

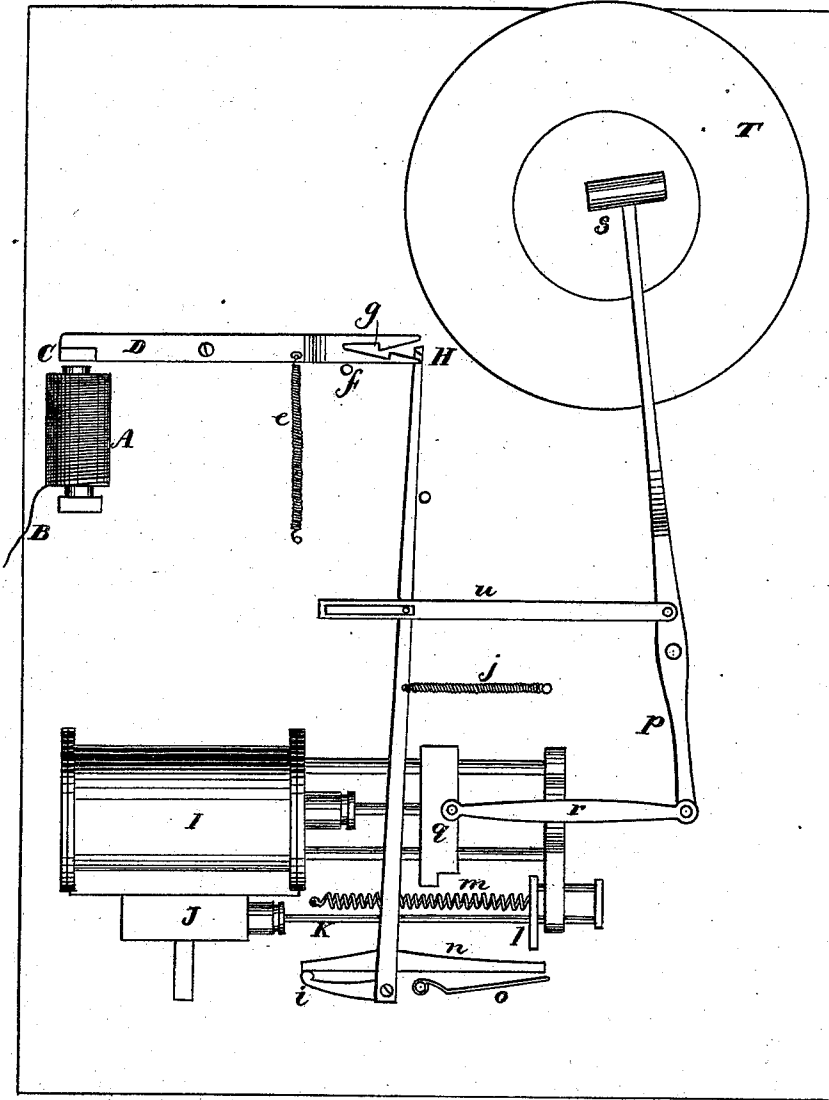
S. D. FIELD.

ELECTRO-MAGNETIC REGULATOR FOR STEAM-ENGINES.

No. 174,127.

Patented Feb. 29, 1876.

Fig. 1



Witnesses

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UNITED STATES PATENT OFFICE.

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IMPROVEMENT IN ELECTRO-MAGNETIC REGULATORS FOR STEAM-ENGINES.

Specification forming part of Letters Patent No. **174,127**, dated February 29, 1876; application filed December 14, 1875.

To all whom it may concern:

Be it known that I, STEPHEN D. FIELD, of San Francisco city and county, State of California, have invented an Electro-Magnetic Engineer for Steam-Engines; and I do hereby declare the following description and accompanying drawings are sufficient to enable any person skilled in the art or science to which it most nearly appertains to make and use my said invention without further invention or experiment.

The object of my invention is to connect the armature of an electro-magnet with the valve which controls the ports of a steam or other cylinder, so that the movement of the valve can be controlled by an electric current passed through a circuit-wire, which is connected with the magnet, thus enabling the operator to start and stop an engine which is located at any required distance from him.

The particular application which I have chosen in order to illustrate my invention, and which is shown in the accompanying drawings, represents how this invention can be employed for sounding a signal, although the particular duty which the engine accomplishes is not material.

Referring to the drawings, Figure 1 is an elevation of my device.

Let A represent an electro-magnet, with which the circuit-wire B is connected, said circuit-wire leading to any desired distance from the magnet. The armature C I attach to one end of a lever, D, which is pivoted at its middle in such a position that the end to which the armature is attached is directly opposite the magnet. The opposite end of this lever is drawn down by a spring, e, against a pin, f, so as to keep the armature at the proper distance from the magnet when no current is passing. The end of the lever D, opposite the armature, has a notch or catch, g, formed in it, with which the upper end of a latch-lever, H, engages when the device is set. This latch-lever H extends down below the valve to be operated, where it is pivoted, and this pivoted end has a trip-arm, i, extending out from it at right angles. A spring, j, serves to draw the upper end of the latch-lever H away from the notch when it is released from the

catch g. I is an ordinary steam-cylinder, inside of which steam or compressed air can be used, and J is the chamber, within which an ordinary slide-valve controls the ports which admit and exhaust the steam or air. The valve-rod K has a cross-head, l, secured to its outer extremity, and a coiled spring, m, serves to move the valve in one direction. A horizontal lever or pawl, n, is pivoted below the valve-rod, so as to latch upon the cross-head l when it is at the farthest end of its stroke, and when the valve covers the steam-port. The opposite end of this lever n will then bear against the trip-arm i on the lower end of the lever H, while a spring, o, serves to force the latch end of the lever upward. It will therefore be evident that when the electric current enters the magnet the armature will be drawn up close against the magnet, thereby releasing the upper end of the latch-lever H. The spring j withdraws the upper end of the lever, causing its trip-arm i to release the lever n from the cross-head on the valve-rod. The spring m then moves the valve so as to admit steam to the cylinder behind the piston and alternate sides of the valve.

When this arrangement is intended to be used for operating a gong-hammer for striking a signal or alarm, I pivot the hammer-handle so as to provide a short lever-arm, p, for operating it. I then connect the end of this short arm with the cross-head q on the end of the piston-rod by means of a pitman, r, so that each stroke of the piston will give one stroke of the hammer S against the gong T. This signal may be operated by the gong at the surface, and furnish a return-signal to the signaling party, indicating that a blow has been struck at the surface.

In order to control the operation of the hammer, I connect the hammer-handle, between the hammer and the pivot, with the latch-lever H, by means of a connecting-bar, u, so that as the hammer recoils after each stroke it will force the latch-lever H into engagement with the notch or catch g, thus withdrawing the trip-arm i, and allowing the spring o to force the lever n upward, so as to cause it to catch upon the cross-head l and arrest the motion of the valve. By this combina-

tion each stroke of the piston gives one stroke of the hammer, so that the operator can thus give any desired signal.

In mines where it is often necessary to send a signal from the surface down into the mine, a small cylinder can be placed at the bottom of the shaft, or at any desired point in the mine where it can be operated by either steam or compressed air, and the circuit-wire can be connected from the surface with a controlling-magnet, so as to strike an alarm or signal, display a flag, or perform some other duty.

The notch or catch *g* can be constructed so as to release the latch-lever *H* upon either the up or down motion of the armature.

In the present instance I have represented a double latch, which requires both movements of the armature in order to release the latch-lever, the upper notch releasing it as the armature moves against the magnet, while the lower notch catches it and releases it on the reverse movement.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In combination with a valve operated in one direction by a spring, *m*, and having the cross-head *l* secured to the valve-rod, a tripping device or series of tripping-levers,

which are connected with and operated by the armature *C*, electro-magnet *A*, and circuit-wire *B*, substantially as and for the purpose described.

2. The valve-rod *K*, having the cross-head *l* secured to its outer extremity, and having the spring *m* arranged to move it in one direction, in combination with the stop-lever or pawl *n*, operated by a spring, *o*, and an automatic tripping device, when said tripping device is operated by an electric current, substantially as and for the purpose described.

3. In combination with a steam-cylinder, *I*, having its piston-rod connected with the short arm *p* of a hammer-handle, and having the valve which controls its steam-ports operated in one direction by a spring, *o*, and arranged to be arrested at the end of its stroke by a pawl or lever, *n*, the connecting-bar *u*, which connects the long arm of the lever with the latch-lever *H*, so that the back or reverse movement of the hammer will automatically set the device and arrest the motion of the valve, substantially as and for the purpose described.

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Witnesses:

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