(No Model.)

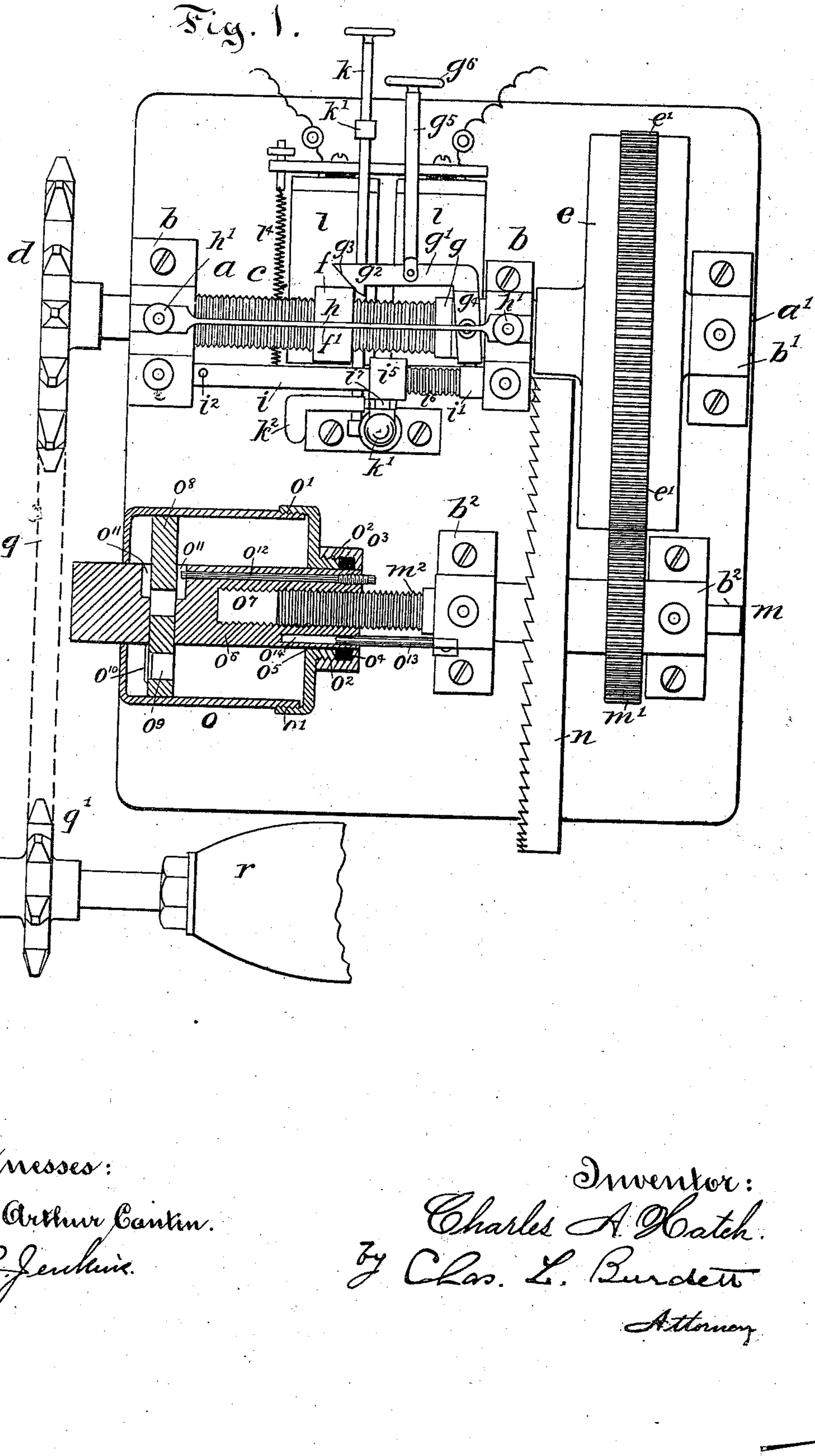
3 Sheets—Sheet 1.

C. A. HATCH.

APPARATUS FOR STOPPING ENGINES.

No. 506,229. Patented Oct. 10, 1893.

Fig. 1.



Witnesses:

Joseph Arthur Cantin.

T. B. Jenkins.

Inventor:

Charles A. Hatch.

by Chas. L. Burdett

Attorney

(No Model.)

3 Sheets—Sheet 2.

C. A. HATCH.

APPARATUS FOR STOPPING ENGINES.

No. 506,229. Patented Oct. 10, 1893.

Fig. 2.

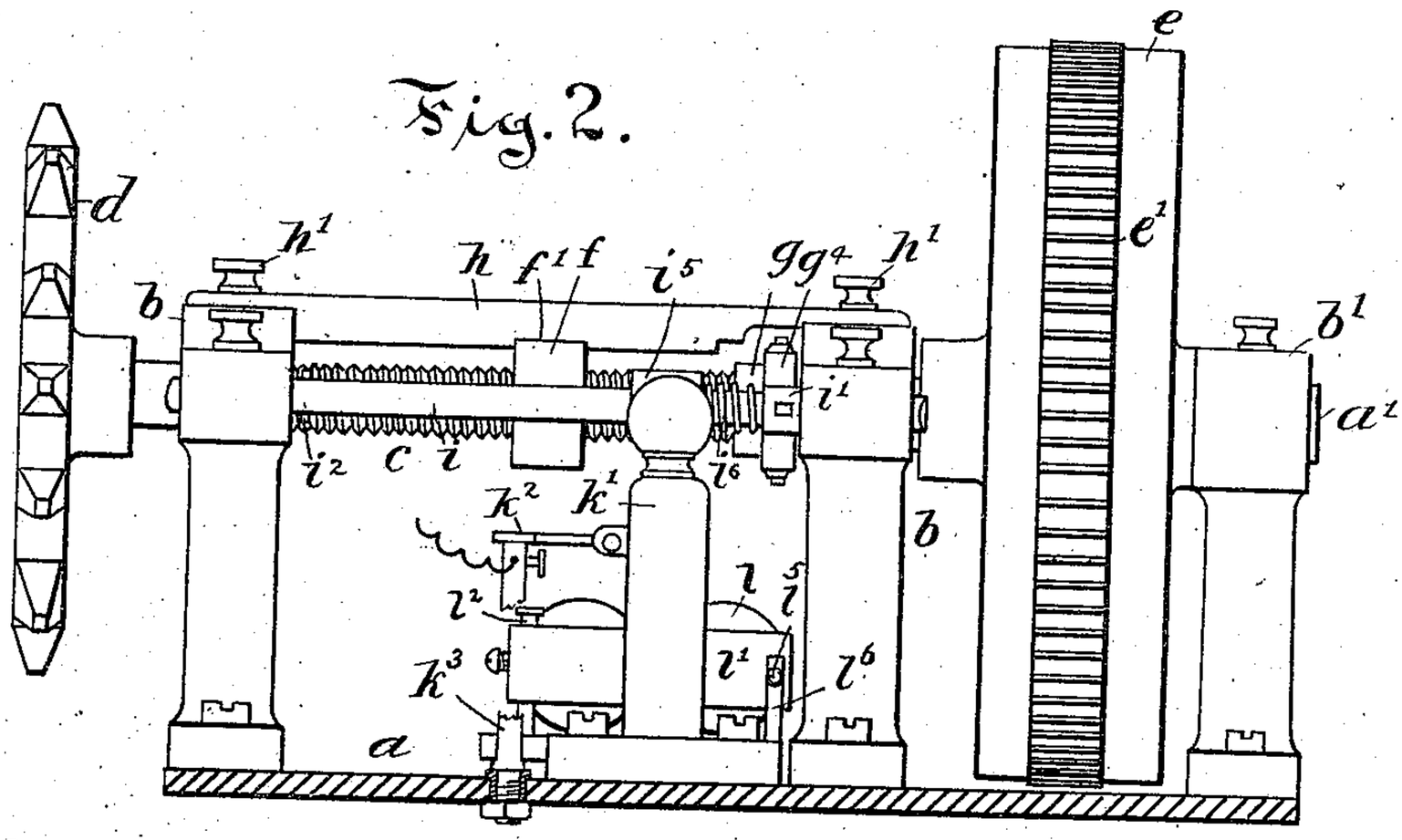


Fig. 3.

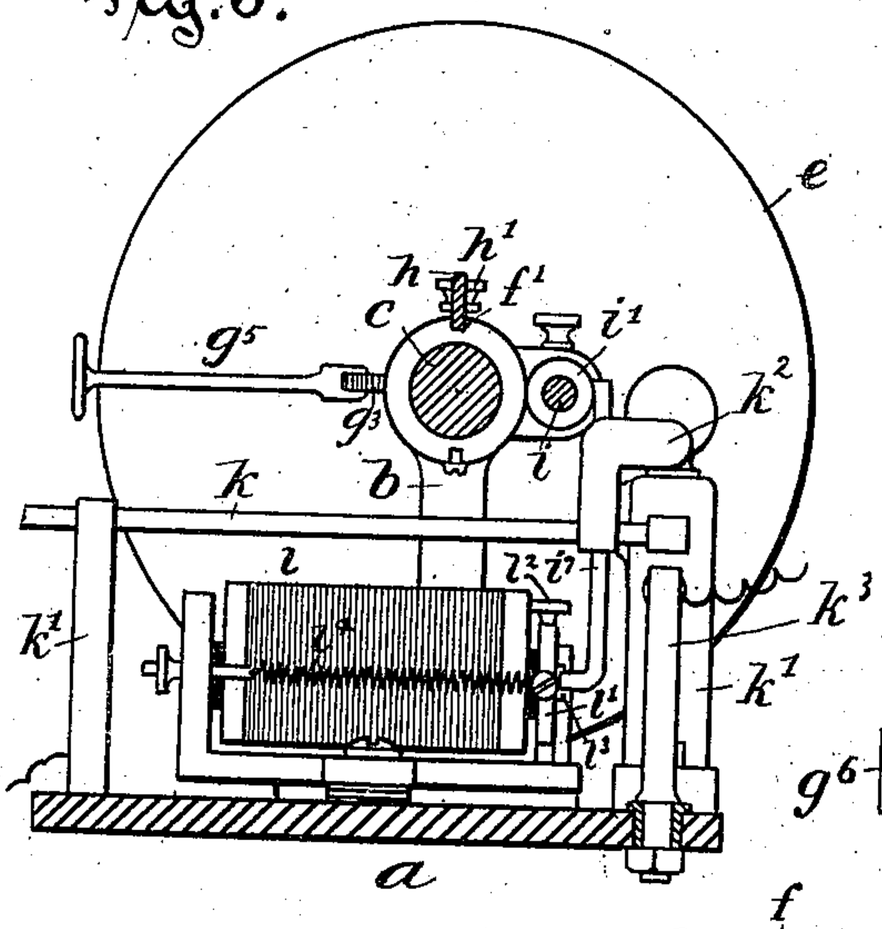


Fig. 4.

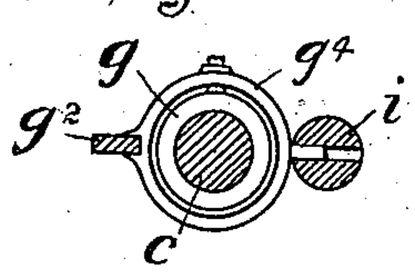


Fig. 5.

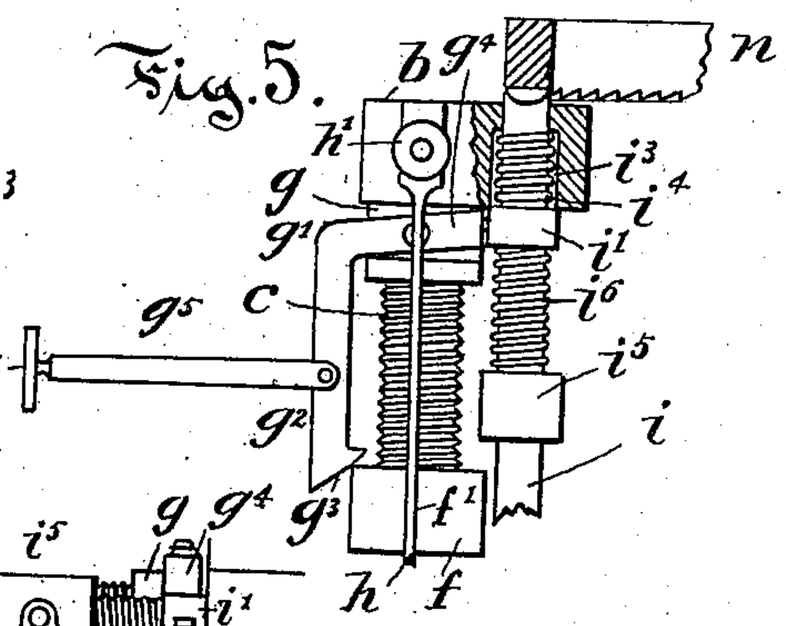
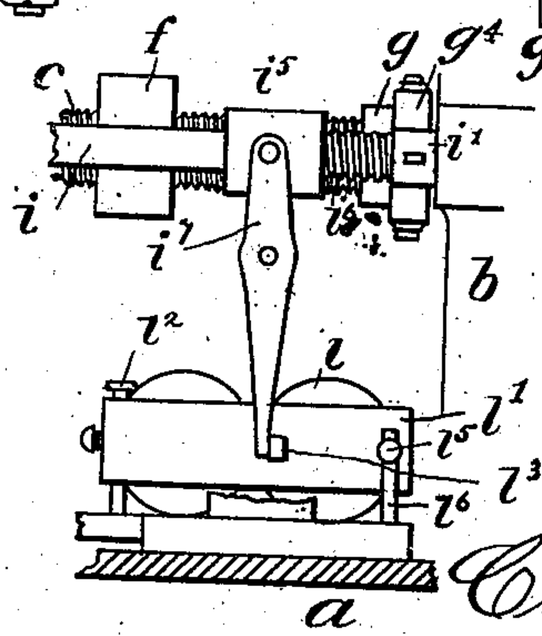


Fig. 6.



Witnesses:

Joseph Arthur Cantin:

J. B. Jenkins.

Inventor:

Charles A. Hatch

by Chas. L. Burdett

Attorney.

(No Model.)

3 Sheets—Sheet 3.

C. A. HATCH.

APPARATUS FOR STOPPING ENGINES.

No. 506,229. Patented Oct. 10, 1893.

Fig. 7.

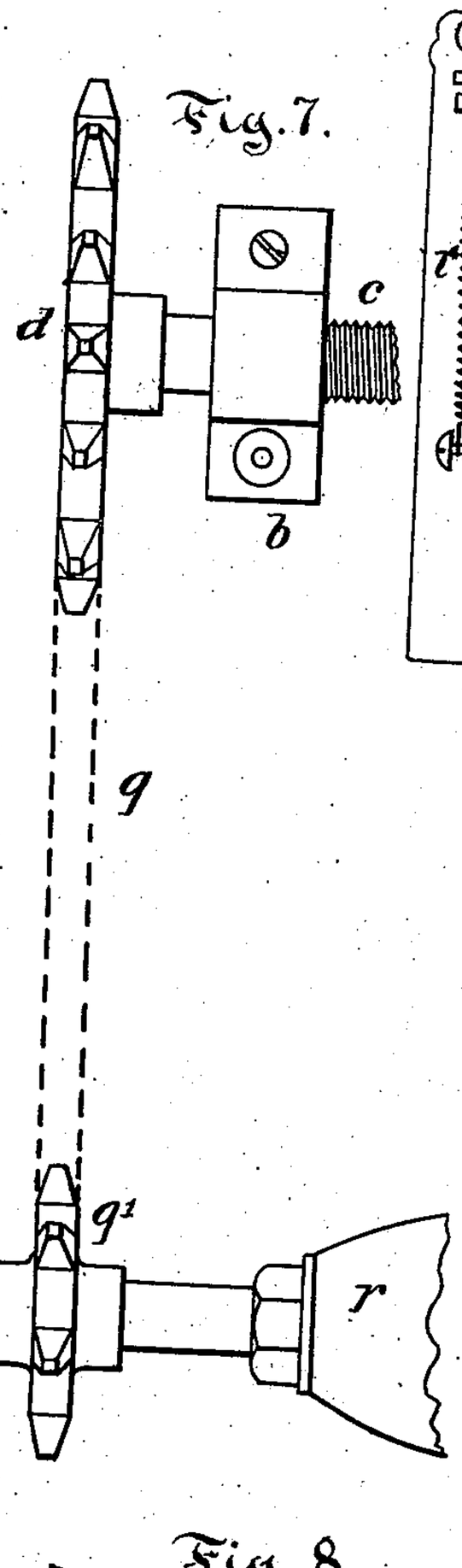
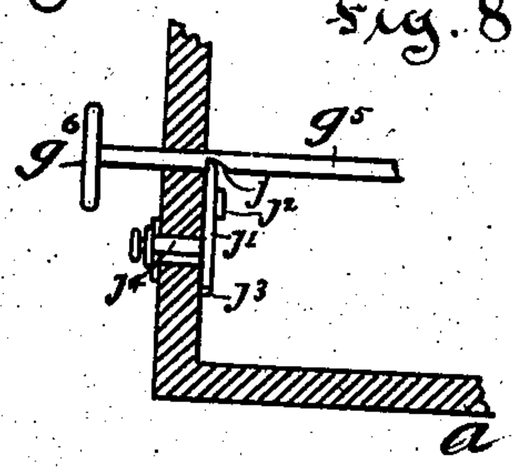
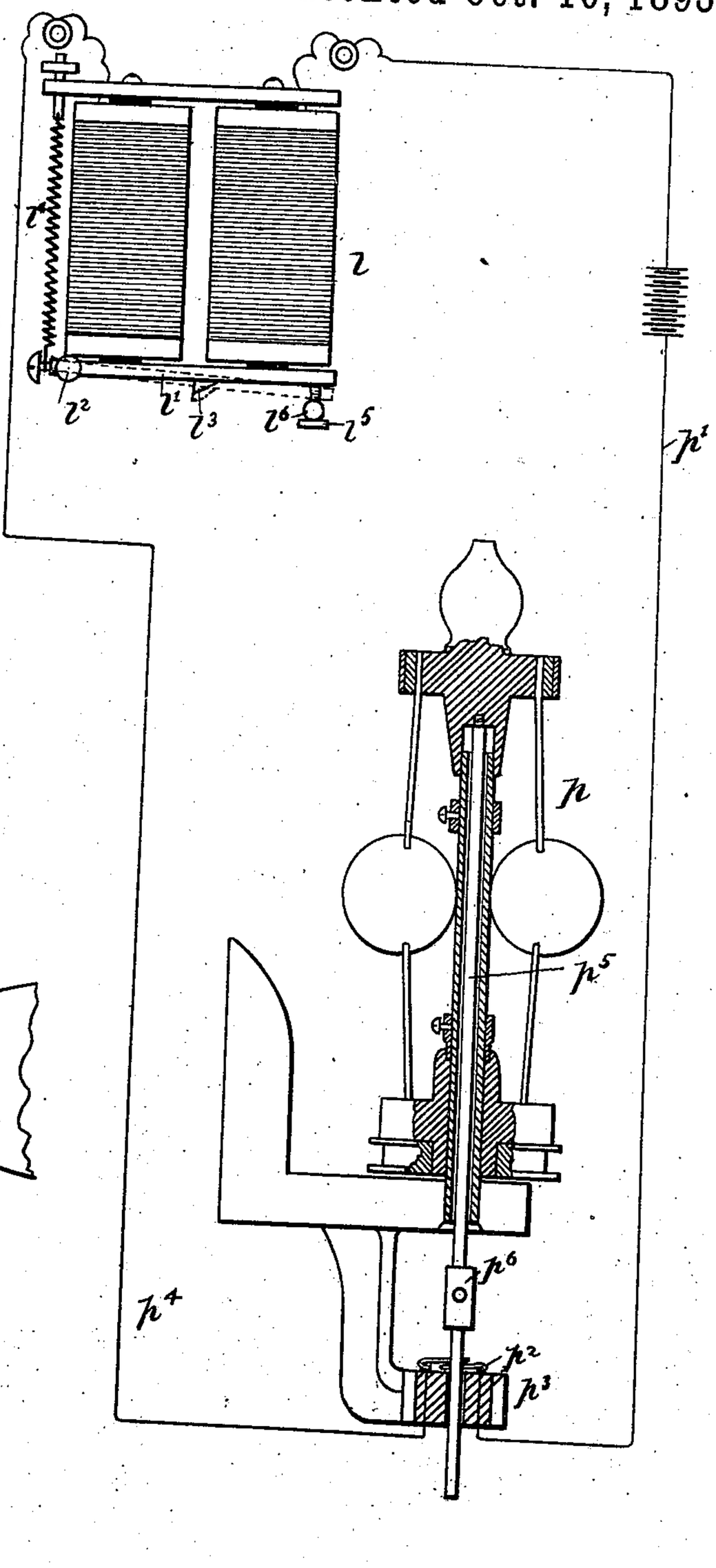


Fig. 8.





Witnesses:
Joseph Arthur Cantin.
T. B. Jenkins.

Inventor:
Charles A. Hatch.
by Chas. L. Burdett,
Attorney.

UNITED STATES PATENT OFFICE.

CHARLES A. HATCH, OF HARTFORD, CONNECTICUT, ASSIGNOR TO THE SAFETY STEAM APPLIANCE COMPANY, OF BOSTON, MASSACHUSETTS.

APPARATUS FOR STOPPING ENGINES.

SPECIFICATION forming part of Letters Patent No. 506,229, dated October 10, 1893.

Application filed February 27, 1893. Serial No. 463,991. (No model.)

To all whom it may concern:

Be it known that I, CHARLES A. HATCH, of Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Apparatus for Stopping Engines, of which the following is a full, clear, and exact description, whereby any one skilled in the art can make and use the same.

The object of my invention is to provide an apparatus by means of which a steam engine may be stopped either at a distance from the engine or by the movement of a part of the engine; and to this end my invention consists in the details of the several parts making up the apparatus as a whole and in the combination of such parts as are more particularly hereinafter described and pointed out in the claims.

Referring to the drawings: Figure 1 is a plan view of my apparatus with parts broken away to show construction. Fig. 2 is a detail view in side elevation of part of the mechanism on a plane cutting vertically through the base between the main shaft and the plunger chamber. Fig. 3 is a detail view in vertical section through that part of the machine shown in Fig. 2 and looking to the right. Fig. 4 is a detail view in cross section of the main shaft. Fig. 5 is a detail plan view showing parts of the clutch mechanism. Fig. 6 is a detail view in elevation showing part of the catch mechanism. Fig. 7 is a detail diagram view illustrating the manner of use of my improved device when connected with the governor of the engine. Fig. 8 is a detail view showing a form of fastening means for the pull rod attached to the pawl operating device.

In the accompanying drawings the letter *a* denotes a base on which in bearings *b* is supported a shaft *c* having on its outer end a sprocket wheel *d* and, preferably at the other end, a spring barrel *e*, in case where a spring serves as the motive power for driving the shaft. One end of the spring is secured in the usual manner to the outer wall of the spring barrel while the other end is secured to a short shaft *a'* that projects into the spring barrel from the bracket *b'* within which it is secured against rotary movement. The shaft *c* for a portion of its length is screw threaded as shown and on this shaft is located a portion of the pawl actuating mechanism consisting of an adjustable nut *f* and a collar *g*. Around the periphery of the nut *f* there are provided at certain intervals notches *f'* within which is located a guide *h*. The guide *h* is preferably secured to the top of and extends between the bearings *b*, thumb screws *h'* being preferably used for securing it in place so that it may be easily and quickly removed and replaced in position. The object of this construction is that the adjustable nut *f* may be located in the proper position on the shaft *c* and then by putting the guide *h* in place so that it is inserted in one of the grooves in the nut, by the operation of the device the nut will be moved along the shaft the required distance to properly engage and operate the several devices with which it comes in contact. The collar *g* is held against rotation upon the shaft *c* but is free to move lengthwise thereon, the shaft rotating freely within the collar, and upon this collar *g* is pivoted a bent lever *g'*, one end g^2 of which is provided with a cam surface g^3 adapted to engage the collar *f*, and the other end g^4 extending around the collar *g* and engaging a collar *i'* secured to the pawl *i*.

To the portion g^2 of the bent lever *g'* is pivoted one end of a rod g^5 that extends outward through the side of a case located upon the base, as shown in Fig. 8 of the drawings. The outer end of this rod is provided with a suitable handle g^6 for use in operating the trip device by hand. The under side of this rod is provided with a recess *j* into which projects a spring actuated slide *j'* that is secured to the side of the casing by means of a pin j^2, the latter being square and engaging a slot in the slide *j'* by means of which the latter is held against rotation but is free to move lengthwise upon the pin j^2. A spring j^3 secured to the side of the casing projects into the path of the slide *j'* and tends normally to hold it in an upward position to engage the recess *j* in the rod g^5, and to the lower end of the slide *j'* is secured a pin j^4 projecting through the casing to the outside and provided on its outer end with a proper handle by means of which the slide may be caused to move out of engagement with the recess *j'* on the rod g^5. By this arrangement when the

rod g^5 is pulled outward the slide j' engages the recess within the rod and holds it in this position until the slide is released by means of the pin j^4, when the rod will automatically be thrown inward.

In the upper part and on one side of the bearings b is borne the pawl i the inner end of which is beveled on one side and the outer end being provided with a pin i^2 to limit the lengthwise movement of the pawl. The bearing b next to the spring barrel e is provided with a recess i^3 (see Fig. 5), within which is located a spiral spring i^4 on the pawl i, one end of the spring projecting against the inner end of the socket and the other against the collar i'. There is located on the pawl i between the collar i' and the collar i^5 another spiral spring i^6 larger than the spring i^4, one end of the former bearing against the collar i' and the other against the collar i^5. The collar i^5 is loosely mounted on the pawl i the latter of which has a lengthwise movement therein, and to this collar i^5 is pivoted one end of the trip lever i^7 that is also pivoted at its center to a fixed part projecting from the base and with its lower end engaging a lug located on the armature of an electro magnet.

Pivoted on the posts k' and extending across the base to the outside of the casing is a rod k and on this rod k is secured a contact k^2 that rests in one position against the top of one of the posts k' and also against the nut i^5 so that as the latter is moved upon the release of the trip lever i^7 from engagement with the lug of the armature of the electro magnet and under the impulse of the spring i^6 it is thrown down into engagement with the binding post k^3, thus closing an electric circuit and causing an alarm to be rung until the contact is turned up out of engagement with the post k^3 after the engine has been stopped, and the nut i^5 has been returned to its normal position, that is, so that the trip lever i^7 engages the lug on the armature of the electro magnet. An electro magnet l is located on the base a immediately under the parts above described and in such position that by the pressure of a push button placed in any desired location the electric circuit will be (in this instance) closed, thus causing the armature l' having one end pivoted on the post l^2 to be drawn up against the coils of the magnet disengaging the lug l^3 from the trip lever i^7 and causing the collar i^5 to be forced backward under the impulse of the spring i^6. A spring l^4 is attached to one end of the armature l' tending normally to hold it in an outward position and an adjustment of the outward position of this armature may be gained by use of the adjusting screw l^5 projecting through a screw threaded opening in the post l^6, as shown in Fig. 7 of the drawings.

In bearings o^2 secured preferably to the base of the machine is mounted a brake shaft m on which is secured a gear m' in mesh with the gear e' on the spring barrel e; there is also secured to this brake shaft a ratchet wheel n, the outer end of the shaft being threaded as at m^2. There is also located on the base supported on a suitable standard and in line with the brake shaft m a cylinder o, one end of which is formed preferably of a screw cap o' fitting upon the threaded end of the cylinder. A threaded flange o^2 projects from the cap o' upon which is fitted a screw threaded nut o^3 between the outer end of which and the end of the flange o^2 may be located a packing o^4 for packing the joint in the usual manner.

Projecting through the opening o^5 in the end of the cylinder and also in the nut o^3 is a piston rod o^6 having an opening o^7, the walls of which are screw threaded to fit the screw threaded end of the shaft m^2. The piston rod o^6 bears the piston o^8 within one side of which is located the opening o^9 closed by the valve o^{10} that opens toward the left hand side of the piston. There is also provided in the piston an angular opening o^{11} that is adapted to be closed by the regulator consisting of a rod o^{12} projecting through the piston rod and into the opening o^{11}, the outer end of this rod being screw threaded to fit a screw thread in the piston and provided with any suitable means, in this instance a squared end, by means of which the rod may be turned to open or close the opening o^{11} through the piston.

Within the cylinder is placed any suitable fluid, preferably glycerine, this being more especially adapted to preserve its normal condition through the different changes of the temperature. A guide pin o^{13} is secured in the bearing b^2 and projects into an opening o^{14} within the piston rod, thus guiding the latter in its lengthwise movement and holding the same against rotation. The piston rod extends from the piston through the opposite end of the cylinder in order to fill the space occupied by the glycerine in its movement from that side of the piston to the opposite side and thus obviate the creation of a vacuum within the cylinder.

In operation when the device as a whole is set the piston will be at the left hand limit of its play and when the device begins to operate under the tension of the spring in the spring barrel e the escape of the fluid from the right to the left hand side of the piston through the opening o^{11} allows said piston to move to the right at a speed limited by the size of the opening o^{11}, through which the glycerine moves from one side of the piston to the other, governed by the regulator o^{12}. In the opposite movement of the piston the fluid within the cylinder may move freely from the right hand to the left hand side of the piston through the opening above mentioned and in addition thereto through the opening o^9, this opening being closed by the valve o^{10} in the opposite movement of the piston.

A governor p of ordinary construction that is usually located on an engine or like motor in connection with which this device is used

may operate to release the trip i^7 from the armature l' by being connected up within the circuit as follows and as shown in Fig. 7 of the drawings. The wire p' extends from the battery to one of the contacts p^2 located on a bracket p^3 underneath the governor and a wire p^4 extends from another contact through the coils of the electro magnet and back to the battery. In the operation of this device as the engine attains a greater speed the balls of the governor are thrown outward by centrifugal force until the downward movement of the rod p^5 causes the adjustable shoulder p^6 located thereon to close the contacts p^2 thereby closing the circuit and drawing the armature l' against the coils, thus releasing the trip i^7 and operating to stop the engine. A chain q extends around the sprocket d and around a sprocket q' fast to the throttle r so that by the movement of the latter the device may be set in position to operate upon the release of the trip i^7.

The operation of the device is as follows: The trip i^7 having been engaged with the lug l^3 on the armature l' the turning of the hand wheel located on the throttle valve through the medium of the sprocket wheels q' and d and the chain q operates to turn the main shaft c of the device causing the adjustable nut f to move to the left as shown in Fig. 1 of the drawings. This will cause the cam surface g^3 located on the end g^4 of the arm g^2 to slide along the nut f under the impulse of the larger spring i^6 acting against the spring i^3, thus throwing the pawl gradually into engagement with the ratchet on the wheel n until the nut f has been disengaged from such surface when the pawl is then in full operation in connection with the said ratchet wheel. The hand wheel on the throttle is turned until the throttle has been opened to the desired distance when the device is set and in readiness to operate to shut down the engine. Closing the electric circuit as by the pressing of a button placed in any desired locality or by the action of the governor as before described causes the armature l' to be drawn against the coils thus releasing the trip lever i^7 from engagement with the lug l^3 on the armature and throwing the collar i^5 quickly to the left upon the pawl i and under the impulse of the spring i^6. The movement of this collar i^5 causes the contact k^2 to be thrown down in engagement with the post k^3, thus closing the circuit and causing a bell located in any desired position to be rung until the contact is moved out of engagement with the post k^3. The release of the trip lever i^7 and the consequent movement of the collar i^5 to the left releases the tension on the spring i^6, thus causing the tension of the spring i^4 to force the pawl i out of engagement with the ratchet teeth on the wheel n. This allows the spring located in the spring barrel e to operate to revolve said spring barrel and consequently the main shaft c and through the sprockets d and q' and chain q operates to shut off the steam by closing the throttle r. The revolution of the shaft c causes the nut f to be moved to the right until it comes in engagement with the nut i^5 located on the pawl i moving the former to the right and causing the trip lever i^7 to be again engaged with the lug l^3 on the armature l'. The movement of this collar i^5 to the right has also placed a tension on the spring i^6 and caused the bent lever g' to come in contact with the collar f, the position occupied by the device in the normal position of the parts.

The apparatus is adapted to be operated by means of a push button or like device, or as many of them as may be desired, located in any part or parts of the factory within which is located the machinery desired to be driven by the motor, the circuit preferably remaining open and being closed by the pushing of the button or by a movement of some part of the motor. The closing of the circuit causes the armature to be drawn toward the magnet and by this movement of the armature the catch is released.

I claim as my invention—

1. In an apparatus for stopping an engine or other motor, in combination, a spring actuated shaft having a threaded portion, an actuating spring with one end secured to the shaft and the other to a fixed part of the frame, a gear wheel fixed to the shaft and engaging a wheel on the brake shaft, a pawl adapted to engage the teeth of the ratchet wheel located on the brake shaft, the pawl tripping mechanism substantially as described, and a fluid brake comprising a cylinder filled with liquid and a reciprocating piston fitting the threaded end of the brake shaft, all substantially as described.

2. In an apparatus for stopping an engine or other motor, in combination, a spring actuated shaft having a threaded portion, a gear wheel secured to the shaft, the shaft actuating spring, a brake shaft having a gear wheel in mesh with the gear wheel on the main shaft, a ratchet wheel located on the brake shaft, a pawl adapted to engage the teeth on the ratchet wheel, the pawl tripping mechanism substantially as described, a fluid brake comprising a cylinder filled with liquid and a reciprocating piston fitting the threaded end of the brake shaft, and a regulating device for controlling the movement of the piston, all substantially as described.

3. In an apparatus for stopping a steam engine or other motor, a spring actuated shaft, a ratchet located in operative relation to said shaft, a pawl engaging said ratchet, the pawl tripping mechanism substantially as described, and a brake device consisting of a cylinder filled with liquid, a piston movable within said cylinder, a piston rod attached to the piston and having one end screw threaded and engaging a screw threaded member in operative engagement with the main shaft, all substantially as described.

4. In combination in a device for stopping an engine, a spring actuated shaft, a brake device substantially as described located in operative relation to said shaft, a ratchet, a spring actuated pawl adapted to engage the ratchet, the pawl operating device mounted on the main shaft and provided with means for holding the pawl automatically out of engagement with the ratchet, and the trip operating device, all substantially as described.

5. In combination in an apparatus for stopping an engine, a spring actuated shaft having a threaded portion, a ratchet supported in operative relation to said shaft whereby the rotation of the latter is governed, a spring actuated pawl adapted to engage the ratchet, a nut borne on the threaded portion of the shaft, the mechanism substantially as described for controlling the movement of the pawl, and the trip device, all substantially as described.

6. In combination in a device for stopping an engine, a spring actuated shaft having a threaded portion, a ratchet borne in operative relation to said shaft whereby the shaft is held against rotation, a spring actuated pawl adapted to engage the ratchet, a nut borne on the threaded portion of the shaft and adapted to engage the pawl controlling mechanism, the pawl controlling mechanism substantially as described, the collar loosely mounted on the pawl in the path of movement of the nut on the main shaft, and the trip lever pivoted to the collar at one end and with its other end engaging a trip device, all substantially as described.

7. In combination in an apparatus for stopping an engine, a spring actuated shaft, a ratchet supported in operative relation to said shaft whereby the latter is held against rotary movement, a pawl adapted to engage the ratchet, a spring located on the inner end of the pawl and bearing against a collar integral therewith, the collar located on the end of the pawl controlling mechanism and secured to the pawl, the spring located between this collar and the collar loosely mounted on the pawl, the collar loosely mounted on the pawl, the trip lever pivoted at its center with one end pivoted to the collar loosely mounted on the pawl and the other end in engagement with the trip device, all substantially as described.

8. In combination in a device for stopping an engine, a spring actuated shaft having a threaded portion, a ratchet supported in operative relation to said shaft whereby the latter is held against rotary movement, a spring actuated pawl adapted to engage the ratchet, a nut borne on the threaded portion of the main shaft and held against rotation thereon, the collar loosely mounted on the pawl in the path of movement of the collar on the main shaft, the trip lever having a central pivot with one end pivoted to the collar on the pawl and the other in engagement with the trip device, all substantially as described.

9. In combination in a device for stopping an engine, a spring actuated shaft having a threaded portion, a ratchet supported in operative relation to said shaft whereby the latter is held against rotation, a spring actuated pawl adapted to engage the ratchet, the tripping mechanism substantially as described having a part joined up within an electric circuit, an alarm also connected up within said circuit and adapted to be rung upon the operation of the trip device, and the lever supporting the contact whereby the sounding of the alarm is controlled, all substantially as described.

10. In combination in a device for stopping an engine, a spring actuated shaft having a threaded portion, a ratchet supported in operative connection with said shaft whereby the latter is held against rotary movement, a pawl engaging the ratchet, the pawl tripping mechanism substantially as described, the nut located on the main shaft and adapted to reset the tripping mechanism, the bent lever supported on a collar loosely mounted on the main shaft with one end integral with the pawl and the other end having a cam surface located in the path of movement of the nut on the main shaft, all substantially as described.

11. In combination in a device for stopping an engine, a spring actuated shaft, a ratchet supported in operative relation to said shaft whereby the latter is held against rotation, the pawl adapted to engage the ratchet, the pawl tripping device substantially as described, the nut located on the main shaft adapted to reset the pawl tripping device, the pawl controlling mechanism supported on the main shaft to engage with the said nut, the lever extending to the outside of the case whereby the pawl controlling mechanism may be operated by hand, all substantially as described.

12. In combination in a device for stopping an engine, a spring actuated shaft having a threaded portion, a ratchet supported in operative relation to said shaft, the pawl adapted to engage the ratchet, the tripping device substantially as described, the pawl controlling device located on the main shaft, the nut supported on the threaded portion of the shaft adapted to engage the pawl tripping and the pawl controlling devices, the lever projecting from the pawl controlling device to the outside of the box whereby the former may be operated by hand, and the spring catch adapted to engage the said lever, all substantially as described.

13. In combination in a device for stopping an engine, a spring actuated shaft having a threaded portion, a ratchet supported in operative relation to said shaft whereby the latter is held against rotation, the pawl engaging the ratchet, the pawl controlling mechanism substantially as described located on the main shaft, the nut located on the threaded portion of the main shaft and adapted to en-

gage the pawl controlling and pawl tripping devices, the pawl trip device in engagement with the armature of an electro magnet, the armature of an electro magnet adapted to be moved by the opening or closing of the circuit to release the pawl tripping device, all substantially as described.

14. In combination in a device for stopping an engine, a shaft having a threaded portion and bearing a spring barrel, the pawl controlling and pawl tripping devices substantially as described located in operative relation to the main shaft, the nut supported on the threaded portion of the main shaft adapted to engage the pawl controlling and pawl tripping devices, the brake shaft having a threaded portion and located in operative relation to the main shaft, the nut supported on the threaded portion of the main shaft adapted to engage the pawl tripping device, and the brake consisting of a cylinder containing a piston and piston rod with a threaded portion adapted to engage the threaded portion of the brake shaft, all substantially as described.

15. In combination with the spring actuated shaft and pawl operating mechanism of a device for stopping an engine, a brake shaft having a threaded portion mounted in operative relation to the spring actuated shaft and bearing a ratchet wheel in engagement with the pawl of the pawl operating mechanism, a cylinder supported on a standard, a piston rod located within the cylinder, bearing a piston and having a threaded portion engaging the threaded portion of the brake shaft and the relief ports located in the piston, all substantially as described.

16. In combination with the spring actuated shaft and pawl operating mechanism of a device for stopping an engine, a brake shaft having a threaded portion and supported in operative relation to the main shaft and bearing a ratchet wheel adapted to engage the pawl of the pawl operating mechanism, a cylinder adapted to be filled with a liquid and bearing a piston rod having a threaded portion in engagement with the threaded portion of the brake shaft, the relief port located in the piston and provided with an automatic valve, and the port having a valve controlling the movement of the piston, all substantially as described.

17. In combination with the spring actuated shaft and pawl operating mechanism of a device for stopping an engine, a brake shaft having a threaded portion and supported in operative relation to the spring actuated shaft and bearing a ratchet wheel adapted to engage the pawl of the pawl operating mechanism, a cylinder adapted to be filled with a liquid as glycerine, a piston located within said cylinder bearing a relief port open in one movement of the piston and closed in the opposite movement, the port located in the piston, the piston rod supporting the piston and held against rotation within the cylinder, and the valve projecting through the piston rod into the port whereby the movement of the piston may be controlled, all substantially as described.

18. In combination in an apparatus for stopping an engine, a spring actuated shaft having a threaded portion, a ratchet supported in operative relation to said shaft whereby the rotation of the latter is governed, a spring actuated pawl adapted to engage the ratchet, a nut borne on the threaded portion of the shaft, the mechanism substantially as described for controlling the movement of the pawl, and the trip device adapted to be operated by an electric circuit controlled by the operation of the governor of the engine, all substantially as described.

19. In combination in a device for stopping an engine, a spring actuated shaft, a brake device substantially as described located in operative relation to said shaft, a ratchet, a spring actuated pawl adapted to engage the ratchet, the pawl operating device mounted on the main shaft and provided with means for holding the pawl automatically out of engagement with the ratchet, and the trip device adapted to be operated by an electric circuit controlled by the operation of the governor of the engine, all substantially as described.

20. In combination in a device for stopping an engine, a spring actuated shaft having a threaded portion, a ratchet supported in operative relation to said shaft, the spring actuated pawl engaging the ratchet, the collar loosely mounted on the pawl, the trip lever supported on the base with one end pivoted to the collar on the pawl and the other end in engagement with the trip releasing mechanism, and the nut located on the threaded portion of the main shaft whereby the trip device is reset by the rotation of the main shaft, all substantially as described.

CHARLES A. HATCH.

Witnesses:
ARTHUR B. JENKINS,
JULIA STERN.