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(*Under International Convention.*)

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Date of Application (in United Kingdom), 12th Nov., 1898

Complete Specification Left, 12th Nov., 1898—*Accepted,* 12th Dec., 1899

COMPLETE SPECIFICATION.

Improvements in Fluid Pressure Engines.

We, La Société des Générateurs à Vaporisation Instantanée Système L. Serpollet, of 27, Rue des Clöys, Paris, France, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to improvements in steam engines and has for object to construct engines which are adapted for the purpose of utilizing more particularly steam superheated to a very high temperature which may rise up to 400° and even 500° C.

Engines according to this invention are provided with valve gear of great simplicity comprising a central cam of special form and operation; and further objects are to dispense with packings of piston rods and of the slide valves, and also with the surfaces on which the said slide valves work; to effect an abundant lubrication without the aid of the usual lubricators and finally, to provide successively a free exhaust without the aid of a slide valve, whilst at the same time effecting compression of the remainder of the fluid imprisoned in the cylinder on the return stroke of the piston.

The engine to which these means are applied and which shall now be described, is of a known type, and comprises a group of two or more horizontal or vertical cylinders arranged opposite to one another, or side by side, or radiating, the said cylinders being single-acting and opening into a common chamber, in which a simple drop feed lubricator maintains a constant level. Through this chamber passes the engine-shaft and in it there moves the common crank which just dips into the oil contained therein and to the crank pin of which are attached the heads of each of the engine connecting rods situated in the same plane. These connecting rods are each jointed directly to the bottom of a hollow piston, which works in a corresponding cylinder. In adjacent parallel planes there may be arranged groups of two, three or more cylinders, arranged opposite to one another, and these groups may be connected or coupled to crank pins arranged tandem-wise or at right angles, or if there are three groups, at 120°, each group consisting of two or more cylinders situated in different parallel planes.

In the accompanying drawings Fig. 1 is a half side elevation and half longitudinal section of an engine having two cylinders arranged opposite to each

other in the same plane, and opening into a common chamber in which the crank works.

Figs. 2 and 3 are plan and elevation respectively of the same. Fig. 4 is an elevation, Fig. 5 a longitudinal axial section on the line b_1, b_1 and Fig. 6 an end view of the distributing cam.

The two single-acting cylinders a, a^1 (Figs. 1 to 6) are mounted in line with and facing each other on the frame b, having the general form of a cylindrical box. The pistons are recessed, and have a considerable length relatively to their diameter, which allows of jointing the connecting rods directly thereto, and dispensing with the piston rod, its stuffing box, and the slides. The two connecting rods have their heads cut away somewhat in the form of a crescent, in such a manner as to be capable of being both supported in one and the same plane of rotation by means of a common crank pin c: as they only work in compression the cap of the end bearing is superfluous. However, for the purpose of avoiding any possible derangement, there are provided two collars d which embrace the shoulders of the heads of the connecting rods and keep them constantly up against the crank pin.

The steam enters the cylinders through the outer end of each of said cylinders on the opening of the corresponding valve e which is operated by means of mechanism hereinafter described. When each piston has arrived at the end of its power-stroke it uncovers the orifices f, which are formed in the wall of the cylinder and through which the fluid exhausts. However, the cylinder remains full of the expanded steam at a pressure which may be slightly above that of the atmosphere and which may besides depend on various causes, such as counter pressure of exhaust, very short duration of the exhaust period *etc.* This steam being imprisoned on the return stroke of the piston is compressed up to the end of the stroke, without having to fear, as would be the case in all slide valve engines, that the compression will exceed the pressure in the boiler.

In fact, as soon as the compression in the cylinders exceeds the pressure in the generator, although the valve e is pulled by the tension of the spring k^1, the said valve e will open and allow the compressed steam to return into the supply pipe, whence it will return afterwards into the cylinder at the commencement of the next power-stroke.

It will be readily understood that this faculty of limiting the pressure in the cylinder to an extent practically equal to the pressure existing in the boiler, will allow of practically doing away with the dead spaces and will thus effect a considerable saving in steam.

The distributing gear employed in this engine is of special construction and is of the valve type, and the valve mechanism is situated on or against the framing. The mechanism comprises a small shaft g parallel to the engine shaft, and rotated by the latter by means of a pair of toothed wheels h, h^1. This small shaft carries a cylindrical cam j which is adapted to slide along a feather, and is thus capable of moving longitudinally when it is actuated by the nut i which is provided with a forked tail embracing the circular groove formed in the end of the cam. This nut is mounted on a screw r parallel to the axis of the said cam and moves when the said screw, which is held between two stops, is turned either by hand or by a governor. In its rotary movement, the cam j moves successively, by means of one of its two noses or projections, the rollers l, mounted on the ends of the sliding rods k, and the end of which serves as a cap or housing for the axle of these rollers. By these means the cam raises the admission valves e which are normally pulled by opposing springs k^1 in such a manner that these valves have a tendency to remain on their seats both by reason of the tension of their springs, as also by the pressure of the steam.

If the engine which has just been described is intended to rotate in one direction only, with a constant admission of steam, the cam would then only have to be made of the total width of the two rollers, with an incline or projection whose length would correspond to the fixed period of admission which

two or three cylinders situated in one and the same plane has its valves, its distributing cam, and all the parts or mechanism hereinabove described.

As already stated, the cylinders may be arranged vertically and side by side, irrespective of the number of the cylinders; the frame serves to support the cylinders and to protect the moving part arranged underneath.

Having now particularly described and ascertained the nature of the said invention, and in what manner the same is to be performed we declare that what we claim is:—

1. A new superheated steam motor, with two or more cylinders provided with a distributing cam having two projections which are situated symmetrically opposite to each other, of which one effects the forward running and the other the backward running, and which produce any desired degree of admission, by acting by means of the rollers mentioned and their rod (which is surrounded by an opposing spring) upon the admission-valves, which the pressure of the steam always holds upon their seat; the said cam also enabling one to produce stoppage which occurs when the rollers are between the two projections of the cam, and being capable of being controlled by hand or by the governor.

2. In a new superheated steam motor hereinbefore specified, the exhaust of steam, produced by means of simple apertures made through the wall of each cylinder, and opened or closed by the simple motion of the corresponding piston, in such a manner as thus to dispense with every moving distributing part and to imprison in the cylinder, and to compress therein, a remaining portion of the exhaust steam, which is regenerated by being mixed with the incoming superheated steam, which immediately increases its temperature and pressure.

Dated this 11th day of November 1898.

For the Applicants

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COMPLETE SPECIFICATION OF LA SOC. DES GÉNÉRATEURS À VAPORISATION INSTANTANÉE SYSTÈME L. SERPOLLET.

(1 SHEET)

Fig 1.

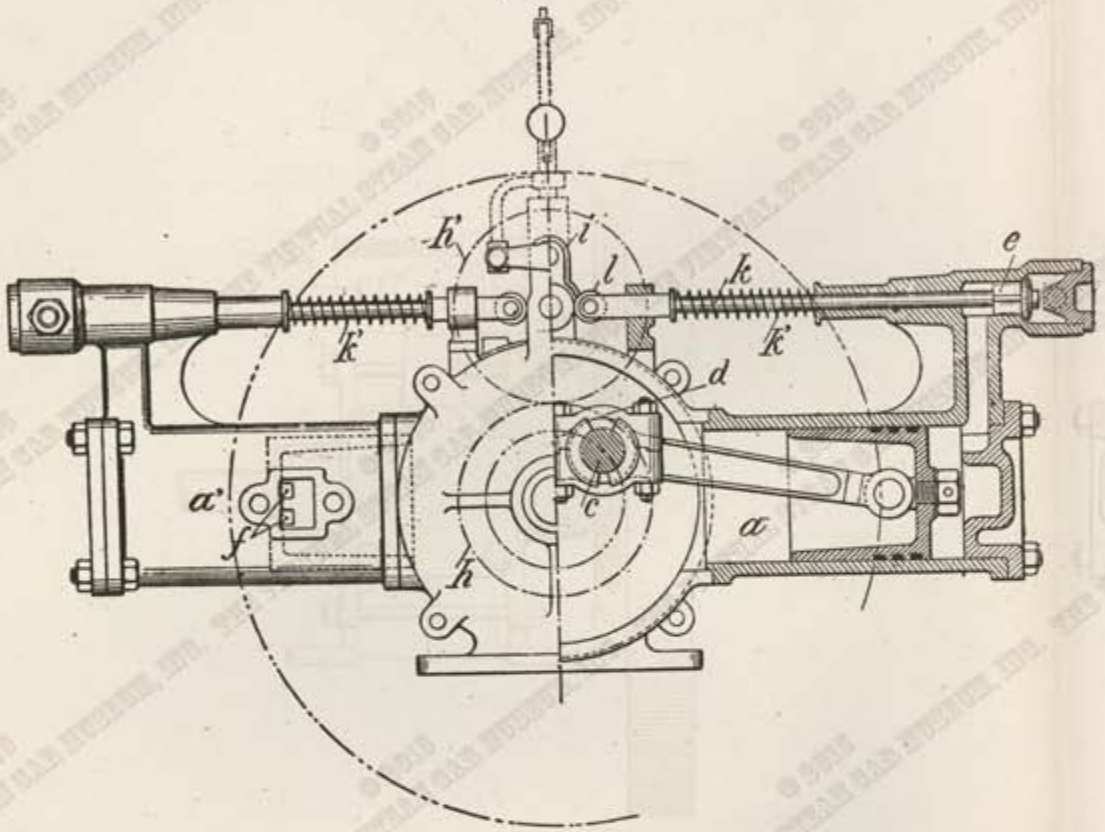


Fig. 2.

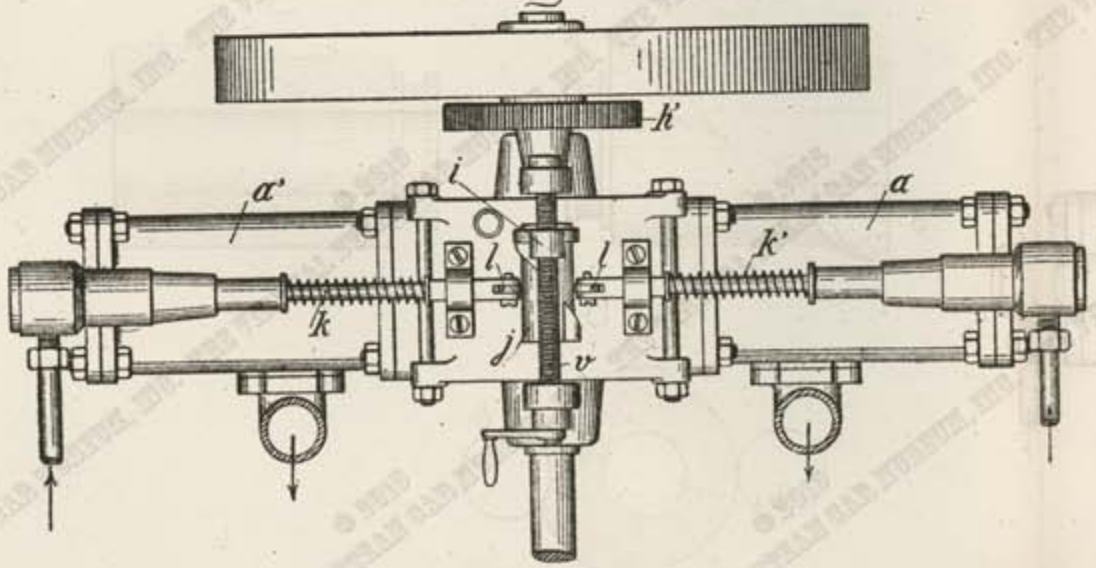


Fig 3.

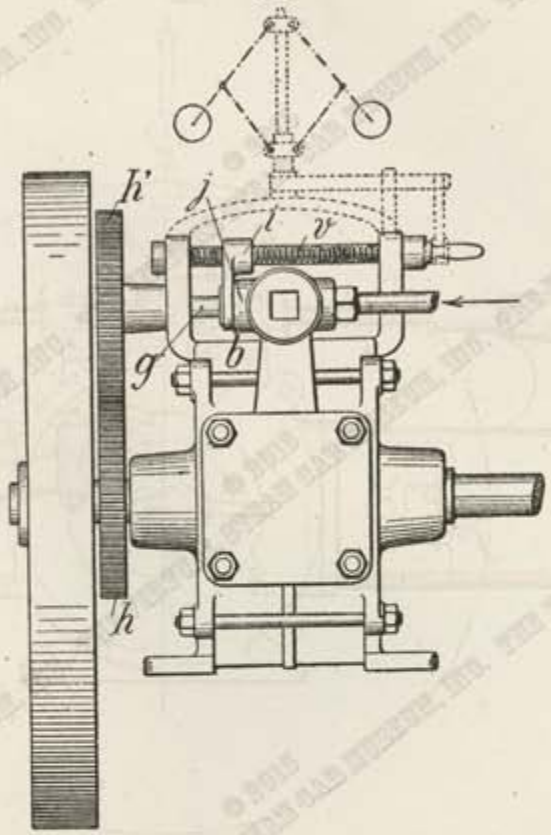


Fig 4.

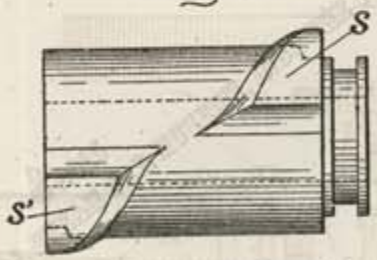


Fig 5

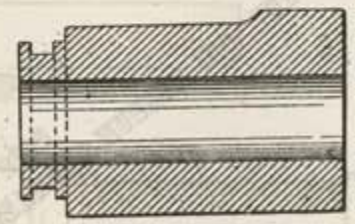
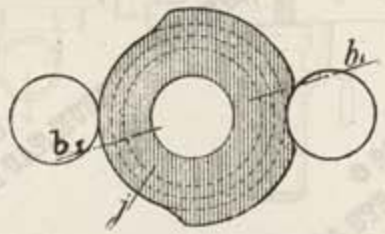


Fig 6



[This Drawing is a reproduction of the Original on a reduced scale.]