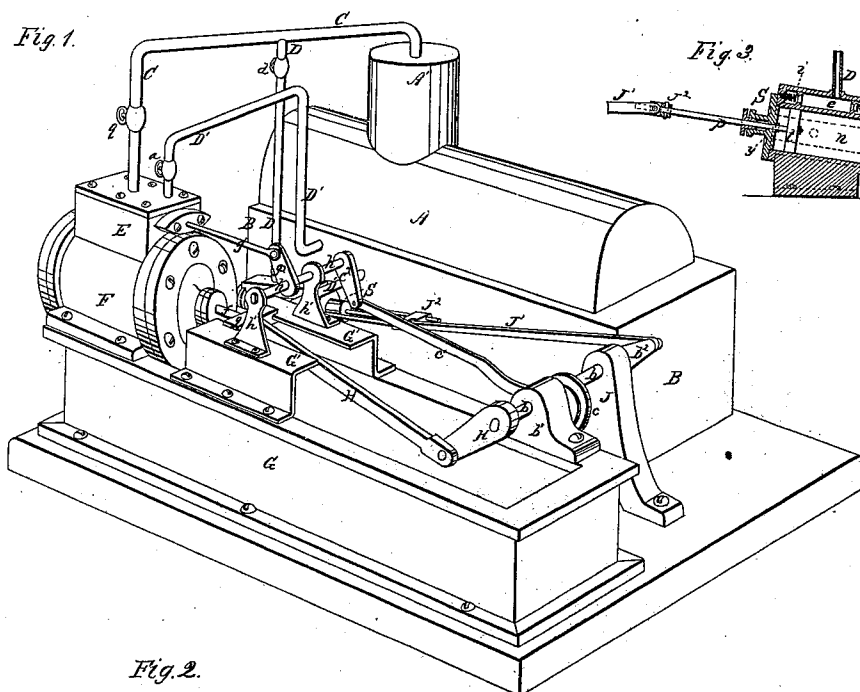


*J. B. Tarr,*  
*Steam-Boiler Superheater.*

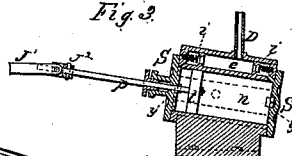
*N<sup>o</sup> 83,224.*

*Patented Oct. 20, 1868.*

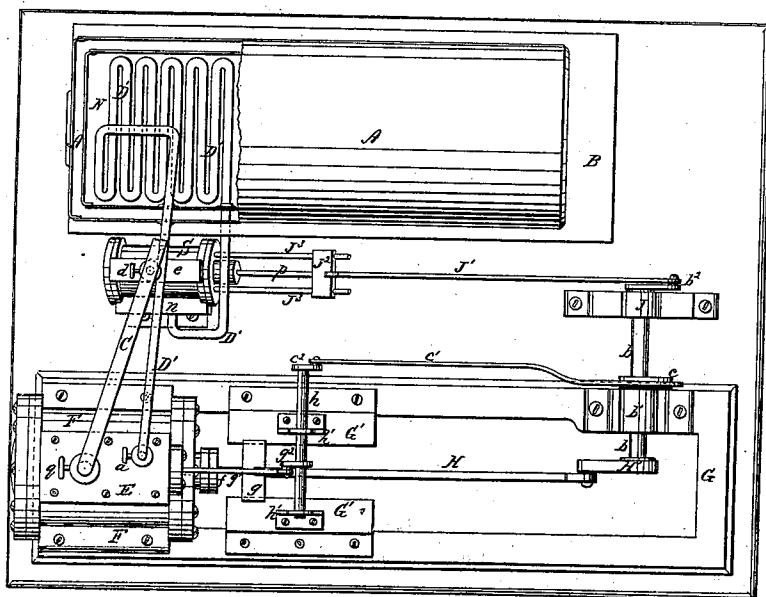
*Fig. 1.*



*Fig. 2.*



*Fig. 2.*



*Witnesses;*

*W. Thompson*  
*per J. B. Tarr*

*Inventor;*

*J. B. Tarr*  
*per J. B. Tarr*

# United States Patent Office.

JOHN BLAKE TARR, OF FAIR HAVEN, MASSACHUSETTS.

Letters Patent No. 83,224, dated October 20, 1868.

## IMPROVEMENT IN STEAM-ENGINES.

The Schedule referred to in these Letters Patent and making part of the same.

### To all whom it may concern:

Be it known that I, JOHN BLAKE TARR, of Fair Haven, in the county of Bristol, and State of Massachusetts, have invented a new and useful Improvement in Steam-Engines; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 is a perspective view of a horizontal engine and steam-boiler, showing a pump, which is worked by the engine, applied to a steam-superheating supply-pipe leading from said pump to the engine.

Figure 2 is a plan view of the same parts, with a portion of the steam-boiler broken away over the furnace-chamber, to show the arrangement of steam-superheating pipe therein.

Figure 3 is a vertical section through the pump, to which the steam-superheating supply-pipe is connected.

Similar letters of reference indicate corresponding parts in the several figures.

The object of this invention is to provide means whereby an engine can be run by steam at high pressure, while the steam in the boiler is maintained at a considerably lower pressure, by which the danger of boiler-explosions, caused by carrying too great a pressure of steam in them, can be guarded against.

In order to carry out this object, my invention consists essentially in conducting steam, on its way from a boiler to the steam-chest of an engine, through a pump which is worked by such engine, and thence passing the steam through a superheater, thereby reheating and increasing the elasticity or pressure of the steam after it leaves the boiler, and while it is cut off from the boiler by the pump.

And, in combination with such means, the invention further consists in making provision for conducting steam directly from the boiler into the steam-chest of the engine, when it is desired to start the engine and the pump, as will be hereinafter explained.

To enable others skilled in the art to understand my invention, I will describe one practical mode of carrying it into effect.

The drawings, figs. 1 and 2, represent my invention applied to a well-known form of horizontal stationary engine and steam-boiler. But in order that my invention may be fully understood, I will briefly describe the several parts of said engine and boiler, in connection with the means employed for superheating steam taken from the boiler.

G represents the frame or bed of the engine, and F the steam-cylinder, in which works a piston, the rod *f* of which is connected to a cross-head, *g*, that slides on ways G' G', and communicates motion to the fly-wheel shaft *b*, through the connecting-rod H and crank-arm H'. - The shaft *b* has its bearings in pillow-blocks b' J, and carries an eccentric, *e*, for communicating mo-

tion to the slide-valve in valve-chest E, which it does through the medium of pitman-rod *c*, crank-arms *c'* and *g'*, shaft *h*, and valve-rod *g*.

The steam-boiler A, which may be of any of the well-known varieties, is mounted over a furnace, and provided with a steam-pipe, C, which leads from the steam-dome A' into the valve-chest E of the engine. The hand-wheel *q* is connected to a valve, which is designed for shutting off the direct communication of the valve-chest with the boiler when the engine is run by steam of higher pressure than that in the boiler.

A pipe, D, which is provided with a valve, *d*, takes steam from the pipe C, when the valve in this pipe is closed, and conducts it into a valve-chest, *e*, of a pump-cylinder, S. This steam is then alternately drawn through valves, *i i*, by the movements of a double-acting piston, *l*, and forced through valves, *y y*, into a steam-chest, *n*. The steam, which is forced into the chest *n* of the pump, escapes into a pipe, D', which enters the fire-chamber under the steam-boiler and over the grate, and is thence carried to the valve-chest E of the engine, as shown in figs. 1 and 2.

After the pipe D' leaves the valve-chest *n* of the pump, it is coiled over the furnace, so that a great length of it will be exposed to the direct heat of the fire, for the purpose of subjecting the steam, as it passes from the pump on its way to the engine, to such a degree of heat as will render it more highly elastic than the steam in the boiler, in which condition it operates to work the engine.

The piston-rod *p* of the pump-piston is connected to a cross-head, J<sup>2</sup>, working upon suitable guide-ways, J<sup>3</sup> J<sup>3</sup>, and the piston of the pump receives its motions from the fly-wheel shaft *b* of the engine, through the medium of a crank-arm, *b'*, and connecting-rod, J, as shown in figs. 1 and 2.

The valves of the double-acting forcing-pump are so arranged and applied to the steam-chambers of this pump, that, when one induction-valve is allowing steam from the boiler to enter the pump-cylinder on one side of the piston, the eduction-valve on the opposite side of the piston is allowing steam to be forced by this piston into the superheating-steam pipe D'. Thus it will be seen that the two sets of valves of the pump, and the piston thereof, serve as cut-offs for preventing the pressure of the superheated or high steam from reacting upon the boiler, which should contain steam at a comparatively low pressure.

In order to start the engine and pump, the valves *a* and *d* are shut, and the valve *q* opened, so as to operate at first with low-pressure steam taken directly from the boiler through the steam-pipe C. During this operation the pump-cylinder S should be in communication with the atmospheric air, to allow the piston of this pump to work freely. When the engine and pump are started, the valves *d* and *a* are opened

and valve *g* closed, which causes all the steam from the boiler to pass through the pump and through the superheating-coils of pipe *D'* on its way to the valve-chest *E* of the engine. The power for operating the pump is derived from the engine, and also from the pressure of steam acting from the boiler.

I do not confine my invention to the particular kind of engine and boiler herein shown and described, nor to the particular kind of forcing-pump, as these parts may be constructed in any well-known manner.

Having described my invention,

What I claim as new, and desire to secure by Letters Patent, is—

1. The mode of working an engine by steam which is reheated after it leaves the boiler, and when cut off

from the boiler by the action of the pump, substantially as described.

2. A pipe or pipes leading from a steam-boiler to the valve-chest of an engine through a furnace, and provided with a forcing-pump, which is operated by said engine, substantially as described.

3. In combination with a steam-pipe, *C*, leading direct from a boiler to an engine, and provided with a cut-off valve, I claim the means for taking steam from said pipe, *C*, superheating it, and then conducting the superheated steam to the valve-chest of said engine, substantially as described.

Witnesses: JOHN BLAKE TARR.

R. T. CAMPBELL,

J. V. CAMPBELL.