(No Model.)

L. S. GARDNER.

IGNITER FOR EXPLOSIVE ENGINES.

No. 562,720. Patented June 23, 1896.

Fig. 1.

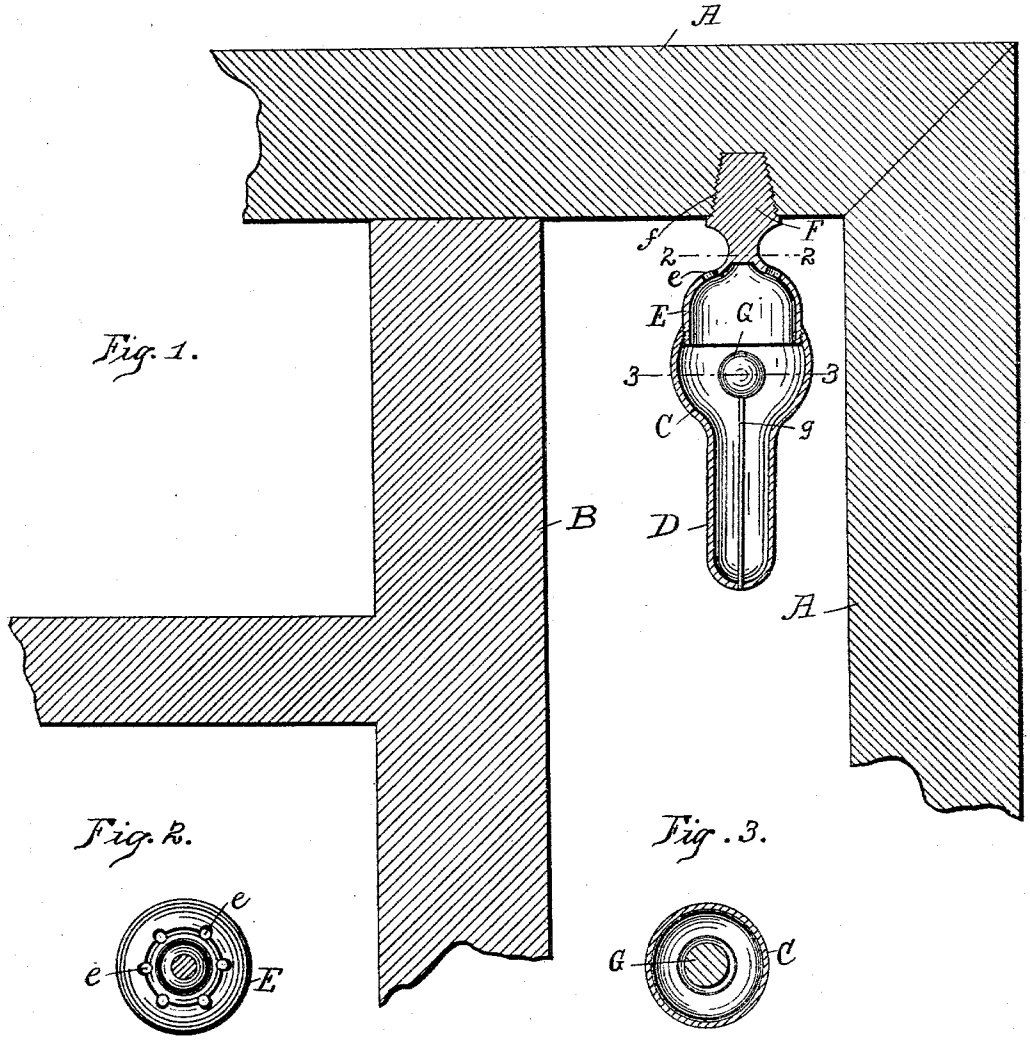

Fig. 2.

Fig. 3.

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UNITED STATES PATENT OFFICE.

LEVI S. GARDNER, OF NEW ORLEANS, LOUISIANA.

IGNITER FOR EXPLOSIVE-ENGINES.

SPECIFICATION forming part of Letters Patent No. 562,720, dated June 23, 1896.

Application filed March 20, 1896. Serial No. 584,071. (No model.)

To all whom it may concern:

Be it known that I, LEVI S. GARDNER, a citizen of the United States, residing at New Orleans, parish of Orleans, State of Louisiana, have invented a certain new and useful Improvement in Igniters for Explosive-Engines; and I declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

My invention has for its object the production of an igniter for explosive engines or motors. In this class of engines three classes of igniters have been generally employed—first, those wherein an electric spark is utilized to explode the charge; second, those wherein a jet of flame is employed to explode the charge both directly and indirectly; third, those wherein a flame is employed to heat to incandescence a tube, which tube in turn ignites the charge. My invention differs from each of these; and it consists in a suspended ball or body of any suitable substance, such as copper, platinum, or any other material which will readily become incandescent by heat and yet not be fused or melted. Said ball is preferably located upon the interior of the cylinder, where it will receive the full heating effect of each succeeding explosion in the cylinder, and is surrounded by a suitable chamber communicating with the cylinder, which will not become incandescent and is free from contact with the ball, whereby the products of combustion or burned gases will surround the ball and insulate it from the new charge of gas until the latter has been compressed to the desired degree prior to ignition.

The invention will be hereinafter explained more in detail.

In the drawings, Figure 1 is a sectional view of a portion of the cylinder and piston with my device in section. Fig. 2 is a cross-section on the line 2 2 of Fig. 1. Fig. 3 is a cross-section on the line 3 3 of Fig. 1.

In carrying out the invention, A represents a portion of the cylinder of an engine, and B a portion of the piston thereof.

Inasmuch as my device is applicable to any explosive engine of any construction where there is space enough between the piston at its maximum stroke and the cylinder-head to locate my device, I have not shown and shall not describe any particular construction.

C is a suitable casing made of any desirable material, preferably steel, having an elongated portion D, a bulb portion E, having orifices *e*, and a stem F, provided with screw-threads *f*, whereby the device may be engaged to the interior wall of the cylinder.

G is a ball of copper, platinum, or any other material which will readily incandesce without fusing, and *g* a wire supporting the ball in the casing C.

The relative sizes and proportions of the above parts depend on the engine to which the device is to be applied, as hereinafter explained.

The operation is as follows: Initially, that is, upon starting the engine, the charge is ignited by any of the numerous devices now known in the art, as, for instance, by an electric spark, and this is continued for perhaps half a dozen explosions, more or less, until the ball G has become heated to incandescence by the heat generated from those explosions. When an explosion takes place, such of the products of combustion, that is, the burned gases, as are in the casing C, will remain there and will not be drawn off with those in the cylinder, owing to the fact that the casing is closed except at the orifices *e*, and to draw them out of the casing would create a vacuum. These burned gases remaining in the casing at atmospheric pressure consequently form an insulator to protect the fresh gases as they enter the cylinder from the ball G, now heated to incandescence. As soon, however, as the fresh gases are compressed they will enter through the orifices *e*, compressing the burned gases in advance. By properly proportioning the parts, so that the burned gases will not be sufficiently compressed to allow the fresh gases to reach the ball until the fresh gases in the cylinder have been compressed to the required degree, the explosion can be made to take place at exactly the desired time. This "time" explosion, as I will term it, is directly due to the fact that the ball is suspended entirely free from the insulating-chamber that surrounds it, and consequently cannot impart its heat to the

chamber-walls. For this reason the ball, after becoming incandescent, always (during the operation of the engine) remains so, while the chamber, having a constant circulation of fresh gas around it, will not become incandescent. By locating the orifices *e* opposite to the point of suspension of the ball, the fresh gases will, after they have compressed the burned gases, first come into contact with the hottest portion of the ball.

It will be seen that the advantages arising from the use of my above device are numerous. It is applicable to any compression-engine. The ball, when located on the interior of the cylinder and suspended entirely within and free from the walls of its insulating-chamber, is in position to receive the full benefit of the heat resulting from the cylinder-explosion and retain it, and can consequently be quickly brought to a state of incandescence and easily maintained there, while it is not accessible to the new gas until the burned gases have been compressed. No valves are necessary to regulate the admission of the fresh gas to the incandescent body, since the burned gases constitute an insulator, and it obviates the necessity of any non-conducting linings of any sort to protect the incandescent body.

It is of course obvious that many mechanical changes may be made in my device without departing from the essence of the invention. So, also, while I have spoken of a "ball" G, yet I would have it understood that I do not limit myself to a sphere, but by that term desire to be understood as contemplating a body of any form or shape.

What I claim is—

1. The combination with the cylinder of an explosive compression-engine, of a suspended body of material capable of being made incandescent by heat, and a chamber surrounding said body and out of contact therewith and communicating with the cylinder said chamber adapted to hold the burned gases whereby the latter form an insulator until compressed by the new charge, substantially as described.

2. The combination with the cylinder, of a ball of material capable of being made incandescent by heat said ball suspended in said cylinder, and a chamber surrounding the ball and out of contact therewith and communicating with the cylinder and adapted to hold the burned gases after each ignition, substantially as described.

3. As an article of manufacture, a casing provided with means for engaging it to the wall of a cylinder or the like, said casing made hollow and elongated, and a ball of material capable of being made incandescent suspended within the casing and free from the sides thereof said casing provided with one or more openings, substantially as described.

4. An igniter consisting of a casing adapted to engage the wall of the cylinder, a body of material suspended in said casing and free from the walls thereof, said casing provided with one or more openings adapted to admit fresh gas to the ball at a point different from the point of suspension, substantially as described.

In testimony whereof I sign this specification in the presence of two witnesses.

LEVI S. GARDNER.

Witnesses:
WALTER H. CHAMBERLIN,
DEWITT W. CHAMBERLIN.