(No Model.) 2 Sheets—Sheet 1.

W. M. WOOD & J. C. MILLER.

AUTOMATIC MOTOR STOP.

No. 561,846. Patented June 9, 1896.

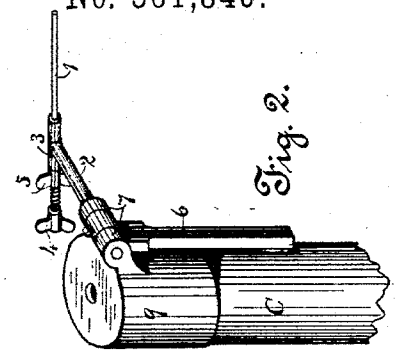

Fig. 2.

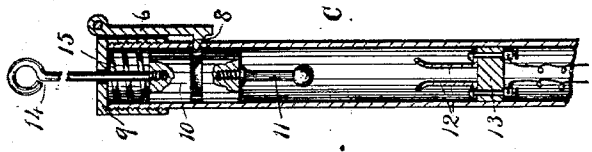

Fig. 3.

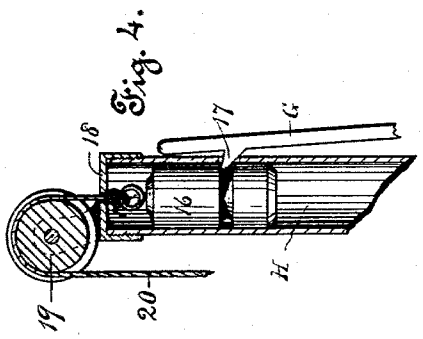

Fig. 4.

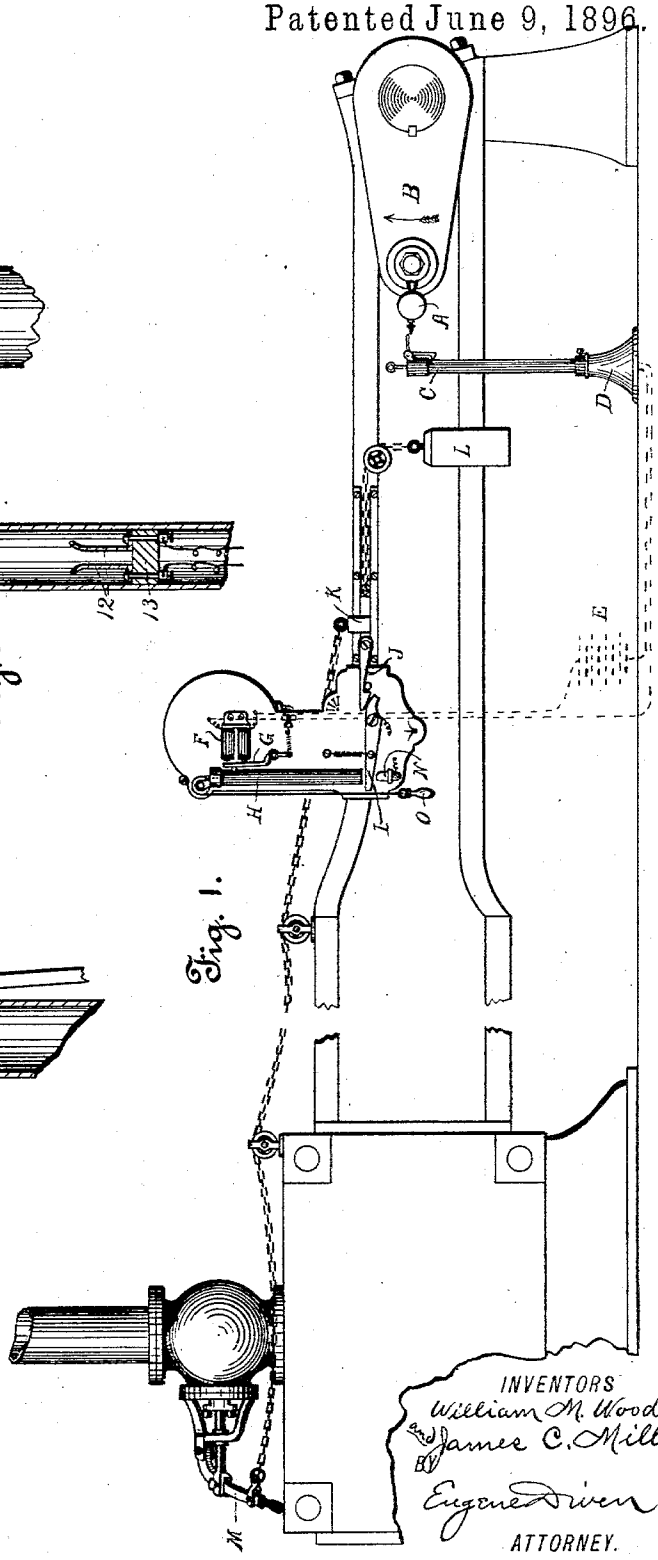

Fig. 1.

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(No Model.) 2 Sheets—Sheet 2.

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AUTOMATIC MOTOR STOP.

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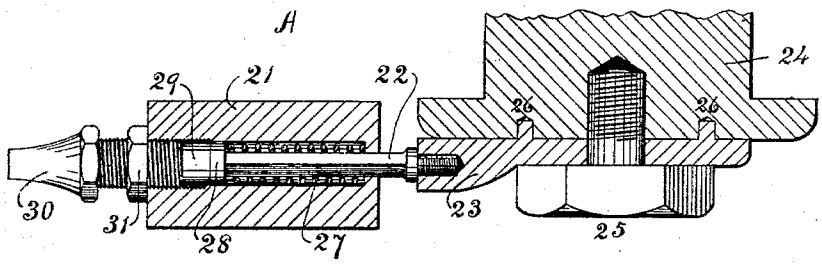


Fig. 5.

Fig. 6.

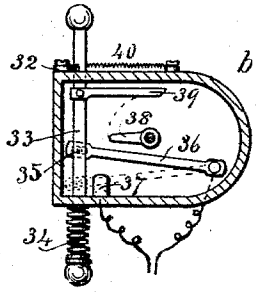
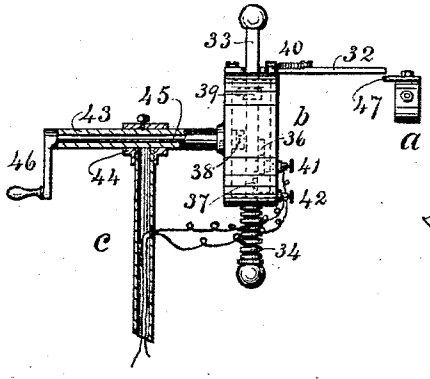


Fig. 7.



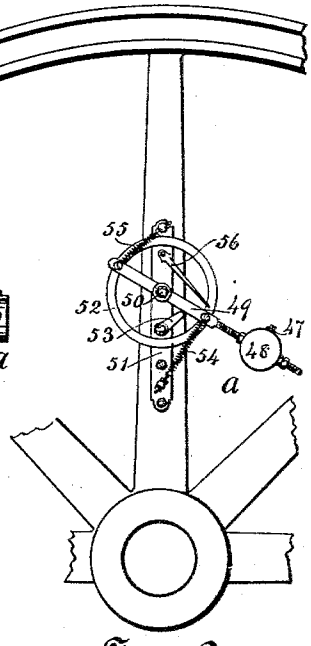


Fig. 8.

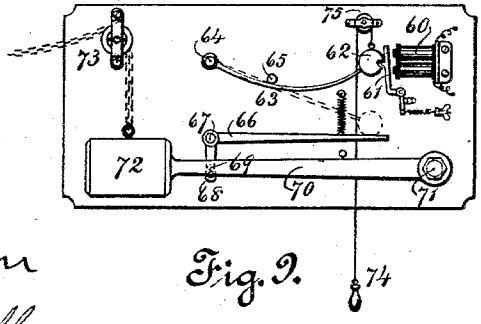


Fig. 9.

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UNITED STATES PATENT OFFICE.

WILLIAM M. WOOD AND JAMES C. MILLER, OF ELMIRA, NEW YORK, ASSIGNORS TO THE ELMIRA SAFETY APPLIANCE COMPANY, OF SAME PLACE.

AUTOMATIC MOTOR-STOP.

SPECIFICATION forming part of Letters Patent No. 561,846, dated June 9, 1896.

Application filed October 21, 1895. Serial No. 566,341. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM M. WOOD and JAMES C. MILLER, citizens of the United States, residing at Elmira, in the county of Chemung and State of New York, have invented new and useful Improvements in Automatic Motor-Stops, of which the following is a specification.

The object of our invention is to prevent a harmful increase in the speed of prime movers by automatically stopping the motor when it has attained a predetermined speed; and we attain this object by means of a governor attached to the motor or to machinery driven by the motor, said governor being adapted to trip an electric-circuit closer, whereby when the speed is attained for which the governor is set an electric circuit is completed and a stop mechanism is set in motion.

For purposes of illustration in the accompanying drawings we have shown our invention as applied to a stationary steam-engine.

Figure 1 is a side elevation showing all the parts of our invention in operative position. Fig. 2 is a detail in perspective showing the trip for the circuit-closer. Fig. 3 is a vertical cross-section of the standard C in Fig. 1, showing the construction of the circuit-closer. Fig. 4 is a vertical cross-section of the top portion of the cylinder H in Fig. 1, showing the weight for actuating the lever I and the retaining-armature G. Fig. 5 is a horizontal cross-section of the governor A in Fig. 1. Figs. 6 and 7 are side and end sectional views of a different form of circuit-closer. Fig. 8 is a governor adapted for use on the arm of a fly-wheel or pulley. Fig. 9 is a different form of weight-tripping mechanism adapted to be used in place of that shown in Fig. 1.

Referring to Fig. 1, A is a governor attached to the outer end of the crank-pin of a Corliss engine. B is the crank. C is a hollow standard containing the electric-circuit closer, and is adjustable vertically in the base D. Wires run from the circuit-closer to the battery E and electromagnets F, the latter attached to an upright fastened in this instance directly to the engine-frame. The magnets operate upon the armature G, which in turn releases a weight within the tube H. The weight in dropping strikes the lever I, which throws up the latch J and releases the slide K, attached to which is the heavy weight L. As the slide moves forward under the influence of the weight L it pulls on the chain connecting it with the lever M of the throttle-valve and shuts off steam from the engine. The long arm of the lever I in descending is brought to rest by the stop N and at the same time makes an electric circuit therewith to ring an alarm-gong on the opposite side of the upright. (Not shown.)

In resetting the apparatus the circuit-closer in the standard C is first drawn up until engaged by its trip, then the weight in cylinder H is pulled up by the cord, to which is attached the handle O, until caught by the armature G, and finally the slide K is pushed back until the latch J drops over its pin. This leaves the throttle-valve free to be opened and closed at the pleasure of the engineer.

In operation the governor A is thrown out at a predetermined speed of the engine, and a projection therefrom strikes a trip to release the circuit-closer. This trip and circuit-closer are shown in Figs. 2 and 3. A pin 1 is threaded into a T 3 at the end of the rod 2 and is adjusted and held fast therein by the head 4 and thumb-nut 5. Ears 7 project from the cap 9 and support the rod 2, to which is fastened the pendent bar 6. A detent 8 projects from the end of this bar and entering through a slot in the tubular standard C engages a groove in the weight 10 to hold said weight in elevated position. A rod 11 projects from the lower end of the weight 10 and is provided with a knob, which, when the weight is tripped, strikes between the terminals 12 and establishes an electric current to energize the magnets F. A diaphragm 13, of insulating material, is fastened in the tube C at the required height and supports the terminals 12 and their respective binding-posts. Attached to the top of the weight 10 and projecting through the cap 9 is a rod 14 to be used in resetting the circuit-closer. A spring 15 is inserted between the cap and top of weight to cause the weight to act quickly and also to prevent it from sticking.

Fig. 4 shows a cross-section of the top of

the tube H, in which is located and guided the weight 16, which drops upon and actuates the lever I. A detent 17 on the armature G projects through a slot in the tube H and into a groove in the weight 16. A cord 20 is attached to the weight and runs over a pulley 19, held upon the cap 18, the free end of the cord being fastened to the hand-pull O. A spring may be inserted between the weight 16 and cap 18 similar to the spring 15.

The governor A is shown in longitudinal cross-section in Fig. 5. The weight 21 slides upon the rod 22, attached to the plate 23, which in turn is held upon the end of the crank-pin 24 by the cap-screw 25. Pins 26 project from the plate and enter corresponding holes drilled in the crank-pin to prevent the plate from turning. The rod 22 is provided with a head 28, which fits a corresponding bore in the center of the weight 21, a spring 27 being inserted between the head and the bottom of the bore. The rod 22 is squared and enters the bore through a square hole in the weight, thus preventing the weight from turning. The outer end of the bore is screw-threaded and plug 29 is screwed thereinto, the tension of the spring and the speed at which the governor acts being regulated thereby. The head of this plug is flattened at 30 and strikes the pin 1 of the circuit-closer trip when the weight 21 is thrown out by centrifugal force. The jam-nut 31 holds the plug as set.

In Figs. 6, 7, and 8 is shown a different form of governor and circuit-closer without departing in any way from the spirit of our invention, and this form of governor and circuit-closer can be used indifferently in connection with the circuit-closer and governor already described. The governor *a* when thrown out by centrifugal force causes a projection 47 to come in contact with the end of a trip 32, which releases a circuit-closer in the box *b*, attached to the standard *c*. Through the box *b* passes a rod 33, provided with a notch to receive a detent on the trip 32. This trip is pivoted to the box near the rod 33, and a spring 40 runs from the box to the free end of the trip to hold the detent on the trip in the notch on the rod. The rod 33 is provided with heads at its ends, and a spring 34 is inserted between the lower head and the box to force the rod downward when the trip is thrown out. A pin 35 on the rod engages a slotted bar 36, which is pivoted to a pin from the binding-post 41. The bar 36 in its downward movement rubs against the contact-plate 37, attached to a second binding-post 42, thus establishing an electric circuit. In order to reset the circuit-closer, the arm 38 is turned up against the arm 39, projecting from the rod 33, until the rod is lifted far enough for the detent to spring into its notch. The arm 38 is keyed to the end of a shaft 45, extending through the projection 43 on the box *b*, and a crank 46 is fastened to the other end of the shaft for operating it. The projection 43 is adjustable longitudinally in a T at the top of the standard *c*, which in turn is adjustable vertically in a base, as shown at D in Fig. 1. The box *b* may also be turned in the T, so that by means of these adjustments the trip may readily be brought into position to be struck by the governor.

The governor shown in Fig. 8 comprises a strap or bracket 51, attached to the spoke of a fly-wheel or pulley, an arm 49, pivoted thereto at 50, and a weight adjustable longitudinally at one end of the arm. This weight is provided with the pin 47, projecting therefrom, as already referred to. An adjustable stop 53 prevents the weight from dropping toward the shaft. A circular guide 52, fastened to the strap 51, prevents side motion of the governor-weight. Springs 54 and 55 hold the arm against the stop 53 and act against the weight. In adjusting the governor for different speeds the weight is shifted upon the arm and the tension of the springs changed as required. An indicator 56 is provided to show the position of the governor-weight when the engine has been run at the speed at which the trip is to be struck. This position being ascertained the trip 32 may be readily located so as to be struck at the proper time.

Fig. 9 shows a modification of the weight-releasing mechanism. Here the magnets 60 actuate an armature 61 to withdraw a detent thereon from a notch in the weight 62. This weight is attached to the end of a flat spring 63, pivoted at 64 and bent against a pin 65. The weight in descending strikes against the free end of a bell-crank lever 66, pivoted at 67 and provided with a pin 68 on its depending arm. Resting upon the pin 68 is a pin 69, projecting from the arm 70, the centers of the two pins being in a vertical line. The arm 70 is pivoted at 71 and provided at its free end with a heavy weight 72, from which runs a chain over the pulley 73 to actuate the lever of a throttle-valve or other shut-off. A cord from the weight 62 runs over a pulley 75 and is attached to a pull 74 for resetting the apparatus.

We have shown the weight-tripping mechanism attached to the frame of an engine, as this renders the whole apparatus compact and out of the way; but it is evident that the frames of many engines cannot be utilized in this way and that other species of motors will require a different location of this tripping mechanism. In applying our invention to different motors in different locations many changes in governor, circuit-closer, and stop mechanism and in their location will of necessity have to be made, without, however, departing from the spirit of our invention, and we therefore do not wish to be understood as limiting ourselves in any way to the specific mechanisms shown.

We are aware that we are not the first to employ governors in combination with elec-

tric-circuit closers to operate stop mechanisms, and we do not therefore claim such a combination broadly.

What we do claim as our invention, and desire to secure by Letters Patent, is—

1. In an automatic motor-stop, in combination, a governor, trip mechanism in position to be struck when the governor is actuated by undue speed in the motor, an electric-circuit closer retained by the trip mechanism, and a stop mechanism controlled by the electric circuit.

2. In an automatic motor-stop, in combination, a governor comprising an adjustable weight controlled by an adjustable spring and provided with a projection, a trip device in line with said projection when the governor is actuated by undue speed of the motor, a circuit-closer operated by said trip device, and a stop mechanism set in motion by the electric current so established.

3. In an automatic motor-stop, a governor consisting of a plate attached to a rotating part, a rod extending from said plate, a weight slidable upon said rod, a spring opposing the movement of the weight upon the rod, and means for adjusting the tension of the spring, in combination with a trip device adapted to be struck by the governor-weight when the governor is actuated by undue speed of the motor, and mechanism released by said trip device to stop the motor, substantially as described.

4. In an automatic motor-stop, a governor consisting of a plate attached to a rotating part, a rod extending radially outward from said plate, a weight slidable upon said rod, a head on the rod fitting a bore in the weight, a spring between the head and the bottom of the bore, a plug screw-threaded into the end of the bore and abutting against the head on the rod, and means for turning the plug and fastening it in place to adjust the tension of the spring, in combination with a stop mechanism adapted to be set in motion by the governor when actuated by undue speed of the motor.

5. In an automatic motor-stop, a trip device consisting of a rod pivoted in a suitable support, a bar pendent from said rod and provided with a detent, an adjustable pin in the free end of the rod, and means for fastening the pin in proper adjustment to be struck by a governor when actuated by undue speed of the motor, substantially as described.

6. In an automatic motor-stop, a circuit-closer consisting of a protective case, a trip device supported thereby, a movable member guided in the case, a notch in said member to receive a detent on the trip device, terminals of an electric circuit within the case adapted to be brought into connection by said movable member when released, and means for resetting the circuit-closer, substantially as described.

7. In an automatic motor-stop, a circuit-closer consisting of an adjustable tubular standard, a cap to said standard, a trip device supported by said cap, a weight within the standard held by a detent on the trip device, terminals of an electric circuit supported below the weight, a knob attached to the weight adapted to strike the terminals when the weight is dropped, and a rod attached to the top of the weight and passing through the cap for resetting the circuit-closer.

8. In a stop mechanism, in combination, a weight connected to an operating-lever, a catch to hold said weight suspended, a lever for operating said catch, a small weight adapted to strike upon the free end of said lever, and an electromagnet having an armature provided with a detent for holding the small weight in elevated position while the magnet is quiescent, substantially as described.

9. In a stop mechanism, in combination, a slide connected to an operating-lever, guides for the slide, a weight attached to the slide, a latch from the slide adapted to catch upon a pin, a lever for throwing the latch, a small weight held by a detent over the free end of said lever, a guide for said weight, and an electromagnet for operating the armature to which the detent is attached, substantially as described.

10. In a stop mechanism, in combination, a weight connected to an operating-lever, a catch to hold said weight suspended, a lever for operating said catch, a small weight adapted to strike upon the free end of said lever, a spring for actuating said weight, and an electromagnet having an armature provided with a detent for holding the small weight in elevated position while the magnet is quiescent, substantially as described.

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Witnesses:
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CHAS. J. MAYO.