No. 779,727. PATENTED JAN. 10, 1905.

F. J. MILLER.

COUNTERWEIGHT ATTACHMENT FOR GAS ENGINES.

APPLICATION FILED MAR. 9, 1904.

2 SHEETS—SHEET 1.

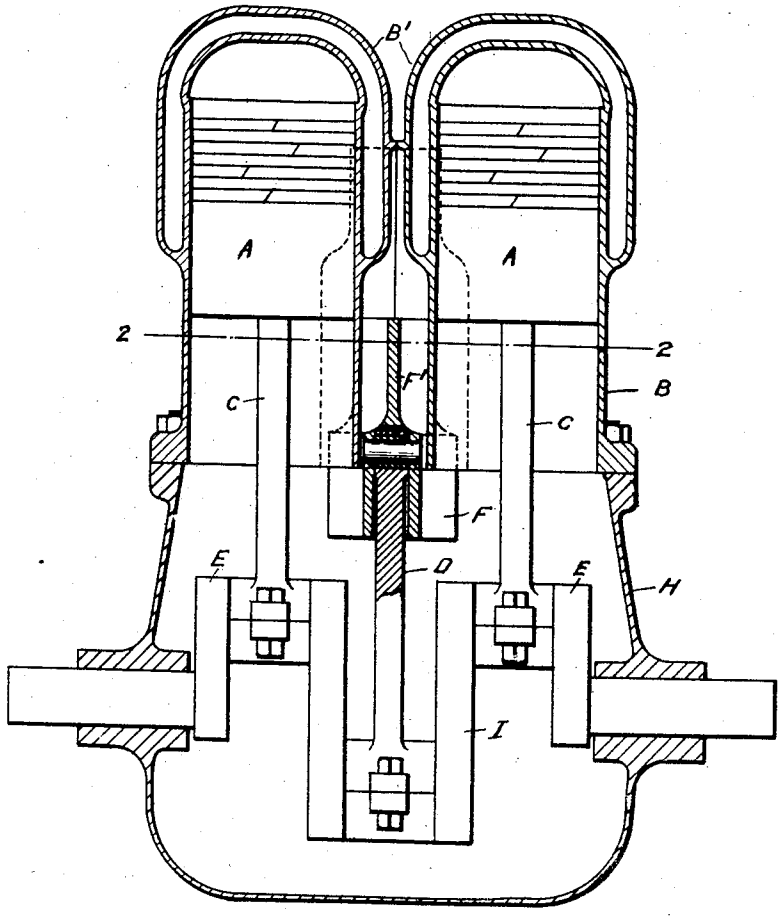

Fig. 1.

Witnesses
M. A. Schmidt
Geo. E. Tew

Inventor
Frank J. Miller
by Miles B. Stevens & Co
Attorneys

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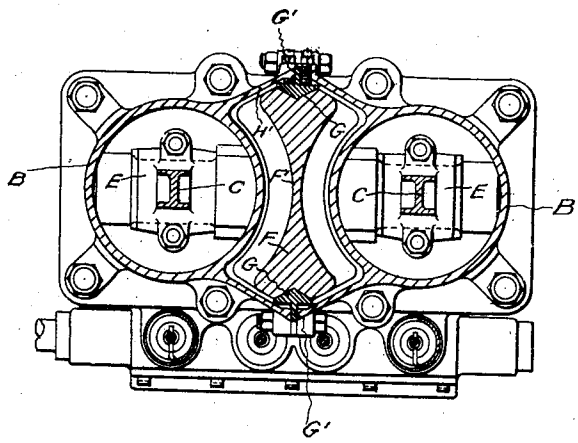

Fig. 2.

Witnesses
M. A. Schmidt.
Geo. E. Terry

Inventor
Frank J. Miller
by Milo B. Stevens & Co
Attorneys

No. 779,727. Patented January 10, 1905.

UNITED STATES PATENT OFFICE.

FRANK J. MILLER, OF CLEVELAND, OHIO.

COUNTERWEIGHT ATTACHMENT FOR GAS-ENGINES.

SPECIFICATION forming part of Letters Patent No. 779,727, dated January 10, 1905.

Application filed March 9, 1904. Serial No. 197,218.

To all whom it may concern:

Be it known that I, FRANK J. MILLER, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented new and useful Improvements in Counterweight Attachments for Gas-Engines, of which the following is a specification.

This invention relates particularly to internal-combustion engines, and has for its object to provide an improved counterweight to balance the pistons and cranks with intent to secure a perfect balance at any speed.

The invention is illustrated in the accompanying drawings, in which—

Figure 1 is a vertical section of a vertical engine of the two-cylinder type provided with my improvement. Fig. 2 is a horizontal section on the line 2 2 of Fig. 1.

The engine illustrated is of the type having the cranks inclosed by a casing, and the trunk-pistons are shown at A, arranged to reciprocate in the cylinders B of any desired or suitable construction. The piston-rods C connect the pistons with the cranks E, which are contained within the crank-casing H, bolted to the cylinders. The throw of both cranks, and consequently the movement of the pistons, is the same.

The middle or counterweight crank I is located between the cranks E and has opposite throw. It is connected by rod D to the counterweight F, which reciprocates between the cylinders upon vertical guides G, held within an upper extension H′ of the casing H. The housing or extension H′ is cast in with the cylinders and forms a chamber between the lower ends of the cylinders, which chamber is closed at the top and opens at the bottom into the crank or oil casing H. The housing is split and bolted together at the median vertical line between the cylinders, and a convenient means of supporting the guides G consists in clamping a fin G′ thereon in the joint between the sections of the housing, whereby the guides lap and cover the joint. The counterweight F is properly shaped to suit the housing and the space between the cylinders and at the top is made thin, as at F′, to pass between the water-jackets B′ around the heads of the cylinders.

In the preferable construction the counterweight F is made equal to the weight of the two pistons A, and the cranks and connecting-rods are balanced in weight. The operation of the engine causes a travel of the counterweight opposite to that of the pistons and gives a balance to the machine at any rate of speed with the known advantages incident thereto. The location of the counterweight in a housing between the cylinders is convenient and occupies very little space. The communication with the oil-casing below insures an effective lubrication of the guides. The advantages of simplicity and design are obvious.

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

1. In an engine, the combination with a cylinder and single-acting piston, and crank-shaft driven by the piston, the cylinder having guides supported thereby, on the side thereof, of a reciprocating counterweight in the guides and connected to a crank on the shaft, to balance the piston.

2. The combination of a cylinder and a crank-casing open thereto, the latter having an extension with guides therein, a reciprocating piston in the cylinder, a shaft in the casing having cranks of opposite throw to one of which the piston is connected, and a counterweight reciprocating in said guides and connected to the other crank.

3. The combination of a pair of single-acting reciprocating engines, the cylinders of which are arranged side by side and the pistons of which have the same throw, of a counterweight reciprocating on guides between the cylinders and connected to the shaft.

4. The combination of a pair of cylinders and pistons therein, a crank-casing into which the cylinders open, a shaft extending within the casing and having cranks of the same

throw, connected to the pistons, and another crank of opposite throw, a housing extending from said casing inclosing the space between the cylinders, and having guides, and a counterweight reciprocable in said guides and connected to said other crank.

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

FRANK J. MILLER.

Witnesses:
JNO. KUNZE,
JOHN A. BOMMHARDT.