(No Model.) 2 Sheets—Sheet 1.

J. FOTHERGILL, W. BRIGGS & I. BRIGGS, Jr.

APPARATUS FOR STOPPING ENGINES.

No. 354,468. Patented Dec. 14, 1886.

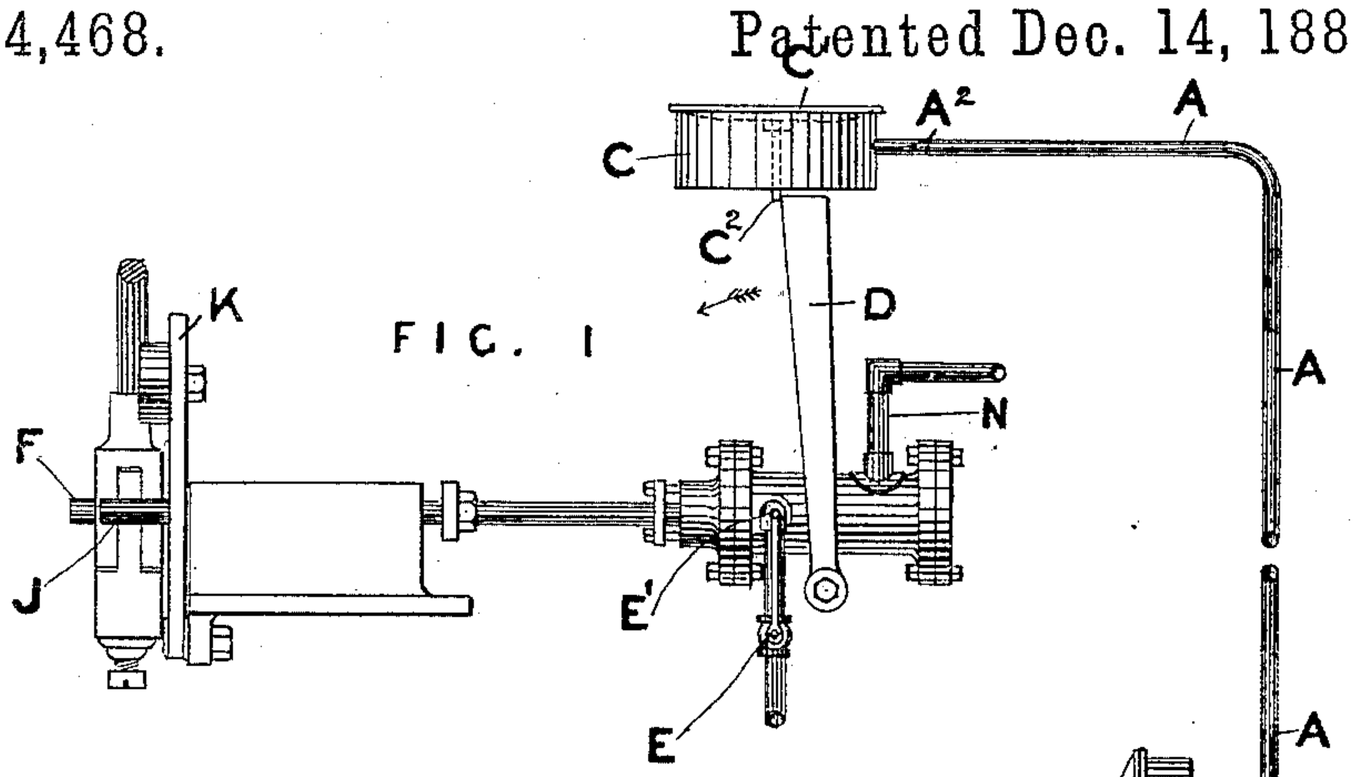

FIG. 1

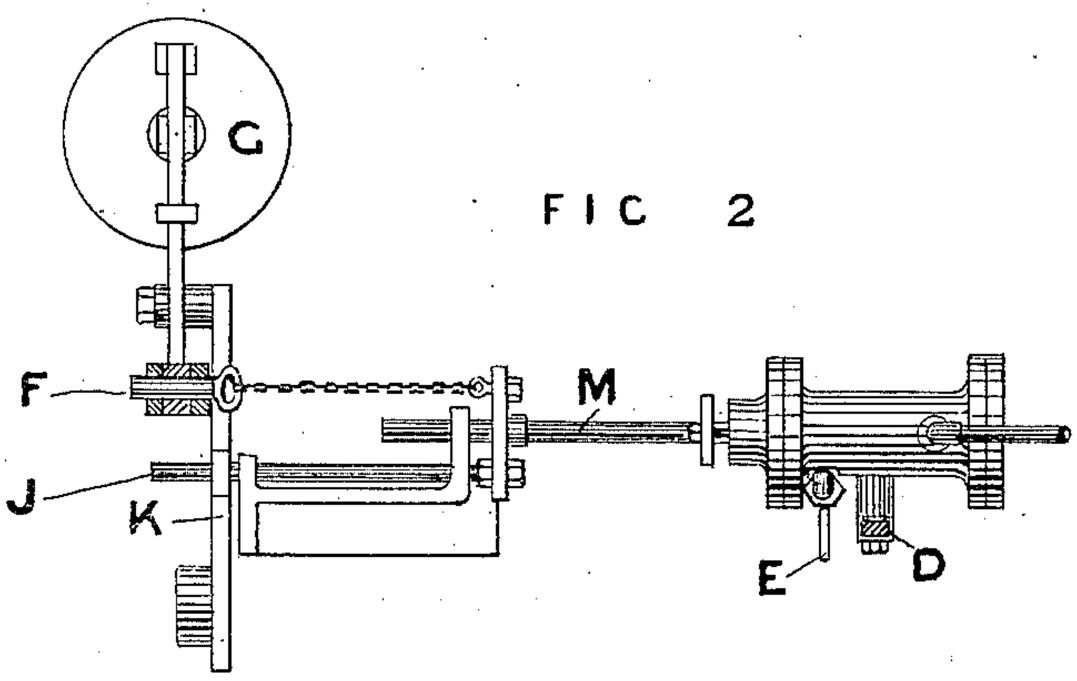

FIG 2

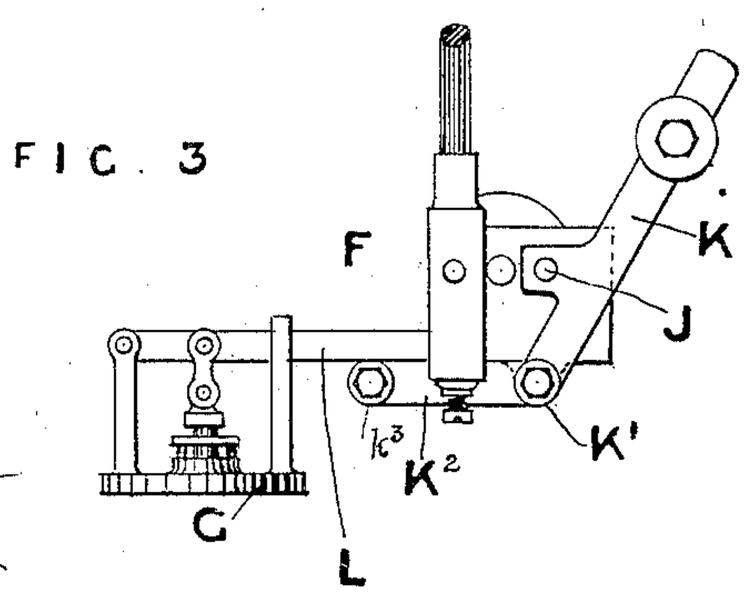

FIG. 3

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(No Model.) 2 Sheets—Sheet 2.

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FIG. 5

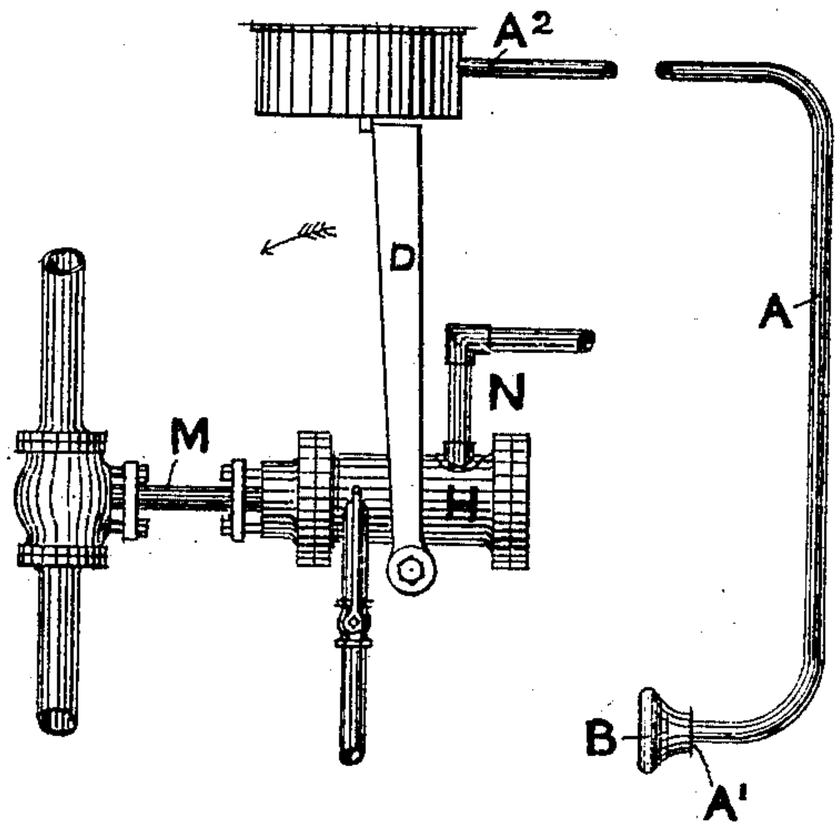
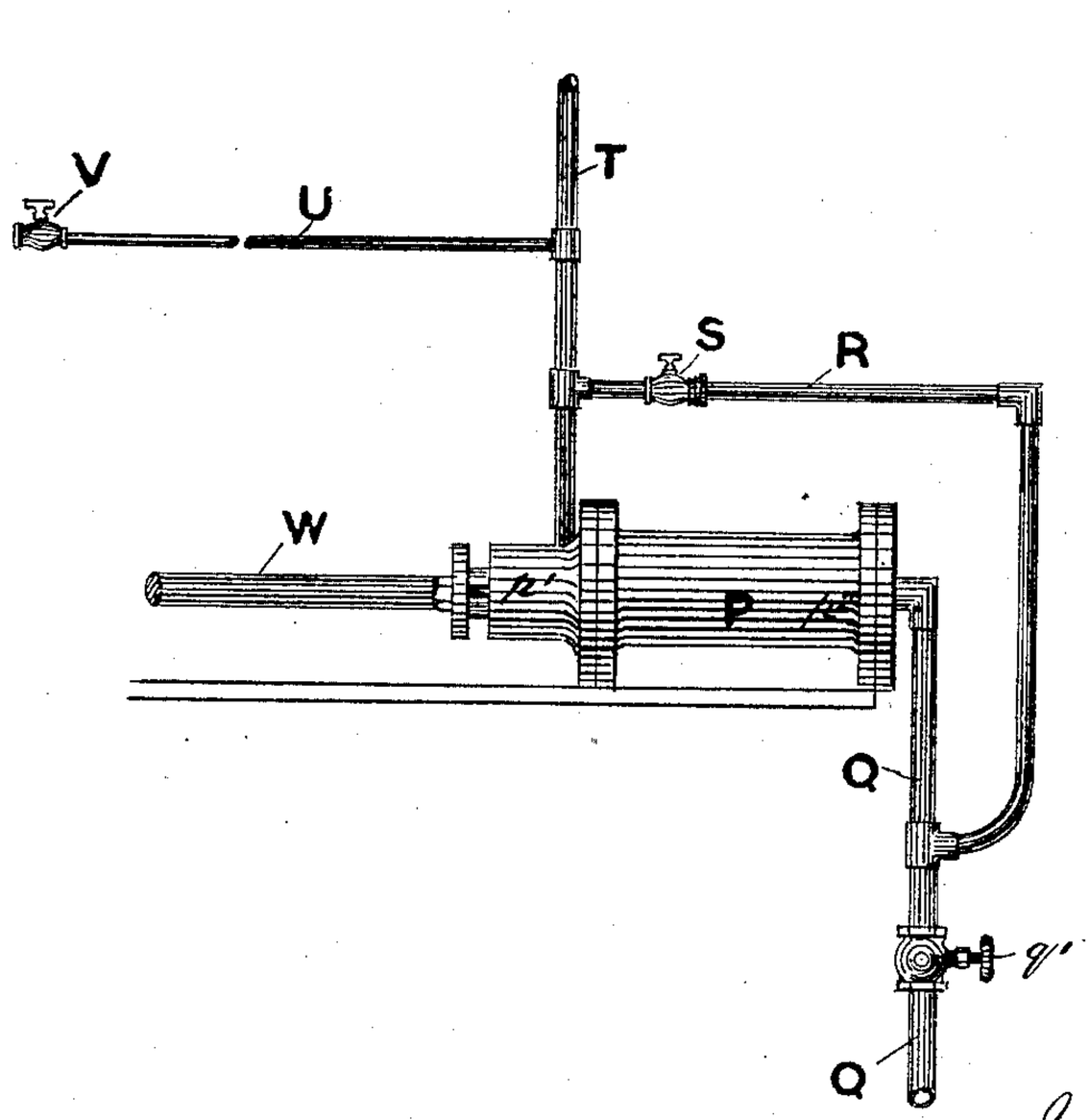


FIG. 4



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UNITED STATES PATENT OFFICE.

JOHN FOTHERGILL, WILLIAM BRIGGS, AND ISAAC BRIGGS, JR., OF WAKEFIELD, COUNTY OF YORK, ENGLAND.

APPARATUS FOR STOPPING ENGINES.

SPECIFICATION forming part of Letters Patent No. 354,468, dated December 14, 1886.

Application filed August 9, 1886. Serial No. 210,495. (No model.) Patented in England May 31, 1886, No. 7,264.

To all whom it may concern:

Be it known that we, JOHN FOTHERGILL, foreman, WILLIAM BRIGGS, and ISAAC BRIGGS, Jr., manufacturers, all of Wakefield, in the county of York, England, and subjects of the Queen of Great Britain, have invented certain new and useful Improvements in Apparatus for Stopping Engines, (for which we have obtained Letters Patent in England No. 7,264, May 31, 1886;) and we do hereby declare that the following is a sufficient description of the invention to enable those skilled in the art to which it appertains to carry the same into practical effect.

This invention has for its object improvements in apparatus for stopping engines, which enables any person to stop the engine or engines from distant parts of the factory or works without going to the engine-room, which often occupies considerable time, and in the case of accidents, which sometimes happen at various machines, valuable life might be lost before the distance could be covered. In the case of breakage much property might often be saved by promptly stopping the machinery. We are aware that attempts have been made to accomplish these ends by electrical and other apparatus, but there is always a liability of various parts getting out of order—such, for instance, as the battery. Now, our invention meets the want most effectively, cheaply, and in a very simple manner.

In order that our invention may be clearly understood and more easily carried into practice, we have appended hereunto two sheets of drawings upon which are shown one modification of our invention applied to a factory-engine, and which will enable competent persons to apply the invention to other positions and conditions which naturally vary considerably in various factories and works.

The drawings show some of the apparatus in outline only, so as to make the principle understood, as the details will vary very much, according to the circumstances of the case.

Figure 1 is a side elevation of a tube arrangement for bringing into action a supplemental force or forces sufficient to operate any vital part of an engine from which it may be stopped, but in this instance shown to operate upon an ordinary equilibrium-valve. Fig. 2 is a plan of the apparatus. Fig. 3 is an end elevation of the same apparatus. Fig. 5 is an elevation of a modification showing the rod of the supplemental cylinder connected direct to the equilibrium-valve. Fig. 4 is an elevation of a mode of connecting the pipes through a vacuum-cylinder, in connection with a condenser or other vacuum-chamber.

We will first explain the modification shown by Figs. 1, 2, and 3, in which the most ordinary pipes of small diameter may communicate with any part of the works, and neither vacuum nor pressure is required to be maintained therein for the successful working thereof. We will assume that the pipes A are of, say, one-fourth-inch bore and connected all over any works, and that the end A′ is near any machine or part or at any required station or distance from the engine, and from which it is desired to stop the engine. The diaphragm-box B is connected to the end A′ of the pipe A, or, instead of the box B, an open mouth-piece or compressible ball or small syringe tube or other appliance for creating required pressure may be connected thereto, and at the engine end of the pipe A, at A^2, is another diaphragm box, C, with the diaphragm C′, carrying the pin C^2, which supports a lever, D, in an almost upright position.

Now, the action is as follows: Immediately the diaphragm B′ is pressed or a puff of air sent into the pipe at the A′ end in the works the diaphragm C′ is moved upward or outward, according to the position in which it is fixed, for it may be fixed in almost any position, so long as the lever is supported thereby. The lever then falls over in the direction of the arrow upon its center *d′* until it strikes the handle E′ of the steam-cock E, which is opened thereby and immediately admits steam-compressed air, vacuum or water pressure to the cylinder H, forcing the piston and rod M to the right-hand end thereof, which first liberates the pin F, thus disconnecting the governors from the equilibrium-valve. Then the pin J is next liberated, which allows the weighted lever K to turn upon its center K′, lifting the arm K^2, and through the roller k^3 the lever L of the equilibrium-valve is lifted and the valve

shut, which stops the engine; or when the reverse motion of the lever L of the equilibrium-valve is required to close it, the pressure of the weighted lever K may be brought to bear on the top of lever L, and thus close the valve by a downward pressure.

Fig. 5 shows the lever D operated through the pipe A from the mouth-piece B, or from other forcing arrangement, as previously explained; but the piston-rod M in this case is connected direct to an equilibrium-valve, which is fixed in any suitable position—such, for instance, as between two lengths of the steam-piping—so as to command the supply of steam to the engine. The arrangement, however, which will be found in practice to work best, is probably the connection of the vacuum apparatus (shown by the previous Fig. 4) direct to the said equilibrium-valve, as the vacuum in the case of low-pressure engines would be most simply maintained by the condenser, and the action would be direct to the equilibrium-valve, which would insure great simplicity and certainty in action.

The vacuum arrangement shown by Fig. 4 is most important, as one end of the cylinder P is connected direct with the condenser of any low-pressure engine by the pipe Q, which always maintains a vaacum therein. In the case of high-pressure engines a special vacuum-chamber may be used and maintained by an air-pump. The other end, p', of the cylinder is also connected with the condenser or air-pumps by the smaller pipe R, with a very small passage-cock, S, which only allows the vacuum to be maintained in any number of such small pipes, as T and U, which run into any or all parts of the mill or works, terminating with small valves V, placed in suitable positions.

In starting the engine the cock S, having two passages—a larger and smaller one—the large one is used until the air is drawn out of the pipes, and then the cock is turned to the smaller passage. The action is as follows: The cock q' being open, the connection is made with the cylinder P, and the piston is maintained in equilibrium, the S-cock being also open, and while the stop-valve to the engine is open, as it would be in starting, and the mill is working, the piston will be at the p' end of the cylinder, and a vacuum will be established and maintained in every pipe throughout the building, and immediately any cock V is opened air is admitted into the pipe, and at once drives the piston-rod W to the p^2 end of the cylinder, the end of the piston being connected with any suitable gear for operating the stop or other valve. The smallness of the valve S does not permit the air admitted into the pipe to reach the p^2 end of the cylinder, and thus the equilibrium is broken. The vacuum may be used to maintain a lever, pin, weight, or other motion in position, which, when liberated by destroying the vacuum, would operate upon a cock and steam cylinder, as in Fig. 1; or the vacuum may have a direct action upon the cylinder and be applied to an equilibrium-valve of engine, as in Figs. 1, 2, and 3, or the vacuum-cylinder may be connected direct to an equilibrium-valve, as shown in Fig. 4.

In fact, any of the modifications shown may be connected to any convenient part of the engine or steam-supply pipes or valves, as will be readily understood by practical men from the examples given.

It will be evident that a pressure of air may be maintained in the pipes instead of a vacuum, and the operation of the levers and other parts will be very similar in their details. It will also be evident that by any of the modes named a lever, pin, or other action may be held ready to liberate upon any moving part of the engine, or to bring into action a rotary slide or other supplemental motion connected and driven by the engine for the purpose of shutting off the steam at any valve, or to disconnect the governor or other part.

What we claim, then, is—

1. In combination with the equilibrium-valve of a steam-engine, a hand-operated air-forcing device, a pipe through which air is driven thereby, a lever actuated by this current of air, and mechanism between said lever and said valve which is controlled by said lever to shut the valve, and thereby stop the engine, substantially as set forth.

2. The lever D, and the diaphragm and pipe whereby it is operated, in combination with a cylinder, the steam-supply of which is controlled by said lever, a piston working within said cylinder, and an equilibrium-valve closed by said piston, substantially as set forth.

3. In combination with a vibrating diaphragm, B′, a pipe, A, through which air is forced by said diaphragm, and mechanism connected with a steam-engine for stopping the same, such mechanism being set in motion by the current of air through said pipe, for the purpose set forth.

In testimony that we claim the foregoing as our own we affix our names in the presence of two witnesses.

JOHN FOTHERGILL.
WILLIAM BRIGGS.
ISAAC BRIGGS, JR.

Witnesses:
JOHN RAYNE,
CHARLES HENRY TODD.