No. 889,859. PATENTED JUNE 2, 1908.

C. O. ROBERTSON.

ENGINE.

APPLICATION FILED JUNE 22, 1907.

2 SHEETS—SHEET 1.

Fig. 1

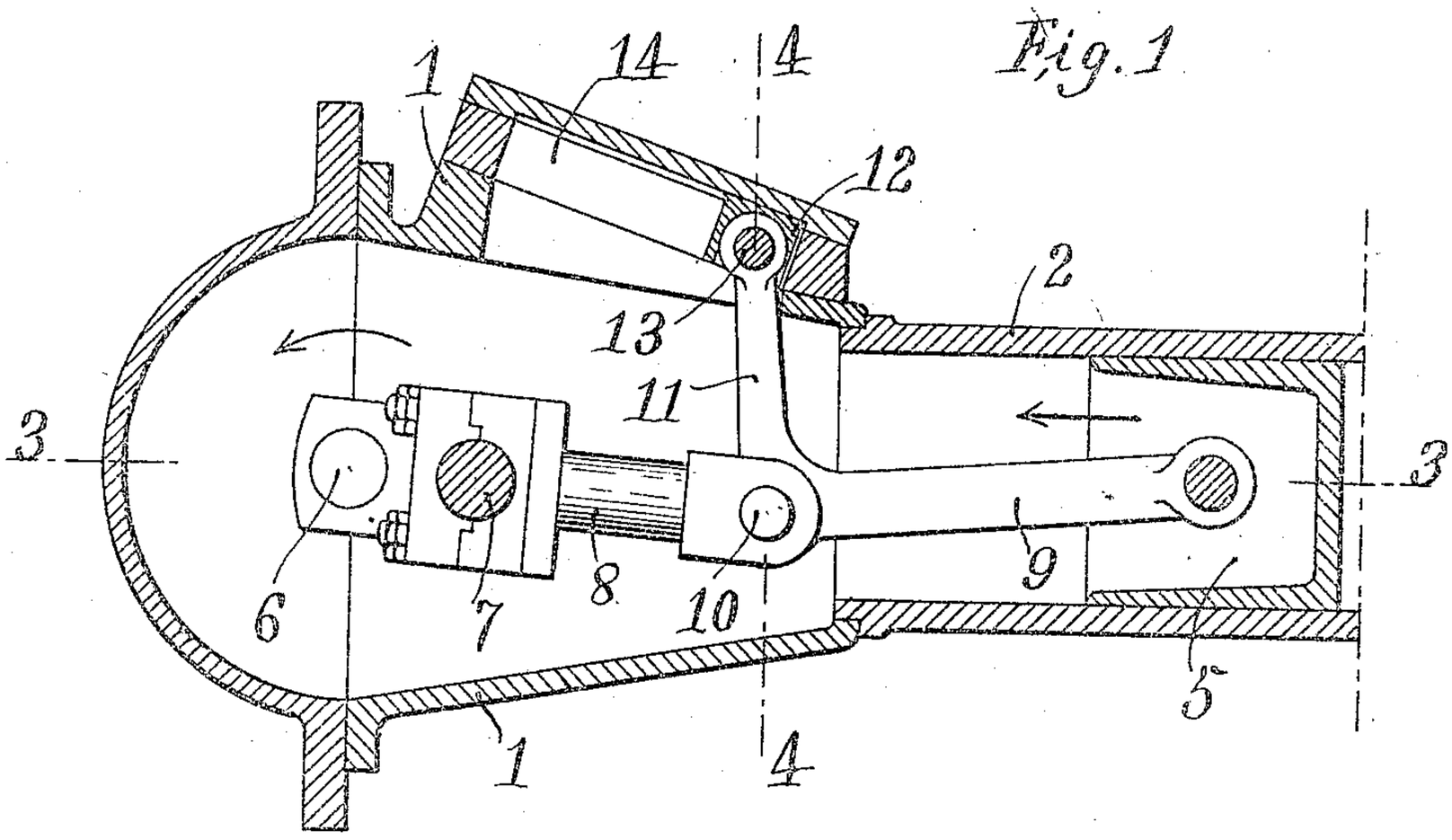
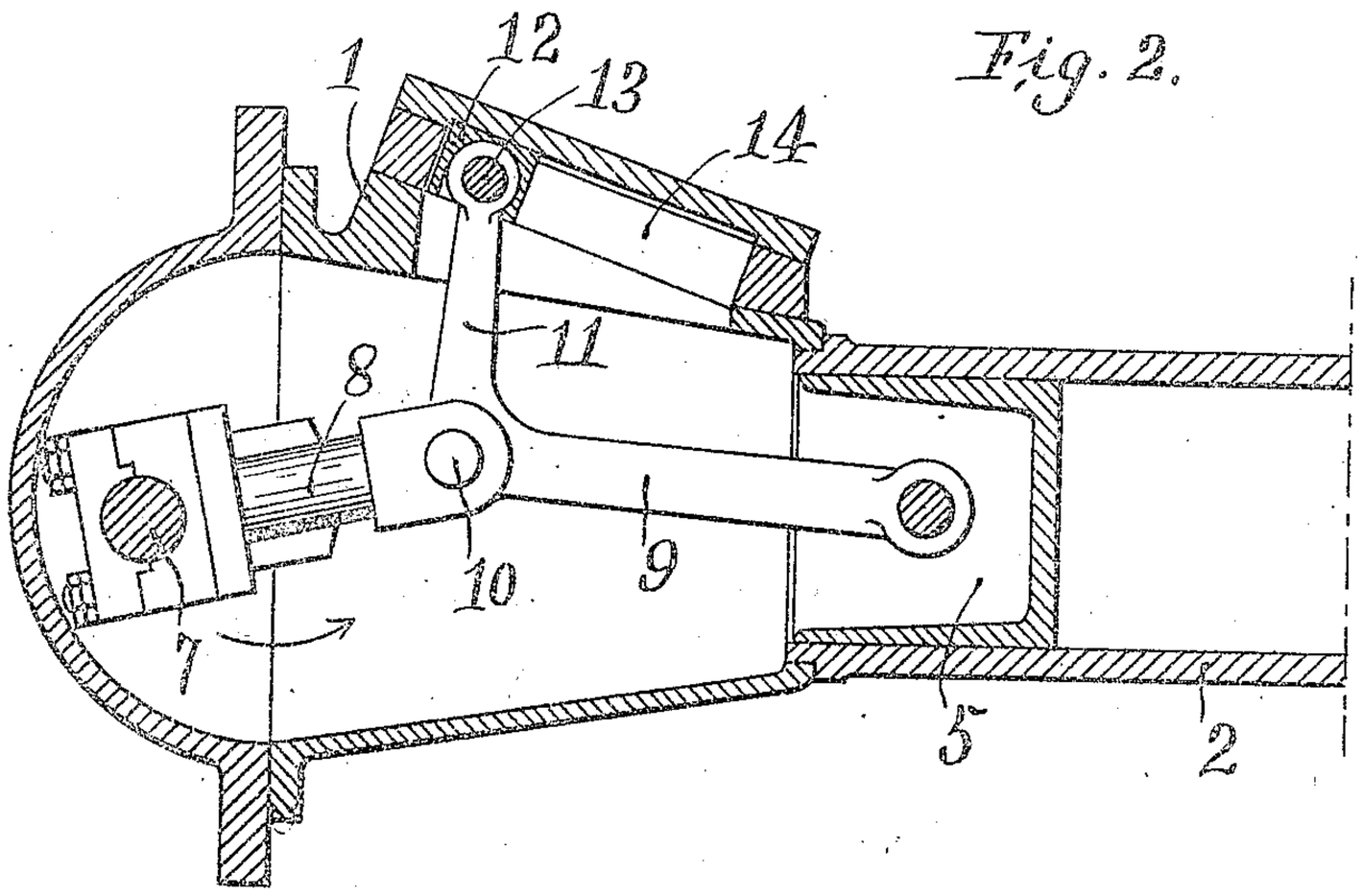


Fig. 2.



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2 SHEETS—SHEET 2.

Fig. 3.

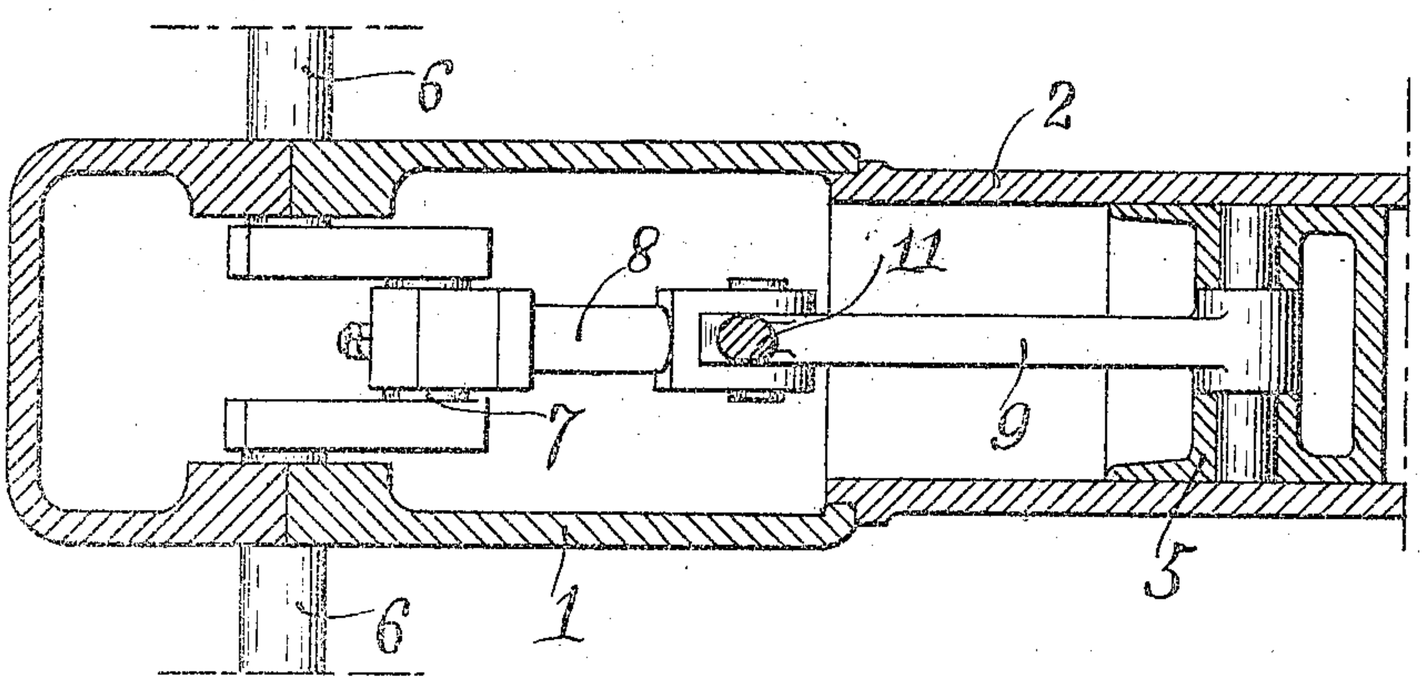
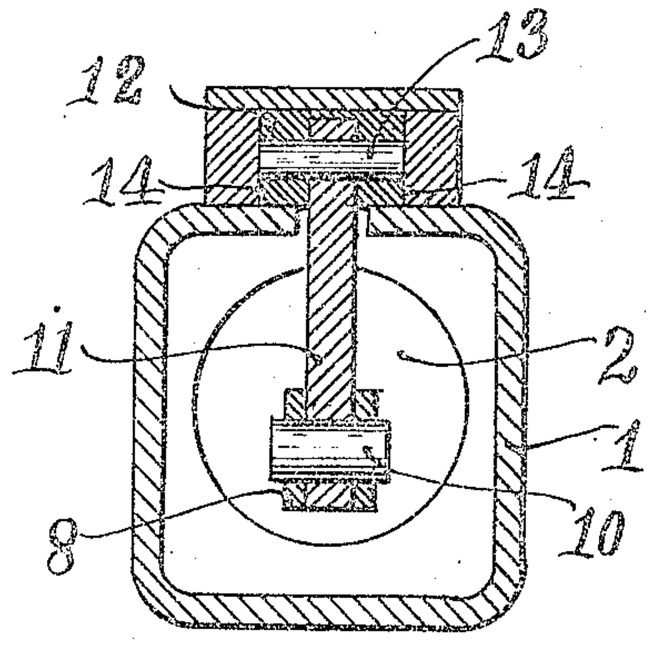


Fig. 4.



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ENGINE.

No. 889,859. Specification of Letters Patent. Patented June 2, 1908.

Continuation of application Serial No. 295,227, filed January 9, 1906. This application filed June 22, 1907. Serial No. 380,225.

To all whom it may concern:

Be it known that I, CHARLES O. ROBERTSON, citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Engines, of which the following is a specification.

This invention relates to that class of engines wherein are employed a piston, a crank shaft and a connection between the piston and shaft whereby the operation of the piston causes the operation of the crank shaft.

The object of my invention is to provide a simple and efficient connection between the piston and crank shaft whereby pressure against the piston in one direction will cause the crank shaft to turn more than half a revolution, thus increasing the power and efficiency of the engine.

The invention consists in the novel construction and combinations of parts hereinafter fully described and claimed.

In the drawings:—Figure 1 is a longitudinal, vertical section through a portion of an engine embodying my invention. Fig. 2 is a similar view, showing the parts in a different position. Fig. 3 is a horizontal section, as on the line 3—3 of Fig. 1. Fig. 4 is a transverse, vertical section, as on the line 4—4, of Fig. 1.

1 designates the engine frame, 2 the cylinder, 5 the piston, 6 the crank shaft and 7 the crank, all of which are of usual and well known construction and need no detailed description herein.

Rotatably mounted on the crank 7 is one end of an arm 8, the other end of which extends toward the piston 5; and pivotally connected to the piston is one end of an arm 9, the other end of which extends toward the crank 7 and is pivotally connected to arm 8, as at 10, thus forming a flexible connection between the crank and piston.

The arm 9 is provided with an extension 11 which is pivotally connected to a cross-head 12, as at 13. This cross-head 12 is fitted to and adapted to slide in guideways 14 in the frame 1. The guideways 14 are arranged on an angle, and the angle of the guideways with respect to the piston 5 and crank shaft 6 is such that when the piston 5 moves in the direction indicated by the arrow in Fig. 1, the pivotal connection 10 will be raised, and that when the piston 5 moves in the reverse direction, the pivotal connection 10 will be lowered.

The working stroke of the piston 5 is effected by the application of pressure to the head thereof, as is well known, and during the working stroke of the piston it moves in the direction indicated by the arrow in Fig. 1. Just as the piston begins its working stroke, the parts occupy the position shown in Fig. 1, in which position the centers of the crank shaft 6, the crank 7 and the pivotal connection 10 are in line; and, as the piston moves in the direction indicated by the arrow, the cross-head 12 moves up the guideways 14 to raise the pivotal connection 10 and thus effect the turning of the crank shaft 6 in the direction indicated by the arrow. The pressure against the head of the piston 5 continues to turn the crank shaft 6 until the centers of the crank shaft 6, the crank 7 and pivotal connection 10 again come in line, as shown in Fig. 2, which illustrates the position of the parts at the completion of the working stroke of the piston. Thus it will be seen that during the working stroke of the piston, the shaft is turned more than half a revolution.

An important feature of my invention is in maintaining the connecting arm 9 nearly parallel to the axis of the piston 5, thereby materially reducing the thrust of the piston against the top and bottom of the cylinder 2 that would be present if the arm 9 were pivoted to the crank 7 in the usual manner.

I claim:—

1. In an engine, the combination with the frame, the crank shaft, the crank, and the piston, of an arm pivotally connected to the piston and having a pivotal and sliding connection with the frame, and an arm rigidly mounted on the crank and pivotally connected to the first named arm, whereby pressure against the piston in one direction will cause the crank to turn more than half a revolution.

2. In an engine, the combination with the

frame having a guideway therein, the crank shaft the crank and the piston, of an arm pivotally connected to the piston, an arm rotatably mounted on the crank and pivotally connected to the first named arm, a cross-head fitted to said guideway, and means connecting said arms with the cross-head whereby pressure against the piston in one direction will cause the crank to turn more than half a revolution.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES O. ROBERTSON.

Witnesses:

SADIE I. HARPER,

A. V. GROUPE.