

(No Model.)

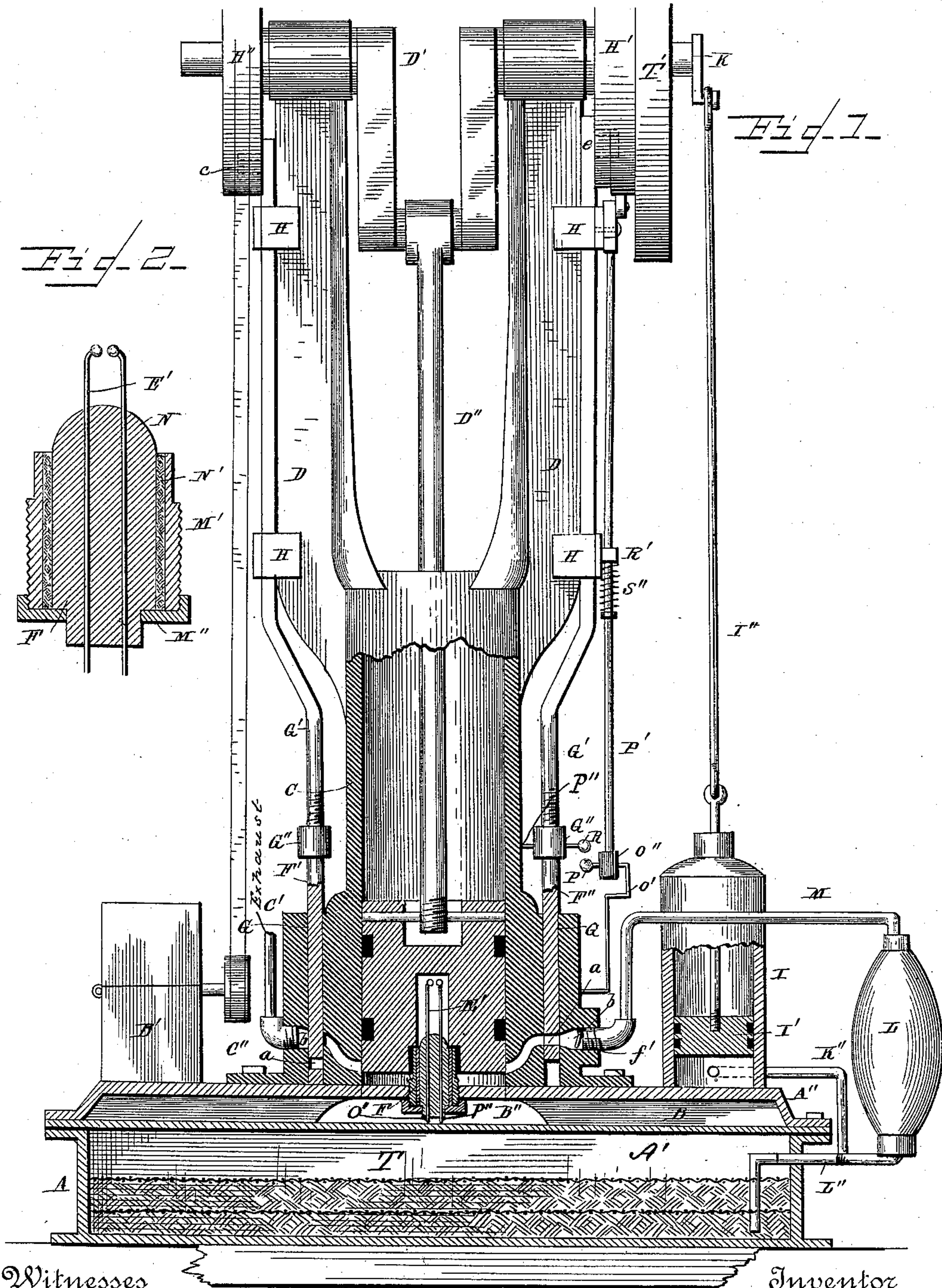
2 Sheets—Sheet 1.

H. K. SHANCK.

GAS ENGINE.

No. 376,212.

Patented Jan. 10, 1888.



Witnesses

Edwin L. Yewell,

W. Chaffin

Inventor

H. K. Shank

By his Attorney

E. W. G. G. G. G.

(No Model.)

2 Sheets—Sheet 2.

H. K. SHANCK.

GAS ENGINE.

No. 376,212.

Patented Jan. 10, 1888.

Fig. 3.

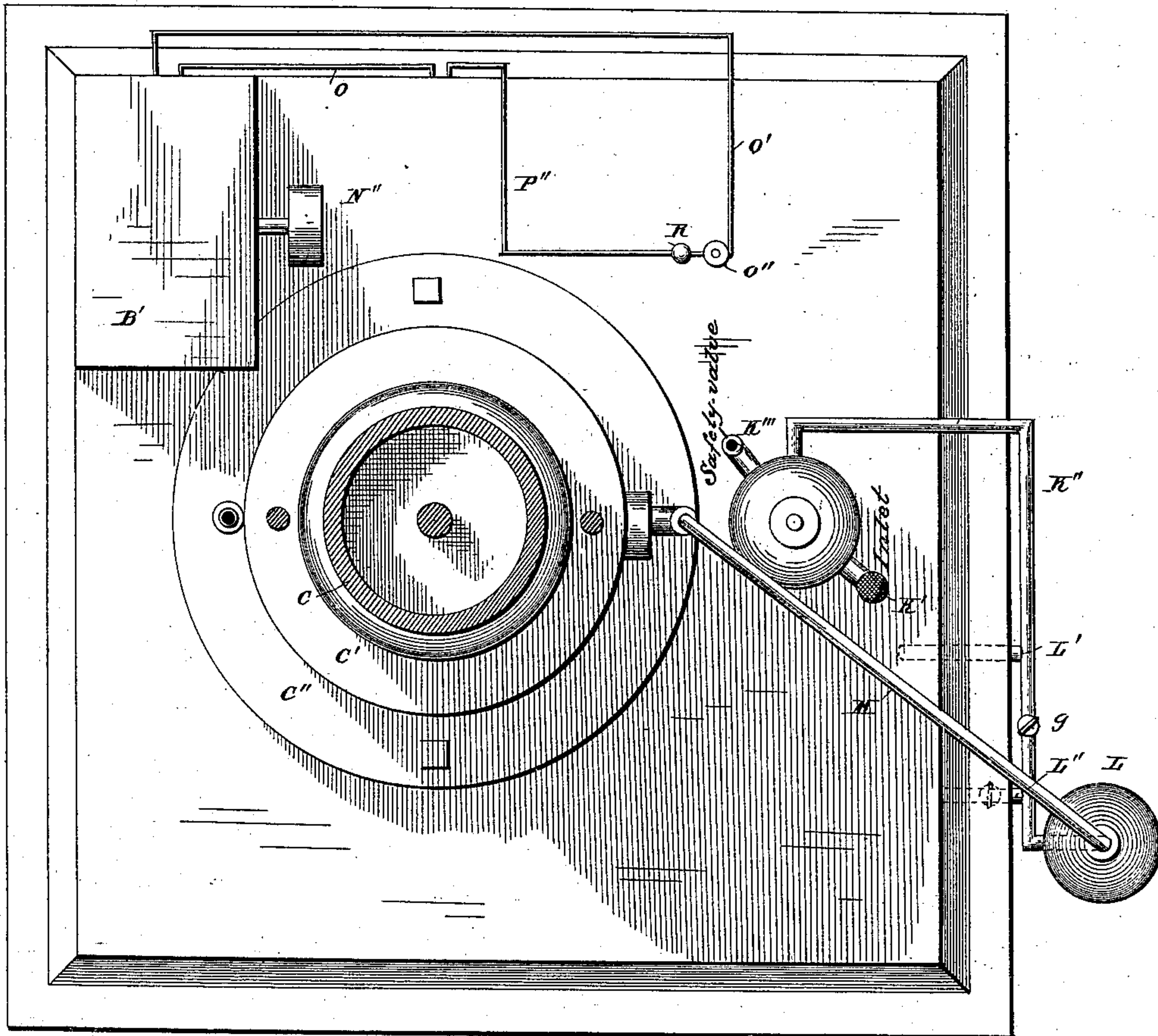


Fig. 4.

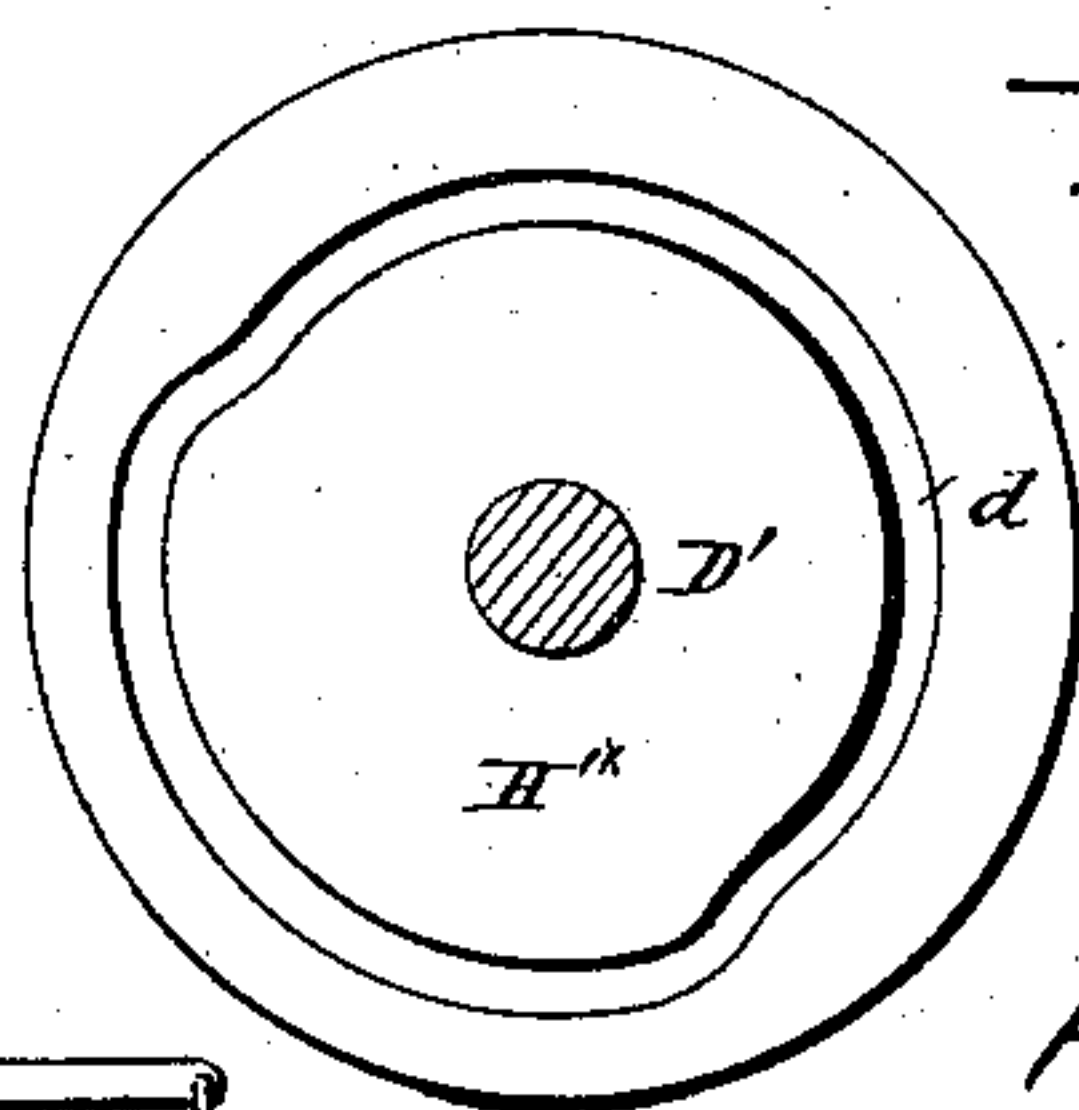
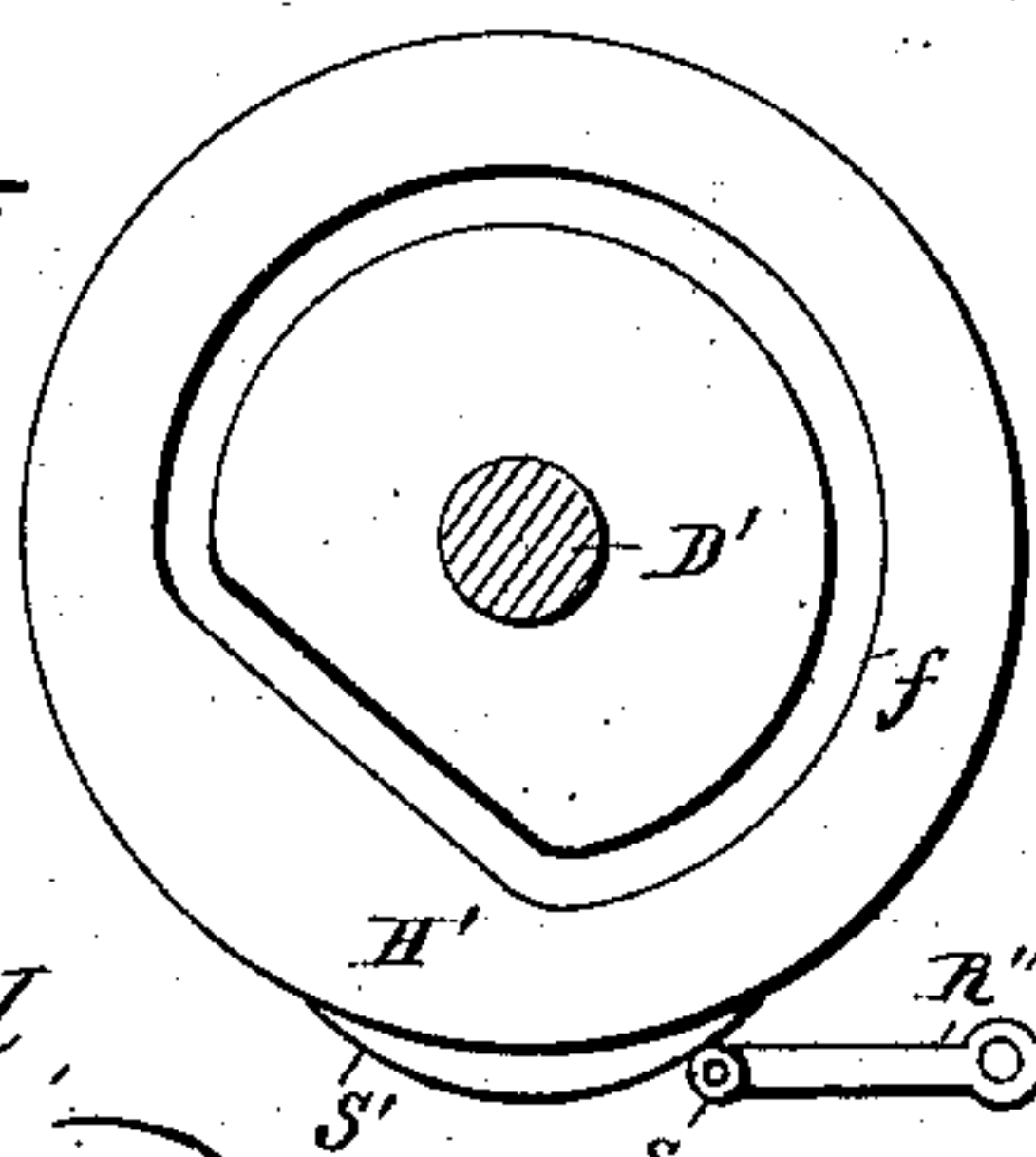


Fig. 5.

Witnesses

Edwin L. Yewell,

W. C. Chaffee

Inventor

H. K. Shank

his Attorney

S. W. Gussabough

UNITED STATES PATENT OFFICE.

HENRY K. SHANCK, OF COLUMBUS, OHIO.

GAS-ENGINE.

SPECIFICATION forming part of Letters Patent No. 376,212, dated January 10, 1888.

Application filed February 13, 1886. Serial No. 191,890. (No model.)

To all whom it may concern:

Be it known that I, HENRY K. SHANCK, a citizen of the United States, residing at Columbus, in the county of Franklin and State of Ohio, have invented certain new and useful Improvements in Gas-Engines, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to improvements in gas-engines.

The object of my invention is to provide an engine in which the explosive gas used to drive the piston of the engine is generated on the spot, said gas being ignited by an electric spark in the cylinder of the engine.

My invention consists, therefore, of placing a receptacle in which the gas producing liquid is stored in juxtaposition to the cylinder; in the manner of supplying said cylinder with the gas and freeing the same of the exhaust or expended air, and of the manner in which the gas in the cylinder is ignited in the cylinder, as will more fully appear.

Referring to the drawings, Figure 1 is a front view, partly in section, of my improved engine. Fig. 2 is a sectional view of the insulated nozzle, through which the wires pass into the cylinder. Fig. 3 is a top or plan view of the engine with the piston-crank and other operating parts removed. Fig. 4 is a side view of the cam for operating the inlet-valve of the engine, and also for operating the devices which control the electric spark for igniting the gas in the cylinder. Fig. 5 is a side view of the cam-disk for operating the outlet or exhaust valve.

My invention is specially designed for working the gas produced from naphthaline or other gas-producing liquid of like character, which will explode when the flame or spark is applied, so that it can be used in locations where the ordinary illuminating-gas is not had, and thus make it useful in rural districts for driving all kinds of machinery and in propelling land and water conveyances or vehicles.

In the present instance I have shown a single-acting vertical engine; but it is obvious that by duplicating the ports and valves at the upper end I can make a double-acting engine, and that by placing the cylinder on its side I can convert it into a horizontal engine.

A indicates the base on which the operating parts of the engine are placed, said base being made of cast-iron or other suitable material, so as to form a chamber, A', in which the naphthaline or other gas-generating material is placed, so as to be within a convenient working distance of the engine, as will be more fully described hereinafter.

A'' is a flanged cast-iron plate, of the form shown, securely bolted to the top of the base A, said plate being so arranged as to form a cavity or space, B, between it and the top of the base A, in which the wires connecting the cylinder with the electric generator B' are placed. The top plate, A'', is cut away at one or more places, so as to form an opening or openings, B'', so that the operator can repair or arrange the wires without having to remove the plate A''.

C is the cylinder, made of cast-steel or other suitable material, and is provided with an enlarged portion, C', in which the ports and operating-valves are placed, and also an annular flange, C'', by means of which the cylinder is securely bolted to the plate A''.

D are extensions secured to or made part of the upper portion of the cylinder, said extensions being made sufficiently strong to form bearings for the crank-shaft D', to which the piston-rod D'' and other operating parts of the engine are secured, as will more fully appear.

The piston-rod D'' is secured to the piston-head E in any suitable manner, said piston being provided with the ordinary packing, so as to insure a perfect joint and at the same time allow the piston-head to work readily back and forth in the cylinder C. The piston-head is provided with a recess, E', to receive the wires E'', which pass up through the insulating-plug F, located in the head of the cylinder, said wires being connected to the generator B', and by which means the gas is exploded in the cylinder, as will be more fully described.

F' and F'' are the valves adapted to work in the valve-seats G, formed in the base or enlarged portion C' of the cylinder, said valves being provided with openings or slots a, which alternately register with the ducts or ports b, formed in the cylinder. The upper ends of the valves are secured to the rods G' by means of the screw-nuts H'' or in any other

suitable manner, so that they can be readily and nicely adjusted to insure the perfect working and timing of the strokes of the valves. The upper portions of the rods G' are passed 5 through the guides H , formed upon or attached to the standards D , so that said rods will move up and down in vertical lines. The upper end of the rod G' of the valve F' is provided with a friction-wheel, c , which projects 10 into the cam-groove d , formed in the side of the disk or wheel H' , said wheel H' being secured to and operated by the shaft D' . The groove d in the wheel H' is so formed and the motion of the valve F' so timed that the port 15 b is open during the greater portion of the time the piston is making its downward stroke, so that the air left in the cylinder after the explosion will escape therefrom; but before the piston has reached the lower end of the cylinder the valve F' closes the port b and prevents 20 the escape of the gases coming through the other port, which just now opens. The upper end of the rod G , which operates the valve F'' , is provided with a friction-wheel, e , which 25 works in a cam-groove, f , formed in the side of the disk or wheel H'' , and is so timed that it will raise the valve F'' to admit the gas into the cylinder as soon as the piston has started on its upward stroke, but to close the gas-port an instant before the explosion takes 30 place.

f' is a pivoted valve located in the end of the pipe M and opens inward, so that should a premature explosion take place this valve 35 will close and shut off the gas, thus preventing the explosion from reaching the gas-holder.

I is an air-pump, the piston I' of which is operated by the rod I'' , the upper end of which is connected to the crank-arm K on the end of 40 the shaft D' .

The pump I is provided with a suitable inlet-pipe, K' , in which is placed an ordinary click-valve, which will open to allow the air to be drawn into the pump I on the upward 45 stroke of the piston, but will close when the piston descends and allow the air to be forced through the pipe K'' into the gas-holder L . The end of the pipe K' is provided with a suitable wire-gauze or perforated cap, so as to prevent the admission of dust into the air-pump. 50

K''' is a pipe leading into the cylinder of the air-pump, and is provided with a suitable safety-valve, so that when a certain predetermined pressure has been reached in the cylinder or holder the valve will rise and relieve the 55 ports from an excess of pressure. The pipe K'' communicates with the chamber A' by means of the pipes L' and L'' , the former pipe, L' , entering well into said chamber, so as to mingle the air with the gas which is formed in said 60 chamber. The pipe L'' , however, enters the chamber A' near the top, and through which the gas and air are drawn from the chamber and forced into the gas bag or holder L , the 65 quantity of air admitted to the chamber A or to the gas-bag being still further regulated by suitable valves, g . The gas bag or holder is

connected to the port of the cylinder by means of the pipe M , a constant pressure of gas being exerted in the holder, so that when the gas- 70 ports are opened the proper amount of gas properly mixed with air to make an effective explosion, will rush into the cylinder at every movement or stroke of the piston. The insulating-plug F is composed of a short section 75 of a metallic tube, M' , which is externally threaded and adapted to screw into an opening in the head of the cylinder. The tube-section M' is provided with a screw-threaded cap, M'' , to support the other portions of the plug, 80 which I will now describe.

N is the insulating portion of the plug F , and is made of zircon, mica, glass, porcelain, pure clay, talc, or any other suitable insulating material, and is held in the tube M by means of a 85 packing of asbestos, N' .

B is the electric generator, in which static electricity is formed by the well-known Holtz machine, and as improved by Tupper and Atkinson, the requisite power being applied 90 through the pulley-wheel N'' by means of a band passing up over the pulley H'' on the shaft D' . The generator B' is made water and air tight, so that the operating parts will not be affected by the changes of the atmosphere. 95 The generator is provided with suitable holders or receivers—such as Leyden jars—in which the excess of electricity is stored. O is a wire leading from the Leyden jar through the insulating-plug F , and terminates in a 100 ball, as shown in Fig. 1.

O' is a wire leading from the Leyden jar also, and passes through the insulating block or bulb O'' , and terminates in a ball or bulb, 105 P , on the end of the rod P' , said rod being operated by devices which will be presently described.

P'' is a wire provided with a ball, R , at one end, which is near to the ball P on the wire O' . The wire P'' then extends under the plate 110 A'' , as does the wire O , and enters the insulating-plug F , and passes up into the cylinder, where it also terminates in a ball or bulb. The rod P' is adapted to work in a guide, R' , and is connected at its upper end to one end 115 of the pivoted lever R'' , the other end of the lever R'' being provided with a friction-wheel, S , which impinges on a cam, S' , formed on the disk or wheel H' . The action of the cam S' is to force the rod R' upward, and thus draw the 120 bulb or ball P toward the ball R while the plunger is beginning its upward stroke, at which time a spark of electricity will fly from the bulb P to the bulb R , owing to their close proximity, which is transmitted through the 125 wire P'' to the cylinder, and at the proper moment, the spark passing from one bulb or ball to the other in the cylinder, ignites the gas which has entered through the gas-port and causes an explosion of the same, forcing the 130 piston to the other end of the cylinder. As soon as the explosion has taken place, the cam S' will cease to act on the lever R , and the coiled spring S'' will force the bar P' down,

thus separating the balls P and R and breaking the circuit, so that no spark will pass from one to the other until the rod P' is again raised by the action of the cam S' on the lever R'.

5 As soon as the circuit is broken the electricity which is being generated in the chamber B' is stored in the Leyden jars for use in subsequent operations of the plunger, and by which means I am enabled to produce an explosion at any
10 stroke of the piston.

The chamber A' is provided with a series of wire screens, T, on which is placed wool, cotton, or other fibrous material, which will absorb the gasoline and cause it to rapidly vaporize, it being understood that the gasoline
15 is forced or pumped into the chamber A' in sufficient quantities to produce a constant supply of gas, which is carried off into the gas-holder in the manner already described.

20 It will be noticed that the gas is formed in close proximity to the cylinder, and that it is mixed with the proper proportions of air and used at once in the cylinder to drive the piston. It will also be noticed that by using the spark
25 of statical electricity to ignite the gas I am enabled to make an explosion at each stroke of the piston. T' is a fly-wheel supported on the shaft D', which acts in the capacity of the fly-wheel on an ordinary engine.

30 In practice I may use, when convenient, the ordinary hydrocarbon gas enriched by passing the same through and mingling it with the gases of naphthaline or gasoline, and thus have a gas which will not form a residuum in the
35 cylinder, the action of the gasoline gas serving to cut or dissolve any bituminous residuums, which would otherwise form from the coal gas. In this case the naphthaline gas will also act as a lubricant and keep the cylinder
40 cool.

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

1. In gas engines of the character described,
45 the gas-producing chamber located at the base in juxtaposition to the cylinder, in combination with the air-pump, connecting-pipe, and cylinder, whereby the air is forced through the liquid and the gas is made and used on the
50 spot, substantially as specified.

2. In a gas-engine of the character described, the gas-producing chamber located in the base of the engine, the air-blast generator, the connecting-pipes and cylinder, and the flexible gas bag or holder, all arranged to operate so
55 as to supply the gas at a uniform pressure to the holder, substantially as specified.

3. The combination, with the gas-producing chamber, of the plate secured to the top thereof and cut away at the sides, forming an access-
60 ible recess for the electric wires or conductors, substantially as specified.

4. The combination, in a gas-engine, of the valves and ports for the admission of the explosive mixture and the evolved gases, the generator B'', the wires O' P'', extending up through
65 the insulating-plug F, the movable rods G P, to which the said wires are separately attached, being insulated therefrom and provided with knobs P R, and the mechanism for operating
70 said rods so as to connect the said knobs P R at the proper intervals to produce a static spark of electricity in the cylinder and explode the gases at proper intervals, substantially as specified.

5. In gas-engines of the character described, the rod P', secured at one end to the wire O', said rod being operated by devices substantially as described, whereby the current of
75 electricity is broken at intervals, as set forth. 80

6. The combination, with the piston having a narrow recess at its bottom, of the insulated plug secured to the cylinder-head, the conducting-wires provided with knobs at their
85 ends and adapted to extend into the recess when the piston is down, and the devices whereby a spark is produced to explode the gases, substantially as specified.

7. In gas-engines of the character described, the air-pump I, operated as described, and
90 having a pipe leading therefrom to the gas-producing chamber, in combination with the pipes L' L'', leading to the gas-producing chamber A', as set forth.

In testimony whereof I affix my signature in
95 presence of two witnesses.

HENRY K. SHANCK.

Witnesses:

L. W. SINSABAUGH,
WM. H. DE LACY.