(No Model.) 2 Sheets—Sheet 1.

E. F. OSBORNE.

STEAM HEATING APPARATUS.

No. 265,697. Patented Oct. 10, 1882.

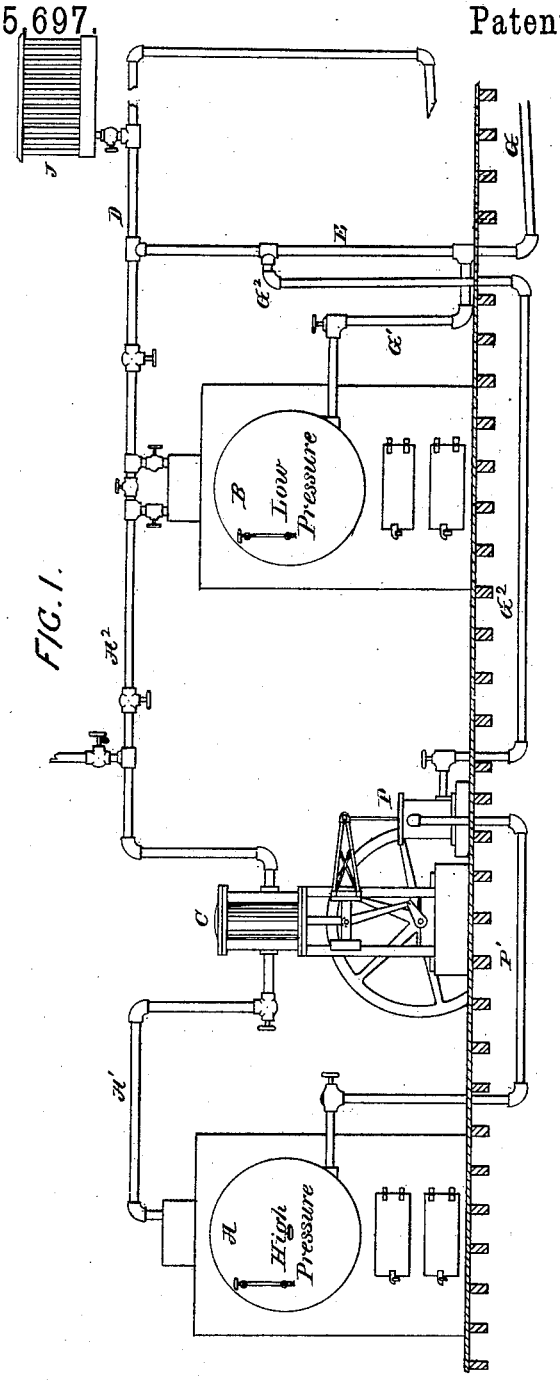


FIG. 1.

WITNESSES
F. U. Adams
F. W. Kasebagen.

INVENTOR
Eugene F. Osborne
per W. C. Dayton
Attorney

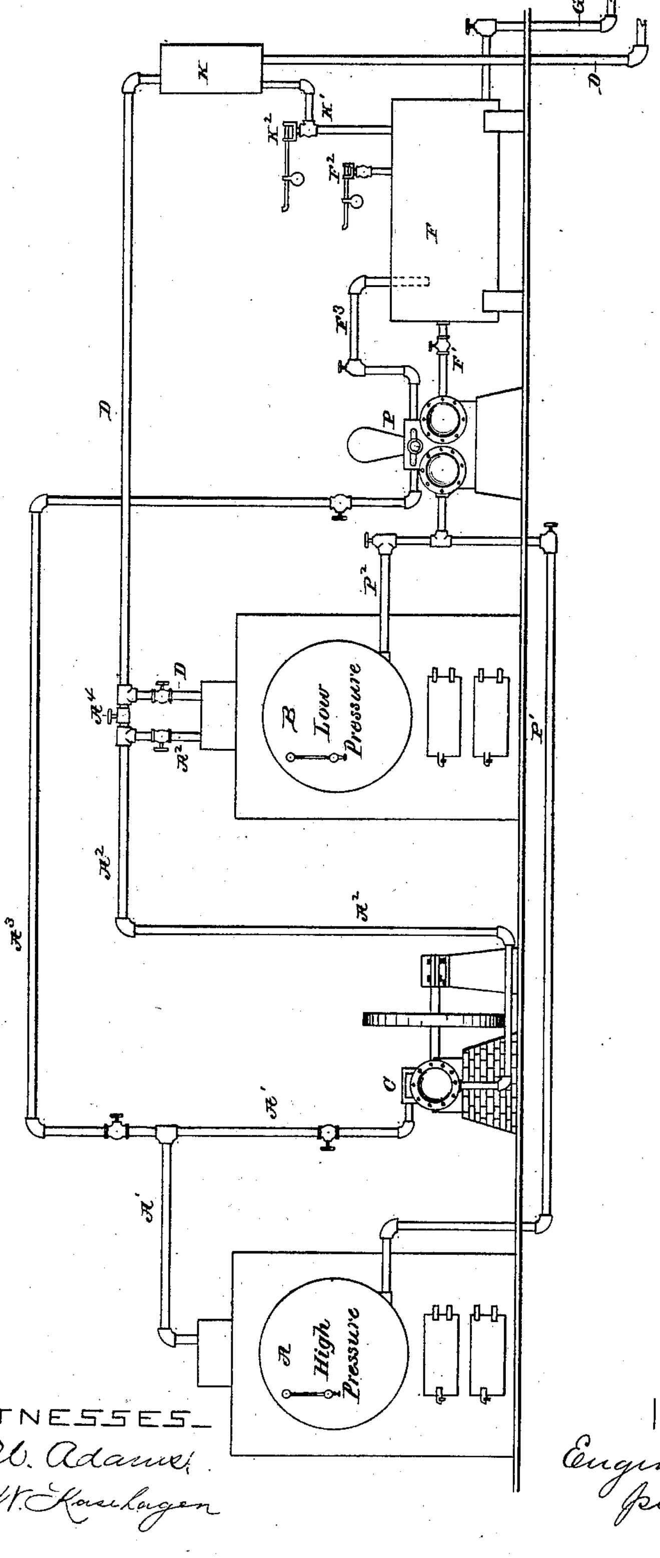
(No Model.) 2 Sheets—Sheet 2.

E. F. OSBORNE.

STEAM HEATING APPARATUS.

No. 265,697. Patented Oct. 10, 1882.

FIG. 2.



WITNESSES_
D. W. Adams,
F. W. Kaselagen

INVENTOR_
Eugene F. Osborne
per W. E. Dayton
Attorney

N. PETERS. Photo-Lithographer, Washington, D. C.

UNITED STATES PATENT OFFICE.

EUGENE F. OSBORNE, OF ST. PAUL, MINNESOTA.

STEAM HEATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 265,697, dated October 10, 1882.

Application filed May 29, 1882. (No model.)

To all whom it may concern:

Be it known that I, EUGENE F. OSBORNE, of the city of St. Paul, in the county of Ramsey and State of Minnesota, have invented certain new and useful Improvements in Steam Heating Apparatus; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to the manner of connecting generators with a system of steam-distribution for heating and other purposes in which the water of condensation is returned to the generators or boilers, of which Letters Patent of the United States No. 236,247, granted to me January 4, 1881, afford an illustration. In heating apparatus of the description referred to the return of the water of condensation to the generator results in great economy of fuel.

It is the purpose of this invention to provide for running a steam-engine in connection with such heating apparatus, and through the medium of the return system of the latter to carry back the condensation of the exhaust from the engine with that of the heating apparatus to the generators.

To this end the invention consists in the combination, with a heating apparatus which returns its water of condensation to the generator and with the engine, of two boilers, both run by fires, but at unequal pressures, the steam heating apparatus being connected to take its supply from the generator having the lower pressure and the engine being connected to take its supply from the generator having the higher pressure and to exhaust into that having the lower, together with a pump and connections for delivering the water of condensation from the return-pipe of the heating apparatus to both generators, as may be required, whereby waste is avoided from exhaust of the engine and maximum economy is secured in the combined apparatus.

I am aware that it has been common to connect an engine between a generator and a secondary vessel, which is sometimes a reheater and sometimes a mere tank. I do not regard such construction as my invention, but the two boilers or generators as part of a system of steam-heat distribution returning the water of condensation and having the engine connected between the generators, together with a pump or its equivalent, all arranged and operating as hereinafter set forth and claimed.

The elements of my invention are shown in the accompanying drawings, wherein Figure 1 is an elevation of the two boilers, an intermediate engine, and a rudimentary heating apparatus; and Fig. 2 is an elevation of the two boilers, the intermediate engine, and the boiler-house connections and devices belonging to a preferred system of general or extended steam-supply for heating or power purposes, or both, in cities and villages.

A is a boiler intended to carry a relatively-high pressure. B is a boiler intended to carry a lower pressure than the boiler A, and C is an engine connected with both boilers and run by the difference in pressure between the two, or by steam passed through the cylinder of the same from the boiler having the higher pressure to that having the lower pressure. A' is the steam-pipe leading from the boiler A to the engine-cylinder, and A^2 is the pipe leading from the engine-cylinder to the boiler B. D is a pipe leading from the boiler B to a steam heating apparatus, and G is the return-pipe conveying the water of condensation from said apparatus back to the boilers.

Referring first to Fig. 1, G' is an extension of the return-pipe leading to the low-pressure boiler B, and G^2 is a pipe connected with the return G, or with an extension, E, thereof, and taking its water at a point on the water-line of the boiler B and leading to the pump P, run by the engine C. P' is a pipe leading from the pump to the high-pressure boiler below the water-line, and returning thereto water derived from the condensation in the heating apparatus.

Referring next to Fig. 2, the pipe D, through which steam is supplied to the mains leading to the working apparatus, (generally beneath the surface of the streets,) is shown as being provided with an anhydrator, K, and the return G leads into the tank F, from which through the pipe F' the water of condensation is returned to one or the other boiler, as may be desired, by the pump P and suitable connecting-pipes. The pump-engine is shown as exhausting into the tank F by the pipe F^3. The tank F is also shown as receiving steam from

the supply D through the regulator-valve K'. Some of these matters do not, however, form any part of the present invention, being essentially the features shown in Letters Patent of the United States No. 236,247, above referred to, and being herein illustrated as a preferred construction of devices adapted for use in connection with a general system of steam-supply for heating and power purposes in cities.

In locating a steam-engine between two boilers carrying unequal pressures and connecting it with them in the manner shown it is to be borne in mind that the only requirement for the successful running of the engine is that there shall be sufficient difference of pressure between the two boilers to drive the engine—that is to say, supposing fifty pounds pressure against the atmosphere to be necessary to run an engine under given conditions of work, if said engine be connected, as shown, between two boilers having a difference of fifty pounds in pressure, steam passed through the engine from the boiler having the higher pressure to the one having the lower pressure will run the engine. It may also be stated that the higher the pressures in the two boilers with a constant difference the more economically the apparatus may be run, for the reason that the higher the pressure the less the difference in temperature relative to such difference in pressure, and therefore the greater is the economy in fuel by which such temperatures and pressures are produced. It may be additionally stated that in even the best constructions of condensing-engines a very material loss of heat is suffered at the exhaust. It is therefore manifest that whenever a motor is required adjunctive to apparatus for the supply of steam for other purposes, and which returns the water of condensation to the boiler, a motor may be connected between the boilers of differing pressures, as set forth, without any loss whatever from exhaust.

In all situations where an extended steam heating apparatus is used of the character referred to power is also wanted in the vicinity of the boilers for driving machinery of some sort, and in the development of the modern system of electric-lighting by dynamo-machines the number of situations furnishing conditions in which machinery may be driven in connection with the supply of steam for heating purposes is and will be vastly increased. Concerning the use of power for driving dynamo-machines it may also be stated that the cost of such power has heretofore been the principal obstacle to the adoption of electric lighting. Means by which this cost may be reduced has therefore obviously material value to the public as being directly promotive of this most desirable system of illumination.

By associating the motor with the generator of a general steam heating apparatus as herein set forth the cost of power for such motor is reduced to its absolute minimum, without increasing the cost of the steam-supply, through the apparatus conjoined with the motor; or, regarding the connected motor and steam-supply apparatus as an integral system or machine, such system or machine may be operated with a materially-lessened waste of heat, and therefore at a reduced cost for fuel.

In the practical operation of this system it is contemplated that separate fires will be maintained beneath the several boilers, A and B, when the engine is in use, whereby obviously the water of condensation received from the engine C is re-evaporated in the boiler B. The valved pipe A^4, connecting the pipes A^2 and D, allows steam to be supplied directly from the high-pressure boiler to the apparatus receiving its supply through pipe D whenever, as may sometimes be desirable, the boiler B is disused. When the engine is not in operation the boiler B alone may be run, as in ordinary steam heating apparatus, and generally pipes and valves are provided, as shown, whereby alternative use may be made of the several boilers as circumstances may require.

I claim as my invention—

In combination with a steam heating apparatus comprising a pipe for the return of the water of condensation to the source of steam-supply, two steam-generators carrying different pressures and constituting such source of steam-supply, an engine connected between said generators so as to run by the difference in their pressures, and a pump and connections for returning the water of condensation to both generators, substantially as described.

In testimony that I claim the foregoing as my invention I affix my signature in presence of two witnesses.

EUGENE F. OSBORNE.

Witnesses:
M. E. DAYTON,
JESSE COX, Jr.