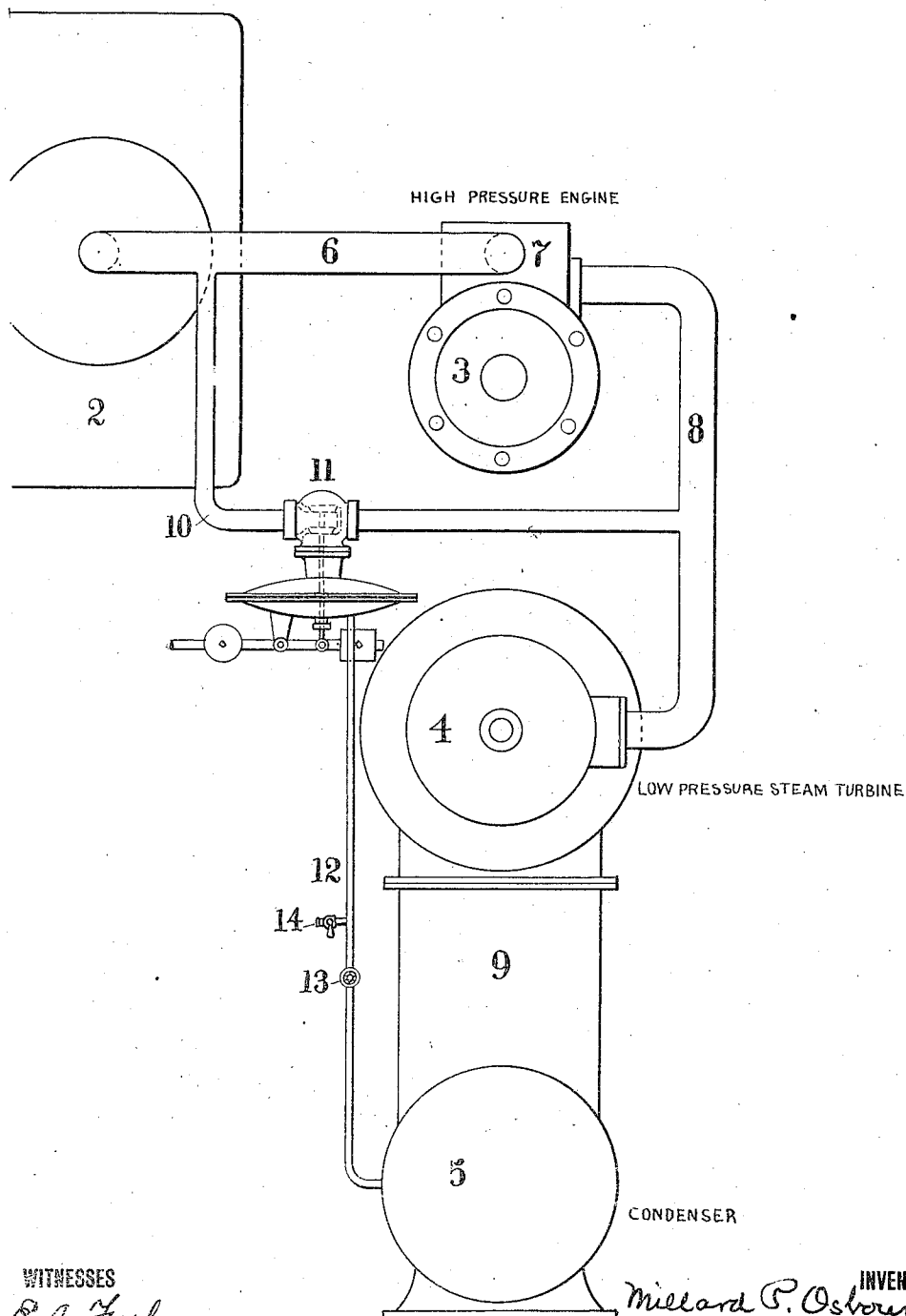


M. P. OSBOURN.
SYSTEM OF OPERATING STEAM ENGINES.
APPLICATION FILED SEPT. 13, 1909.

1,052,745.

Patented Feb. 11, 1913.



WITNESSES

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SYSTEM OF OPERATING STEAM-ENGINES.

1,052,745.

Specification of Letters Patent. Patented Feb. 11, 1913.

Application filed September 13, 1909. Serial No. 517,419.

To all whom it may concern:

Be it known that I, MILLARD P. OSBOURN, a citizen of the United States, and resident of the city of Merchantville, county of Camden, and State of New Jersey, have invented an Improvement in Systems of Operating Steam-Engines, of which the following is a specification.

My invention has reference to a system of operating steam engines and consists of certain improvements which are fully set forth in the following specification and shown in the accompanying drawings which form a part thereof.

The object of my invention is to transform the energy of steam into power by use of steam engines operating at different pressures and in series and in which the steam supplied to the engine operating at the lower pressure is the exhaust steam from the engine operating at the higher pressure, supplemented when necessary by live steam under automatic control whereby the low pressure engine may be supplied with the required quantity of steam necessary to its duty, notwithstanding irregularities in the operation of the high speed engine and in the quantity of steam derived therefrom.

My object is also to provide an automatic means, independent of the speed of a low pressure steam turbine engine, for regulating the steam supplied thereto from a source of steam of relatively higher pressure than required whereby steam of a constant pressure and necessary volume may be supplied to the engine.

My invention consists of the features of construction and operation which are fully described hereinafter, and more specifically defined in the claims, and will be better understood by reference to the drawings, in which is shown in diagrammatic form an illustration of the devices coacting in the carrying of my improvements into practice.

Referring to the drawing, 2 is a boiler or steam generator, 3 is a high pressure engine and may be of any of the ordinary reciprocating types having single or a plurality of cylinders and involving one or more expansions and exhausting at, below, or above atmospheric pressure, 4 is a low pressure steam turbine engine and may be of any construction desired, and 5 is the vacuum creating devices for the exhaust end of the

low pressure turbine and may be made in any suitable manner.

Steam is supplied from the boiler 2 to the steam chest 7 of the high pressure engine 3 by a pipe 6 and the exhaust steam from said high pressure engine may be supplied to the inlet port of the low pressure turbine engine 4 by a pipe 8 which may also act as a receiver to reduce the pulsations before delivering the steam to the turbine.

9 is the vacuum chamber connecting the exhaust end of the turbine 4 with the vacuum creating devices 5. Where high and low pressure engines are employed in this way, considerable difficulty has been experienced in insuring uniform operation of the low pressure steam turbine, and this I have overcome by the following means.

10 is a by-pass pipe for supplying steam direct from the boiler 2, steam pipe 6 or any other available source of steam above the pressure of that supplied by pipe 8 to the low pressure steam turbine 4. In the pipe 10 I provide a reducing valve 11 of any suitable construction which permits supply of steam from the source of higher pressure to the pipe 8 whenever the volume of steam in the said pipe 8 is reduced sufficiently to reduce the pressure in said pipe below the predetermined amount. The reducing valve 11 may be adjusted to insure the maintenance of the steam in the pipe 8 at atmospheric or any other pressure so long as it is lower than the pressure of the source of supply. Ordinarily, the reducing valve 11 may be governed by the pressure in the pipe 8, but for more perfect regulation said reducing valve may be governed in its operation by the difference in pressures in the pipe 8 and vacuum chamber of the vacuum creating device 5. This latter is made possible by providing the vacuum pipe 12 connecting with the casing of the reducing valve on one side of the diaphragm whereas the chamber on the opposite side of the diaphragm is in communication with the pressure in the pipe 8. When this particular regulation is not required the valve 13 in pipe 12 may be closed and valve 14 opened to the atmosphere.

I do not restrict myself to any particular form of regulator or reducing valve, nor to the arrangement of the apparatus, as these may all be varied to suit the requirements of

the engineer; the essential feature of my invention being in the method and means of supplying steam at a constant pressure and requisite volume to operate a low pressure steam turbine independent of its speed and irrespective of the pressure of the source of steam supply.

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

1. The combination of a steam engine, a source of steam supply, means for supplying steam continuously to the engine in variable quantities at a pressure less than that of the source of steam supply, and automatic means for supplying additional quantities of steam at reduced pressure from the source of supply to the engine said means controlled by the difference in pressure between the inlet and exhaust sides of the engine and independently of its speed.

2. In apparatus of the character described, the combination of a source of steam, a high pressure engine receiving steam therefrom, a low pressure engine receiving the exhaust steam of the high pressure engine, a by-pass for steam from the source of steam to the low pressure engine direct, and means controlled by the pressure in the inlet side of the low pressure engine to regulate the volume of steam supplied by the by-pass and to reduce its pressure approximately to that of the exhaust steam.

3. In apparatus of the character described, the combination of a source of steam, a high pressure engine receiving steam therefrom, a low pressure engine receiving the exhaust steam of the high pressure engine, a by-pass for steam from the source of steam to the low pressure engine direct, and means controlled by the joint action of the pressures in the inlet and exhaust sides of the low pressure engine to regulate the supply of steam by the by-pass independently of the speed of the low pressure engine.

4. In a system of operating two steam engines, the combination of two engines respectively operating under different pressures, a source of steam, means for supplying the steam to the engine of higher pressure, means for supplying the exhaust steam from the engine of higher pressure to the engine of lower pressure, and automatic means independent of the speeds of the engines for supplying an additional amount of steam from the source of steam to the engine of lower pressure simultaneously with the supply of exhaust steam thereto and reducing its pressure at the time of supply to approximately that of the exhaust steam.

In testimony of which invention, I hereunto set my hand.

MILLARD P. OSBOURN.

Witnesses:

R. M. KELLY,
E. H. BARLOW.