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J. S. LANG.

STARTING MEANS FOR INCANDESCENT IGNITERS.

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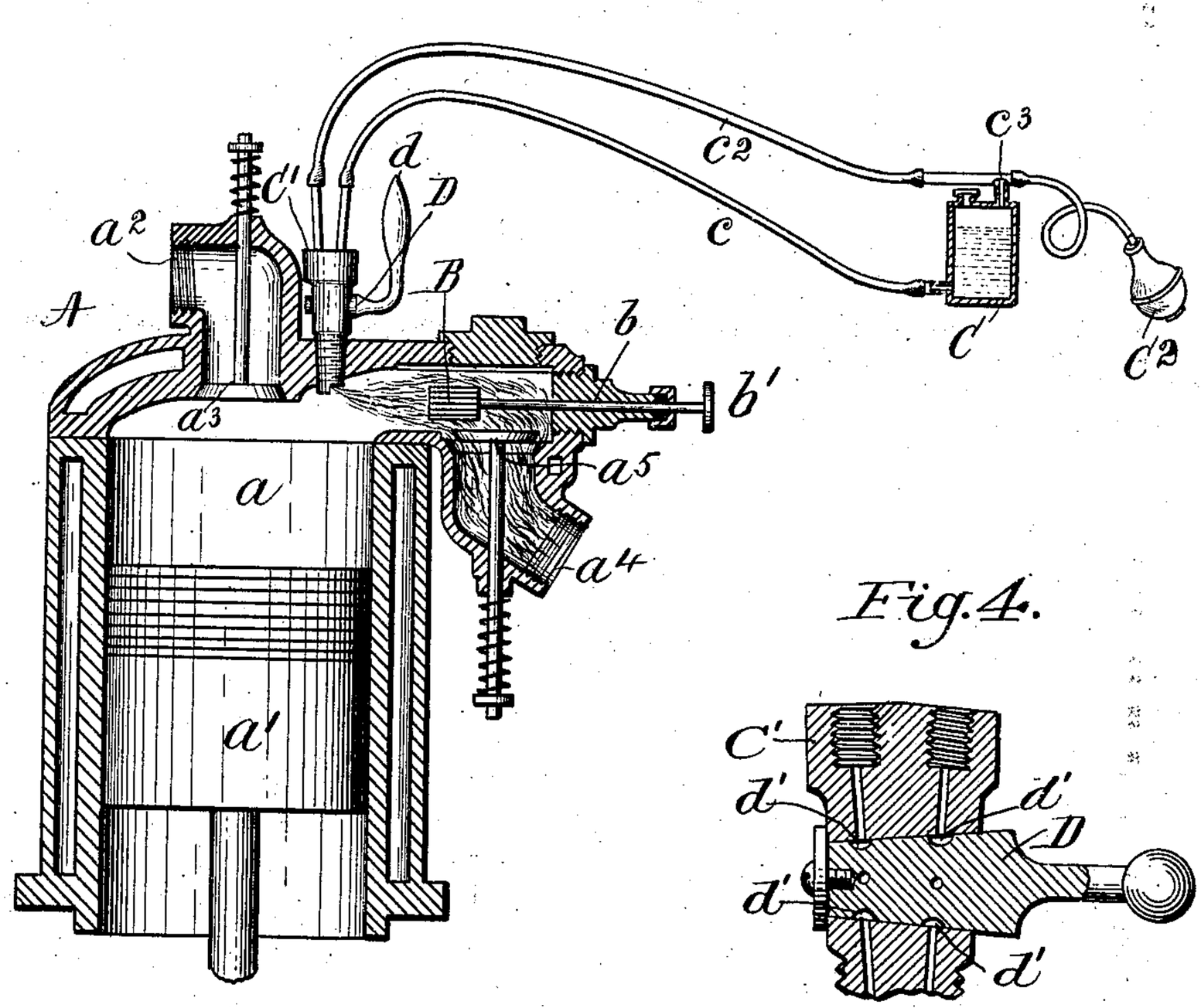

Fig. 1

Fig. 4.

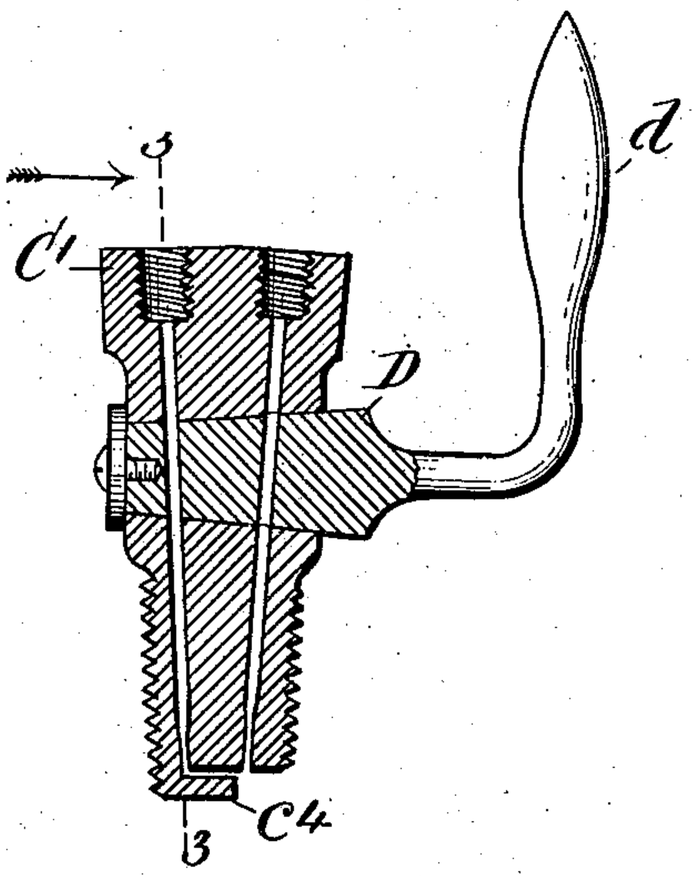

Fig. 2.

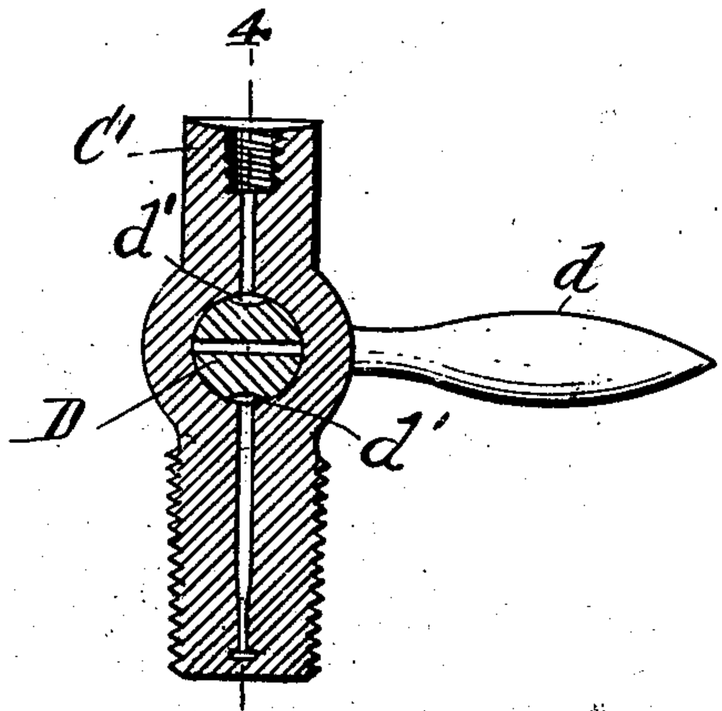

Fig. 3.

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STARTING MEANS FOR INCANDESCENT IGNITERS.

No. 860,038. Specification of Letters Patent. Patented July 16, 1907.

Application filed April 24, 1905. Serial No. 257,037.

To all whom it may concern:

Be it known that I, JAMES S. LANG, of Boston, in the county of Suffolk and State of Massachusetts, a citizen of the United States, have invented a new and useful Improvement in Starting Means for Incandescent Igniters, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification, in explaining its nature.

The invention relates to an improvement in gas explosion engines and especially to that part of the engine pertaining to the ignition of the gaseous charge as it is successively formed and compressed in the combustion chamber.

The invention consists in the use of an igniter or igniting surface inside the combustion chamber of the engine and combined with it a means or device for extraneously introducing into the combustion chamber a heated blast or flame for raising the igniter or igniting surface to a temperature sufficiently high to induce ignition.

The invention can best be seen and understood by reference to the drawings, in which—

Figure 1 represents a portion of an explosion engine fitted with the improved means or device. Fig. 2 shows in enlarged detail a vertical section of a portion of said means to which special reference will hereinafter be made, and Fig. 3 shows a section on the line 3—3 of Fig. 2. Fig. 4 shows a section on line 4—4 of Fig. 3.

Referring to the drawings:—A represents a portion of the cylinder of a gas explosion engine providing the combustion chamber *a* above the piston a^1. The gas is fed into the combustion chamber through the inlet passage a^2 controlled by the valve a^3, and the exploded charge escapes through the outlet passage a^4 controlled by the valve a^5.

B is the igniter which is contained within the combustion space of the engine and is located preferably as shown within its outlet port or passage. This igniter may be of any suitable kind or material. I prefer, however, to employ an igniter substantially like that shown in United States Letters Patent No. 727,158, granted to me May 5, 1903. As is described in said patent, the igniter is preferably supported in the outlet or exhaust passage so as to be movable at will towards and from the explosion chamber. I have accordingly shown the igniter supported by a rod *b* which extends horizontally through the wall of the casing and is provided with a handle b^1 by which it may be moved in and out and the igniter moved towards or from the combustion chamber as occasion demands.

Reference will now be made to the means of heating the igniter before starting the engine, or in other words, before the initial gaseous charge is compressed in the combustion chamber. This means in its various details of construction comprises first a receptacle C, adapted to contain some combustible fuel. Extending from this receptacle is a fuel supply pipe *c* connecting with a nozzle C^1 through which the fuel supply passage is extended or continued. This nozzle is in the nature of a nipple threaded into the wall of the combustion chamber and extending through it. It is located at a point not far from the igniter or preferably at a point adjacent to the entrance of the outlet port or passage so that the combustible fuel flowing from the nozzle may be ignited within the combustion space and, being thus in close proximity to the igniter, may act to heat it to the best advantage.

C^2 is an air compressor bulb which I have adapted for forcing the combustible fuel from the receptacle in which it is contained through the fuel supply pipe and nozzle and also for atomizing or reducing it within the combustion space and directing it into the exhaust or outlet passage, in order that when ignited a blast or flame may be directed upon the igniter. For this purpose the bulb has extending from it an air supply pipe c^2 which connects with the fuel-holding receptacle through a by-passage c^3 and also with the nozzle C^1 through which the air passage is continued. This air supply passage through the nozzle, as may be noted, is located on the side of the nozzle away from the igniter, and the end of the nozzle is provided with a turned or projecting lip c^4 by which means the course of the air passage is changed and the air directed to flow in a direction across the mouth of the fuel supply passage through the nozzle and towards the igniter and outlet pipe. It is obvious that upon compressing the bulb C^2 air will not only be forced into and compressed in the fuel holding receptacle to force the fuel out through the fuel supply pipe and nozzle into the combustion chamber, but a forcing draft of air will also at the same time pass out through the air supply pipe and nozzle and, being directed to flow crosswise the fuel emerging from the adjacent fuel supply passage in the nozzle, will act to vaporize this fuel or reduce it to a highly combustible vapor or spray, which flows through and around the igniter and thence out through the exhaust passage.

Both the fuel and air supply passages in the nozzle are controlled by a single cock D having an operating handle *d*. By this means both passages may be simultaneously opened or closed as occasion may demand. Further attention is also called to the fuel and air supply passages through the nozzle, in that the ends of these respective passages are made slightly contracted. This is for the purpose of making the fuel and air emerge from the nozzle in relatively small streams, and has also the advantage of keeping carbon or other products of combustion from blowing up into the passages and clogging them. As a further means for preventing or counteracting any clogging of this

kind, it is to be noted that the cock D at the points adjacent to the fuel and air supply passages, when the cock is closed, is provided with small recesses d^1 which provide spaces or chambers auxiliary to the passages themselves, in which air may be stored or compressed by the force of the explosion and afterwards, when the combustion chamber is relieved by the opening of the outlet port, the air so confined in these recesses or chambers will expand or relieve itself and in such expansion blow out any carbon or other combustion matter which may clog the passages. I preferably make these recesses d^1 on both sides of the cock in order that the auxiliary air chambers may be provided whether the cock is turned in one direction or the other in closing it.

The operation of the igniter in connection with the auxiliary heating device is as follows: When it is desired to start the engine, the cock D controlling the fuel and air passages is opened; then by compressing the bulb C^2 the fuel will be forced into the combustion chamber under pressure and also vaporized or reduced to a spray, blowing in the direction of the igniter and out through the outlet passage. This combustible spray may then be ignited at some point along the outlet pipe or passage. After the igniter has been heated to a sufficiently high temperature, to induce an ignition of the compressed gaseous charge, the cock D is then turned, shutting off the fluid and air supply, and the engine is ready for operation.

The means I have described is very simple; there is nothing to get out of order; and it can readily be very conveniently operated. Moreover, there is only one igniting means used and this of a kind which after the engine is once started will continue to be kept in operative condition by the heat of the exhaust, as was described in the specification of my said patent.

Having thus fully described my invention, I claim and desire to secure by Letters Patent of the United States:—

1. In an engine of the character specified, an igniter contained within the combustion space thereof, and in combination with said igniter, means for generating a forced flame within said combustion space, adapted to heat said igniter.

2. An engine of the character specified having an igniter located in the exhaust or outlet passage from its combustion chamber, means for introducing a combustible fuel into said combustion chamber, and means for generating a forced blast of air, adapted to reduce or vaporize said fuel and direct it in the direction of said igniter and exhaust passage.

3. In an engine of the character specified, an igniter located in the combustion space of said engine and in combination with said igniter, extraneous means for introducing into said combustion space a heating blast or flame for heating the igniter, the same comprising a fuel-holding receptacle, a pipe leading therefrom and having outlet within said combustion space, an air compressor, and means whereby said air compressor may simultaneously force the fuel from said fuel-holding receptacle, and reduce or vaporize the same inside the combustion space of the engine.

4. In an engine of the character specified, an igniter located in the combustion space thereof and in combination with said igniter, extraneous means for introducing into said combustion space a heating blast or flame for heating the igniter, the same comprising a fuel-holding receptacle, a pipe connection between the same and said combustion space of the engine, an air compressor, a pipe connection between the same and said combustion space of the engine, means whereby the air blast from said air compressor may be directed to reduce or vaporize the fuel entering said combustion space and direct it in the direction of said igniter, and means for controlling said gas and air supply.

5. In an engine of the character specified, an igniter located in the combustion space of the engine, and in combination therewith a fuel-holding receptacle, a fuel supply pipe, an air-compressing means, an air supply pipe leading to said air-compressing means and connecting with said fuel-holding receptacle, a common nozzle for said pipes connecting with and extending through the wall of the engine into the combustion space thereof, the passages of which fuel and air supply pipes extend through said nozzle, and a cock in said nozzle controlling said passages.

6. In an engine of the character specified, an igniter located in the combustion space of said engine, and combined therewith, a fuel supply passage through which fuel is adapted to pass into said combustion chamber for generating therein a flame adapted to heat said igniter, and means whereby said passage may be self-cleaning.

7. In an engine of the character specified, an igniter located in the combustion space of the engine, and in combination therewith, means for heating said igniter, the same comprising a fuel supply pipe and an air supply pipe, a common nozzle for said pipes through which the passages thereof are extended or continued, said nozzle connecting with and extending through the wall of the engine into the combustion space thereof, a common controlling cock for said passages in said nozzle, and recesses formed in said cock at points adjacent to said passages forming air chambers auxiliary thereto, substantially as and for the purposes set forth.

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Witnesses:
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