

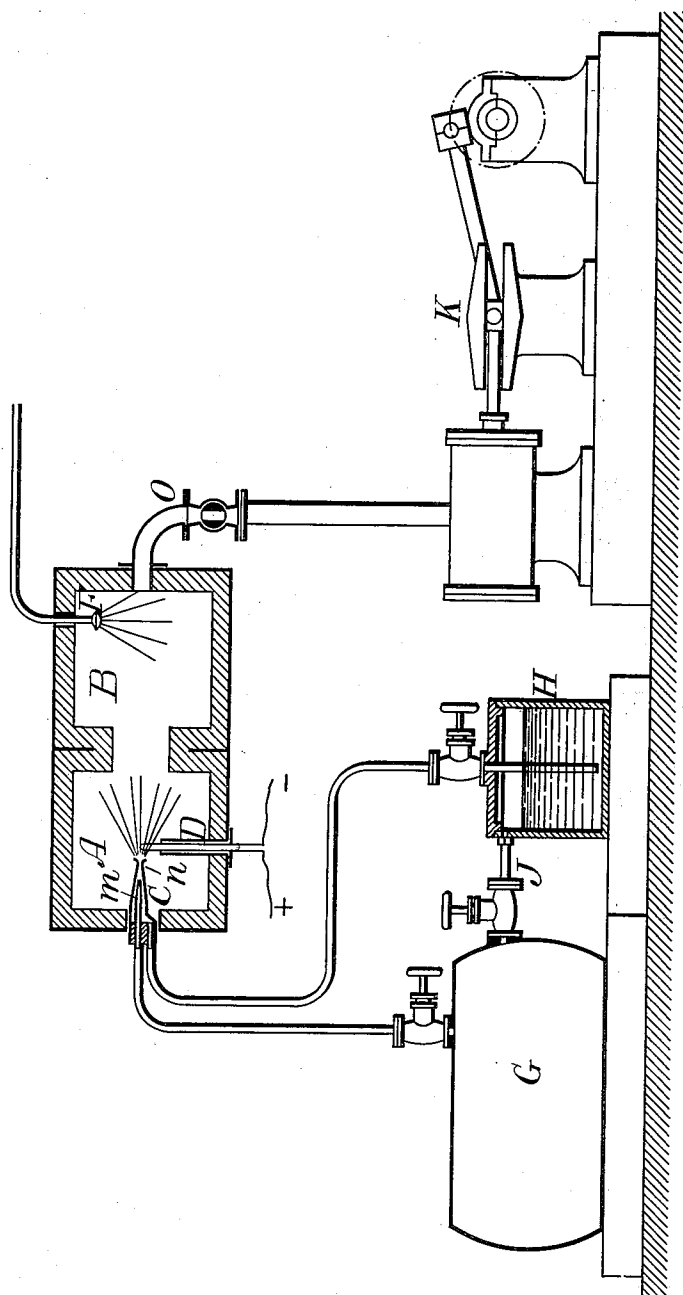
(No Model.)

E. LANGEN.

APPARATUS FOR GENERATING ELASTIC FLUID UNDER PRESSURE.

No. 525,271.

Patented Aug. 28, 1894.



Witnesses:
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UNITED STATES PATENT OFFICE.

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APPARATUS FOR GENERATING ELASTIC FLUID UNDER PRESSURE.

SPECIFICATION forming part of Letters Patent No. 525,271, dated August 28, 1894.

Application filed January 25, 1894. Serial No. 497,988. (No model.) Patented in Belgium December 28, 1893, No. 107,823, and in Italy January 30, 1894, LXIX, 410.

To all whom it may concern:

Be it known that I, EUGEN LANGEN, a subject of the King of Prussia, German Emperor, residing at Cologne, Germany, have invented certain new and useful Improved Apparatus for Generating Elastic Fluid under Pressure, Available for Performing Work, (for which I have obtained Letters Patent in Belgium, dated December 28, 1893, No. 107,823, and in Italy, dated January 30, 1894, Vol. LXIX, No. 410,) of which the following is a specification.

According to this invention elastic fluid under pressure, available for performing work is generated by effecting the combustion of a combustible liquid or gas with air within a closed chamber to which steam or water spray is admitted so that the introduced steam or the steam resulting from the water spray mixes with the hot combustion gases under pressure, producing a compound elastic fluid under pressure that is led off from the chamber to the motor engine or other apparatus in which its elastic pressure is to be utilized. For this purpose the said closed chamber is provided at one end with an injector nozzle connected on the one hand with a supply of air under pressure and on the other hand with a supply of combustible liquid or gas which may or may not be subject to pressure, so that by the action of the air under pressure the combustible liquid or gas is drawn through the injector nozzle and mixes and enters into combustion with the entering air, the mixture being ignited either by means of an electric spark or by an incandescent body heated either by electricity or by an external flame, or by the heat produced in the chamber itself by the combustion. At the other end of the chamber is provided a nozzle for the introduction of either steam, or of water spray under pressure, which in entering is at once converted into steam by the heat, such steam being caused to mix with the hot combustion gases on their way to a discharge opening through which the elastic fluid mixture passes into a pipe or channel leading it to the motor engine.

The accompanying drawing shows a sec-

tional diagram of an apparatus operating as above described.

A B is the closed chamber which may be partly or wholly lined with refractory material as shown and which has at one end an injector C for the introduction of air and liquid or gaseous fuel, and at the other end a nozzle or rose F for the introduction of steam or water spray, and a pipe O for conducting away the elastic working fluid produced. The injector C has a nozzle *m* through which issues air supplied from the reservoir G containing air under pressure, and a nozzle *n* through which flows combustible liquid supplied from the reservoir H containing such liquid under pressure. The pressure within this vessel may be maintained either by connecting it by a pipe J with the air pressure reservoir G, as shown, or by any other means, such as by forcing in the liquid by a pump.

The reservoir H may also be subjected only to atmospheric pressure if the air pressure employed be sufficiently high above that existing in the chamber A as to cause the liquid to be drawn in to the required extent by the injector action of the air jet.

The mixture of air and combustible fluid thus injected into the chamber A is there ignited and maintained in continuous combustion by an electrical igniting device D, the chamber A being made sufficiently large for this purpose. The resulting hot combustion gases pass into the compartment B and mix with the steam or water spray entering through the nozzle F; if water spray be employed this is instantaneously converted into steam by the heat of the gases, while if steam be employed this becomes superheated to a corresponding extent. By this means an elastic working fluid is produced composed mainly of carbonic acid, nitrogen and steam, which is led off through a pipe O to a steam engine K or other motor, such as a steam turbine.

By correctly proportioning the quantity of steam or water spray supplied, the temperature of the combustion gases can be so reduced that the elastic fluid can work in an engine cylinder, without requiring this to be

cooled, so that the losses of heat such as are caused in ordinary gas motor and caloric engines by the use of cooling water and by the heat passing away with the hot escaping gases or air, are avoided.

By the above described means the elastic working fluid may be readily regulated so as to work at a higher or lower temperature, and by providing either a throttle valve on the supply pipe O of the engine, or by the use of variable expansion gear the motor engine can be regulated to give off any desired power, as the continuous production of the hot working fluid in the chamber A B is independent of any variation in the quantity of the working fluid taken off in a given time, the chamber being of sufficient capacity to afford the necessary store of such fluid.

The two compartments A B of the generating chamber can be more or less separated by a partition with an opening as shown.

The ignition of the entering combustible mixture may be effected either by an electric spark or by an incandescent body heated either by an external flame, or by the high temperature of the combustion taking place in the chamber itself.

Having now described the nature of my said invention and the best means I know for carrying the same into practical effect, I claim—

1. The herein described apparatus for producing an elastic working fluid, consisting of a closed chamber having two communicating compartments A B, an injector C entering one of said compartments and provided with the two nozzles *m n*, an air pressure reservoir G communicating with one of the injector nozzles, a reservoir H containing combustible

fluid under pressure and communicating with the other nozzle of the injector, whereby a mixture of air and combustible fluid may be supplied to one compartment of the closed chamber, a nozzle F for introducing steam or water spray into the other compartment of the closed chamber from an exterior source of supply, to mix with the hot combustible gases, means for igniting the fluid mixture in the closed chamber, and a discharge-pipe for conducting the resulting elastic working fluid to a motor, substantially as set forth.

2. The herein described apparatus for producing an elastic working fluid, consisting of a closed chamber, an injector entering one end of said chamber and provided with the two nozzles *m n*, an air pressure reservoir G communicating with one of the injector nozzles, a reservoir H containing combustible fluid and communicating with the other injector nozzle, the valved pipe J connecting the air reservoir G and combustible fluid reservoir H, a nozzle F for introducing steam or water spray into the end of the closed chamber opposite the point where the air and combustible fluid are introduced, means for igniting the fluid mixture in the closed chamber, and a discharge pipe for conducting the resulting elastic working fluid to a motor, substantially as set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 23d day of December, A. D. 1893.

EUGEN LANGEN.

Witnesses:

FRITZ SCHRÖDER,
SOPHIE NAGEL.