

(No Model.)

4 Sheets—Sheet 1.

B. CHATTERTON.
GAS OR VAPOR ENGINE.

No. 505,751.

Patented Sept. 26, 1893.

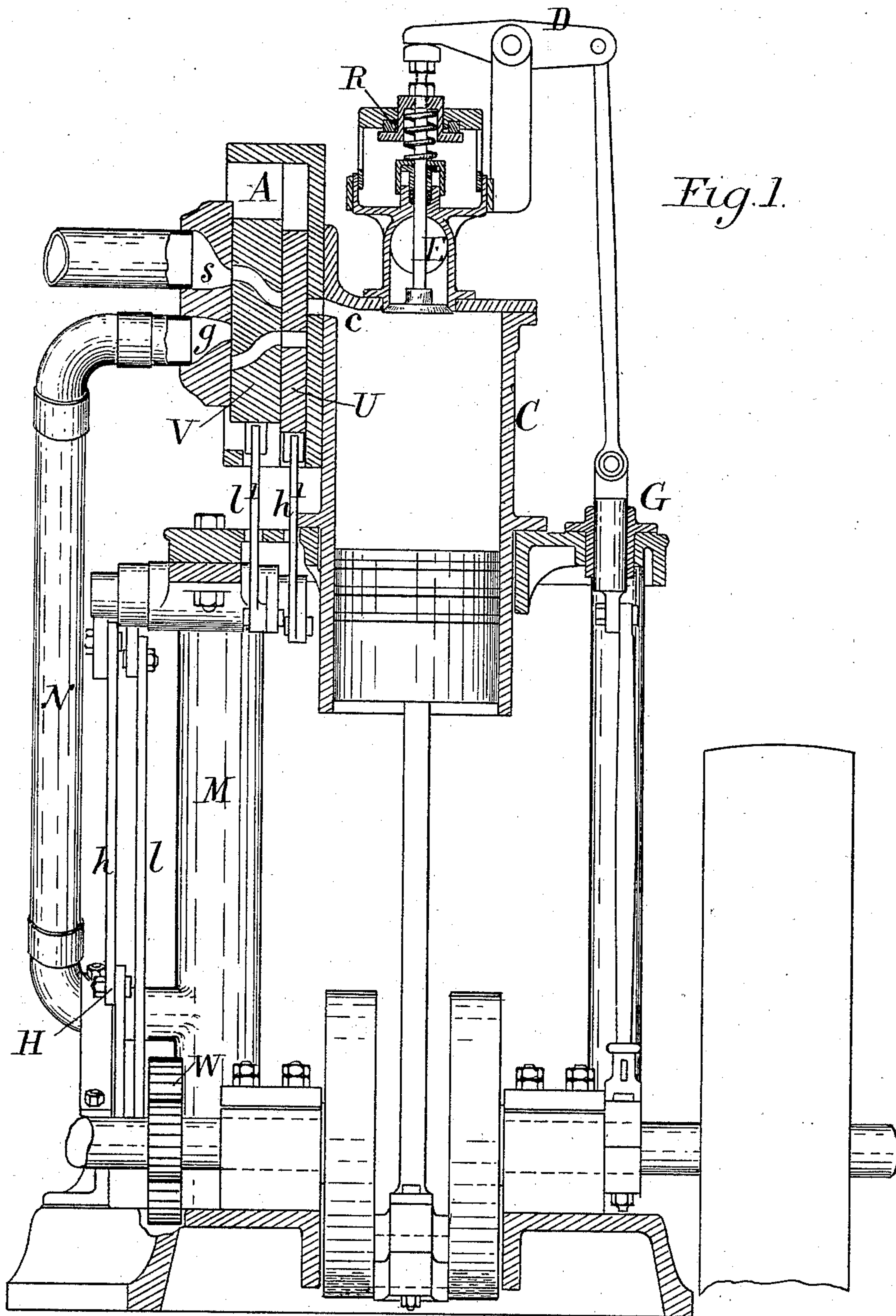


Fig. 1.

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J. H. Daly.

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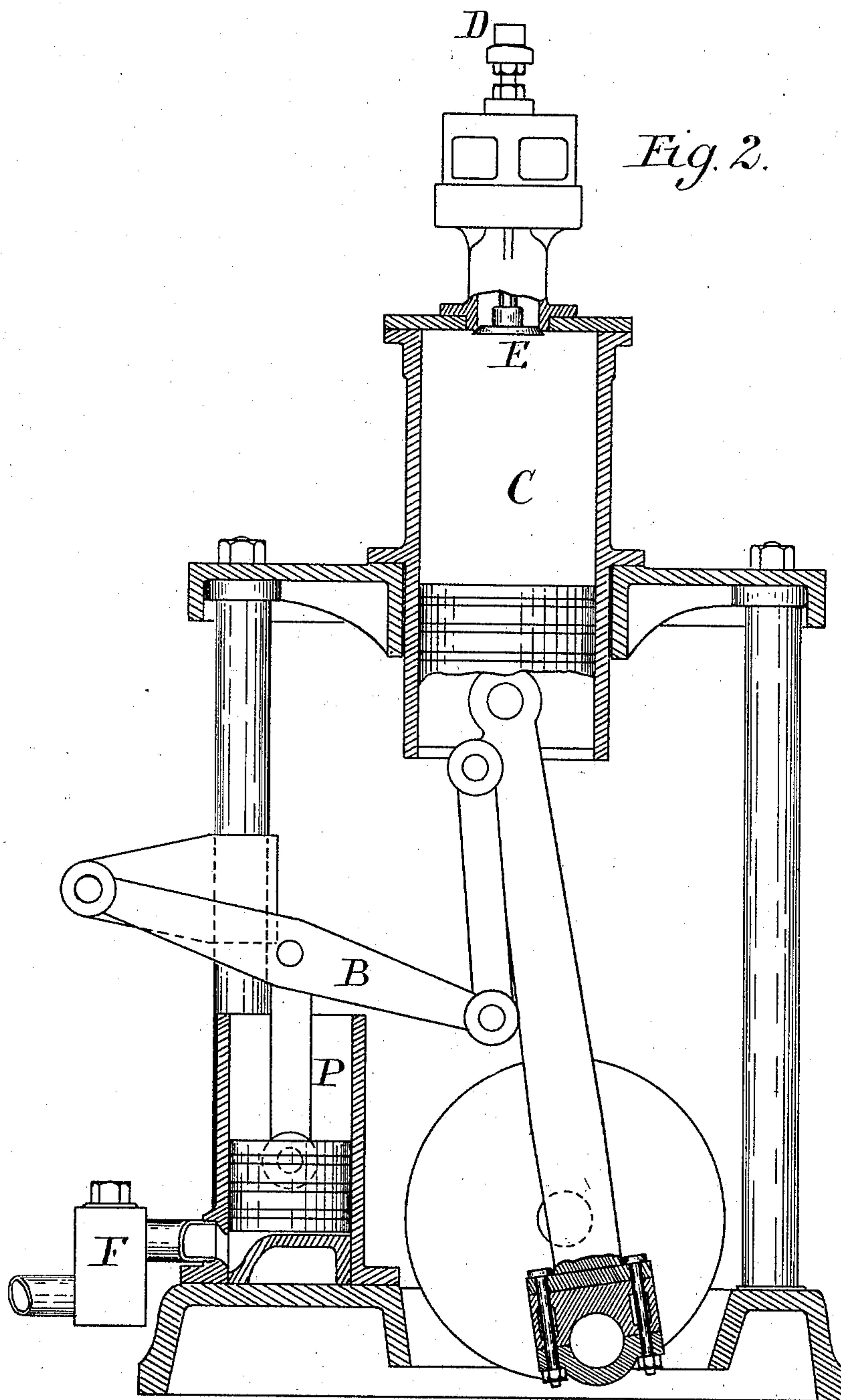


Fig. 2.

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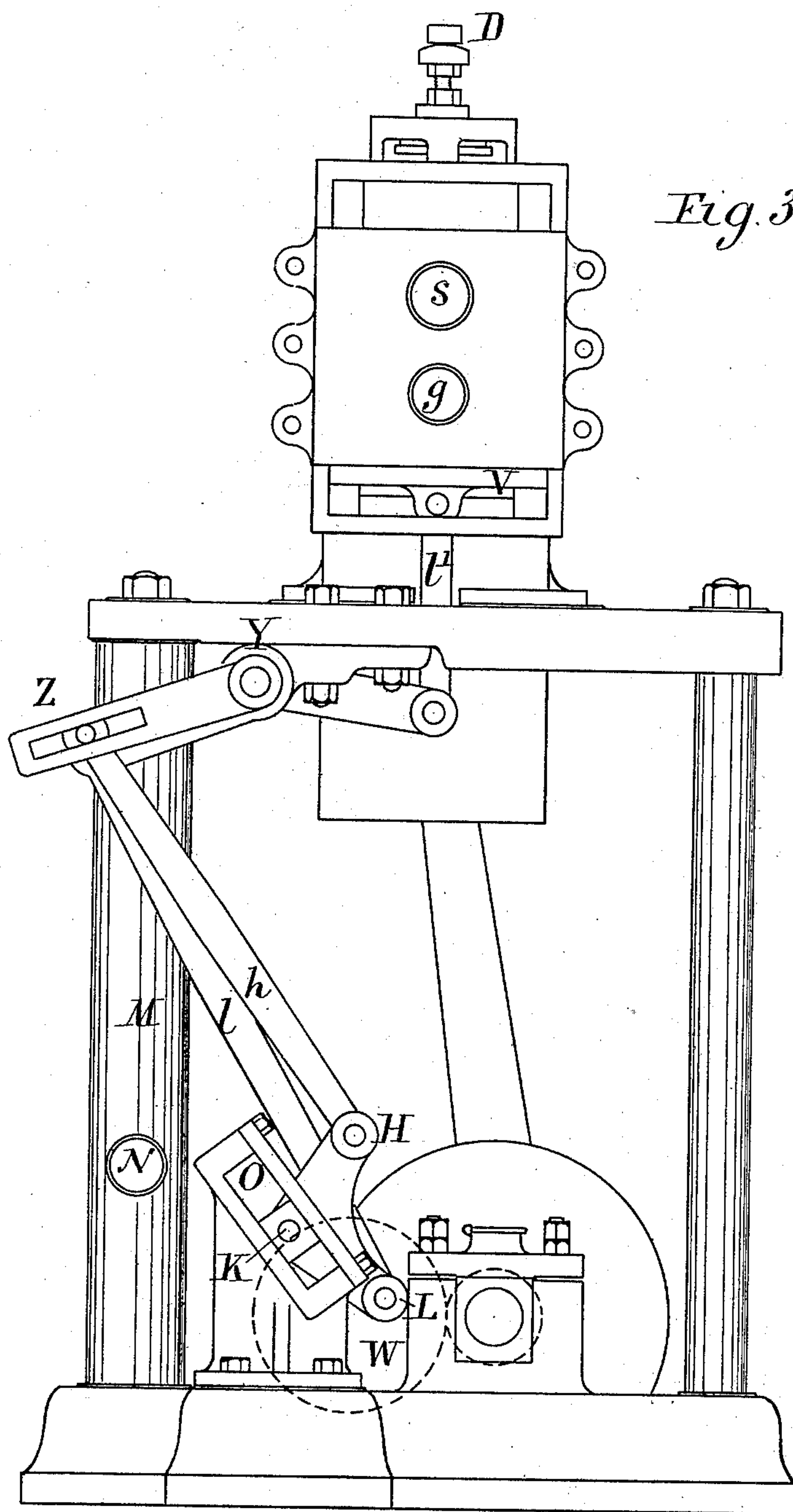


Fig. 3.

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Fig. 4.

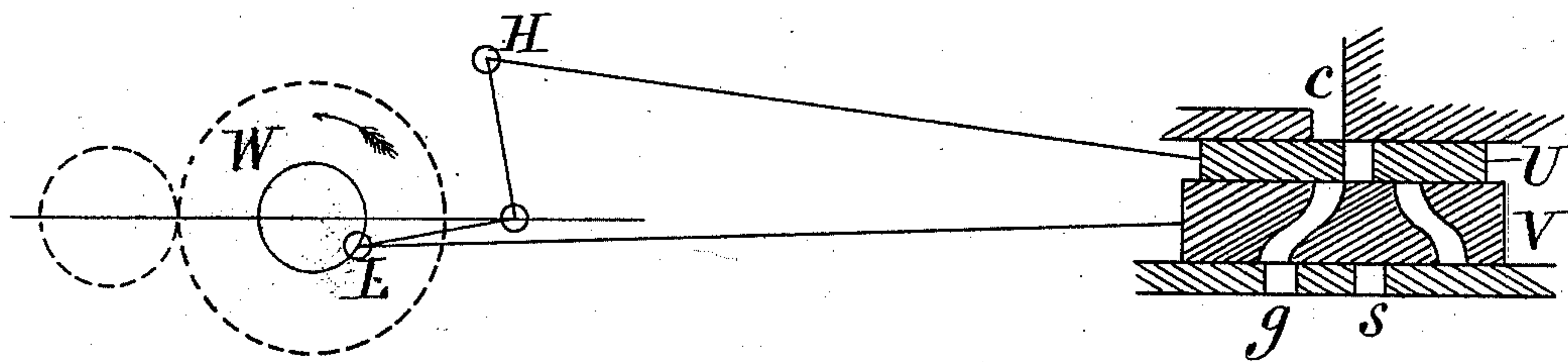
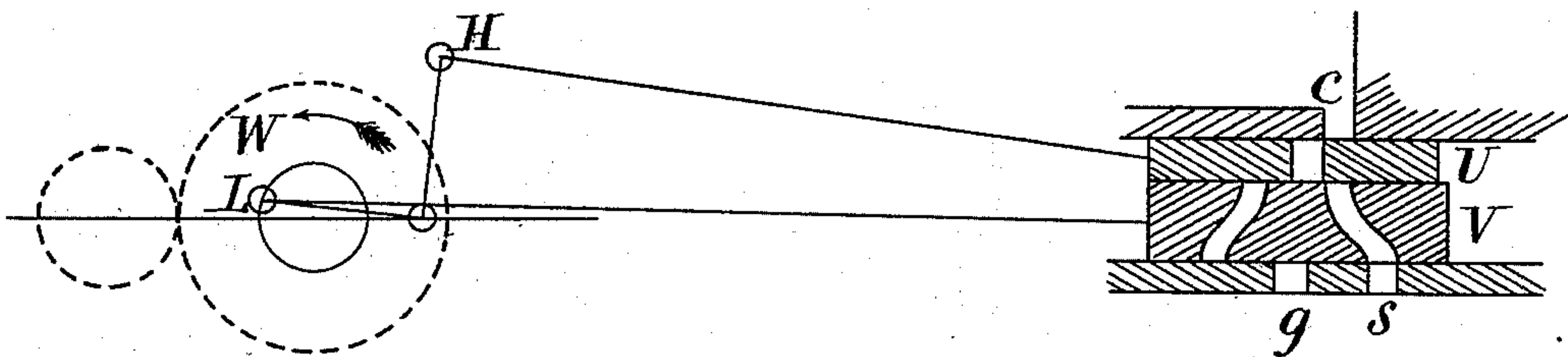


Fig. 5.



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UNITED STATES PATENT OFFICE.

BERTRAM CHATTERTON, OF LONDON, ENGLAND.

GAS OR VAPOR ENGINE.

SPECIFICATION forming part of Letters Patent No. 505,751, dated September 26, 1893.

Application filed September 29, 1892. Serial No. 447,253. (No model.) Patented in England April 1, 1892, No. 6,284.

To all whom it may concern:

Be it known that I, BERTRAM CHATTERTON, a citizen of England, residing at 44 Rye Hill Park, Peckham Rye, London, in the county of Surrey, England, have invented certain new and useful Improvements in Gas or Vapor Engines, (for which I have obtained Letters Patent in Great Britain dated April 1, 1892, No. 6,284,) of which the following is a specification.

When steam is employed for producing motive power, the cooling of the cylinder which results from the expansion during one stroke condenses part of the steam admitted for the next stroke, thus causing a serious loss of efficiency. Again when the combustion of gas or inflammable vapor mixed with air is employed, the cylinder in which the combustion takes place has to be cooled artificially so that in this case also there is a serious waste of heat and consequent loss of efficiency.

My invention relates to an engine for the production of motive power, by the conjoint use of steam and of combustible gaseous mixture in such a manner that there is little or no loss of steam by the cooling in the cylinder, resulting from expansion, and little or no loss of the heat derived from the combustion of the inflammable mixture. For this purpose, I provide novel means whereby the cylinder is supplied during one stroke with steam which expands therein performing work and cooling the cylinder, and during the next stroke a charge of combustible mixture is supplied which, being fired, produces expansion propelling the piston and also heating the cylinder. Thus the steam being always received in a heated cylinder undergoes no such loss as would result from cooling, and the heat produced by the combustion of the gaseous charge is taken up by the cylinder and imparted to the steam at the next stroke, instead of being wasted as usual in heating water in the cylinder jacket.

In the accompanying drawings Figures 1 and 2 are vertical sections on planes at right angles to one another, with parts shown in elevation. Fig. 3 is a side elevation showing the valve gear, other parts being removed for the sake of clearness. Figs. 4 and 5 are dia-

grammatic views of the valves in two conditions.

C is the cylinder which is single acting and has its piston connected to a crank below. An admission slide V and a cut off slide U are arranged in a valve chest A which may be open to the atmosphere as shown, or might be inclosed in a case supplied with lubricant. The exhaust E is the exhaust valve for both gas and steam which is worked by a lever D from an eccentric on the shaft by rods for which G is a guide. The valve is held closed by a spring except when it is opened by the eccentric during the lower half of its motion. An elastic buffer ring R may be used to deaden shock as the valve becomes seated.

As shown in Fig. 2, P is a pump for supplying compressed explosive mixture worked from the lever B which is linked to the main connecting rod. The pump is single acting and is furnished with admission and delivery valves arranged in a valve box F so as to deliver gas and air into a reservoir, which may be one of the supporting columns such as M, made hollow for the purpose and communicating by a pipe N with one of the inlets to the admission slides, which are worked in the following manner. A wheel W worked by a pinion on the shaft at half speed has a crank pin L which is directly connected to the slide V moving it to and fro so as to admit alternately gaseous mixture and steam to the cylinder C from the ports *g* and *s* respectively. The cut off slide U is worked from the arm H of a bell crank, the pivot K of which slides in a straight guide O, or might be carried on a radius arm so as to move in a circular arc nearly coinciding with the straight path. Owing to the relative motions of the slides U and V worked respectively from H and L the port in the cut off slide U alternately overtakes and passes the steam and gas ports in the slide V.

As shown in Figs. 1 and 3 the links *h* and *l* connect the pins H and L respectively to arms on a rocking shaft and sleeve Y arms of which are connected by links *h'* *l'* to the slides V and U respectively. The arm Z for the cut off slide is slotted so that by moving the pin of the rod *h* to various positions in the slot, varying degrees of travel are given to the

slide U, thus varying the cut off. The position of the pin may be adjusted by hand or may be controlled by a governor.

The operation of the engine is as follows:—

- 5 When the piston is at top stroke, the upper passage of the slide V coinciding with the port *s* and the port in U also coinciding with the cylinder port *c*, steam passes into the cylinder until the slide U closes the port, this
- 10 steam expanding and propelling the piston. During the return stroke, effected by the momentum of the flywheel, the steam is expelled past the exhaust valve E which is then open, and is discharged into the open air or into a
- 15 condenser, or it may be to a larger cylinder in which it works at lower pressure as in a compound engine. When the piston is again at top stroke, the lower passage of the slide V coinciding with *g* and the passage in U co-
- 20 inciding with *c*, compressed gaseous mixture enters the cylinder until the port *c* is closed by U, and thereupon the cylinder charge is ignited by an electrical or other known ignition apparatus. The piston is thus propelled
- 25 and the exhaust valve being opened the products of combustion escape. A portion of

their heat may be utilized if desired to aid in generating steam.

Having thus described the nature of my invention and the best means I know for carrying the same into practical effect, I claim— 30

The combination with a cylinder, and a reciprocating piston working therein, of pipes and valve mechanism which supply, alternately, to the cylinder at one and the same 35 side of the piston, steam, and an inflammable mixture, substantially as and for the purpose described.

In testimony whereof I have signed my name to this specification, in the presence of 40 two subscribing witnesses, this 16th day of September, A. D. 1892.

BERTRAM CHATTERTON.

Witnesses:

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