

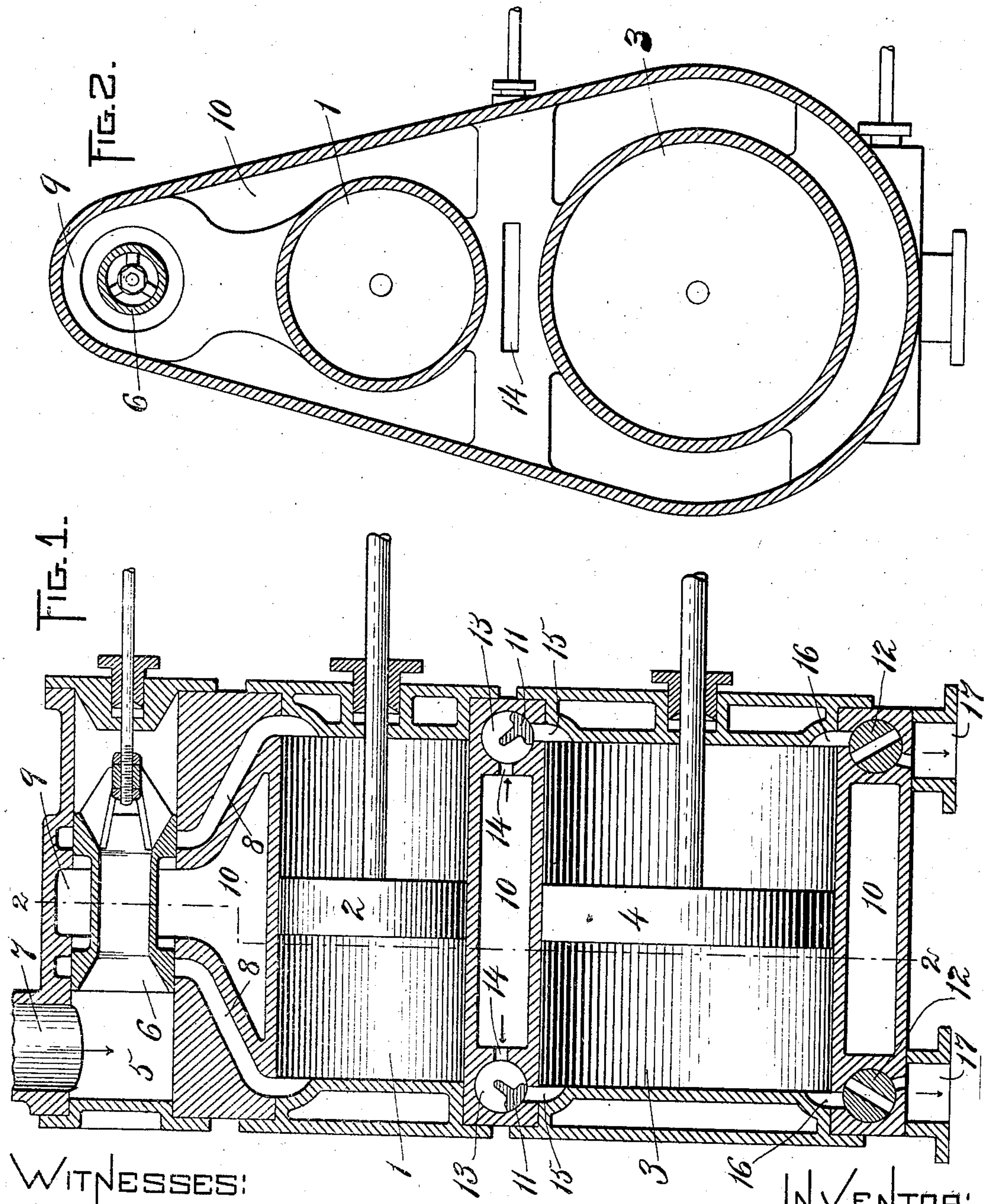
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S. A. REEVE.

METHOD OF UTILIZING WORKING FLUID IN JACKETED ENGINES.

APPLICATION FILED APR. 24, 1901.



WITNESSES:

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# UNITED STATES PATENT OFFICE.

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## METHOD OF UTILIZING WORKING FLUID IN JACKETED ENGINES.

No. 870,585.

Specification of Letters Patent.

Patented Nov. 12, 1907.

Application filed April 24, 1901. Serial No. 57,255.

*To all whom it may concern:*

Be it known that I, SIDNEY A. REEVE, of Worcester, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Methods of Utilizing Working Fluid in Jacketed Engines, of which the following is a specification.

This invention has for its object to provide a method for utilizing superheated steam or other superheated motive fluid, and it consists in certain novel features of procedure which I shall now proceed to describe and claim.

Of the accompanying drawings, forming a part of this specification,—Figure 1 represents an axial section of a compound steam-engine adapted to carry out my invention. Fig. 2 represents a section on the line 2—2 of Fig. 1.

The same reference characters indicate the same parts in both of the figures.

In the drawings, 1 represents a high-pressure working cylinder having a piston 2, and 3 represents a low-pressure working cylinder having a piston 4.

5 is a valve-chamber containing a balanced piston slide valve 6, and having an inlet-opening 7 for the admission of the live steam or other working fluid to said valve chest. The valve 6 controls admission ports 8, 8 leading from the valve chest 5 to the two ends of the high-pressure cylinder 1, and an exhaust port 9 leading from said valve-chest into a receiver chamber or space 10, which envelops or forms a jacket for both the high-pressure and low-pressure cylinders.

Oscillating inlet-valves 11, 11 and exhaust valves 12, 12 at the two ends of the low-pressure cylinder 3 control the admission and exhaust respectively of the working fluid to and from said cylinder. The admission valves 11, 11 operate in valve-chests 13, 13 which are provided with ports 14, 14 opening from the receiver space 10 into said valve-chests, and ports 15, 15 opening from said valve-chests into the two ends of cylinder 3. The valves 11 operate to open and close these latter ports. The exhaust valves 12 operate to open and close ports 16, 16 at the respective ends of the cylinder 3 connecting with exhaust pipes 17, 17.

Any suitable system of valves and any preferred arrangement or relative location or number of cylinders may be employed without departing from the spirit of my invention, the limit to the number of cylinders depending upon the character and degree of super-heat of the working fluid, the extent to which expansion is carried in each cylinder and other causes and working conditions, which are well understood in steam-engine practice.

It will be noted that the high-pressure cylinder 1 is

jacketed by its own exhaust fluids, which are therefore reheated by the heat of the live steam or other fluid, conducted through the cylinder walls at each admission and through the walls of the live fluid admission ports, the exhaust fluids by the same operation serving to deprive the live fluids of a portion of their heat. The reheated receiver fluid is admitted to the low-pressure cylinder 2 and that which is in the receiver space supplies external heat to the expanding fluid which is doing work on the low-pressure piston.

I am aware that it has been proposed to jacket a working cylinder with its own exhaust, but this would be a bad expedient with a saturated or only slightly superheated motive fluid, unless a heater were placed in the receiver space for the exhaust fluid, to restore heat to it. Otherwise, the exhaust fluid which has done work in the cylinder and is at a lower temperature than the live fluid, would deprive the live fluid of heat which it could not spare, the resulting tendency being in the case of a slightly superheated fluid to reduce it to a state of saturation, and in the case of a saturated live fluid, to produce condensation. So far as I am aware, receiver reheaters have always been employed where the receiver jackets the cylinder whose exhaust it receives. In the case of highly superheated steam, however, and of certain motive fluids consisting of a mixture of superheated steam and combustion gases, there may be present an excess of heat in the live fluid entering the engine, a portion of which heat it may be an advantage to get rid of, in order to prevent injury to the working parts of the engine, and even if the temperature of such live working fluid is not so great as to be injurious to the engine, it may still be so high as to go through its expansion in the working cylinder, and still not be reduced to a state of saturation or of non-efficiency by being jacketed with the exhaust fluid from said cylinder. In all such cases my invention may with advantage be employed.

I claim:

1. The process of converting the thermal energy of a highly-superheated fluid into mechanical energy which consists in performing mechanical work by the action of the working-fluid, thereafter exhausting the fluid into an unreheated receiver-space, and jacketing the fluid doing the work by means of the exhaust fluid.

2. The process of converting the thermal energy of a highly-superheated fluid into mechanical energy which consists in performing mechanical work by expansive action of the working fluid in a cylinder, exhausting the fluid from said cylinder, and without reheating the exhaust fluid, employing the latter to abstract heat from the fluid in the working cylinder.

3. The process of converting the thermal energy of a highly-superheated fluid into mechanical energy which consists in performing mechanical work by expanding the

working fluid successively in a plurality of cylinders, exhausting the fluid from the high-pressure cylinder into an intermediate unreheated receiver-space, and jacketing the fluid in both high and low-pressure cylinders by means of  
5 said exhaust-fluid, whereby the high-pressure working fluid is cooled and the low-pressure fluid heated.

4. The hereindescribed process which consists in performing mechanical work by the action of a working fluid composed of superheated steam and products of combus-

tion, thereafter exhausting said fluid, and communicating 10 heat from the working fluid to the exhaust fluid through the walls of the working chamber.

In testimony whereof I have affixed my signature, in presence of two witnesses.

SIDNEY A. REEVE

Witnesses:

R. M. PIERSON,

E. BATCHELDER.