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J. S. LANG.

BURNER FOR EXPLOSIVE ENGINES.

APPLICATION FILED JUNE 28, 1905.

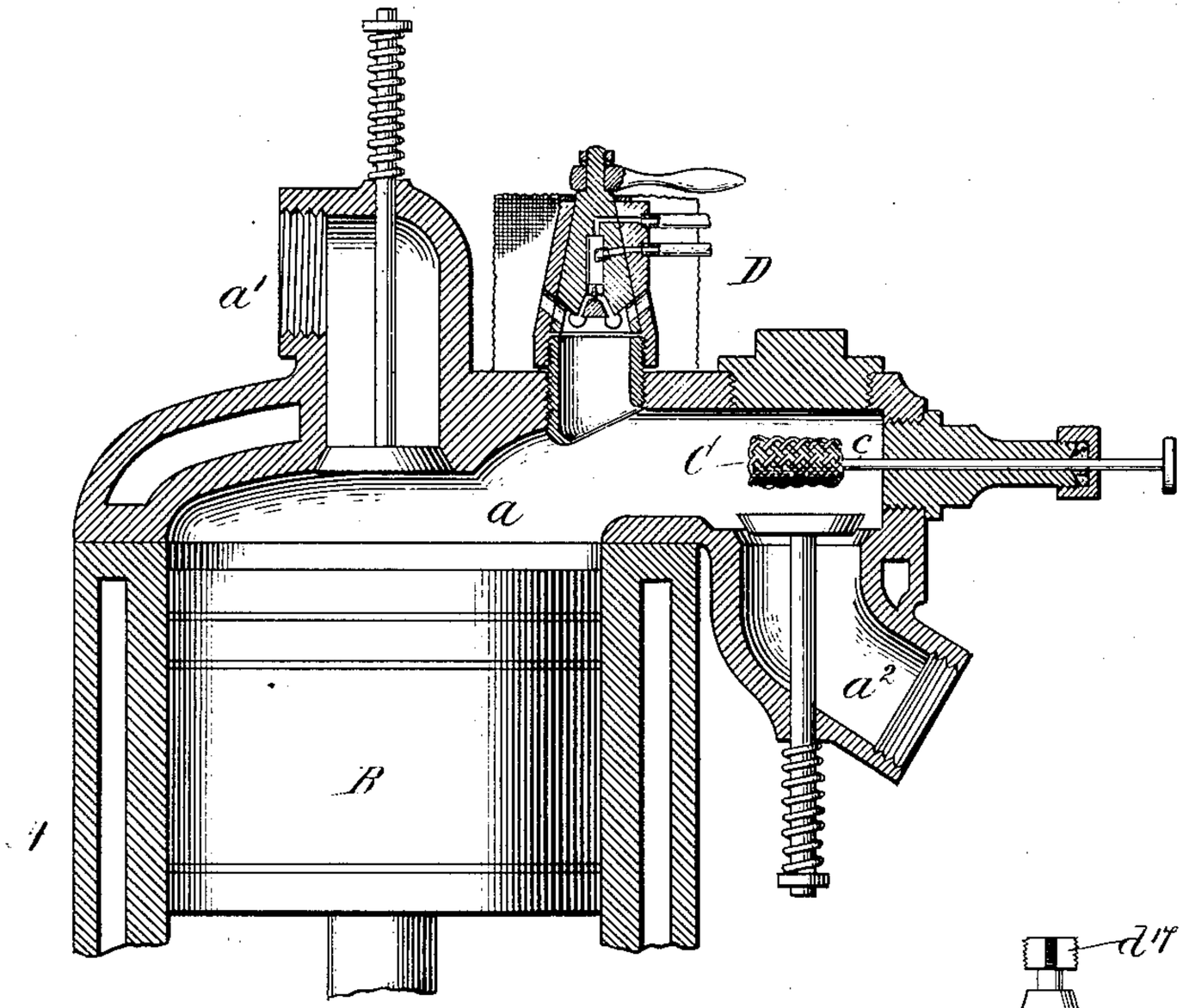

Fig. 1.

Fig. 3.

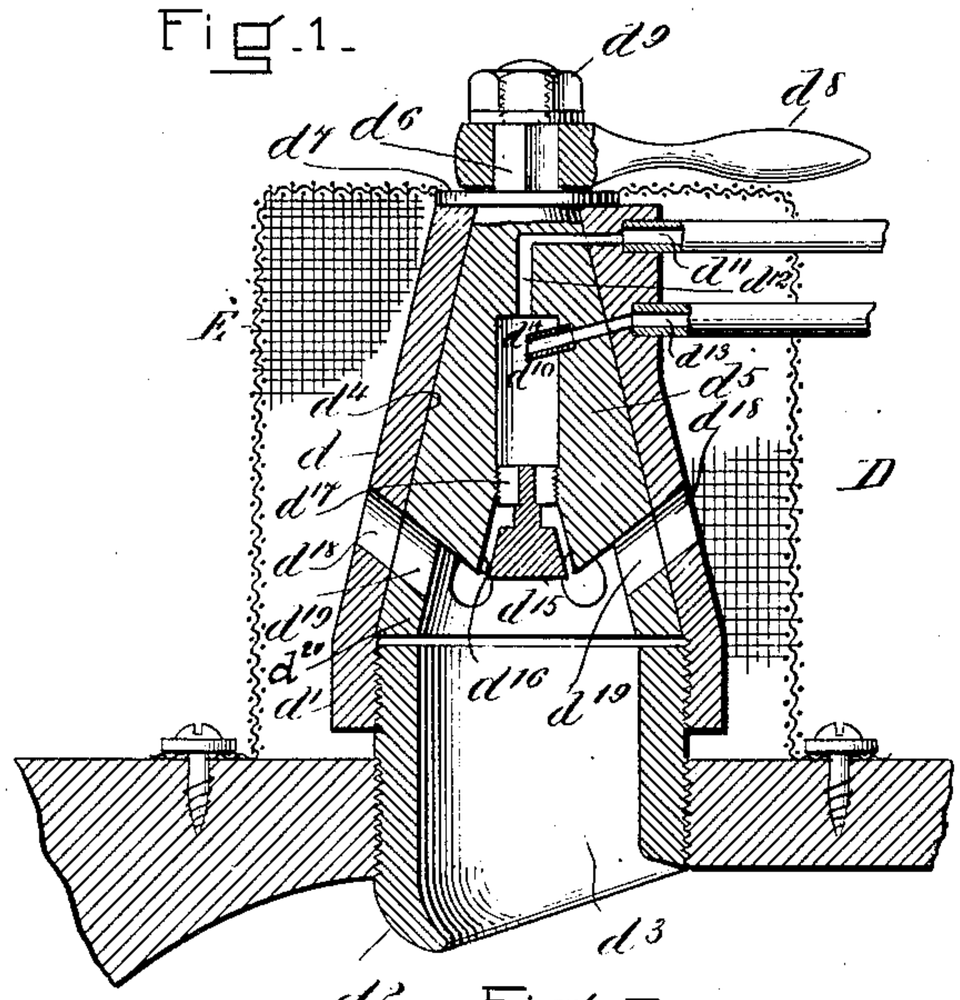

Fig. 2.

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BURNER FOR EXPLOSIVE-ENGINES.

No. 880,313. Specification of Letters Patent. Patented Feb. 25, 1908.

Application filed June 28, 1905. Serial No. 267,406.

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 Burners for Explosion-Engines, 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 burners made to be used in connection with the combustion chambers of explosion engines for heating igniters or igniting surfaces.

The especial adaptability of the burner is in connection with an igniter or igniting surface like that shown and described in my Letters Patent of the United States, No. 727,158, granted May 5, 1903, in which the igniter is located in the exhaust passage of the combustion chamber of the engine and kept hot by the repeated discharges of the exhaust expelled through this passage. Inasmuch as the igniter can be kept hot by the exhaust only after the engine has been started, a primary igniter is necessary to first ignite the compressed charge, as described in said Letters Patent. As an improvement upon this, however, I have provided by the invention of my co-pending application, Serial No. 257,037, filed April 24, 1905, means for extraneously introducing into the combustion chamber, by its outlet passage, before the engine is started, a heating fluid or flame for raising the igniter or igniting surface to a sufficiently high temperature to induce ignition.

My present invention consists accordingly in an improved means or type of burner by which this may be accomplished, the special object of my invention being not only to provide as simple a means as possible, in which as will hereinafter be explained a burner and valve are practically combined, but also to provide a burner capable of developing a strong and intensely hot flame and especially adapted to the purpose to which it is applied.

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

Figure 1 shows in cross vertical section my improved burner applied to an engine. Fig. 2 shows a vertical section of the burner in enlarged detail. Fig. 3 shows in elevation a detail or part thereof to which special reference will hereinafter be made.

In the drawings:—A represents a portion of the cylinder of a gas explosion engine, in which is formed a combustion chamber *a* containing a piston B. The gas is fed into the combustion chamber through the inlet passage a^1 and expelled through the outlet or exhaust passage a^2, both valve-controlled in the usual manner. In the outlet or exhaust passage is an igniter or igniting surface C. This is arranged within the passage upon the end of an igniter rod *c*.

With reference now to the improved means or burner D for primarily heating the igniter, or in other words for heating it before the engine is started. This is in the nature of a burner and combined cock. On the outside it comprises a hollow valve casing *d* of a cone-shaped formation. On its large end the casing has an annular, internally threaded, flange-forming portion d^1 by which it screws onto the end of a pipe or coupling d^2. This coupling screws into a hole or opening formed in the wall of the combustion chamber at a point about adjacent to the mouth of its outlet or exhaust passage, by which means a closed connecting passage d^3 is made between the inside chamber d^4 of the valve casing and the interior of the combustion chamber at the point mentioned.

Within the chamber of the valve casing *d* is arranged a cone-shaped valve d^5. This valve has on its end a stem d^6 which projects up through the open apex of the valve casing. Over this projecting stem and resting upon the end of the valve casing is placed a washer d^7. Above the washer is fitted a handle d^8 over which on the end of the projecting stem screws a locking nut d^9. By tightening the nut d^9 the valve is drawn to fit tight within its valve casing and the handle d^8 is also secured to the end of the valve, by which it may be turned within its casing. Within the valve d^5 is a chamber d^{10} which serves as a mixing chamber for compressed air and fuel admitted into it through separate air inlet and fuel supply pipes or passages. The compressed air is admitted by a passage d^{11} extending through the valve casing, thence continued by a passage d^{12} extending into the valve and turning to outlet into the mixing chamber d^{10} at the end thereof. The fuel under pressure is admitted by a passage d^{13} extending through the wall of the casing, thence continued through the body of the valve by a pipe or passage d^{14} which outlets within the mixing chamber. In this con-

nection it is to be noted that the end of the pipe is about on a line with the outlet to the air passage d^{12}, so that the stream of air as it enters the end of the mixing chamber from the air inlet passage will flow across the outlet to the fuel supply pipe and striking the fuel will comminute it or reduce it to a spray, besides mixing therewith. These fuel and air supply passages are adapted to register with one another only when the valve is open, or in other words, when it is turned to a certain position with respect to its casing. On turning the valve to a changed position these passages will be entirely cut off.

The mixing chamber outlets through the end of the valve into the passage d^3 leading into the combustion chamber of the engine, as before described. This outlet practically forms the mouth of the burner or burner proper, for from it when the combustible material is ignited the flame issues. Inasmuch as the air inlet passage enters the mixing chamber at the end thereof opposite its outlet, the compressed air will not only reduce and mingle with the fuel, but will also act to blow or force the combustible mixture from the mixing chamber through the outlet thereof into the passage d^3.

For contracting the outlet to the mixing chamber or mouth of the burner, in order that the combustible mixture may be emitted therefrom with increased force and also in a diverging, annular stream, there is placed in said outlet a diffusing plug d^{15}. This plug is made conical in form and of a size to about fill the outlet or so as to leave an annular orifice between it and that portion d^{16} of the internal wall of the valve forming the outlet. Through such an orifice, of course, the combustible mixture will issue in an annular stream. It is also to be noted that the internal wall d^{16} flares outwardly. The plug d^{15} is also made correspondingly diverging in form so that the inclination of the annular orifice between these parts will be such as to direct the combustible fuel or flame (for as the combustible fluid issues from the orifice it becomes ignited), against the internal wall of the pipe or coupling forming the passage d^3 beyond the mouth of the burner, for a purpose which will hereinafter be explained. The diffusing plug d^{15} is held in place by a wing nut d^{17} to which it is secured. This nut screws up inside the interior chambered portion of the valve. By adjusting the nut the location of the diffusing plug may be changed relatively to the wall d^{16}, by which wall together with the plug the orifice is made, so regulating the size of the orifice and consequently the amount of fluid or combustible mixture passing through it.

For admitting atmospheric air into the passage d^3 beyond the mouth of the burner, there are formed through the wall of the casing air passages d^{18}, continued by passages d^{19} through the annular portion d^{20} of the valve, which projects forward from and around the end portion of the body thereof, forming the mouth of the burner, as before explained. These air passages d^{18}, d^{19}, are so located as to be opened when the fuel and air supply passages through the valve and casing are opened and closed when they are closed. In other words, all the fuel and air supply passages in front of or behind the mouth of the burner are closed simultaneously upon turning the valve in the valve casing. Moreover, with the parts thus arranged, the atmospheric air entering through the passages d^{18}, d^{19}, will be drawn in through these passages to mix with the combustible mixture or flame streaming from the mouth of the burner so materially increasing its strength and intensity. The reason for this is that a partial vacuum is formed within the annular flame streaming from the mouth of the burner, on which account the air entering through these passages d^{18}, d^{19}, will tend to pass through the flame and fill the vacuum and so will be drawn in to mingle with and feed the flame. The air is further drawn in to mix with the flame by reason of its contact with the inner surface of the pipe or coupling d^2 which acts to draw or pull in the air as it wears against the inner surface of said pipe or coupling; thus not only is a large amount of air supplied to feed the flame at the mouth of the burner, but the adaptation of the parts is also such that the air will be drawn or forced into the flame to mix with it, thereby producing a strong and intense heat.

The operation of the burner is as follows:—When it is desired to start the engine, the valve by means of its operating handle is turned to an open position. Fuel and air will then be admitted to the mixing chamber of the valve where the fluids will mix with one another. They will then be forced by the air pressure out of the mixing chamber and through the annular orifice forming the mouth of the burner into the passage d^3. Atmospheric air will there mix with the combustible mixture, which will flow through the passage d^3 into the combustion chamber of the engine and out through its outlet or exhaust passage containing the igniter, as before explained. This combustible mixture is then ignited at some point or opening along the outlet or exhaust passage, the flame starting from the mouth of the burner. After the igniter has been heated to a sufficiently high temperature to induce the ignition of the gaseous charge to be compressed in the combustion chamber of the engine, the valve is then turned to a closed position shutting off all the fluid and air supply openings through the valve and casing, and the engine is ready for operation.

The valvular structure is very simple; it can easily be fixed to the wall of the engine and can be easily operated. The structure is also very strong and especially adapted to stand the shock of the explosion in the combustion chamber of the engine.

In order that there may be no danger from the ignition of explosive gases in the atmosphere surrounding the burner, I prefer to provide it with a fine wire gauze E after the manner of a safety lamp.

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

1. A burner of the character specified having a casing, a valve inside said casing, gas and air supply passages extending through said casing and valve to form a combustible mixture inside the valve whereby a flame may issue from a portion thereof forming the mouth of the burner, and air supply passages admitting air to the flame beyond said mouth of the burner.

2. A burner of the character specified having a casing, a valve inside said casing having an opening therein forming the mouth of the burner, said valve having also a portion extending forward from said mouth and lying snugly adjacent to the wall of the casing, fuel and air supply passages extending through the wall of said casing and valve to connect with said mouth, and air passages extending through said casing and said extended portion of the valve beyond said mouth.

3. A burner of the character specified comprising an external valve casing, a valve contained within said casing, a mixing chamber within said valve having an outlet at the end of the valve forming the mouth of the burner and from which the flame issues, fuel and air passages extending through said valve and casing to said mixing chamber, and air passages for admitting air to the flame through said valve and casing at a point about opposite the mouth of the burner.

4. A burner of the character specified having an external casing, a valve contained therein, a mixing chamber inside said valve and connecting with the end of said valve forming the mouth of the burner, and fuel and air supply passages extending through the valve and casing to connect with said mixing chamber the air supply passage being arranged to direct a stream of air across the end of said fuel supply passage and towards said mouth of the burner.

5. A burner of the character specified having an external casing, a valve contained within said casing and with an outlet at one end thereof forming the mouth of the burner or point from which the flame issues, an entry extending through said casing and valve to connect with the valve outlet or mouth of the burner for admitting and directing thereto combustible matter, means arranged in said outlet and forming an annular orifice through which the products of combustion are adapted to be discharged and directed to issue against the interior wall of a passage beyond said mouth of the burner, said passage beyond the mouth of the burner, and air passages through said valve and casing admitting air to the flame between said mouth and the point where the flame contacts with the interior wall of the passage beyond said mouth.

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Witnesses:
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