

(No Model.)

G. H. REYNOLDS.

GAS ENGINE.

No. 284,328.

Patented Sept. 4, 1883.

Fig 2.

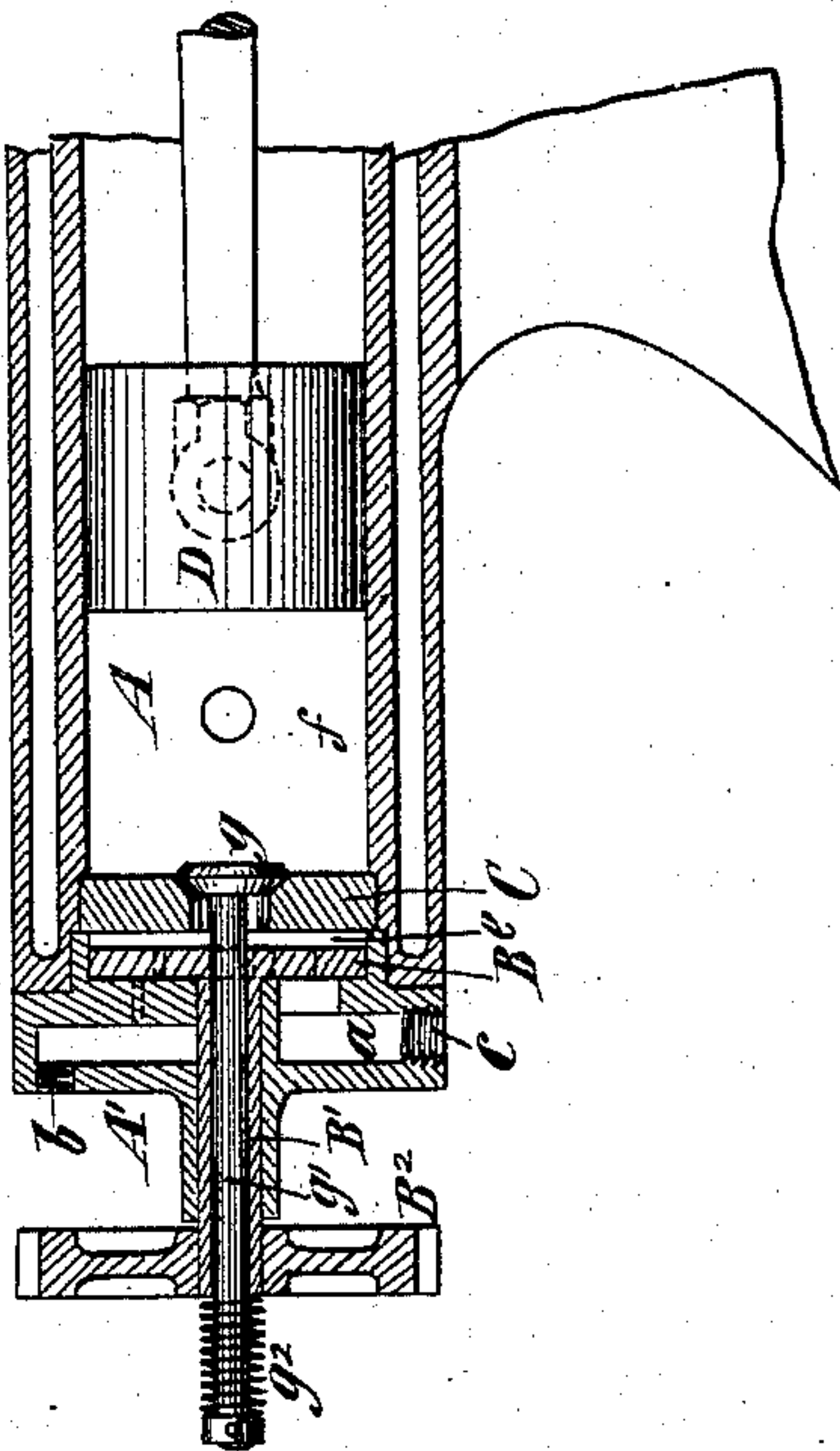
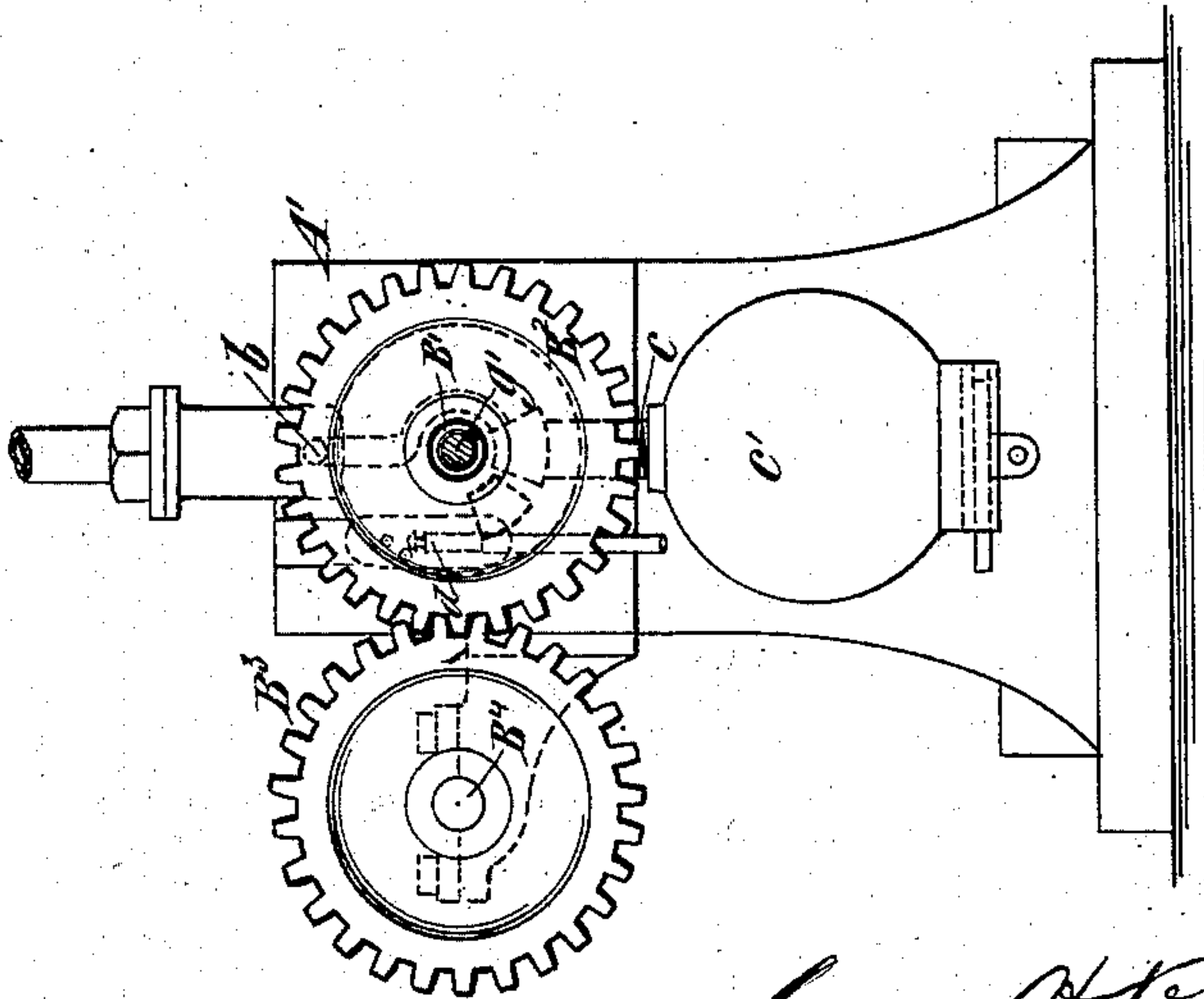


Fig 1.



Witnesses
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UNITED STATES PATENT OFFICE.

GEORGE H. REYNOLDS, OF NEW YORK, N. Y., ASSIGNOR OF ONE-HALF TO CORNELIUS H. DELAMATER, GEORGE H. ROBINSON; AND WILLIAM DELAMATER, OF SAME PLACE.

GAS-ENGINE.

SPECIFICATION forming part of Letters Patent No. 284,328, dated September 4, 1883.

Application filed July 27, 1883. (No model.)

To all whom it may concern:

Be it known that I, GEORGE H. REYNOLDS, of the city and county of New York, in the State of New York, have invented a new and useful
5 Improvement in Gas-Engines, of which the following is a specification.

My invention relates to those engines which are operated by an explosive mixture of air and gas, and in which the explosive mixture,
10 taken into the cylinder at one stroke of the piston, is compressed to a high degree by the return-stroke of the piston, and is exploded while in such compressed state. Engines of this class are much more economical and de-
15 sirable than those in which the gas and air are exploded at or but little above the normal pressure, because for equal power they are of a smaller size, and because they work with much less clearance; but heretofore the addi-
20 tional mechanism necessary to adapt the engine for firing under pressure has been of such complicated character and has added so much to the cost of the engine that only gas-engines of the larger sizes—say two-horse power and
25 over—have been operated on that principle.

The object of my invention is to provide a simple and inexpensive means for enabling the engine to fire under pressure, and thus to se-
30 cure all the advantages of the more expensive class of engines now in use, while retaining the simplicity of engines of the other class.

To this end the invention consists in the combination of a gas-engine cylinder having a large and a small compartment, a piston fit-
35 ted to the larger compartment, a valve controlling the admission of the explosive mixture to the smaller compartment and its ignition in said compartment, and a valve separating the two compartments and adapted to
40 open toward the larger compartment. The valve between the two compartments opens to allow the explosive mixture to pass through the smaller compartment into the larger, and to allow the fire to communicate with the gas
45 which is under pressure in the larger compartment when the gas in the smaller compartment is ignited. I may separate or form the two compartments by a partition or diaphragm introduced into the cylinder and having the

valve fitted in it; or the valve itself may be 50 made large enough to constitute a partition and close on a seat in the cylinder.

In the accompanying drawings, Figure 1 is a rear elevation of part of an engine embody-
ing my invention, and Fig. 2 is a longitudi- 55 nal section of a part of the cylinder and appurtenances.

Similar letters of reference designate corresponding parts in both figures.

A designates the cylinder, which is closed 60 at the back by a hollow head, A', in which is the usual mixing-chamber, *a*. Gas is introduced to the mixing-chamber *a* by a passage or inlet-opening, *b*, and air is introduced thereinto through a pipe, *c*, provided with the 65 usual reservoir, *c'*, to prevent the loss of gas by its escaping into the atmosphere.

On the inner side of the head A' is the usual disk-valve, B, which controls the inflow of the mixture of gas and air from the mixing-cham- 70 ber *a*, and which also controls the ignition of the explosive mixture from a jet or burner, *d*, which is arranged in a recess in the head A', and communicates with the cylinder when an aperture in the valve B comes opposite a 75 small aperture in the head A'. The disk-valve B is mounted upon a stem or shaft, B', upon which is a gear-wheel, B², and said stem and valve are rotated by a wheel, B³, on a shaft, B⁴, which extends lengthwise of the en- 80 gine and is geared with the crank-shaft of the engine. I have not shown the crank-shaft or the connection with the shaft B⁴; but as in engines of this kind the shaft B⁴ commonly works the exhaust-valve, it follows that in an 85 engine firing under pressure the shaft B⁴ should make only one revolution to two revolutions of the crank-shaft, so that the exhaust-valve will be opened only during the return-
stroke of the piston which follows the explo- 90 sion. I have not shown the exhaust mechanism, as it forms no part of my present invention.

In the cylinder A is fitted a partition or diaphragm, C, dividing the cylinder with two 95 compartments, *e f*. The former compartment, *e*, which is very small, receives the explosive mixture of gas and air from the valve B, and

the larger compartment, *f*, contains the piston D. The communication between the compartments *e f* and through the partition C is controlled by a valve, *g*, which opens toward the larger compartment *f*, so as to allow the explosive mixture to pass from the compartment *e* to the compartment, *f*, but which closes to prevent the passage of the mixture in the reverse direction. The valve *g* is fixed to a stem, *g'*, which extends rearward through the valve-stem or shaft B', and has a spring, *g''*, applied to its rear end to hold the valve closed.

In lieu of having a fixed partition and a valve fitted thereto for dividing the cylinder into two compartments, I may employ a larger valve, which by seating on the cylinder will constitute a partition to form the two compartments *e f*.

Referring now to the operation of the engine, I will suppose that the piston is just about to commence its movement away from the partition or diaphragm C, and that the valve B is just about to admit the explosive mixture to the compartment *e*. As the piston moves, it draws in a charge of the explosive mixture through the compartment *e* and valve *g*; but when the piston commences its return movement, the valve *g* instantly closes, and hence at the completion of the return movement the mixture in the compartment *f* is highly compressed, while the mixture in the compartment *e* (supposing the valve *g* to be tight) is at the normal pressure. If the ignition-burner *d* were exposed to the compressed mixture in the compartment *f*, it would be blown out without firing the gas; but the mixture in the compartment *e*, not being compressed, is fired when the valve B exposes the ignition-burner *d*. The pressure produced by the explosion of the mixture confined in the compartment *e* momentarily opens the valve *g* and ignites the compressed mixture in the compartment *f*, which acts upon the piston. Moreover, the mixture confined in the com-

partment *e* becomes heated sufficiently to produce a slight degree of expansion before it is fired, and consequently when the ignition-burner *d* is exposed by the valve B there will be a slight puff of the explosive mixture through the apertures in the valve B and cylinder-head A' to meet the burner; hence the firing of the mixture in the compartment *e* is rendered certain.

The construction of the cylinder with the partition C and valve *g* adds comparatively nothing to the cost of the engine, and does not complicate it in any way; hence my invention may be embodied with advantage in the smallest gas-engines, and will greatly increase their power as compared with engines which do not fire under pressure.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination of a gas-engine cylinder having a large and a small compartment, a piston fitted to the larger compartment, a valve controlling the admission of the explosive mixture to the smaller compartment and its ignition in said compartment, and a valve separating the two compartments and adapted to open toward the larger compartment, substantially as and for the purpose described.

2. The combination of the cylinder A, divided by the partition C into small and large compartments *e f*, the head A', the piston D in the compartment *f*, the valve B in the compartment *e*, and the valve *g* in the partition C, all substantially as described.

3. The combination of the cylinder A, divided by the partition C into small and large compartments *e f*, the head A', the piston D in the compartment *f*, the valve B in the compartment *e*, the hollow valve stem or shaft B', the valve *g* and its stem *g'*, and spring *g''*, all substantially as described.

GEO. H. REYNOLDS.

Witnesses:

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