(No Model.)

W. L. TOBEY.

GAS ENGINE.

No. 306,443. Patented Oct. 14, 1884.

Fig: 1.

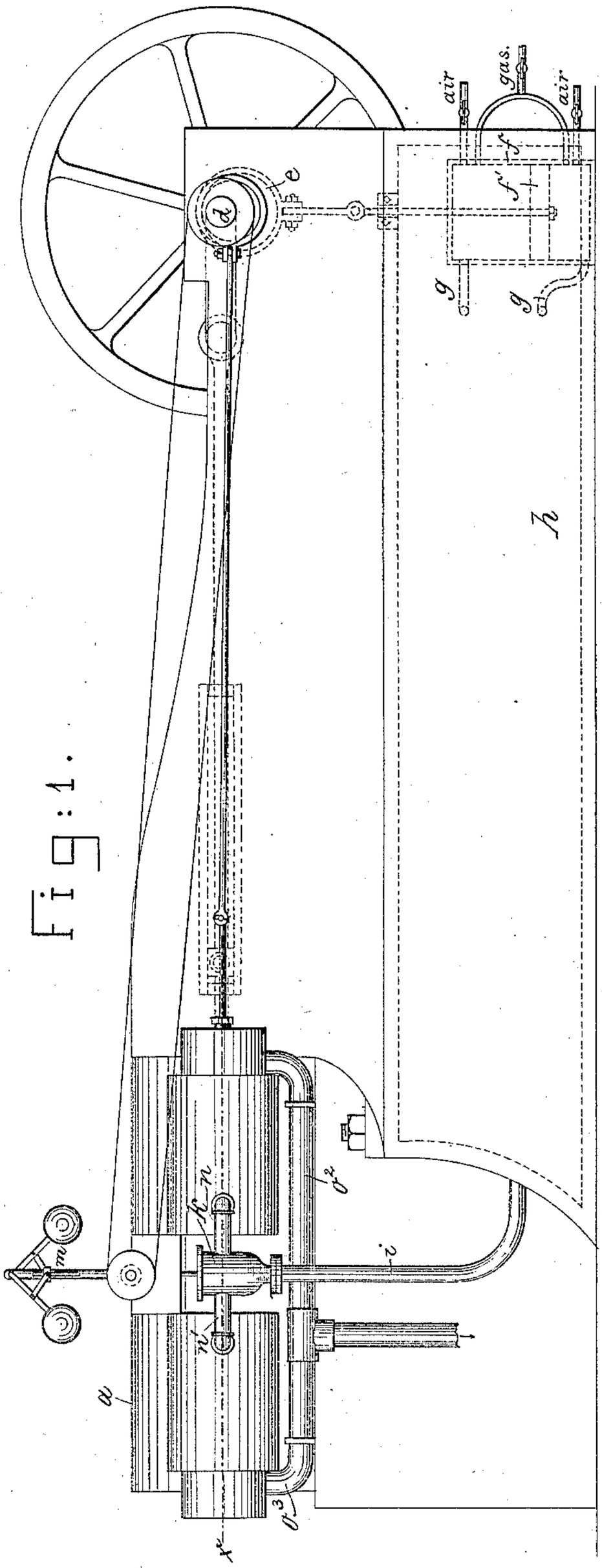
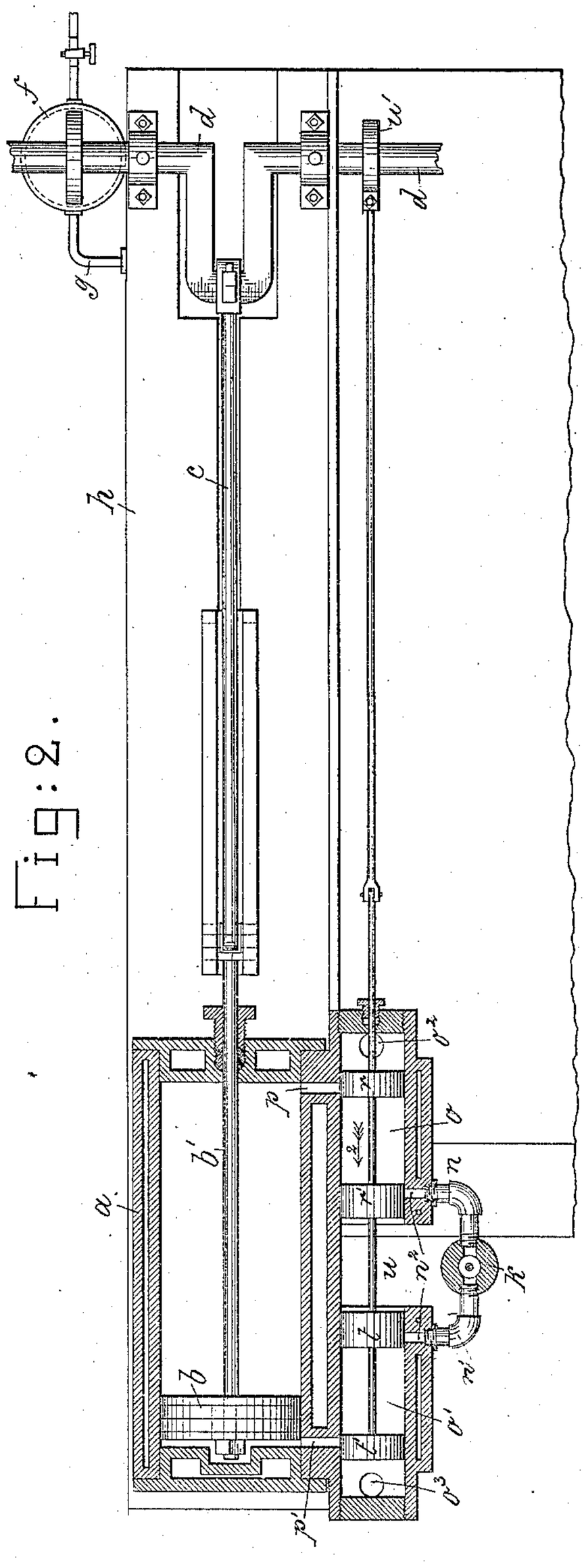


Fig: 2.



Witnesses.

Arthur Lippincott.

Henry Marsh.

Inventor.

William I. Tobey.

by Crosby & Gregory attys.

UNITED STATES PATENT OFFICE.

WILLIAM L. TOBEY, OF BOSTON, MASSACHUSETTS.

GAS-ENGINE.

SPECIFICATION forming part of Letters Patent No. 306,443, dated October 14, 1884.

Application filed March 14, 1884. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM L. TOBEY, of East Boston, county of Suffolk, and State of Massachusetts, have invented an Improvement in Gas-Engines, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

My invention relates to a gas-engine in which the piston is actuated by the explosion of a mixture of gas and air. In engines of this class as heretofore made the mixture of gas and air has usually been compressed in the cylinder before being exploded, and in some cases it is also somewhat compressed before entering the cylinder by a compressor or force-pump actuated by the engine.

The invention consists, mainly, in the valve mechanism by which the actuating-mixture is safely transferred from the tank to the engine-cylinder, it being admitted alternately at opposite ends of the said cylinder, so that the engine is double-acting, the piston being actuated by the fluid-pressure in both directions.

Figure 1 is a side elevation of a gas-engine embodying this invention; and Fig. 2 is a horizontal section thereof on line *x x*, Fig. 1, the frame-work and crank-shaft being shown in plan view.

The cylinder *a*, piston *b* therein, with the piston-rod *b'*, connecting-rod *c*, and crank-shaft *d*, may all be substantially the same as in any well-known double-acting reciprocating engine. The said crank-shaft *d* is provided with a crank or eccentric, *e*, having a suitable strap and rod for actuating a compressor or force-pump, *f*, of any suitable or usual construction, having a piston or plunger, *f'*, by which the mixture of air and gas is forced through the pipes *g* into the tank or reservoir *h*, which is shown in this instance as made in the bed or frame-work of the engine. The tank will always be kept full of the gaseous mixture, and will remain full when the engine ceases to operate, so that there will be a supply of compressed gaseous mixture ready for starting the engine, which will not have to be run by hand or other extraneous power for a short time in starting, as is usual in gas-engines. The gaseous mixture thus compressed in the tank *h* is conveyed therefrom through a supply-pipe, *i*, and a valve, *k*, controlled by an automatic governor, *m*, in any usual manner, to two branch pipes, *n n'*, leading to a double-valve chest, *o o'*, shown as cylindrical in form, and having ports *p p'*, leading to opposite ends of the cylinder *a*. The valve-chest *o o'* contains a series of piston-valves, *r r' t t'*, fixed upon a common actuating-rod, *u*, moved by an eccentric, *u'*, on the main shaft *d* of the engine in the usual manner. The pair of pistons, as *r r'*, working in one portion of the valve-chest, inclose a space between them shorter than the distance between the inlet-port n^2 to the said valve-chest and the port *p*, leading to the engine-cylinder, and as the said pistons continue to move in the direction of the arrow 2, Fig. 2, they will uncover the port n^2, placing the space or chamber formed between them in connection with the pipe *n* and tank or reservoir for the compressed mixture, so that the said space or chamber will receive a charge of the compressed mixture from the said tank. The same movement of the four connected pistons *r r' t t'* that placed the valve-chest *o* in communication with the tank also caused the port *p* to be uncovered by the piston *r*, thus placing the engine-cylinder in communication with the portion of the valve-chest on the side opposite to the piston *r'* from which the exhaust-passage o^2 leads, thus permitting the contents of the engine-cylinder *a* to exhaust through the port *p* and passage o^2. At the same time, also, the piston *t'* is moved beyond the port *p'*, so that the space or chamber between the pistons *t t'* is brought into communication, through the port *p'*, with the end of the engine-cylinder, thus permitting the charge which had been previously supplied through the pipe *n'* and port n^2 to the said chamber to enter the cylinder, where it is exploded, and actuates the piston in the usual manner. While the piston *b* is at or near the other end of the cylinder the valve-pistons move in the direction opposite to the arrow 2, conveying the charge previously received between the pistons *r r'* to the port *p* at the adjacent end of the engine-cylinder, while the contents of the cylinder at the other side of the piston is exhausted through the port *p'* and exhaust-passage o^3, and a new charge received between the pistons *t t'*.

The quantity of explosive mixture received

in the valve-chamber between the valve-pistons, and the consequent actuating-power of the engine, is varied and controlled by the governor-valve *k;* and it will be seen that the space in the valve-chest *o o'* between the pairs of pistons *r r'* and *t t'* constitutes an intermediate chamber between the said tank and cylinder, which chamber is placed alternately in communication with the tank or reservoir for the explosive mixture and with the cylinder, but never with both at the same time, communication being wholly cut off with the tank before it is established with the cylinder, and the reverse, so that there is never any communication between the tank and the cylinder, and it is consequently impossible to accidentally explode the contents of the tank.

I claim—

1. The engine-cylinder and valve-chest, and inlet and exhaust ports leading to and from the said valve-chest, and ports connecting it with the ends of the cylinder, combined with the valves arranged in said valve-chest with relation to said ports as shown and described, and valve-actuating mechanism whereby communication is alternately established and cut off between the inlet-port and portions of the said valve-chest adjacent to each end of the cylinder, and one end of the cylinder is connected with the exhaust-port while communication is established between the adjacent portion of the valve-chest and the inlet-port, and also between the other end of the cylinder and the portion of the valve-chest adjacent thereto, which is then cut off from the inlet-port, substantially as set forth.

2. In a gas-engine, the engine-cylinder, and a tank or reservoir for an explosive gaseous mixture, and an intermediate chamber and valve mechanism, whereby the said chamber is alternately placed in communication with the said tank and cylinder without at any time establishing direct communication between the said tank and cylinder, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM L. TOBEY.

Witnesses:

JOS. P. LIVERMORE,

W. H. SIGSTON.