No. 885,313. PATENTED APR. 21, 1908.

B. M. ASLAKSON.

TWO CYCLE EXPLOSION MOTOR.

APPLICATION FILED DEC. 9, 1905.

4 SHEETS—SHEET 1.

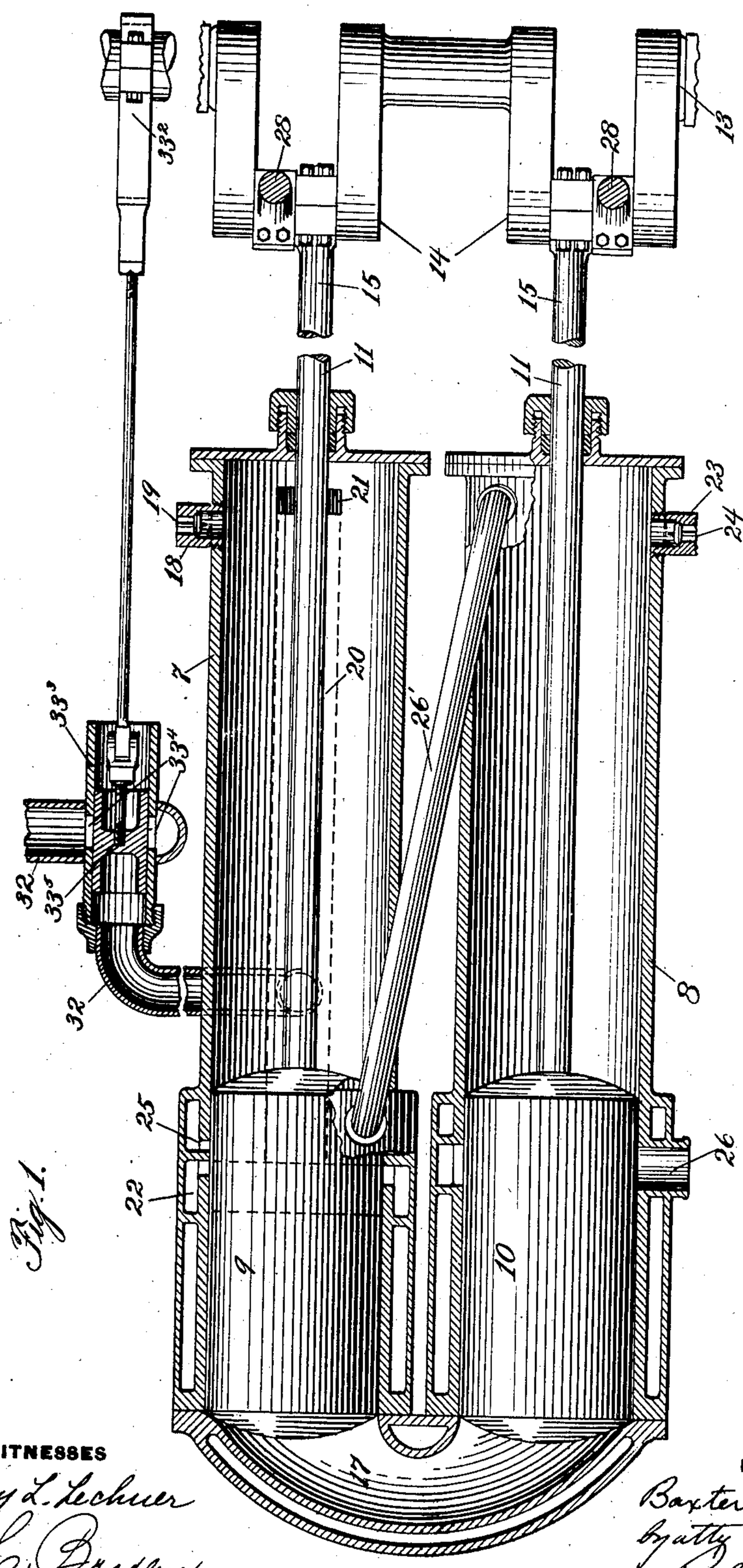

Fig. 1.

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4 SHEETS—SHEET 2.

Fig. 2.

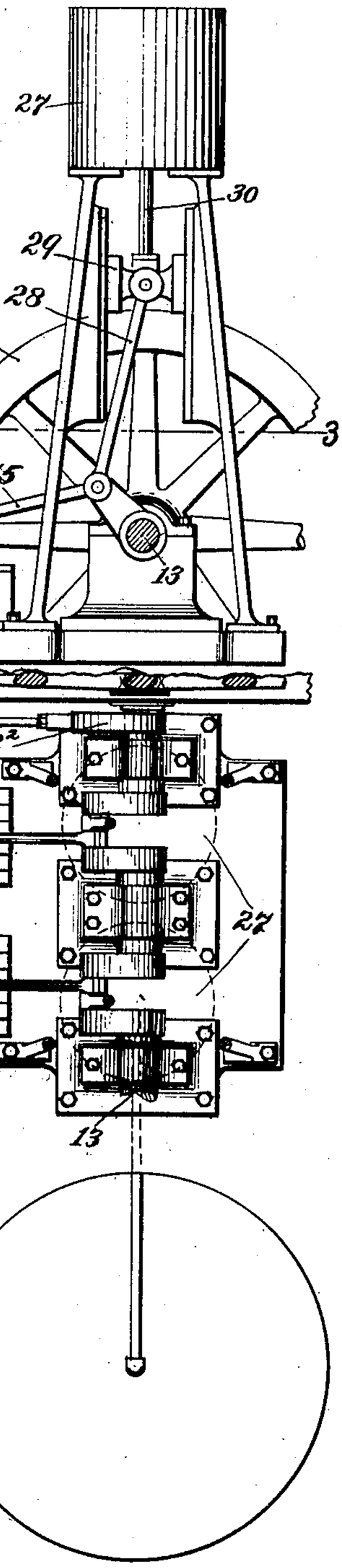

Fig. 3.

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4 SHEETS—SHEET 3.

Fig. 4.

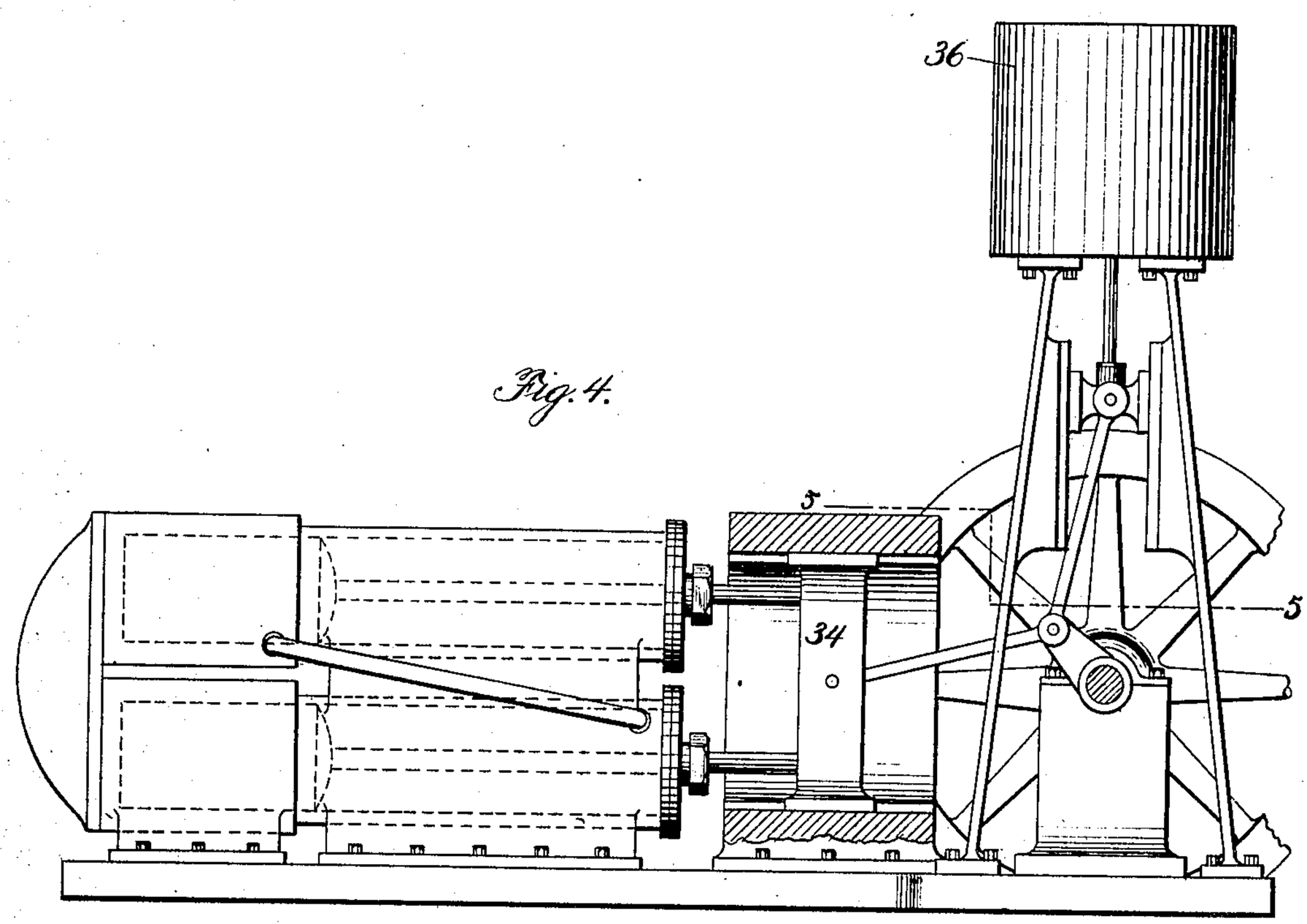
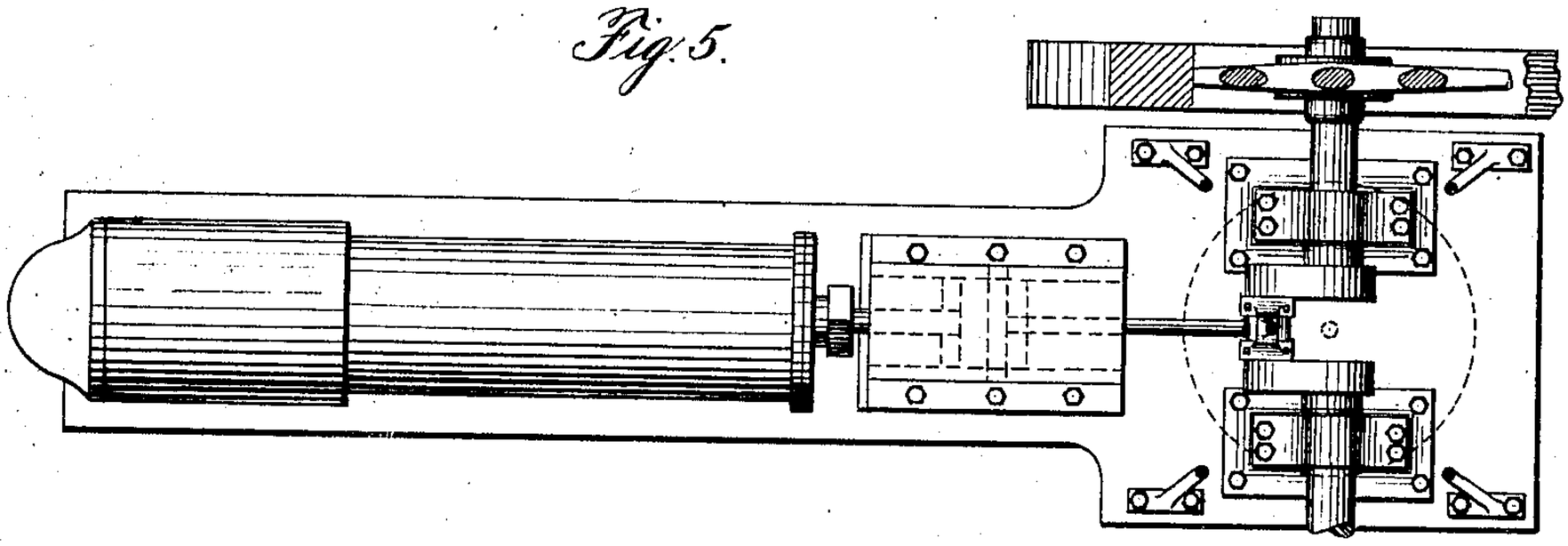


Fig. 5.



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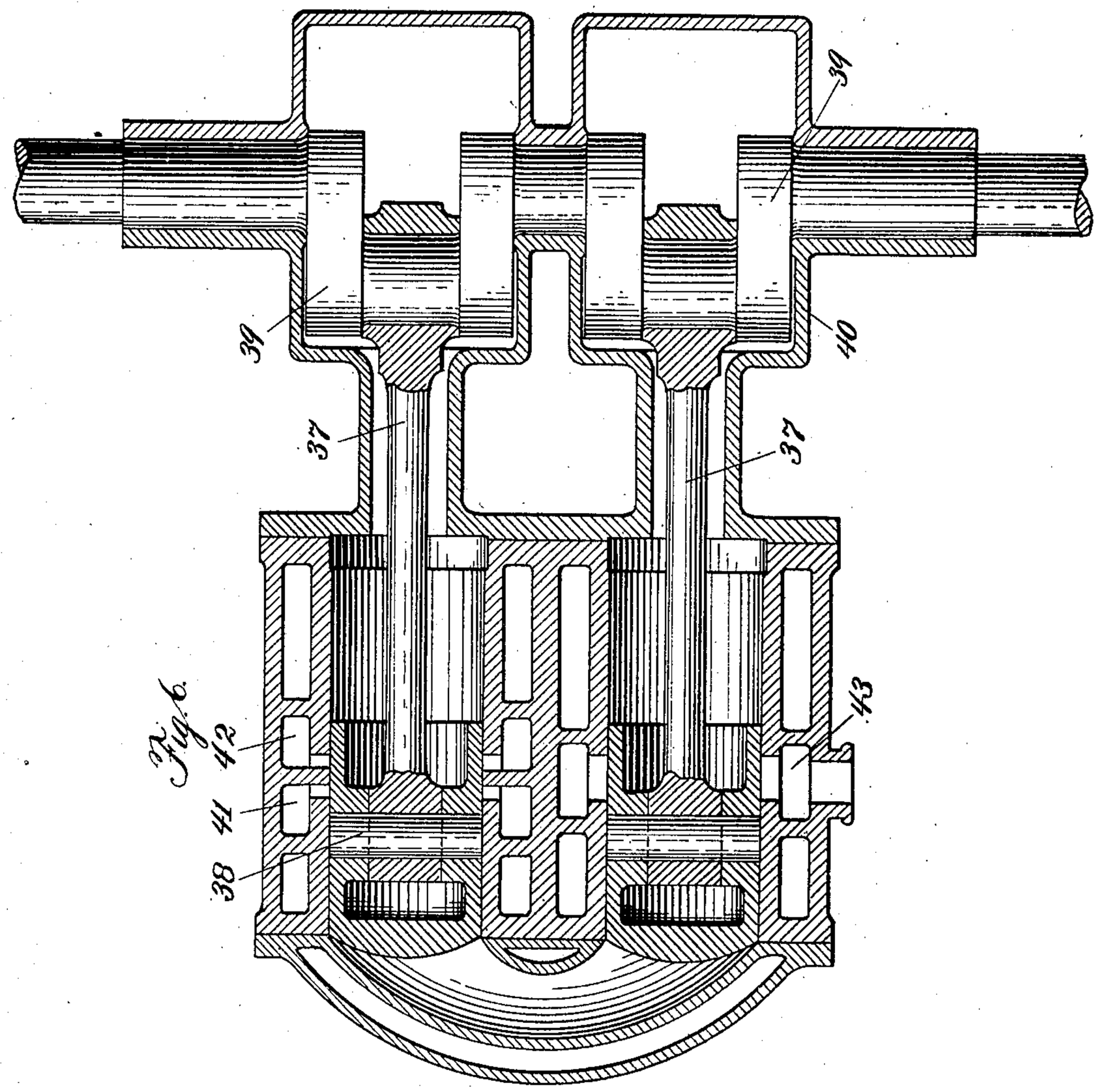

Fig. 6.

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UNITED STATES PATENT OFFICE.

BAXTER M. ASLAKSON, OF SALEM, OHIO.

TWO-CYCLE EXPLOSION-MOTOR.

No. 885,313. Specification of Letters Patent. Patented April 21, 1908.

Application filed December 9, 1905. Serial No. 291,053.

To all whom it may concern:

Be it known that I, BAXTER M. ASLAKSON, a citizen of the United States, residing at Salem, in the county of Columbiana and State of Ohio, have invented certain new and useful Improvements in Two-Cycle Explosion-Motors, of which the following is a specification.

The invention relates to explosion motors and has for its objects; to provide a two-cycle motor of such simple construction as to be adapted for use with the poorest kind of fuel without clogging or accident; to provide a motor whose motor cylinders are entirely valveless; to provide a motor in which the products of combustion are forced out and the cylinders scavenged by pure air; to provide a motor in which the pure air for scavenging precedes the gas and prevents any escape thereof at the exhaust before compression, and to provide a very inexpensive motor that shall be reliable under the most unfavorable circumstances. The preferred forms of engine are shown in the accompanying drawings in which—

Figure 1 is a transverse cross section through the cylinders with most of the other parts of the engine broken away, the cranks only being shown;

Figure 2 is a side elevation of the engine applied in the preferred way to use with a compressor;

Figure 3 is a plan view of the engine as shown in Figure 2, with the parts above the line (3) (3) broken away in order to more clearly show the crank connections;

Figure 4 is a side elevation of a modified construction of the engine as applied to a compressor, in which view a part of the guides for the cross head are broken away in order to show such cross head;

Figure 5 is a plan view of such of the engine shown in Figure 4 with the parts above the line (5) (5) broken away to more clearly show the construction, and

Figure 6 is a transverse section through a modified form of engine of a type particularly adapted to marine work.

The engine is primarily designed to be used in blast-furnace work and to be operated by waste products from the furnace. Because of the poor quality of the fuel the engine must be of a type adapted to run properly under the most unfavorable circumstances. The engine is particularly designed with this idea in view, and as will be found from the further description, the construction of the motor is exceedingly simple, and valves in the motor cylinders are entirely done away with for the reason above indicated. It will be understood, however, that the motor is adapted for other kinds of work than blast furnace, and in fact is particularly adapted to marine work in which a motor of simple construction and reliable operation is desirable. It will also be understood that other and better fuel than waste products from furnaces may be used with a correspondingly increased efficiency and increase of power, and of course in marine work other fuel such as gasolene for instance is used. When used in blast furnace work the motors are ordinarily intended to operate tubs or compressors, the air being stored in a reservoir after compression and subsequently used in the furnace in the usual way. I have illustrated my motors as connected up to vertical compressors in two ways, but it is evident that other connections might be used and that the compressors might be arranged horizontally without in any way modifying the invention.

As shown in the drawings, the motor is provided with two parallel cylinders 7 and 8. These cylinders carry elongated pistons 9, 10. (See Figure 1.) The pistons are connected to piston rods 11, which piston rods are, as shown in Figure 2, connected to cross heads 12 in the usual manner. The crank shaft 13 is provided with a pair of cranks 14, which cranks are placed relatively at the same angle with the crank shaft and are connected to the cross heads 12 by means of the connecting rods 15. The crank shaft is provided with a fly wheel 16 in the usual manner. It will be noted from the construction thus far set forth that the pistons 9 and 10 are connected for synchronous and uniform movement, that is, both pistons advance at the same time and similarly move backward at the same time. As shown in Figures 1 to 5, inclusive, the cylinders 7 and 8 are formed of uniform size from end to end, and the pistons 9 and 10 traverse only a portion of the length of these cylinders. The forward untraveled portion of the cylinders constitute compression chambers in which gas and air are to be compressed. The rear ends of the cylinders are connected by means of the arched chamber 17. This chamber 17 constitutes the ignition chamber for the motor. The forward end of the cylinder 7 is designed for the compression of the air to be used and has a connection

18 for supplying fresh air, which connection is provided with a puppet valve 19 for allowing ingress of air and preventing egress thereof, and also has a connection 20 shown in dotted lines in Figure 1 and opening at the point 21 into the cylinder at one end and into the air port 22 in the cylinder at the other end. As shown, this connection comprises a passage cast in the body of the cylinder. Another connection might be used however, such as a pipe screwing into the cylinder at 21 at one end and into the port opening 22 at the other end. The forward end of the cylinder 8 comprises the gas compression cylinder which cylinder is connected at one end with a gas supply by means of a pipe 23 having a puppet valve 24, similar to 19, and also has a connection with the gas port 25 in the cylinder 7 by means of the pipe 26′ which has connection at its forward end with the forward end of the cylinder 8 (see Figure 1). As shown, this connection is a pipe but it is apparent that if the cylinders 7 and 8 were cast integral such connection might well be a longitudinal passage in the casting itself, connecting the two desired points. The exhaust for the motor is by the port 26 located in the cylinder 8 in such a position as to be uncovered by the extreme forward stroke of the piston 10. The operation of the device as thus far described and shown in Figure 1, is as follows:—Starting with the pistons in the positions shown in Figure 1, a mixture of gas and air is compressed in the chamber 17 and ignitation occurs, the expansion of the gases forces the two pistons 9 and 10 simultaneously forward, which motion as the pistons approach the forward end of the stroke uncover the exhaust port 26 and the air port 22, allowing the products of combustion to escape through the exhaust 26 and at the same time a fresh charge of air which has been compressed in the forward end of the cylinder 7 to enter the cylinder 7 via the passage 20 and the port 22. The admission of this pure air serves to force out the products of combustion, the arched shape of the back of the ignition chamber permitting a ready flow in the proper direction. A slightly greater movement of the pistons serve to uncover the port 25, thereby admitting through the passage 26 and port 25 the compressed charge of gas from the forward end of the cylinder 8. It will be seen that the charge of air from the port 22 constitutes a cushion between the products of combustion and the charge of gas from the port 25, thereby preventing any leakage of gas through the port 26. It will also be noted that the pressure from the air port 22 serves to force out the products of combustion and to scavenge the cylinders with a charge of pure air. The pistons are now at their extreme of forward movement and on the back stroke cover up the ports 22, 25 and 26, and compress the mixture of gas and air in the cylinders, and when they reach the point shown in Figure 1 are ready for ignition and another cycle of movement as just described. I have shown in Figures 2 and 3 the motor as applied in the preferred way to the operation of a compressor or tub as it is called in blast furnace work. As here shown, the compressor is arranged vertically with a compression cylinder 27 over each crank of the engine, (see the dotted circles in Fig. 3). The engine cranks are connected by means of the connecting rods 28 and cross heads 29 to the piston rods 30 of the compressor pistons. I have shown in Figure 3 the reservoir 31 in which the compressed air from the compressor is stored. I have also shown a pipe 32 leading to the passage 20 in the cylinder 7. The object of this connection is to provide a means for augmenting the volume of air admitted to the port 22. Under certain conditions the amount of air admitted through the connection 18 from the outside air is sufficient to properly scavenge the cylinder and supply the necessary amount of air for combustion, and any additional supply such as that from the pipe 32 is unnecessary, but under other conditions more air is necessary and the pipe 32 supplies it. My invention also contemplates supplying the air from the pipe 32 alone and omitting the construction for supplying air by compression in the forward end of the cylinder 7. It is desirable to reduce the pressure in the pipe 32 and also to provide means in the pipe 32 whereby air is admitted to the passage 20 only at stated intervals, and for these purposes respectively a throttling or reducing valve 33 (Fig. 3) is provided, and the piston valve 33′ (see Figs. 1 & 3). This valve is operated by the eccentric 33^2 on the crank shaft 13 and comprises a casing 33^3 connected at both sides with the pipe 32 and having the ports 33^4 controlled by the piston 33^5. The construction is arranged so that the ports are uncovered at the same time that the piston uncovers the port 22. It is immaterial which of the two cylinders is used for compression of gas and which for air. The arrangement shown may be reversed.

In Figures 4 and 5 I have shown a modification of the arrangement of the engine and its connections to the compressor. In this form it will be noted that the cylinders are one above the other instead of side by side and that one cross-head 34 is used to which both of the piston rods are connected and that only a single compressor cylinder 36 is used, thereby somewhat reducing the number of parts and simplifying the construction.

In Figure 6 I have shown still another form of engine and one which is particularly adapted for marine work. It will be seen that in this construction the piston rods 37

are connected pivotally inside the pistons at 38 and that cross-heads are dispensed with, the other end of the piston rods connecting directly with the cranks 39. The piston rods and cranks are inclosed in a tight casing 40 and the entire space inside the casing at one side constitutes the compression space for the air and the corresponding space at the other side constitutes the space for the gas. As shown in this figure, 41 is the air port, 42 the gas port and 43 the exhaust port. The operation of the machine is precisely the same as that of the motor shown in Figure 1 and the port connections (not shown) from the air and gas spaces respectively to the ports 41 and 42 may be either by means of pipes or by connecting openings in the castings themselves. As shown in this figure and also in Figure 1, the forward end of the exhaust port 43 is on a line with the forward edge of the air admission port 41, but if desired this may be modified and the ports arranged so that the forward edge of the port 43 is uncovered a short space of time before the forward edge of the port 41.

Having thus described my invention and illustrated its use, what I claim as new and desire to secure by Letters Patent, is the following:

1. In combination, a pair of cylinders, one of which has a gas compression chamber at its forward end, and the other an air compression chamber at its forward end, admission means therefor, a port connection from each chamber to the intermediate part of one of the cylinders, additional means for supplying compressed air to the port for compressed air, an exhaust port at the intermediate part of the other cylinder, an ignition chamber connecting the rear ends of the cylinders, pistons in the cylinders connected for synchronous movement and adapted on the forward stroke to uncover the air, gas and exhaust ports, and at other times to keep such ports covered.

2. In combination, a pair of cylinders, one of which has a gas compression chamber at its forward end, and the other an air compression chamber at its forward end, admission means therefor, a port connection from each chamber to the intermediate part of one of the cylinders, additional means for supplying compressed air into the port for compressed air comprising a connection to a source of supply provided with an automatically operated valve, an exhaust port at the intermediate part of the other cylinder, an ignition chamber connecting the rear ends of the cylinders, pistons in the cylinders connected for synchronous movement and adapted on the forward stroke to uncover the air, gas and exhaust ports, and at other times to keep such ports covered.

In testimony whereof I have hereunto signed my name in the presence of the two subscribed witnesses.

BAXTER M. ASLAKSON.

Witnesses:
JAMES C. BRADLEY,
F. E. GAITHER.