(No Model.)

A. HOGG.

STEAM ENGINE.

No. 592,144. Patented Oct. 19, 1897.

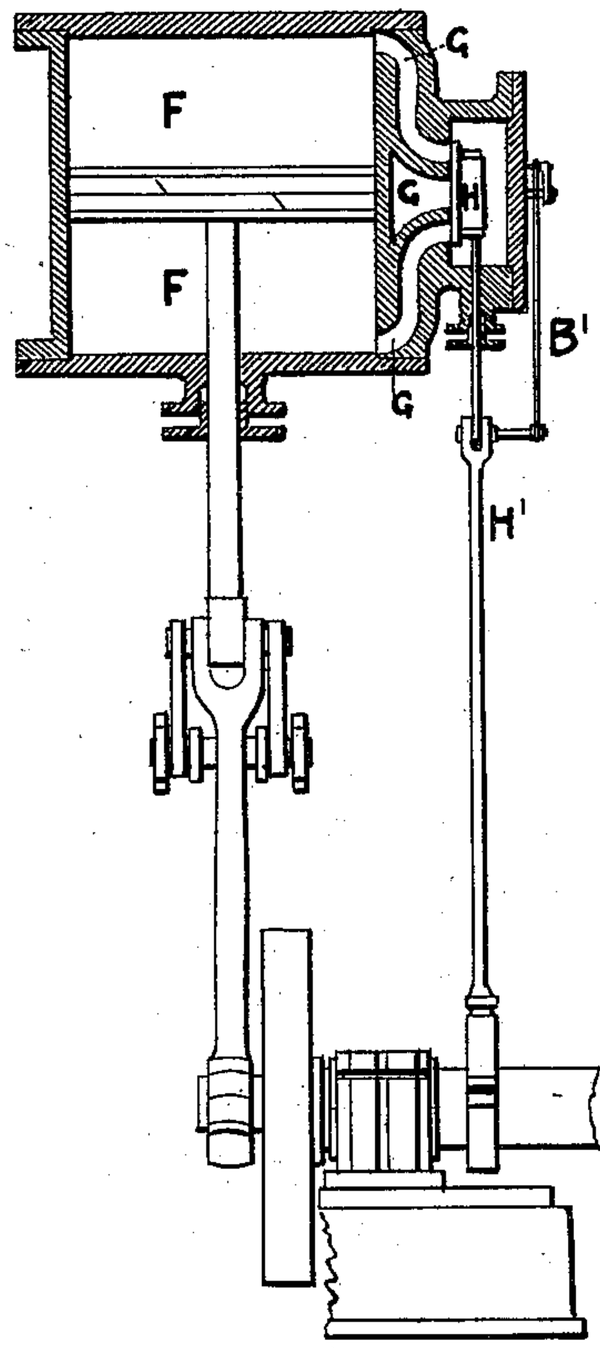

FIG: 1

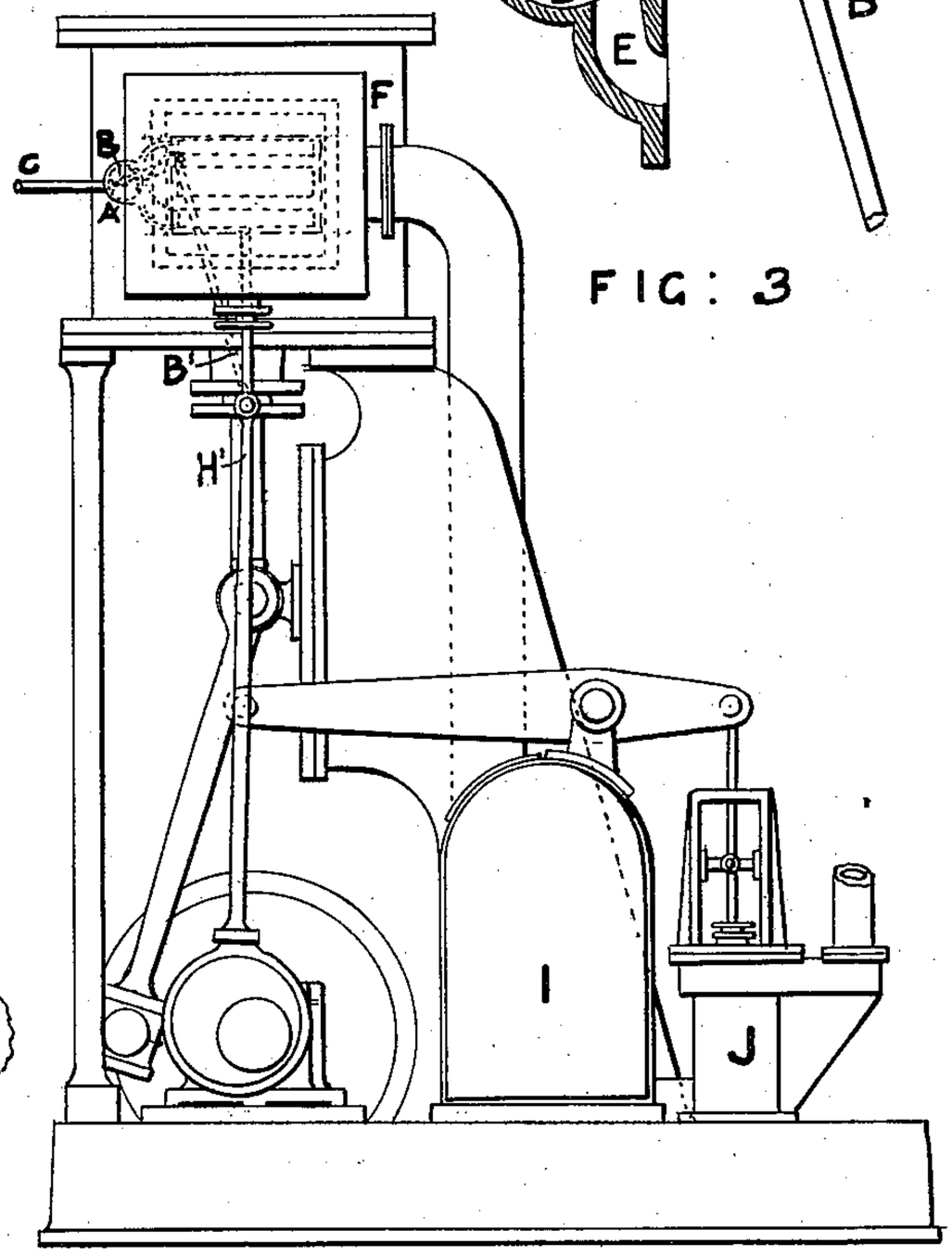

FIG: 2

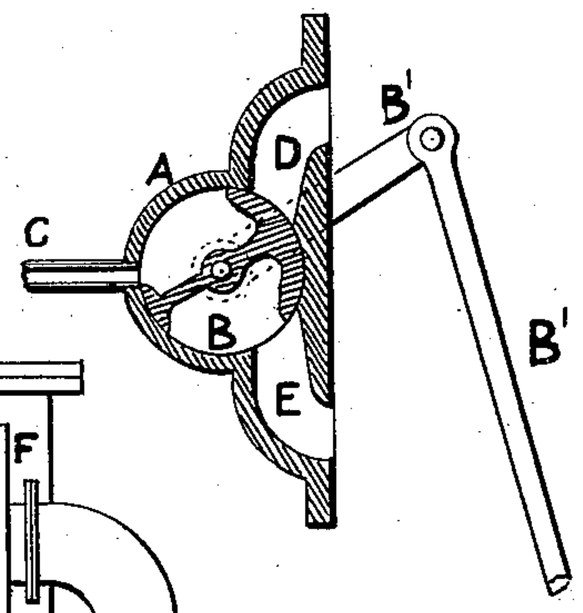

FIG: 3

Witnesses—
John C. Wilson
Percy C. Bowers.

Inventor—
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UNITED STATES PATENT OFFICE.

ALFRED HOGG, OF DUNEDIN, NEW ZEALAND.

STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 592,144, dated October 19, 1897.

Application filed October 31, 1895. Serial No. 567,519. (No model.)

To all whom it may concern:

Be it known that I, ALFRED HOGG, salesman, a subject of the Queen of Great Britain, residing at 31 Moray Place, Dunedin, in the British Colony of New Zealand, have invented certain new and useful Improvements in Steam-Engines; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

The objects of this invention are the utilization of steam-power for the working of engines by a more economical method, and in a more convenient form, than that which now obtains; by the reduction of pressure of steam in boilers from the very high temperatures generally used to that of atmospheric pressure, or slightly over; by safety from explosions, which have been increasing in proportion to the increase of steam-pressure used; by the reduction in the amount of fuel required to produce a given power; by the reduction of weight and size of steam-boilers; by the increased space available for cargo in steamers, in consequence of the lesser quantity of fuel required, and the reduction of the weight and size of the boilers.

Any type of steam-boiler may be used, but not necessarily of a greater weight and strength than sufficient to resist any steam that may be generated slightly over atmospheric pressure, to insure the delivery of water into the cylinder at about 212° Fahrenheit. As the boiler is merely used for the purpose of heating water, and not for producing large quantities of steam, it may be of smaller dimensions and of lighter material. An ordinary condensing steam-engine is used, composed of the usual working parts, connected to a condenser arranged to keep the cylinder in a constant state of vacuum. The quantity of water is regulated to fill the cylinder with active steam (into which, owing to the absence of atmospheric pressure, it is converted on being admitted into the cylinder) which forces the piston forward until the pressure is relieved by the slide-valve coming to the position for the return stroke. Thus, as water at boiling-point is well known to be equivalent to atmospheric pressure, power is exerted on the piston to the extent of the vacuum maintained. When more cylinders than one are used, they would be connected up as a pair of engines, and not as compound engines.

Referring to the accompanying drawings, Figure 1 is a section of an ordinary low-pressure steam-engine. Fig. 2 is a side elevation of the same, showing the usual cylinder, steam-chest, slide-valve, condenser, and air-pump, and also the usual working parts, together with a small regulating slide-valve for regulating the hot-water supply from the boiler. Fig. 3 is an enlarged section of the regulating slide-valve, showing its working and connections.

A is the outer casing of the regulating slide-valve to be attached to the cylinder or steam-chest, as shown.

B is the valve, arranged to work so as to admit the desired quantity of water into either end of the cylinder for each stroke.

B′ shows the lever-and-rod arrangement for connecting the valve to work in proper manner with the slide-valve.

The supply is received through the pipe C, and thence alternately admitted to the passages D and E into the cylinder F, entering same at a temperature of about 212° Fahrenheit, which expands into steam in the absence of atmospheric pressure.

At the termination of each stroke the exhaust-steam passes through the ports G G and the slide-valve H, thence to the condenser I, and is discharged by the air-pump J. The connections of the valve B to the valve H are as shown, except that the valve B is shown slightly more open than it would be in practice to show it more clearly. The rods B′ and H′ open and shut both valves at the same time.

To reduce the pressure of the atmosphere in the cylinder of the engine to such a degree that water at approximately 212° Fahrenheit will expand into steam if admitted into the cylinder, a small amount of steam is admitted into the cylinder, just enough to run the engine, and hence the air-pump, for a few strokes. When the air has thus become sufficiently reduced in pressure in the cylinder, the hot water is admitted, which will, owing to the reduced pressure, expand into steam and drive the piston without further use of steam direct from the boiler.

It will readily be seen how, after the engine and pump have been run several strokes, a fairly good vacuum will be produced in the cylinder, which will afterward develop into a better one.

The boiling water for supplying the cylinder is taken from the hottest part of the boiler, such as from just over the furnace.

The pipes conveying the water from the boiler to the cylinder are of smaller sizes as compared to the pipes now used to convey steam.

Owing to the comparatively low temperature to which the water is heated, a great saving of fuel is effected, and the danger which now exists from explosions is reduced to a minimum.

By the use of vapor in sufficient volume, admitted from the boiler into the cylinders at a temperature of about 212° Fahrenheit, instead of water, the same results practically are obtained, but the steam-space in the boiler and the steam-pipes would require to be enlarged as against those required for water, and in this case the regulating slide-valve A B would not be required.

I am aware that steam has been worked at low pressures, and I am also aware that patents have been granted to W. E. Prall, No. 457,793, dated August 18, 1891, for a street-car motor for using stored hot water in a secondary receiver, disconnected from a fire, the said water being heated previously to about 400° Fahrenheit and mixed with compressed air before using, and also to W. E. Prall, Jr., No. 547,089, dated October 1, 1895, for a superheated-water motor, for compound engines, to be worked by hot water, but at a still higher temperature and pressure, but otherwise in a somewhat similar manner to the invention of the said W. E. Prall, No. 457,793; but I am not aware that anything approaching my method has been in use at any time.

I do not rely on the use of water at a high temperature nor steam at a high pressure, nor do I use compound engines, but a simple engine, or if more than one, then coupled as pairs. The pressure I use is that produced by water spray or vapor delivered into the cylinder at about 212° Fahrenheit, atmospheric pressure being withdrawn by the action of the condenser and air-pump. A continuous supply of hot water or vapor is produced by any type of boiler heated by a furnace in the usual manner. I use low-pressure engines as at present constructed, only adding a means of regulating the inflow of the hot water, as alluded to in my former specification, and now shown in the shape of the small regulating-valve A B, and even this addition is not required if vapor be used instead of water.

Having now fully described my invention, what I desire to claim and to secure by Letters Patent of the United States is—

The combination with a steam-engine, of a regulating-valve having the semicircular casing A, ports D and E, the T-shaped rocking valve B having its sides rounded to conform to the shape of the said casing, an arm B′ attached to the said valve, and inlet C, the said valve attached to the steam-chest of said engine and communicating with the cylinder thereof and adapted to admit water in regular quantities and a valve-rod for actuating said regulating-valve, connected at one end to the eccentric-rod of the said engine and at the other end to the arm B′ of the valve, substantially as described.

ALFRED HOGG.

Witnesses:
ERNEST TURNER,
JAMES HOGG.