(No Model.)

S. WILCOX.

GAS ENGINE.

No. 343,745 Patented June 15, 1886.

FIG. 1

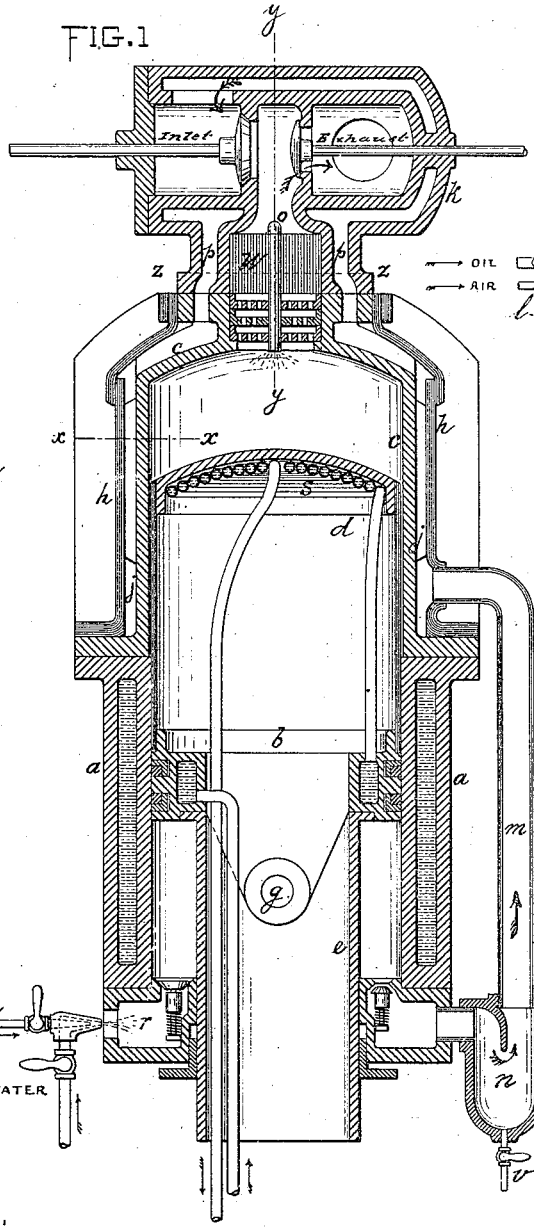


FIG. 3

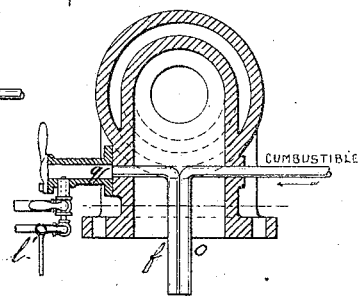


FIG. 2

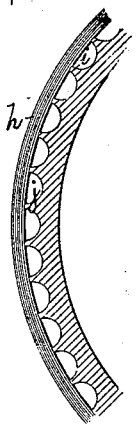
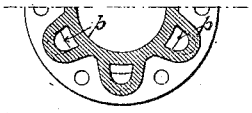


FIG. 4



WITNESSES:

Aug. Crevelin

F. R. Wadsworth

INVENTOR

Stephen Wilcox

BY

Chas. N. Forbes

ATTORNEY

UNITED STATES PATENT OFFICE.

STEPHEN WILCOX, OF BROOKLYN, NEW YORK.

GAS-ENGINE.

SPECIFICATION forming part of Letters Patent No. 343,745, dated June 15, 1886.

Application filed November 14, 1885. Serial No. 182,779. (No model.)

To all whom it may concern:

Be it known that I, STEPHEN WILCOX, a citizen of the United States, residing at Brooklyn; in the county of Kings and State of New York, have invented a new and useful Improvement in Gas-Engines, of which the following is a specification, reference being had to the accompanying drawings, forming a part of the same, in which—

Figure 1 represents a longitudinal section; Fig. 2, a cross-section through the cylinder-wall on the line *x x;* Fig. 3, a vertical section through the line *y y*, and Fig. 4 a transverse section through the line *z z*.

The object of this invention is to reduce the loss of heat in this class of engines occasioned through conduction, radiation, and exhaust; and the invention consists in intercepting the escaping heat and directing it to the combustion-chamber, as hereinafter described.

It is well known in practice that about fifty per cent. of the heat generated is conducted through the walls of all water-jacketed cylinders, thirty per cent. escapes through the exhaust-passages, and five per cent. is lost by radiation, leakage, &c., while but about fifteen per cent. is converted into power; and it is evident that if a portion of such escaping heat is intercepted a higher average temperature will be obtained in the cylinder or combustion-chamber; and to this end I will proceed to describe an engine adapted to secure this result.

I have illustrated my invention in connection with a single-acting engine trunked at its cool end to form an air-pump, and the cylinder provided at its opposite end with an extension-chamber, in which the hot gases act upon a plunger connected to the main piston.

In the drawings, *a* represents the cylinder, in which the piston *b* reciprocates; and *c*, the extended chamber of the cylinder, in which the hollow plunger *d* is arranged, the latter being connected directly with the piston *b*. The piston *b* is constructed with a trunk, *e*, that passes through a stuffing-box, and is also provided with an interior connection, *g*, to which the connecting-rod of the engine is attached, this trunk arrangement providing an annular space that is utilized as the air-pump chamber, the piston *b* acting as the air-pump.

h represents a wrought-iron jacket surrounding the cast-iron shell of the extended cylinder-chamber, the latter being constructed with external ribs or projections, *i*, (shown in the cross-sectional view, Fig. 2,) against which the jacket is closely fitted. This jacket *h* firmly supports the cast-iron shell of the extended chamber, and its elasticity provides for the contraction and expansion of the cylinder, the expansion of the latter tending to straighten the wrought-iron jacket between its points of bearing on the external projections of the cylinder. The working-cylinder is water-jacketed as far as the piston reciprocates, the latter being also made hollow to provide for water-circulation. The plunger *d* is kept at a safe temperature through the medium of a coil of water-pipes, as shown at *s*, which are connected to the water-circulation in the manner shown or in any convenient way.

In passing the compressed air through the space provided between the chamber and its surrounding jacket on its way to the cylinder or combustion-chamber, I cause the current of air to flow uniformly over the whole exterior surface of the cylinder and through a series of passages, *j*, between the cylinder and jacket that connect with the valve-box. The air enters the jacket through a pipe, *m*, leading from a water-trap, *n*, located between and communicating with the air-pump, and passes into the valve-chambers through a series of openings, *p*, in the flange of the valve-chamber nozzle. (Shown in cross-section, Fig. 4.) The temperature of the air passing through the jacket is controlled by a water-jet, *r*, arranged within range of the air-pump induction, the water-jet being pulverized by an air-jet, *u*, leading from the receiver. That portion of the spray condensed on the surfaces of the cylinder and valves, or any excess of water suspended in the entering air, will separate and collect in the trap *n*, from which it may be drawn through the cock *v*.

To recover a portion of the heat of the exhaust, I place a regenerator, *w*, between the valve-box and the cylinder, as shown in Fig. 1. The regenerator is composed of a series of metal plates arranged above a series of perforated partitions made of porcelain or similar substance, and the pipes that convey the

inflammable fluid to the combustion-chamber are passed centrally through the regenerator, as shown at *o*, Fig. 1, the point of combustion being located within the cylinder, and the charge of inflammable fluid brought in contact with the air after the latter passes the regenerator. It will therefore be seen that a portion of the heat of the exhaust product of combustion in passing through the regenerator will be retained therein and carried back to the cylinder by the next charge of air following each exhaust. The entering air is thus heated in three successive stages—first, by contact with the hot cylinder; second, by passing through the regenerator, and, third, by receiving the full complement of heat in the combustion-chamber.

The igniting-flame is conveyed to the combustion-chamber through the pipe *f*, arranged adjacent to the oil-supply pipe *o*, the igniting-candle being thereby removed at such a distance from the combustion-chamber that the cushioning or other pressure in the latter will not force the burned gases back and extinguish the flame.

The ignition is effected by a candle, *q*, having an air and oil supply, as shown in Fig. 3, and a valve, *l*, operated by any convenient moving part of the engine mechanism, which will open the valve just in advance of the main valve, so that the current of air will convey the flame through the pipe *f* to the combustion-chamber.

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

1. In a gas-engine, a regenerating device arranged between the point of combustion, the air-jacket, and the exhaust-passage, whereby a portion of the heat of the escaping products of combustion is intercepted and returned to the combustion-chamber with the entering air.

2. A gas-engine provided with a jacket forming a passage to the entering air, and a connected water-jet for supplying moisture to the air, whereby the temperature of the jacket and cylinder is regulated.

3. An igniting device having an oil and air supply, the latter being provided with an auxiliary valve operated by the engine mechanism, so as to allow a small current of air to flow past the igniting device and convey the flame to the combustion-chamber.

4. In a gas-engine, an igniting device in constant communication with the combustion chamber, and located at such distance therefrom as to prevent the cushion or other pressure from forcing back the burned gases and extinguishing the flame.

5. An air-pump of a gas-engine, provided with a water-jet for moistening the air, and a trap for collecting and removing condensation or an excess of water contained in the air.

STEPHEN WILCOX.

Witnesses:

C. W. FORBES,

C. R. WATERBURY.