

No. 891,820.

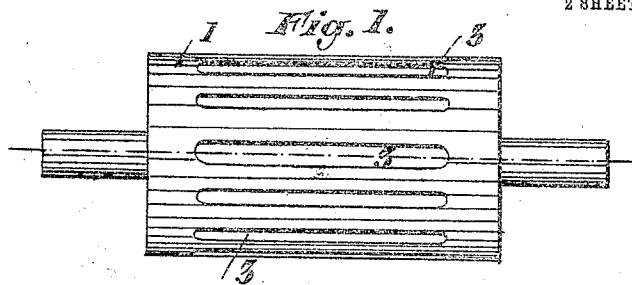
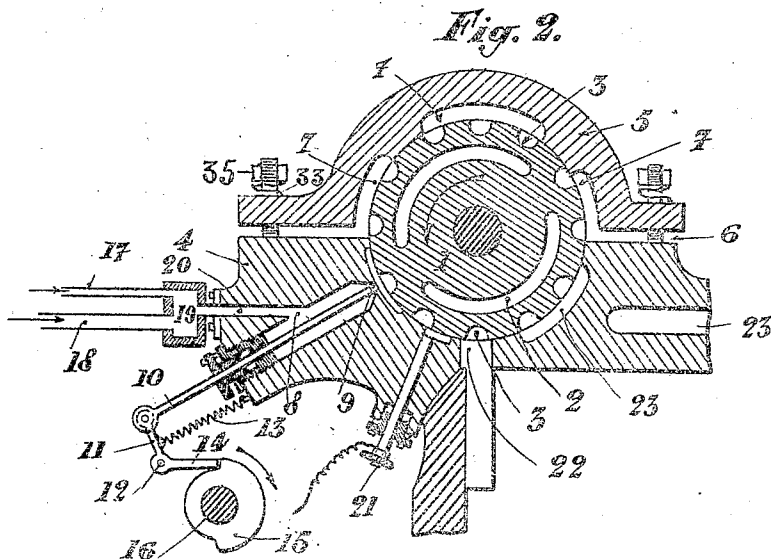
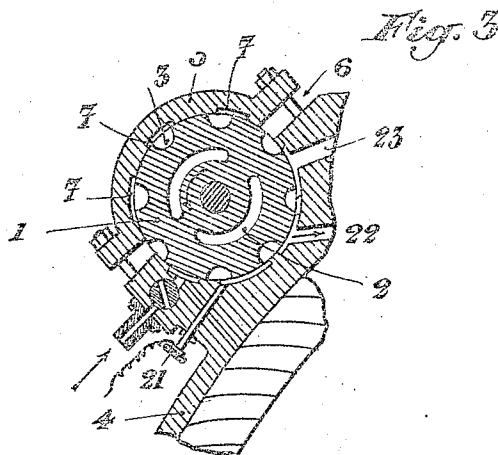
PATENTED JUNE 30, 1908.

W. J. CRUYT.

APPARATUS FOR THE PRODUCTION OF HOT FLUIDS UNDER PRESSURE.

APPLICATION FILED MAY 31, 1906.

2 SHEETS—SHEET 1.



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Fig. 4.

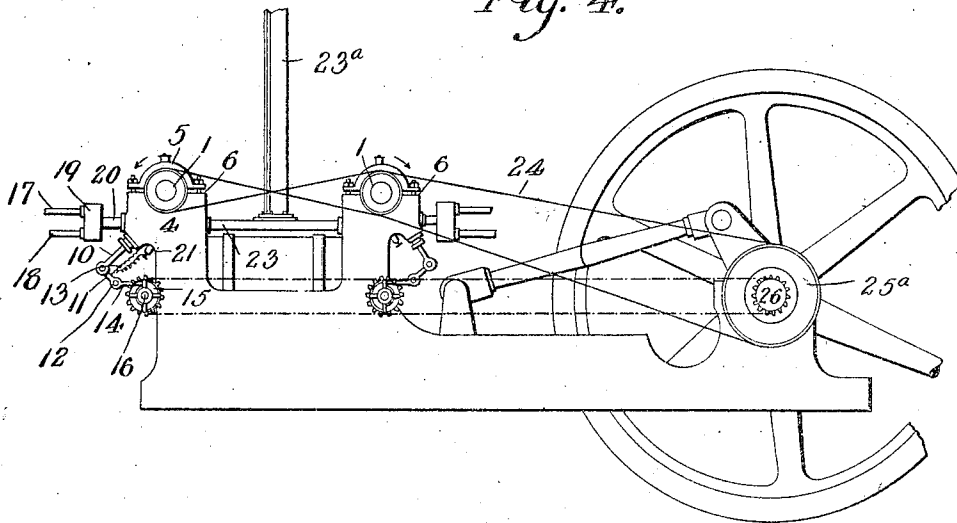
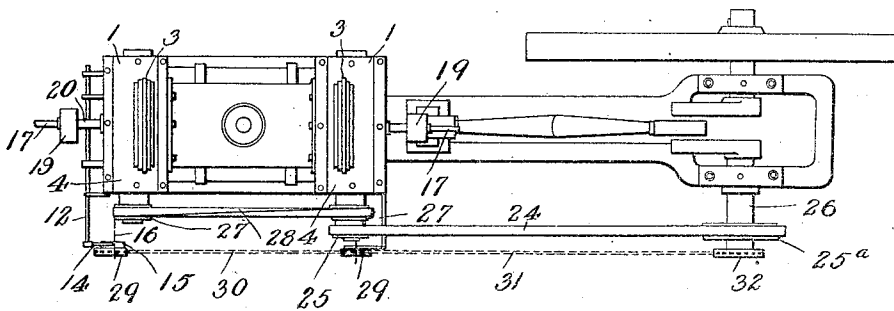


Fig. 5.



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APPARATUS FOR THE PRODUCTION OF HOT FLUIDS UNDER PRESSURE.

No. 891,820.

Specification of Letters Patent.

Patented June 30, 1908.

Application filed May 31, 1906. Serial No. 319,568.

To all whom it may concern:

Be it known that I, WILLIAM JOHN CRUYT, engineer, a subject of the King of the Belgians, residing at Chaussée de Vleurgat, No. 80, Brussels, in the Kingdom of Belgium, have invented certain new and useful Improvements in Apparatus for the Production of Hot Fluids under Pressure, of which the following is a specification.

10 This invention relates to apparatus for use in the combustion of hydrocarbons and has for its object to produce, by the combustion of hydrocarbons, hot fluids under pressure, capable of being utilized for industrial purposes such as heating, generating motive power, etc.

One construction of apparatus according to this invention is illustrated in the accompanying drawing, in which:

20 Figure 1 is a side elevation of the rotary drum forming the chief part of the apparatus. Fig. 2 is a cross-section showing a construction of the whole of the apparatus. Fig. 3 is a cross-section of another form of construction when the inlet of explosive mixture is controlled by a rotary valve. Fig. 4 is a side elevation of the apparatus in connection with the motor by which it is driven and Fig. 5 is a top view of Fig. 4.

30 The apparatus comprises a cylindrical or conical drum 1 capable of being quickly rotated about its spindle (the speed of the said movement being for instance 400-600 revolutions per minute). This rotary motion is imparted to the drum either by a small special motor of any shape and kind, from the crank shaft of the engine. This drum may be cooled by circulation of water or air which passes through recesses 2 made in the same.

40 On its outer surface the drum is provided with a series of longitudinal grooves 3 having the shape of troughs of semi-circular cross-section 12 of which are shown in Fig. 1. These troughs stop at either side at a certain distance from the ends of the drum. The drum rotates in a gas tight manner in a casing cast in one or two pieces. In the latter case one of these sections 4 is fixed and the other 5 is made in the form of a cover or cap which is placed over the drum and secured to the first half or section by means of screws or bolts 34 and nuts 35. A small clearance 6 is left between the two halves of the casing and enables adjustment to take up any wear. If desired springs 33

or other elastic members of adjustable tension may be inserted between the nuts 35 and the part 5 to permit the two halves moving relatively to each other, when there is any expansion.

On the inner face of the cap 5 are formed wide grooves 7 extending throughout the whole of its length and admitting air to the outer surface of the drum, so as to cool the troughs and remove any products of combustion that they may contain.

As regards the bottom part of the casing, its arrangement is described hereinafter together with the working of the apparatus.

In the thickness of metal constituting the bottom half of the casing there is formed a small cylinder 8, opening into the interior of the casing by an orifice normally closed by a valve 9. The movement of this valve is controlled by a rod 10 to which is connected a bell crank lever 11 pivoted about a pin 12 and drawn downwards by a spring 13. The end 14 of the bell crank lever is held by the spring 13 against a cam 15 mounted on a spindle 16 driven by the engine or in any other suitable manner. The shape of the cam is such that it is possible to admit fresh gas to the troughs during given periods of time, which has a special advantage when the apparatus is applied to engines.

The working fuel supplied to the apparatus is in the form of any explosive mixture, which if needed has been previously compressed by means of any compressor operated in any desired manner.

In case of the explosive mixture being air or gas the air and the gas are admitted respectively by two pipes 17 and 18, the cross-section of which are calculated in accordance with the pressure and the nature of the gas and the richness of the mixture. The air and gas are mixed in a chamber 19, and the mixture passes through an oblique pipe 20 into the small cylinder 8, and thence, when the valve 7 is raised, into the troughs 3 of the drum, as the troughs pass in front of the said valve.

The supply of explosive mixture to the troughs could, of course, be made in any other suitable manner. For instance, as shown in Fig. 3, by replacing the valve 9 by a small oscillating cock, the reciprocating movement of which would depend on the time that the admission is to last and the reciprocating movement being produced in any suitable manner.

The troughs charged with explosive mixture then pass owing to the rotation of the drum in front of a continuously operating ignition device 21 which may be either in the form of a wire rendered incandescent by electric current, or by a spark which is produced in a continuous and uniform manner at the end of a plug of suitable design. Thus ignited the gas contained in the trough explodes, and its pressure suddenly increases considerably and at the same time its temperature also increases to a corresponding extent. When in this state the gas is brought by the movement of the drum in front of an orifice 22 which can be followed by other similar orifices if desired. Hot gases under pressure thus produced, can be utilized for various purposes, more particularly for the production of motive power and for heating.

The orifices 22 can for instance give access to one or more tanks in which the pressures have given values, which, however, are lower than the pressure in the troughs. The gas can thus pass from the troughs successively into the different tanks and expand, whence it may be conveyed by pipes for any use desired. This arrangement applies for instance, to the case of heating.

When the gas is used for producing motive power it can be utilized in various kinds of motors either in reciprocating or piston engines or in the rotary or turbine types of engine.

The drums 1, 1 are each provided with a pulley 27 (Figs. 4 and 5) which are connected with each other by means of a crossed belt 28 so as to allow of the rotation of the drums in opposite directions. One of the drums is further provided with a pulley 25 which by means of a belt 24 is connected with a pulley 25^a fixed on the main shaft 26. The mixing of air and gas takes place under pressure in the storage casings 19 whence the mixture passes into the troughs of the drums through the openings 20. The gases which remain in the troughs after the trough has passed beyond the opening 22 escape through the exhaust passage 23^a and thence through the pipe 23^a. The gases which may remain in the troughs after this discharge pass into the atmosphere through the openings 7. The two cams 15, 15 fixed on the shafts 16 are connected by means of sprocket wheels 29 and 32 and chains 30, 31 with the main shaft 26.

In the case of reciprocating motors, the cylinders of the motors constitute the tanks in which the gas expands. The motor can therefore be with several cylinders in which the gas successively expands the pressure in the successive cylinders gradually decreasing and the motor thus working as a compound engine, or the motor may have a single cylinder in which part of the gases expand from the troughs through part 22. The remainder of the gas passes through part 23 and

may be utilized for heating purposes or for transforming water into steam, which in the case of motors of the turbine type can be used together with the gas.

The apparatus enables considerable quantities of gas at a high pressure and at a high temperature to be produced while the apparatus itself occupies but little room. According to the nature of the mixture and to the degree of the initial compression of the mixture, the pressures can reach up to 40 and 50 atmospheres, and the temperature 2,000° to 3,000° C.

The explosions are produced in small quantities of gas at a time, whereby their intensity is reduced and the strain on the apparatus reduced which increases its durability.

The apparatus owing to its shape and construction is particularly adapted to resist the strain due to explosions and owing to the method of erecting the casing, there is sufficient clearance to avoid all risk of jamming due to the increase of temperature.

The apparatus is also easy to lubricate and to examine and can be readily cooled. Not much water is required for this purpose owing to the arrangement of the drum and of the casing allowing to be cooled by the outside air.

When applied to motors, the apparatus does away with inlet valves which are the chief source of stoppages.

Further, several identical apparatus could be used on the same motor, so that, if one of them fails, the motor does not stop altogether. The replacing of a defective apparatus can, moreover, be effected at once.

In the case of reciprocating engines as the explosions no longer take place in the cylinder itself, the dimensions of the cylinder connecting rods etc. can be reduced, and the cooling water for the cylinder can be done away with or considerably reduced.

It will be understood that the details of construction may be varied without departing from this invention.

Having now fully described my invention what I claim and desire to secure by Letters Patent is:

1. An apparatus for producing and distributing hot fluids under pressure, comprising a casing and a rotatable drum in the casing and provided with circumferential pockets; said casing having an inlet for the fluid, an igniter spaced from the fluid inlet, and an exhaust for the fluid spaced from the igniter.

2. An apparatus for producing and distributing hot fluid under pressure, comprising a casing consisting of two yieldingly connected parts, a rotary drum in the casing and provided with longitudinal concave pockets in its circumference, and means for cooling the drum extending parallel to the pockets; said casing having an inlet for the fluid, an

gniter spaced from the fluid inlet, and an exhaust for the fluid spaced from the igniter.

3. An apparatus for producing and distributing hot fluids under pressure, comprising a casing consisting of two yielding connected parts, a rotary drum in the casing and provided with longitudinal concave pockets in its circumference, means in the drum for cooling the drum and extending parallel to the pockets, and means in the walls of the casing for cooling the pockets and permitting escape of residual gases; said casing having an inlet for the fluid, an igniter spaced from the fluid inlet, and an exhaust for the fluid spaced from the igniter.

4. An apparatus for producing and distributing hot fluids under pressure, comprising a casing consisting of two yielding connected parts, a rotary drum in the casing and provided with longitudinal concave pockets in its circumference, means in the drum for cooling the drum and extending parallel to the pockets, and means in the walls of the casing for cooling the pockets and permitting escape of residual gases; said casing having an inlet for the fluid, an igniter spaced from the fluid inlet, and an exhaust for the fluid spaced from the igniter, and means for controlling the admission of fluid through the inlet.

5. An apparatus for producing and dis-

tributing hot gases under pressure, comprising a casing consisting of two parts yielding together, a rotatable drum in the casing, and means for adjusting the drum in its bearings.

6. In an apparatus for producing and distributing hot gases under pressure, comprising a casing consisting of two parts yielding together, a rotary conical drum in the casing and having longitudinal concave pockets in its circumference, means for adjusting the drum in its bearings, means for admitting an explosive mixture to the pockets, means for igniting the mixture in the pockets and spaced from the means for admission of the mixture, means for exhausting the ignited and not expanded gas from the pockets and spaced from the igniting means, means in the drum for cooling the drum, means in the walls of the casing for cooling the pockets to prevent excessive friction between the drum and the casing and providing an escape for residual gases in the pockets, and means for regulating the admission of explosive mixture to the drum.

In witness whereof I have hereunto set my hand in presence of two witnesses.

WILLIAM JOHN CRUYT.

Witnesses:

E. HEYL.

GREGORY PHELAN.