

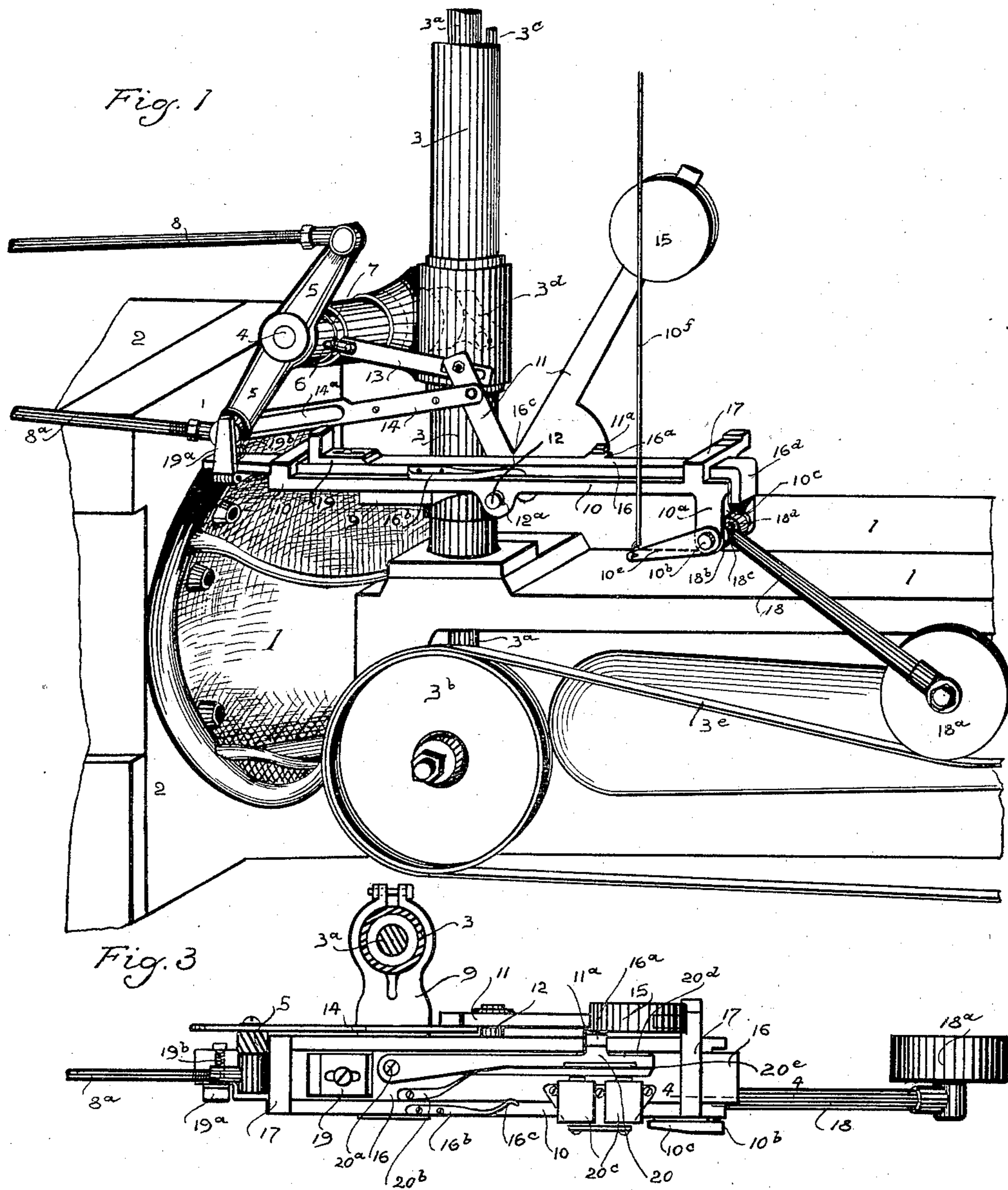
(No Model.)

2 Sheets—Sheet 1.

J. H. EASTWOOD, C. E. BIBB & F. McCLINTOCK.
AUTOMATIC ENGINE STOP.

No. 604,142.

Patented May 17, 1898.



WITNESSES:

Hugo Seydler
Roy M. McClintock.

INVENTORS:

John H. Eastwood,
Charles E. Bibb,
Frank McClintock.

BY Frank McClintock, ATTORNEY.

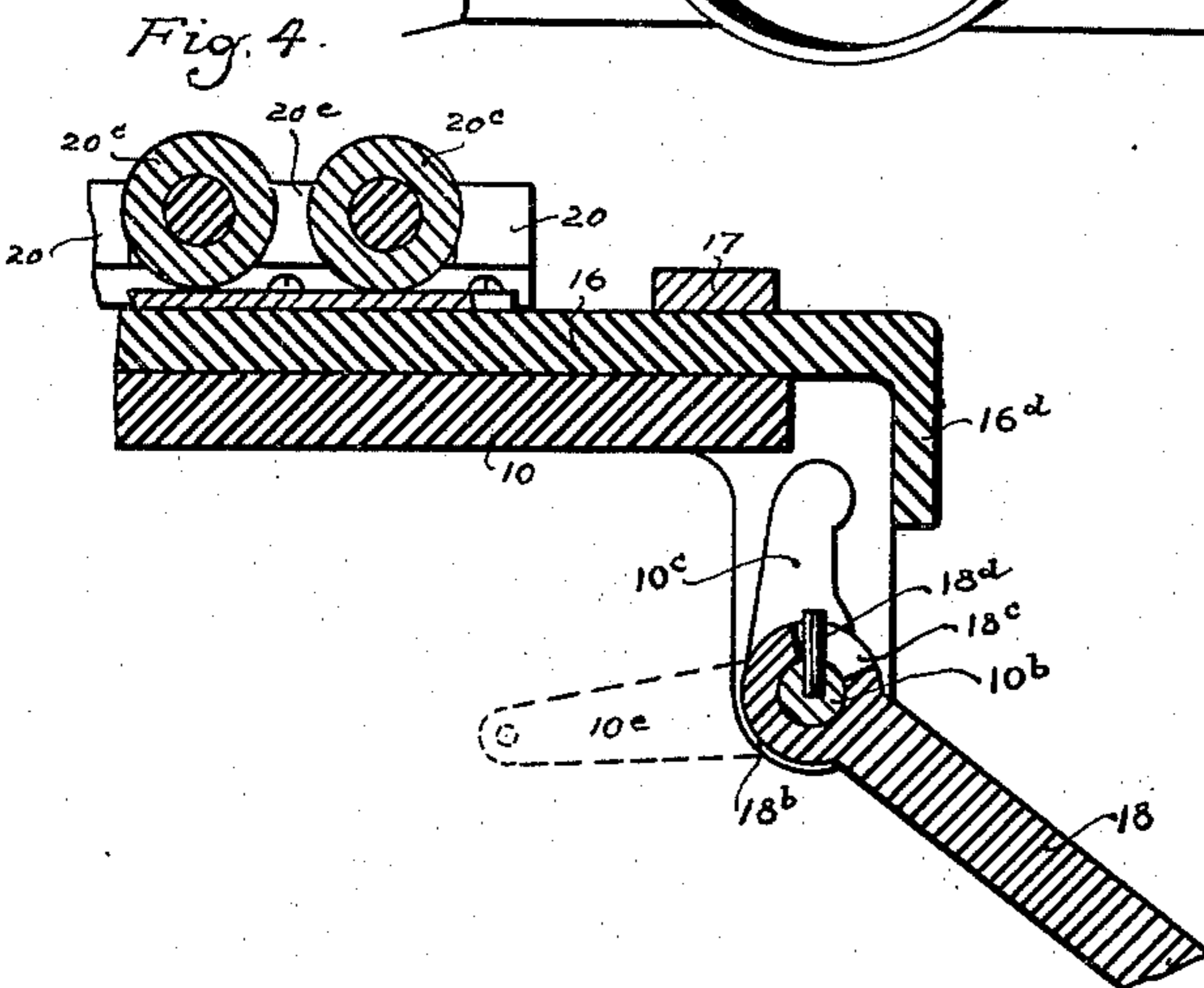
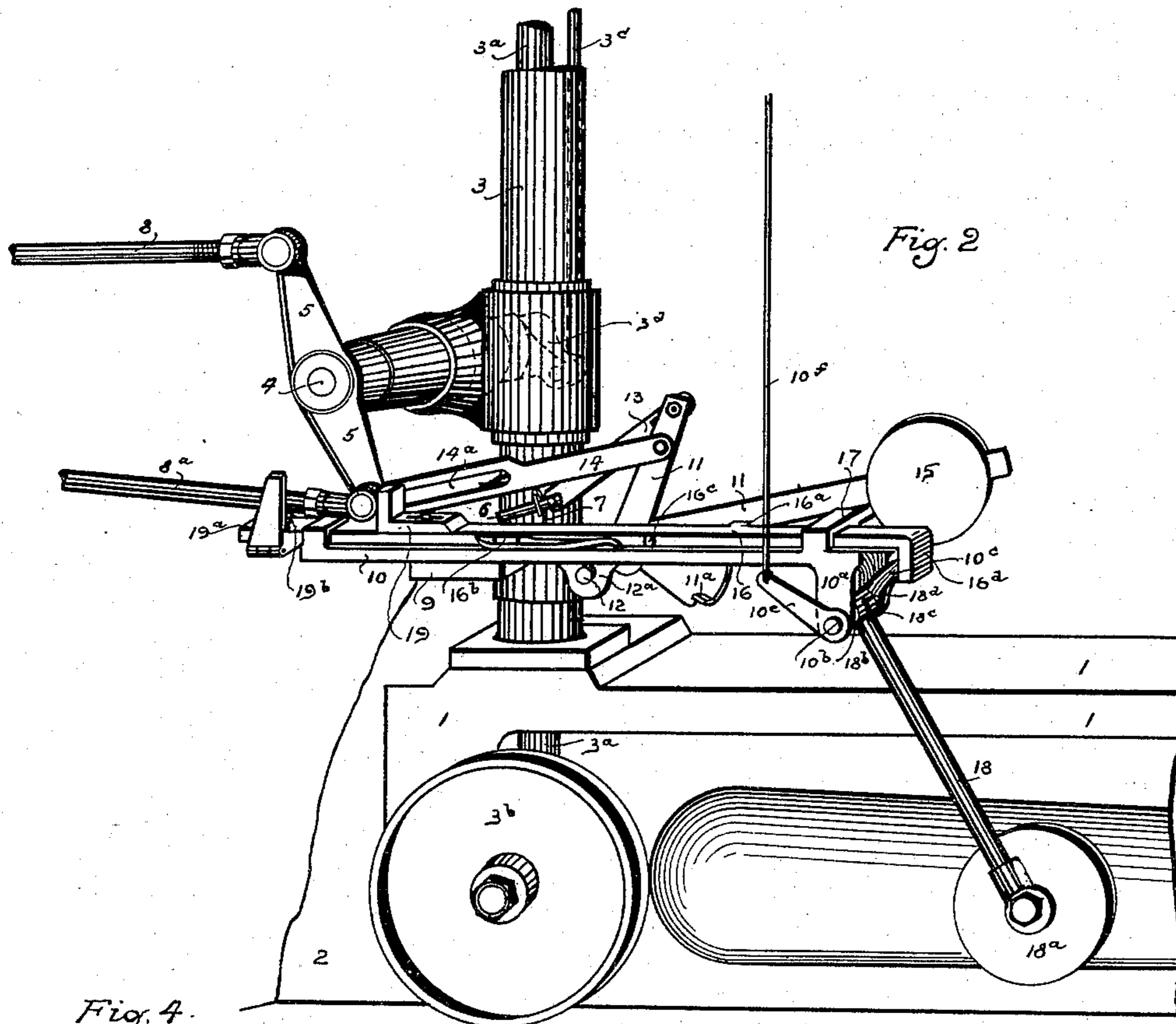
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UNITED STATES PATENT OFFICE.

JOHN H. EASTWOOD, CHARLES E. BIBB, AND FRANK McCLINTOCK, OF
COLORADO SPRINGS, COLORADO.

AUTOMATIC ENGINE-STOP.

SPECIFICATION forming part of Letters Patent No. 604,142, dated May 17, 1898.

Application filed June 26, 1897. Serial No. 642,392. (No model.)

To all whom it may concern:

Be it known that we, JOHN H. EASTWOOD, CHARLES E. BIBB, and FRANK McCLINTOCK, citizens of the United States, residing at Colorado Springs, in the county of El Paso and State of Colorado, have invented certain new and useful Improvements in Automatic Engine-Stops, of which the following is a specification.

10 Our invention is especially adapted for use with that class of steam or other engines which are provided with a detachable valve-gear and wherein the mechanism for operating and regulating the detachment of the valves is
15 actuated by means of reach-rods extending from the valve mechanism at either end of the cylinder to the ends of a centrally-pivoted lever which, by means of suitable connecting mechanism, is rocked to and fro by the rise
20 and fall of the governor-balls as their speed of rotation increases or decreases.

The object of our improvement is to provide a simple device operated mechanically for instantly disconnecting the reach-rod lever from its rigid connection to the governor
25 and then throwing the lever to such a position that the latch mechanism, which serves to "hook up" the valves, is made inoperative, thus allowing the valves to remain closed and
30 preventing any further admission of steam to the cylinder; also, to provide a suitable catch or latch for normally holding the actuating element of said device in operative position and to provide means whereby said latch may
35 be moved so as to release the said actuating element automatically, either when the speed of the engine rises above or falls below a certain desired limit or in case the governor-belt
40 should break or run off the pulley, or by hand, either by mechanical or electrical means, whenever necessary or desirable to stop the engine from a distant point without loss of time. These objects are attained by means of the mechanism shown in the accompanying drawings, in which—

45 Figure 1 is a perspective view of the device, showing the parts in their normal position. Fig. 2 is a perspective view showing the position of the various parts after the device
50 has operated to stop the engine by the breaking or running off its pulley of the governor-

belt. Fig. 3 is a top plan view of the latch mechanism constructed so as to be operated independently by either mechanical or electrical means; and Fig. 4 is an enlarged sectional view showing the manner of connecting the arm which carries the loose pulley resting on the governor-belt to the lever, which operates to throw off the latch, so that said lever may be operated freely.

Similar figures refer to similar parts throughout the several views.

The drawings show our invention as applied to an engine of the type or class known as the "Corliss" engine, having rotary cut-off
65 valves actuated by means of a "wrist-plate" or equivalent device, which is given a reciprocating rotary motion from an eccentric on the main shaft of the engine. Links extending from the wrist-plate to crank-arms serve
70 to give the proper reciprocating rotary movement to the valves. These crank-arms are not permanently connected with the valves, but have a suitable latch connection therewith which allows them to be disconnected or
75 detached therefrom at any time before the completion of their throw. The time of the detachment of the valves from the crank-arms is determined by the position of "knock-off
80 cams" or other equivalent mechanism which are connected with and automatically controlled by the governor. These knock-off cams or equivalent devices may be moved sufficiently to prevent the crank-arms from
85 "hooking up" or opening the valves, which thus remain closed even with the engine and valve mechanism in motion. These knock-off cams are by means of "reach-rods" connected to the ends of a centrally-pivoted lever
90 which rocks in either direction from a vertical position and is ordinarily rigidly connected to and controlled by the governor.

As our device can be applied to any engine without regard to any special construction of the valve mechanism, provided reach-rods
95 and a pivoted lever are used to connect the governor proper with the mechanism used to control the detachment of the valves, the drawings have been limited to such parts of the engine as necessarily coöperate with it.

No change or substitution whatever of any of the parts of the governor or valve operat-

ing or controlling mechanism is necessary in attaching our improvement to an engine of the class described, except that when the reach-rod lever is secured to the governor by a key it is removed and a hole drilled through the hub of the reach-rod lever and shaft to which it is secured and a pin inserted therein, as described below and shown in the drawings.

1 is the engine bed or frame, with the cylinder 2 secured thereto in the usual manner.

3 is the post, which supports the governor mechanism. The governor-balls are secured in the usual manner to the upper end of a vertical shaft 3^a within the hollow post 3, which is rotated from the pulley 3^b by means of bevel-gearing. A belt 3^c extends from the pulley 3^b to a pulley on the main shaft of the engine. As the governor-balls rise and fall, owing to variations in the speed of the engine, their movement is communicated by means of the rod 3^d and lever 3^d to the short rock-shaft 4 or by other equivalent mechanism, giving said shaft a rocking reciprocating movement. The reach-rod lever 5 is secured to the shaft 4 by a pin 6, which is preferably made tapering, so as to be easily withdrawn, and is normally retained in its seat by means of a spring 7, which is secured to said pin and partially encircles the hub of the reach-rod lever, as shown in Fig. 1. This spring is not essential, as the link 13 will prevent the pin from working out of its seat, so as to entirely disconnect the parts; but the spring, by holding the pin securely in place, insures a rigid connection between the governor and the valve-controlling mechanism, thus maintaining the speed of the engine uniform under varying conditions in the usual manner. It is evident that by withdrawing the pin 6 the reach-rod lever 5 will be free to move to and fro, so as to operate the knock-off cams without regard to the position or movement of the governor-balls. By moving the lever 5 to the position shown in Fig. 2 the reach-rods 8 and 8^a will throw the knock-off cams or equivalent devices in such position as to prevent the hooking up or opening of the steam-valves and the entrance of steam to the cylinder. A bracket 9, secured by a clamp to the governor-post 3, supports a shelf 10, on which are carried the operative parts of the device. The bracket and shelf are slotted or otherwise constructed, so as to allow the shelf to be moved sufficiently to bring the various parts of the device in the proper relative position to the parts of the engine to which they are to be connected, and when properly adjusted the bracket and shelf are securely bolted together. A V-shaped lever 11 is secured at or near its angle to a short shaft or pivot 12, which revolves in bearings 12^a. A link 13 is secured to the short arm of the lever 11 and has its other end pivoted to the end of the pin 6. A slotted connection of the link 13 to the lever 11 is preferred, as it allows a free movement of the end of the pin 6, without bending, as the lever

5 rocks to and fro. A second link 14 is also secured to the same arm of the lever 11, with its other end connected to the reach-rod lever 5. A slot 14^a of sufficient length to allow the lever 5 to rock through its normal path is used instead of a rigid pivotal connection on one end of the link 14. A weight 15, secured to the long arm of the V-shaped lever 11, tends to throw it down; but it is normally retained in the position shown in Fig. 1, which will be called its "operative" position, by means of the projecting lug 11^a, which engages a catch or stop 16^a, which projects from the sliding latch-plate 16. If preferred, a spring may be used in place of the weight 15 to throw down the lever 11. If now the sliding latch-plate 16 be moved by any suitable means in any direction a sufficient distance to allow the lug 11^a to clear the stop or catch 16^a, the weight 15 will instantly operate to throw the lever 11 downward and toward the right hand, causing the link 13 to withdraw the pin 6, while the link 14 pulls the reach-rod lever 5, now disconnected from the governor, to the position shown in Fig. 2, which, as above explained, entirely prevents the opening of the steam-valves.

It is evident that the link 14 may be dispensed with and a spring or weight secured directly to the reach-rod lever in such a manner as to pull or throw the lever to the position shown in Fig. 2 immediately on the withdrawal of the pin 6. The construction shown is, however, much preferable, as the addition of any weight or spring power to the lever 5 affects the adjustment and sensitiveness of the governor. The sliding latch-plate 16, which carries the projecting catch or stop 16^a, slides freely longitudinally in guides 17 on the shelf 10. A spring 16^b, secured to the shelf 10 and having its free end engaging a shallow notch or depression 16^c in the side of the latch-plate 16, may be used to prevent any accidental movement of the latch-plate. A short shaft 10^b is supported in bearings 10^a at or near the end of the shelf 10, to which is rigidly secured an arm 10^c, projecting upward in such position as to engage, if moved to the right, the downwardly-projecting end of the latch-plate 16^d, as may be more clearly seen in Fig. 4. The arm 10^c is also secured to the same shaft, the two arms forming a bell-crank lever, and has a wire or cord 10^f attached to its outer end, which may be carried to any point from which it may be desired to stop the engine. The pulling up of the cord or wire 10^f raises the arm 10^c and throws the arm 10^c into engagement with the downwardly-projecting end 16^d of the latch-plate 16, and thus moves said latch-plate until the catch or stop 16^a is clear of the lug 11^a.

In order that the latch-plate 16 may be moved automatically, so as to release the lever 11 immediately if the governor-belt should break or run off the pulley, so as to shut off steam and stop the engine before it begins racing, an arm 18 is provided, having a hub

18^b on one end, which is loosely fitted to the shaft 10^b. This arm carries a loose pulley 18^a at its other end, which rests on the governor-belt 3^e. A pin 18^d is secured to the shaft 10^b and extends out through a slot 18^c in the hub 18^b. (See Fig. 4.) This construction allows the shaft 10^b to move freely when the cord or wire 10^f is pulled, while if the governor-belt should break or run off its pulley the arm 18 would fall and engage the pin 18^d, thus throwing the arm 10^c and the latch-plate 16 to the right, as shown in Fig. 2.

In order to provide for the automatic movement of the latch-plate, so as to release the lever 11 whenever the speed of the engine rises above or falls below any desired limit, two adjustable speed-limit stops 19 and 19^a are secured to the latch-plate 16 in the path traversed by the end of the reach-rod lever 5 and adapted to be engaged thereby as it rocks to and fro as the speed of the engine varies. These stops are secured to the latch-plate 16 by screws passing through slots. The one on the right, which is engaged by the lever 5 as the speed of the engine increases, is secured to the upper side of the latch-plate, and the one on the left, which is engaged as the speed of the engine decreases, is secured to the underside of the latch-plate. It is evident that when the engine is stopped normally by closing the throttle-valve the end of the reach-rod lever 5 will as the engine slows down engage the stop 19^a and move the latch-plate 16 and release the lever 11, making it necessary to put the device again in operative position before the engine can be again started. In order to avoid this, the stop 19^a is made in two parts, hinged together, so that the part to be engaged by the lever 5 may be drawn aside out of the path of said lever, so it will not be engaged thereby whenever the engine is stopped normally. A spring 19^b serves to return it to its normal position in the path of the lever 5 when the engine is started up again without any attention from the engineer.

In order that the latch or catch may be operated when desired to stop the engine from a point or points so situated as to make the use of a wire or cord, as above described, impracticable, or in case it is preferred to use an electrical current to operate it without interfering in any way with its mechanical operation, the latch-plate may be modified, as shown in Figs. 3 and 4. The projecting stop or catch 16^a, instead of being rigidly secured to the latch-plate 16, as in Figs. 1 and 2, is attached to a lever 20, which is pivoted at 20^a to the latch-plate 16. A spring 20^b serves to hold it in its normal position against a stop 20^d. An electromagnet 20^c is secured to the latch-plate 16, and an armature 20^e is secured to the lever 20, opposite the poles of the electromagnet. Upon passing a current of electricity through the coils of the electromagnet the lever 20 will be attracted, so that the catch or stop 16^a will release the lever 11, allowing the device to operate to shut off steam

from the cylinder in the same manner as if the entire latch-plate had been moved longitudinally. Should it be desired to control the device by what is called a "closed" circuit, the function of the electromagnet and the spring may be reversed—that is, the lever 20 may be retained in its normal position by the attraction of the electromagnet, while the tension of the spring may tend to throw the lever, so as to release the catch. Then upon the opening or breaking of the circuit at any point the latch will be operated.

It is evident that other means than those specified may be adapted to operate the latch, and thus stop the engine automatically. For instance, if it be desired to insure the immediate shutting off of steam in case the cylinder-head should blow out, a wire or cord secured to some part thereof may be attached either to the wire or cord 10^f or directly to the latch-plate 16. Other connections to the latch-plate 16 may be readily devised, whereby other accidents or abnormal conditions to the engine or machinery operated thereby will automatically release the lever 11.

Having described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. The combination with a governor and a reach-rod lever for controlling and regulating the detachment of steam-valves, of a pin for rigidly securing the reach-rod lever to rocking shaft, a link connected thereto and having its other end secured to a weight or spring actuated lever, a latch or catch for retaining said lever in operative position, means for releasing said latch or catch and means for throwing the reach-rod lever to such position as will prevent the opening of the steam-valves.

2. The combination with a governor and a reach-rod lever for controlling and regulating the detachment of steam-valves, of a tapering pin for rigidly securing the reach-rod lever to the governor rocking shaft, a spring for retaining said pin normally in its seat, a link pivotally connected to said pin and having a slotted connection at its other end to a weight or spring-actuated lever, a latch or catch for retaining said lever in operative position, means for releasing said latch or catch, and means for throwing the reach-rod lever to such position as will prevent the opening of the steam-valves.

3. The combination with means for disconnecting the reach-rod lever of an engine-valve gear from the governor, of a link having at one end a slotted connection with the reach-rod lever and the other end secured to a weight or spring actuated lever, a latch or catch for retaining said lever in operative position, and means for releasing said latch or catch to allow the lever to operate to throw the reach-rod lever to such position as will prevent the opening of the steam-valves.

4. The combination with a governor and a reach-rod lever for controlling and regulat-

ing the detachment of steam-valves, of a pin for rigidly securing the reach-rod lever to the governor rocking shaft, means for withdrawing said pin to disconnect the reach-rod lever from the governor, means for throwing the reach-rod lever to such position as will prevent the opening of the steam-valves; a latch-plate for retaining the parts normally in operative position, and means operated by the breaking or running off its pulley of the governor-belt for moving said latch-plate so as to release the operative parts.

5. The combination with means for disconnecting the reach-rod lever of an engine valve-gear from the governor and means for throwing the reach-rod lever to such position as will prevent opening of the steam-valves, of a latch or catch for retaining the parts normally in operative position and capable of being moved longitudinally to release the operative elements, a lever adapted to engage and move said latch or catch longitudinally and a wire or cord connected to said lever and extending to a distant point.

6. The combination with means for disconnecting the reach-rod lever of an engine valve-gear from the governor and means for throwing the reach-rod lever to such position as will prevent the opening of the steam-valves, of a latch or catch for retaining the parts normally in operative position and capable of being moved longitudinally to release the operative elements, speed-limit stops adjustably secured to said latch or catch across the path traversed by the end of the reach-rod lever and adapted to be engaged thereby.

7. The combination with means for disconnecting the reach-rod lever of an engine valve-gear from the governor and means for throwing the reach-rod lever to such position as will prevent the steam-valves being opened, of a compound latch or catch for retaining the parts normally in operative position having as a whole a longitudinal movement operated mechanically and an independent lateral movement and means for operating the lateral movement electrically.

8. The combination with means for disconnecting the reach-rod lever of an engine valve-gear from the governor and means for throwing the reach-rod lever to such position as will prevent the opening of the steam-valves, of a compound latch or catch for retaining the

parts normally in operative position having as a whole a longitudinal movement operated mechanically, an independent arm adapted to move laterally to which the projecting catch is secured, a spring for holding said arm normally in a locking position, and an electromagnet adapted to attract said independent arm with its projecting catch whenever the electric circuit is closed substantially as specified.

9. The combination in an automatic engine-stop of a pin for securing the reach-rod lever of the engine valve-gear rigidly to the governor, a spring for holding said pin normally in its seat, a link connected pivotally to said pin and having its other end secured by a slotted pivotal connection to a weight or spring-actuated lever, a link having a slotted pivotal connection to the lower arm of the reach-rod lever and having its other end secured to said weight or spring actuated lever, a compound latch or catch for normally retaining the weight or spring actuated lever in operative position which is adapted to be moved longitudinally as a whole to release said lever, adjustable speed-limit blocks secured to said longitudinally-movable latch and adapted to be engaged by the reach-rod lever as it is moved to and fro by the governor as the speed of the engine varies, a pivoted lever having one arm adapted to engage and move the latch-plate longitudinally and a wire or cord secured to the other arm and extending to a distant point, an arm loosely connected to said pivoted lever and having a pulley on its outer end adapted to rest normally on the governor-belt, and a pin connection between the hub of said arm and the pivoted lever, adapted to be engaged and cause the latch-plate to be moved, upon the dropping of the arm and pulley, a laterally-movable arm, carrying a projecting stop, pivoted to the longitudinally-movable part of the latch-plate and held in its normal position by means of a spring, and an electromagnet for attracting and withdrawing said laterally-movable arm upon the closing of an electric circuit, substantially as specified.

JOHN H. EASTWOOD.

CHARLES E. BIBB.

FRANK McCLINTOCK.

Witnesses:

CHARLES H. THEOBALD,
CHARLES E. DAYTON.