steam or vapor practically at atmospheric pressure; and it further consists in the details of construction, hereinafter set forth in the description and claims.

Reference will now be had to the accompanying drawings, in which—

Figure 1 is a side elevation; Fig. 2, an end elevation of the cylinder end of the engine; Fig. 3, an enlarged section taken on the line 1 2 of Fig. 2, showing portions of the device enlarged; Fig. 4, a detail view of the steam-valve, rocker-arm, and eccentric-rod link. Fig. 5 is a central section of the condenser, showing the exhaust-coil and water entry and discharge therefrom.

Same letters of reference refer to similar parts throughout the several views.

In the drawings, A represents the entire device, and at V is shown the throttle-valve, which is in direct connection with the source of steam-supply. As before stated, it is not intended to generate vapor practically over the atmospheric pressure, and all the steam-pressure that is necessary to be generated is that which will blow through the power-cylinder, hereinafter described, and displace the air for the purpose of creating a vacuum in the same, after which the engine can be operated with vapor at the atmospheric pressure.

C is the cylinder, and by reference to Fig. 3 it will be seen that the upper end is open to the atmosphere and that a piston C′ is fitted therein in the usual manner, and to which a connecting-rod D is pivotally secured by the pin and lug C^2.

The frame of the machine is made up of the legs S, fitted to the base S′, and upon this is securely fixed by bolts, screws, or otherwise a casting, which embraces the power-cylinder C, surface-condenser A′, crank-shaft bearings A^5, and plunger pump-barrel F. All these may be made in one casting, or the pump-barrel and power-cylinder may be secured to condenser A′ by means of the brackets C^3, integral with them. The frame S has brackets S^3, to which the pump N is affixed. The condenser-cap A^2 is secured onto the condenser by means of the bolts A^3, which cap has upwardly-extending arms B′, which support the beam center bearings B^2 of the beam B. The gudgeons B^5 play in the bearings B^2. The beam B has bifurcated ends B^3 and B^4, the end B^3 being provided with bearings, in which the pin D′ of the piston-rod D is set. Within the crank-shaft bearing A^5 is set the crank-shaft H, to which the fly-wheel G is secured. The crank-shaft H has a crank H′ and crank-pin H^2, to which the connecting-rod E is connected. The connecting-rod E is secured in the end B^4 of the beam B by means

of the pin E′. The crank-shaft bearings A^5 are supported by the brackets A^{11}, either secured to or forming part of the condenser A′. Upon the crank-shaft H is the eccentric K, having the eccentric-straps K′ and eccentric-rod K^2 secured to it.

I locate the steam-valve a^8, that regulates the inlet and exhaust of the steam, with its accompanying ports of entry and exhaust, preferably under the cylinder C and within the same casting. The steam-valve here used is cylindrical and is set in the cylindrical valve-chamber a^4, the valve being suitably packed at a^9 to keep it steam-tight. The valve is provided with a steam-port b^2, which alternately aligns with the port a^6, leading into the cylinder C and steam-inlet a^5, and the exhaust-port a^7, leading into the condenser A′, and the port a^6, leading into the cylinder.

The eccentric-rod K^2 is connected to the steam-valve a^8 by means of the rocker-arm a^2, secured to the valve-stem a'. The rocker-arm has a pin a^{10}, upon which a washer a^{11} is secured by means of the split pin a^{12}. The connecting-rod K^2 has a slotted end or link a^3, in which the pin a^{10} is free to move. The foregoing establishes communication between the piston C′ and the crank-shaft H, and also provides an operative device whereby the ports leading to the cylinder and exhaust and to the source of steam-supply are alternately opened and closed. The primary object of this last-mentioned arrangement is to secure as near as possible a vacuum in the cylinder C under the piston C′, and in order to do this it is necessary at the commencement of the operation to use vapor at a pressure slightly above that of the atmosphere. The exhaust-vapor after leaving the cylinder enters the exhaust-pipe L′ and into the surface-condenser through the opening L^2 in the casting into the pipe L′, which leads into the condenser, and there communicating with the pipe-coil L, where it descends to the bottom of the condenser and ending in the pipe L^3, which leads to the air-pump N. The pipe or coil L and the pipe L^3 are united by the swiveling union S^2. The pump-barrel F, as before stated, is secured in the brackets C^3. The barrel of the pump is connected with the condenser by means of the pipe F^8, having the check-valve F^7, the pipe F^8 entering the condenser at F^6, Fig. 3. The exhaust passing through the pipe L′ into the coil L does not discharge into the condenser A′, but passes through the coil, while the water from the pump-barrel passing into it at F^{15}, out into the pipe F^8, thence into the condenser at F^6, Fig. 3, passing around and cooling the coil L, thereby condensing such vapors as pass through it. The water from the pump-barrel passes into the condenser, as before described, out of the discharge-pipe and valve F^{16}, Fig. 1, where it ascends to a tank preferably located on the roof of the dwelling or to any other desired place. The water enters the pump-barrel at the suction-valve F^{15}, Fig. 1.

The water of condensation from the coil L passes down into the pipe L^3, thence into the air-pump N, of the usual construction. The union between the air-pump N and the coil L may be a swiveling one, as shown at N′, and the air-pump N has the usual piston N^8, suction-valve N^{10}, discharge-valve N^9, and outlet N^2, the water of condensation being led wherever desired.

It will be seen from Fig. 3 that the center of the pump-barrel F and the air-pump N align with each other and that the air-pump N is located beneath the pump-barrel F. The object of this arrangement is to enable the pump-rod F^2 to operate the plunger F′ of the pump and the piston N^8 of the air-pump without making it necessary to otherwise operate the air-pump. This connection between the pump-rod F^2 and the piston N^8 of the air-pump is made by means of the piston-rod N^3, which passes through stuffing-boxes in the air-pump cylinder and pump-barrel and is connected at one end with the plunger F′, as at N^7, Fig. 3, and at the other end to the piston N^8 of the air-pump.

Thus it will be seen from the foregoing that a pumping mechanism is provided comprising a force-cylinder, fly-wheel, eccentric, and a valve governing the admission and exhaust of steam, a condenser, a force-pump, and an air-pump, all of which when properly connected and operated form an operative device.

The operation of the pump is as follows: A pressure having been generated in the boiler slightly above that of the atmosphere, the throttle-valve V is opened, and momentum being given to the fly-wheel G by hand or otherwise the valve a is oscillated, opening the port a^6, in communication with the port a^5, thereby admitting steam to the power-cylinder. It must here be understood that steam is not admitted to the power-cylinder for the purpose of exerting any appreciable pressure on the piston C′, but simply for the purpose of making or assisting to make a vacuum under the piston. The port b^2 having come into line with the port a^6 and discharge-port a^7, any vapor in the power-cylinder will blow through the pipe L′, through the coil L, where it will be condensed, down the pipe L^3, into the air-pump, the air-pump at the same time being operated to discharge the water of condensation and the air. This operation leaves a vacuum in the power-cylinder, and the pressure of the atmosphere exerting itself on top of the piston C′ drives the same on its downstroke. It will thus be seen that three forces are utilized to give momentum to the engine: First, momentum is given to the fly-wheel G, thereby operating the moving parts of the engine, and simultaneously with this, if desired, steam is admitted into the cylinder, and it, by the aid of the air-pump and the water of condensation, creates a vacuum under the piston. Then the atmosphere, exerting its pressure on the

top of the piston, drives it on its return stroke, the operation of the device being accomplished by these three forces.

It is the intention in my device to make the entire construction tend to the accomplishment of an efficient pumping-engine, and to that end I have located the pump-barrel, which operates as a force-pump on the downstroke, between the point of application of power from the cylinder to the beam B and its point of pivotal suspension. Therefore, when the atmosphere is exerting its pressure to drive the piston on its downstroke, it is also effecting the forcing of the water, and thereby doing work (which in this case is the heaviest) when the greatest power of the engine is developed. The lifting of the pump-plunger is accomplished by the momentum of the machine, that being generally the lightest work the engine has to do. Of course the upstroke of the plunger F operates the piston of the air-pump, which draws off the water of condensation and air from the cylinder and condenser; but this work I do not consider as heavy as the act of forcing the water. Therefore I say that on the upstroke of the pump-plunger the lightest part of the work is done.

By referring to Fig. 4 it will be seen that the link a^3 permits the valve to remain in one set position during a portion of the movement of the eccentric-rod K^2. In other words, I have provided that there shall be an interval of rest between the opening and closing of the ports of entry and exhaust. This permits the air-pump to operate to draw off all the condensed water and air, if any there be, and leaving a clear space for the steam or vapor exhausting from the power-cylinder to enter, thereby more absolutely insuring as near as possible a perfect vacuum. If desired, the entire machine—that is, as far as the heavier parts of it are concerned—may be cast in one piece or the parts assembled in any desired manner to secure strength, lightness, and accuracy of action. The feature of compactness is also a very essential one, and this I have secured by locating the condenser centrally upon the bed of the machine, supporting the beam B upon it, and locating the force-pump between the point of suspension of the beam and the point of application of power from the cylinder to it. Furthermore, compactness is secured by locating the air-pump N directly under the pump-barrel, whereby the same means which operates the pump-plunger can operate the piston of the air-pump, and placing the steam-valve within the same casting and directly under the force-cylinder and bringing the cylinder and condenser nearer together, thereby saving space and realizing economy in material.

Many changes and modifications may be made in my device without departing from the spirit of my invention.

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

1. In a pumping-engine, a force or power cylinder in which a vacuum is made, and means for creating a vacuum, which consists in an air-pump suitably operated, a passage-way between the cylinder and air-pump, a steam-valve intercepting said passage-way, the air-pump operating to draw off the air and water of condensation when the said valve closes the said passage-way, and a condenser intercepting the power-cylinder and air-pump, substantially as described.

2. In a pumping-engine, the combination of a power-cylinder, the coil L, operatively connected with the power-cylinder, an air-pump N, and downwardly-extending pipe L^3, with swiveling unions S^2 N′ in said pipe, substantially as described.

3. In a pumping-engine, a casting having the bifurcated and outwardly-extending arms C^3 and upwardly-extending portion, in which the cylinder C is formed, and a valve-casing a^4 and ports a^5 a^6 a^7 in the said casting and under the cylinder, and a pump-barrel F, located between the said bifurcated arms, substantially as described.

4. In a pumping-engine, a casting having an outwardly-extending portion C^3, an upwardly-extending portion, in which the cylinder C is formed, and a valve-casing a^4 and the ports a^5 a^6 a^7 in the said casting and under the cylinder C, substantially as described.

5. In a pumping-engine, the frame S, having brackets S^3 for the support of the air-pump N, the cylindrical condenser A′, having a removable cap A^2 and upwardly-extending bearing-arms B′, outwardly-extending brackets A^{11}, provided with bearings A^5, arms C^3, having the power-cylinder C at their extreme ends, and pump-barrel F, secured within the arms C^3 and between the condenser A′ and power-cylinder C, substantially as described.

6. In a pumping-engine, the combination, with the frame S, of a condenser A′, having a movable cap A^2, a beam B, secured in bearings on the said condenser, and air-pump N, secured to the frame S and connected to the coil L in the condenser by means of the pipe L^3, a power-cylinder and pump, and means for regulating the entry and exhaust of steam in the power-cylinder, a source of supply F^{15} to the pump-barrel, a pipe F^8, leading from the pump-barrel to the condenser, whereby the water in the pump-barrel is forced into the condenser and around the coil L, and a pipe and valve F^{16} for regulating the egress of the water from the condenser A′, substantially as described.

7. In a pumping-engine, the combination of the force-cylinder C, suitably supported and having its upper end open to the atmosphere, a piston C′ in the said cylinder, and means for creating a vacuum under the piston C′, comprising the coil L, secured within the condenser A′, air-pump N, valve a, and ports of entry and exhaust, the valve a and coil L being connected by means of the pipe L′, the air-pump N and coil being connected by means

of the downwardly-extending pipe L^3, substantially as described.

8. The combination, with the cylinder C, having the piston C′, and means for regulating the entry and exhaust of steam to and from the cylinder, said cylinder being open to the atmosphere above the piston C′, of a force-pump operatively connected with the piston C′, the piston being forced downward by the atmosphere, the plunger-piston of the pump and the piston of the force-cylinder being so connected and arranged in relation to each other that when the atmosphere is forcing the piston of the force-cylinder down the pump will be forcing water, substantially as described.

9. In a pumping-engine, the combination, with a beam B and means for supporting and operating the same, of the pump-barrel F, suitably supported, the air-pump N, suitably supported below the pump-barrel F, the pump-rod F^2, depending from the beam B, pump-plunger F′ in the pump-barrel F, piston N^8 in the air-pump N, the plunger F′ and piston N^8 being connected together by the rod N^3, the pump-barrel F′ and air-pump N being provided with stuffing-boxes, substantially as described.

10. In a pumping-engine, the combination of the base or support S, upwardly-extending cylindrical condenser A′, brackets A^{11}, extending out from one side of the condenser and being provided with bearings A^5, arms C^3, secured at the opposite side of the condenser A′ and having at their extreme end the upwardly-extending cylinder C, valve-casing a^4, and pump-barrel F, the pump F being located between the condenser A′ and cylinder C, substantially as described.

11. In a pumping-engine, the combination of a force-cylinder open at one end to the atmosphere and having a movable piston, a beam suitably mounted in the bearings and connected to the said piston, and a force-pump located between the bearings of said beam and the power-cylinder, the said pump operating to force water on the downstroke of said piston, and means for regulating the entry and exhaust of steam into and from the cylinder, substantially as described.

12. In a pumping-engine, the combination, with a base S, upwardly-extending condenser A′, having a movable cap A^2, upwardly-extending pillars B′ on the cap A^2, having bearings B^2, a beam B, set in said bearings, with the cylinder C, secured to the condenser A′ at one side thereof, a pump F, located between the condenser and cylinder C, both the cylinder and the pump being operatively connected with the beam B, and a fly-wheel, crank, rod, and eccentric located on the opposite side of the condenser and operatively connected with the beam B, and means for regulating the entry and exhaust of steam into and from the cylinder C, substantially as described.

13. In a pumping-engine, the combination of a power-cylinder open at the top to the atmosphere, means for creating a vacuum in said cylinder, the said cylinder being supported upon a bed or frame, a beam pivotally supported upon such frame, a fly-wheel, and means for regulating the entry and exhaust of steam to the power-cylinder, the fly-wheel and power-cylinder being operatively connected to said beam, and a pump located between the power-cylinder and pivotal support of the beam and connected with it, substantially as described.

14. In a pumping-engine, the combination, with the frame S, of a condenser A′, having a removable cap A^2, a beam B, secured in bearings on the said condenser, an air-pump N, secured to the frame S and connected with the coil L in the condenser by means of a pipe L^3, a power-cylinder and pump, and means for regulating the entry and exhaust of steam to and from the power-cylinder, substantially as described.

15. In a single-acting pumping-engine, the combination of the power-cylinder open at one end and having a movable piston adapted to be operated by the pressure of the atmosphere, a beam suitably supported, to which the power-piston is connected, a pump connected to the said beam, and means for regulating the entry and exhaust of steam to and from the power-cylinder for operating the beam, the said pump operating to force water when the atmosphere is moving the piston of the power-cylinder, substantially as described.

16. In a pumping-engine, a force or power cylinder in which a vacuum is made, and means for creating a vacuum therein, comprising an air-pump suitably operated, a passage-way between the power-cylinder and air-pump, a valve intercepting said passage-way, a condenser, a coil within the condenser, and exhaust-way leading from the power-cylinder to the said coil, a passage-way from the coil to the air-pump, the said air-pump having a suitable port of discharge, substantially as described.

17. In a pumping-engine, a force or power cylinder having a steam-passage leading thereto, and means for creating a vacuum in said cylinder, comprising an air-pump suitably operated, an exhaust-way between the cylinder and air-pump, a rotary valve intercepting both exhaust and steam ways, the air-pump operating to draw off air and water of condensation when the said valve closes the said exhaust-way, and means for resting the said valve during a portion of its stroke, comprising an eccentric, a slotted link on the eccentric, a rocker-arm on the valve working in said link, and means for operating the eccentric, substantially as described.

18. In a pumping-engine, a force or power cylinder in which a vacuum is made, and means for creating a vacuum in the said cylinder, which comprises an air-pump suitably operated, a passage-way between the cylinder and air-pump, a valve intercepting said

passage-way, a condenser, a coil within the condenser, an exhaust-way leading from the power-cylinder to the said coil, a passage-way from the coil to the air-pump, having a suitable port of discharge, combined with a pump for forcing or raising water, operatively connected to the power-piston, substantially as described.

19. In a pumping-engine, the combination of the power-cylinder open at one end and having a movable piston adapted to be operated by the pressure of the atmosphere, a beam to which the power-piston is connected, a pump adapted to raise or force water, working synchronously with the power-piston, and means for regulating the entry and exhaust of steam to and from the power-cylinder for operating the beam, substantially as described.

20. In a pumping-engine, the combination of the power-cylinder open at one end and having a movable piston adapted to be operated by the pressure of the atmosphere, a beam suitably supported and to which the power-piston is connected, a pump adapted to raise or force water, working synchronously with the power-piston and located between the points of suspension of the beam and application of power thereto, and means for regulating the entry and exhaust of steam to and from the power-cylinder for operating the beam, substantially as described.

Signed at the city, county, and State of New York this 2d day of December, 1890.

JOHN A. GROSHON.

Witnesses:
MARCELLUS C. HEATH,
JOSEPH L. LEVY.