G. B. DIXWELL.

Reciprocating Engines.

No. 166,688. Patented Aug. 17, 1875.

Fig. 1.

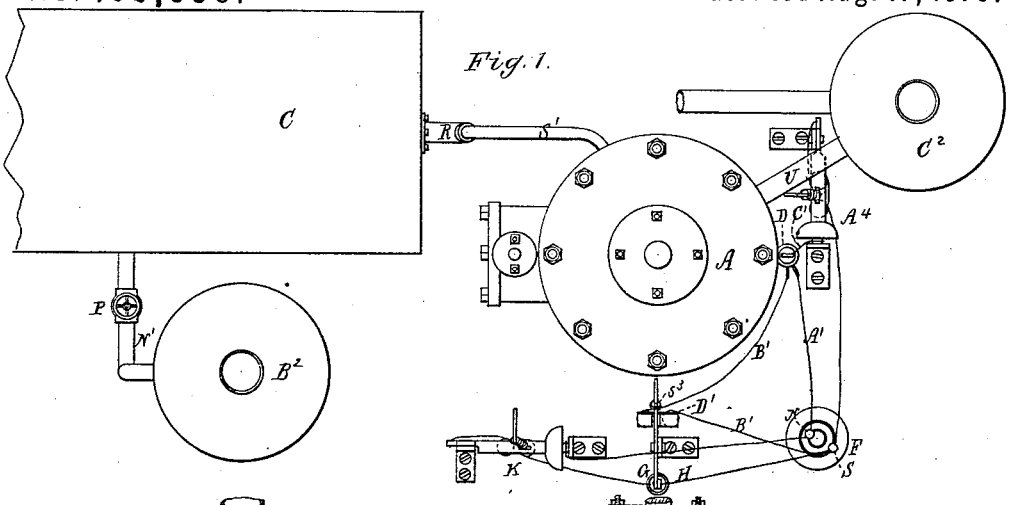


Fig. 2.

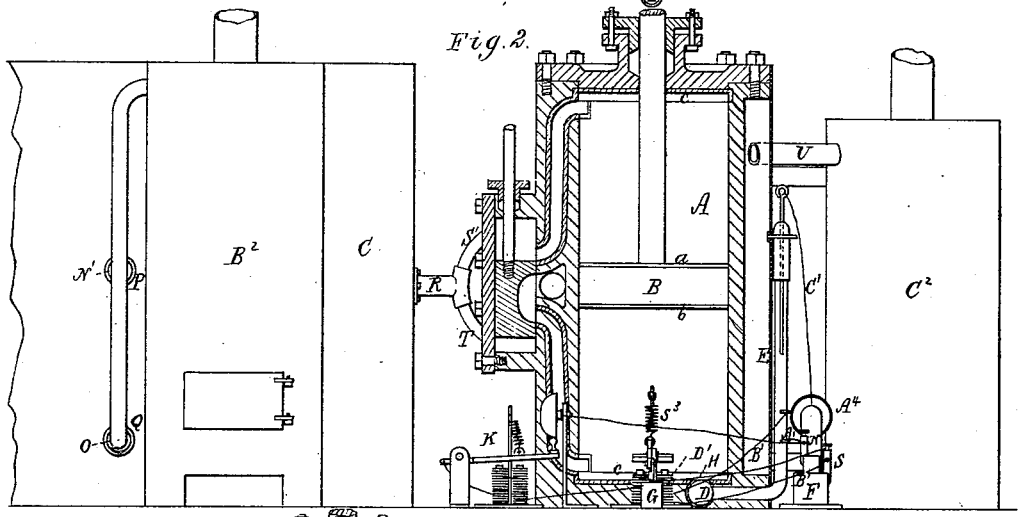
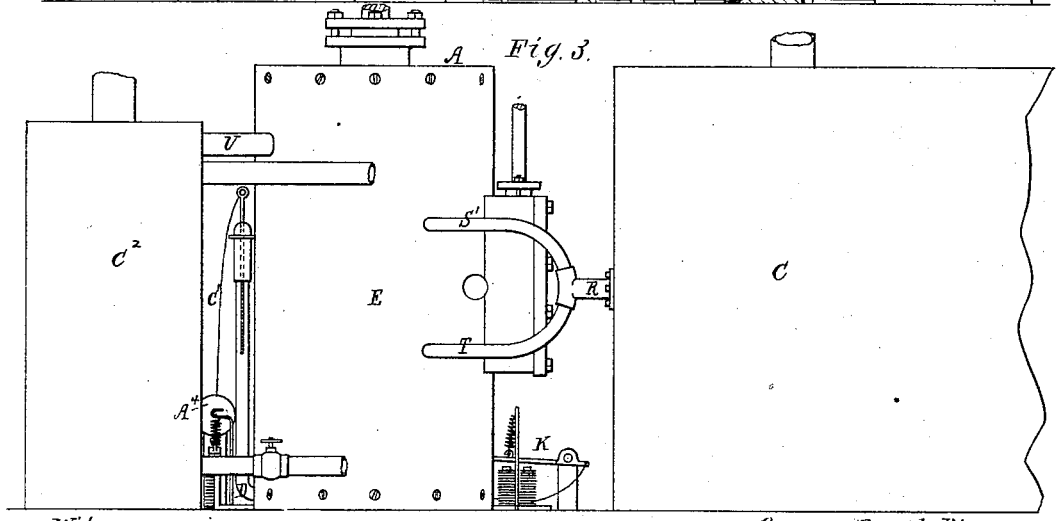


Fig. 3.



Witnesses
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UNITED STATES PATENT OFFICE.

GEORGE B. DIXWELL, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN RECIPROCATING ENGINES.

Specification forming part of Letters Patent No. **166,688**, dated August 17, 1875; application filed May 22, 1875.

To all whom it may concern:

Be it known that I, GEORGE B. DIXWELL, of Boston, of the county of Suffolk and State of Massachusetts, have invented new and useful Improvements in Steam-Engines; and do hereby declare the same to be fully described in the following specification, and represented in the accompanying drawings.

My invention, which consists in the combination of a hot-air-jacket thermometer and an electric alarm, relates to improvements in steam or vapor engines, whereby the cylinder-condensation arising from the alternate cooling and heating of the piston, its rod, and the interior surfaces of the cylinder, (as well as those of the intermediate receiver in some forms of compound engines,) may be either prevented or greatly diminished. This cylinder-condensation becomes greater as the measure of expansion is increased. The steam-jacket diminishes it to so small an extent that it may still be said to be the chief obstacle to the economical working of engines.

I prefer to derive the hot air from a separate furnace urged by a system of steam-jets, which, being increased or diminished by one or more regulating throttle-valves, will increase or diminish the supply of hot air to the jacket; but any other proper means of heating and regulating the heat of the jacket may be used. The hot-air jacket should not generally surround the valve-ports, but be sufficiently withdrawn from them to avoid heating the valves by conduction. I keep watch, then, over the heat of the cylinder by keeping watch over that of the steam by means of a thermometer or pyrometer within the cylinder, or within an adjacent cavity.

Of the aforementioned drawings, Figure 1 denotes a top view, Fig. 2 a sectional elevation, and Fig. 3 a rear elevation, of a steam-engine cylinder, piston, and boiler, hot-air furnace, and feed-water heater, the adjuncts necessary to my invention.

In such drawings, A denotes the steam-engine cylinder; B, its piston; C, the hot-air furnace; B^2, the boiler, and C^2 the feed-water heater, the cylinder and piston being represented in vertical section, in order to exhibit the interior arrangements, namely, the non-conducting coverings *a b c c* to the piston and interior of the cylinder ends, and a thermometer, D, which lies in a cavity formed for it in the metal of the cylinder, or in the clearance-space when this is sufficient. The stem of the thermometer D passes out through the side of the cylinder, and through the jacket E, applied to such cylinder. Near the lower end of the thermometer there passes out of it a wire, which we will call wire A^1, and which proceeds to the pole N of a galvanic battery, F, and serves to electrically connect this pole with the wire next above, which we will call wire B^1, so long as the mercury is above the said wire B^1, and also with a wire, which we will call wire C′, and which passes out through the top of the thermometer whenever the mercury touches it. This wire C′ is passed out through the top of the thermometer, or screws therein in such a manner that it (the wire) can be raised or depressed at pleasure, and be fixed at any desired point, say, for instance, at 400° Fahrenheit. This wire C^1 should be connected with an electric bell or alarm apparatus, A^4, and through such with the pole S of the battery, so that whenever the mercury touches the wire, a current passing through wire A^1 from the pole N, and round through wire C^1 and the bell to the pole S of the battery, would give the alarm and notify the engineer to diminish the heat in the jacket, as hereafter described. The wire B^1 passes to the electro-magnet D′, and thence to the pole S of the battery, in such a manner that as long as the mercury is above B′ a current flows from the pole N through A^1, through the mercury through B^1, over the electro-magnet D′, and thence to the pole S. Thus, as long as the mercury is above B^1, the electro-magnet is a magnet, or is attractive, and holds its armature in contact, and, through the lever which proceeds from the armature, it holds out of the cup of mercury G the wire H, which forms a portion of a circuit of another electric bell or alarm apparatus, K. Thus, so long as the mercury is above the wire B^1, the circuit of the bell K is broken; but as soon as the mercury descends below the wire B^1 the current from A^1 to B^1 is broken, the electro-magnet D′ ceases to attract the armature, and the armature, being overweighted by the opposite end of the lever, or pulled on by a

spring, S^3, ascends, the wire H descends into the cup of mercury G, the circuit of the electric bell K is complete, the bell rings and warns the engineer that a previously-selected minimum temperature, say, for instance, 370° Fahrenheit, has been reached, and that it is time to increase the heat in the jacket, as described. It should have been mentioned that the wire B^1 is supposed to pierce the thermometer at the point marking the said temperature of 370° Fahrenheit. C is the furnace for supplying hot air for the jacket E. N′ and O are pipes admitting steam-jets from the boiler B^2, and they may or should be furnished with throttle-valves or cocks P and Q, by means of which valves or cocks the flow of hot air through the pipe R, and the branch pipes S^1 and T thereof, and through the jacket E, and thence through the pipe U into the feed-water vessel C^2, is governed.

Now, let us imagine the engine to be set at work, and that the hot-air furnace is acting too energetically. The mercury in the thermometer will rise until it touches the wire C^1, and will thus complete the circuit with the wire A^1, and the interposed electric bell will give the needed alarm, and the engineer will diminish the action of the furnace by partially closing the throttle-valves P and Q. If these be closed too much, the heat in the cylinder will be diminished, the mercury will descend below the wire B^1, the circuit passing between B^1 and A^1 around the electro-magnet D′ is cut, and D′ then ceases to attract its armature. The wire H descends into the cup of mercury, G completes the circuit, and the bell K gives the alarm, and notifies the engineer to increase the action of the furnace by partially opening the throttle-valves P and Q.

I claim—

In combination with the steam-engine cylinder, and its hot-air jacket or means of heating the cylinder, as and for the purpose specified, a thermometer and the electrical alarm apparatus or apparatuses, substantially as described, applied thereto, to indicate the extremes of temperature to be maintained in the cylinder to prevent the formation of mist in said cylinder, as or under circumstances as stated.

GEORGE BASIL DIXWELL.

Witnesses:

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