No. 814,838. PATENTED MAR. 13, 1906.

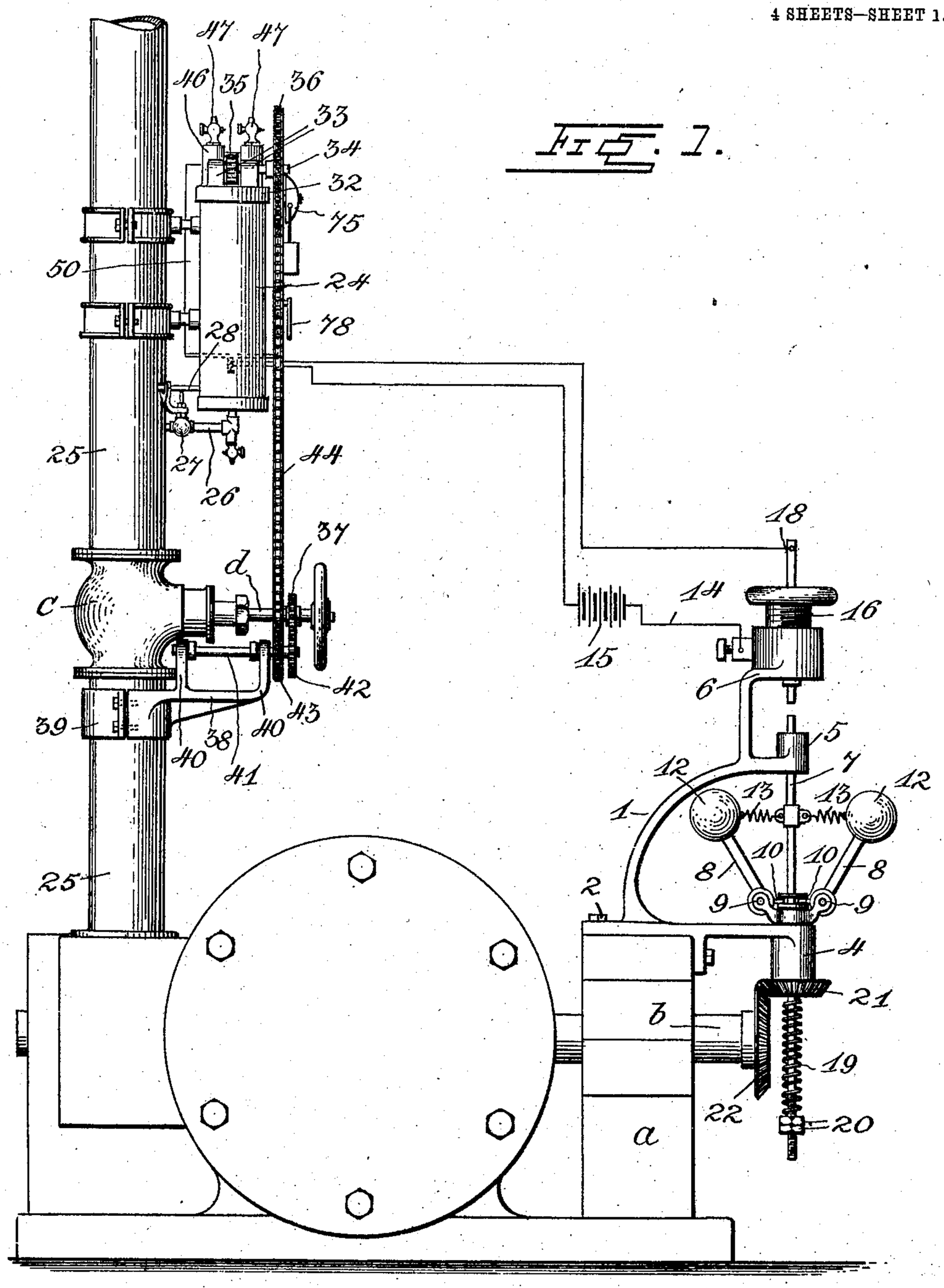
J. E. J. GOODLETT.

STOP MECHANISM FOR STEAM ENGINES.

APPLICATION FILED APR. 27, 1905.

4 SHEETS—SHEET 1.

FIG. 1.



Witnesses
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4 SHEETS—SHEET 2.

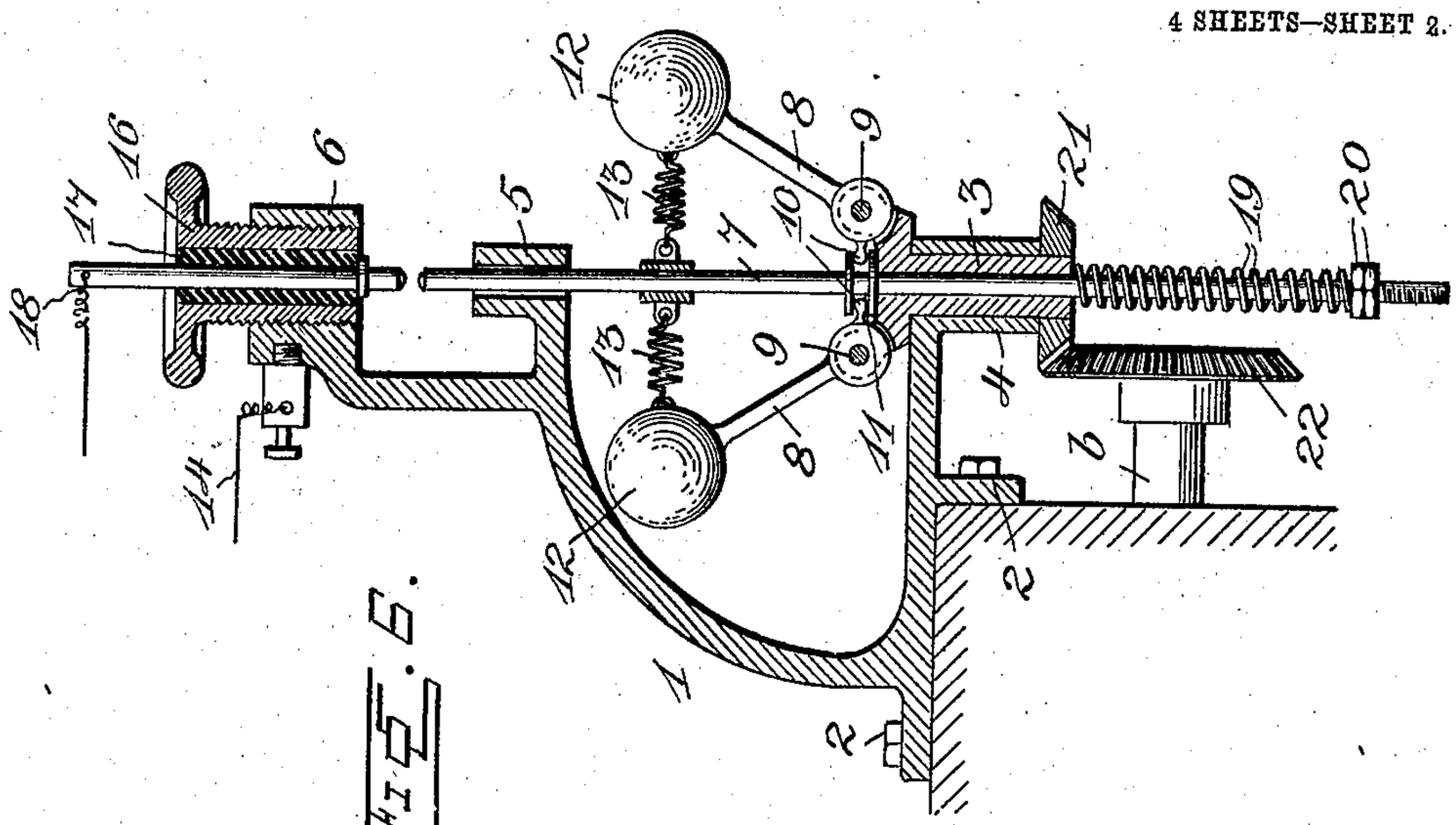

FIG. 6.

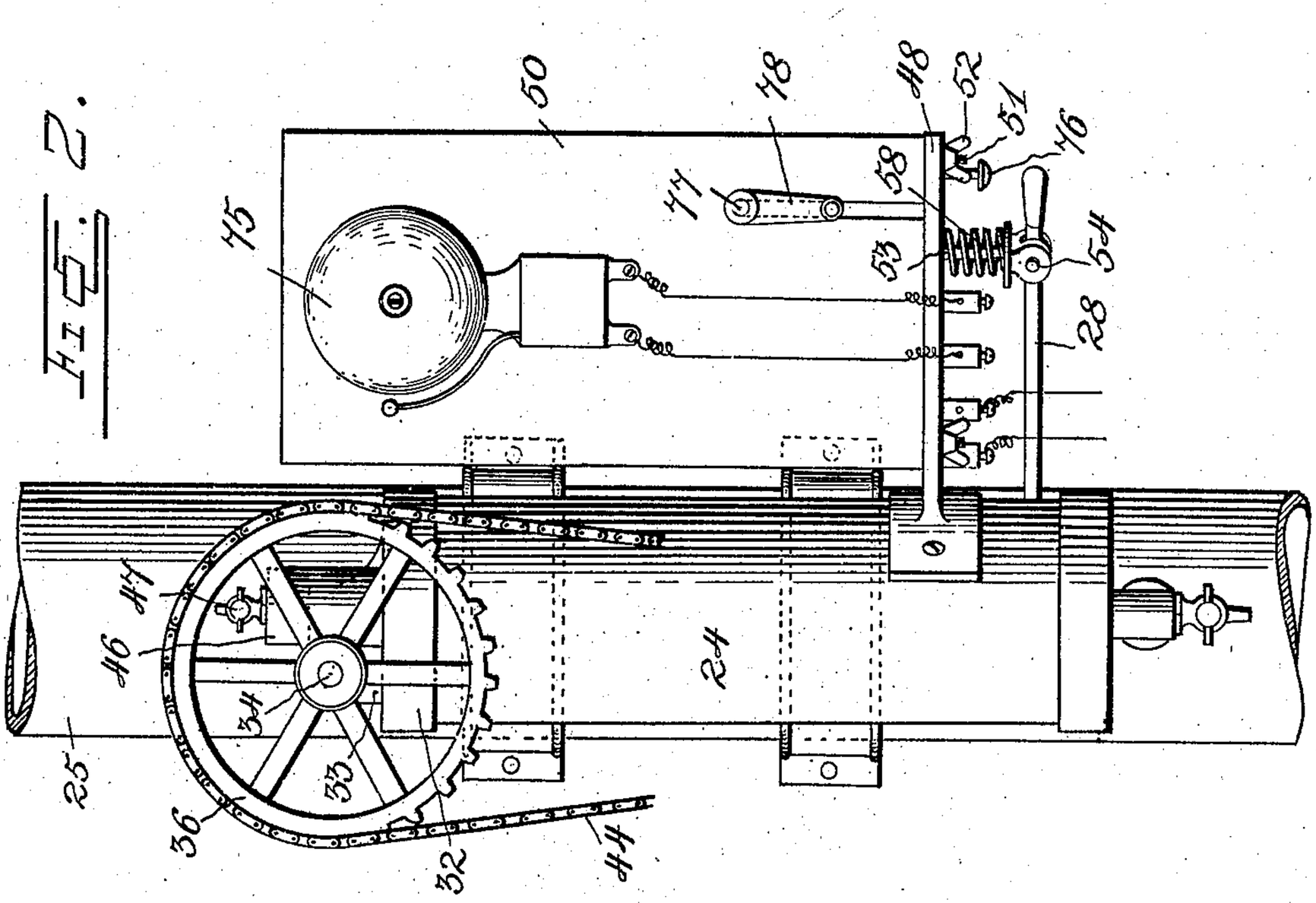

FIG. 7.

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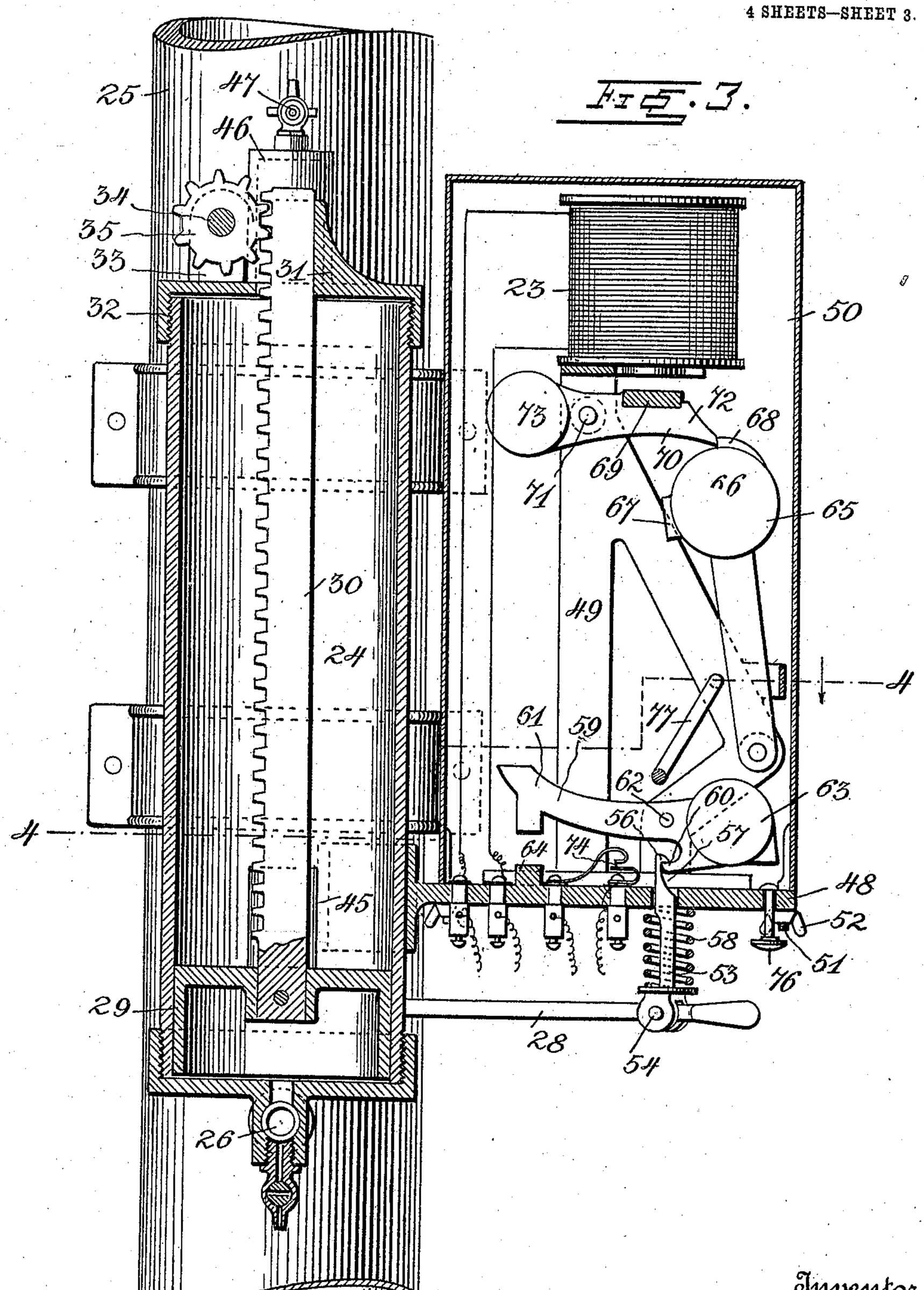
4 SHEETS—SHEET 3.

FIG. 3.



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4 SHEETS—SHEET 4.

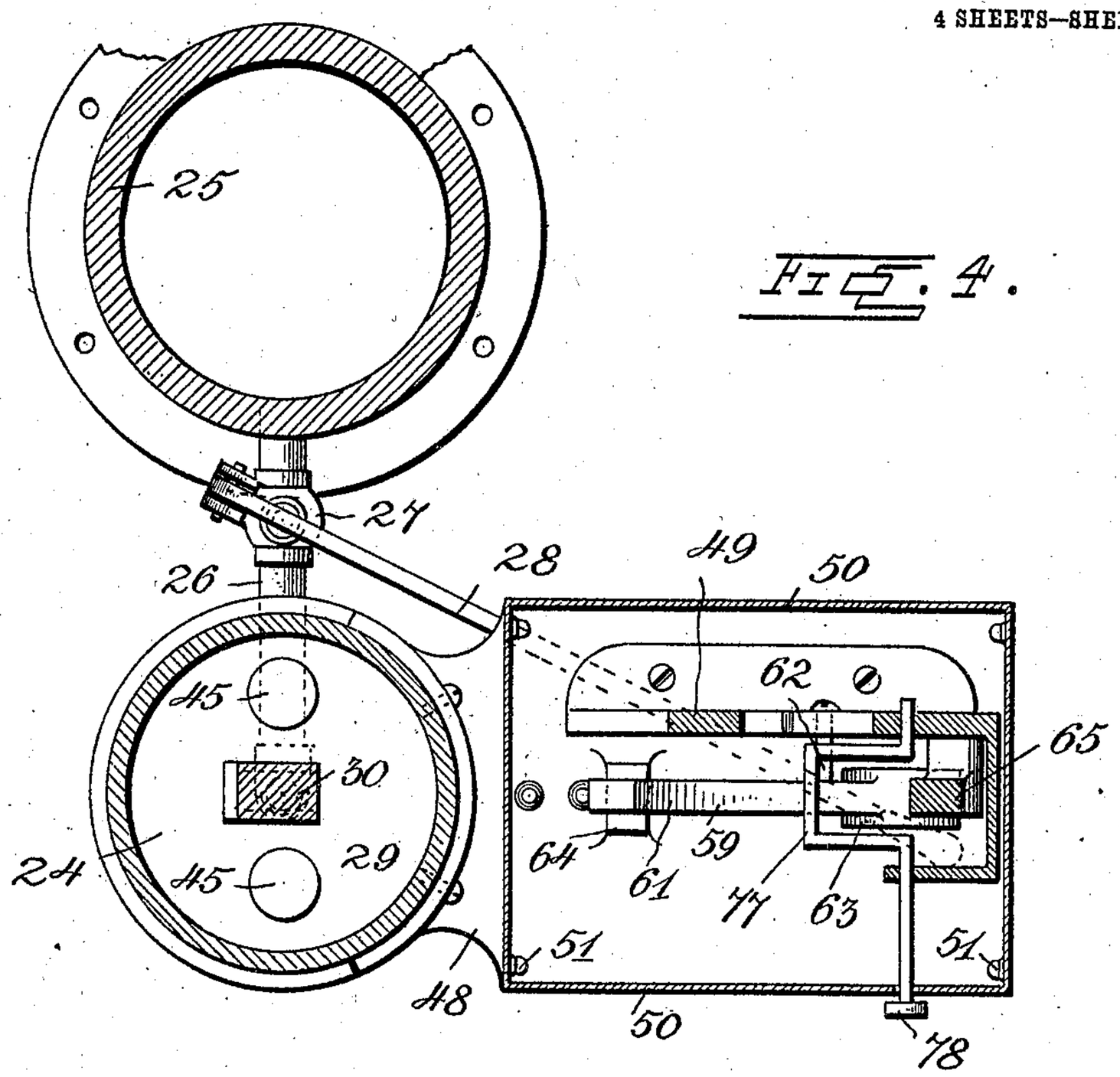

FIG. 4.

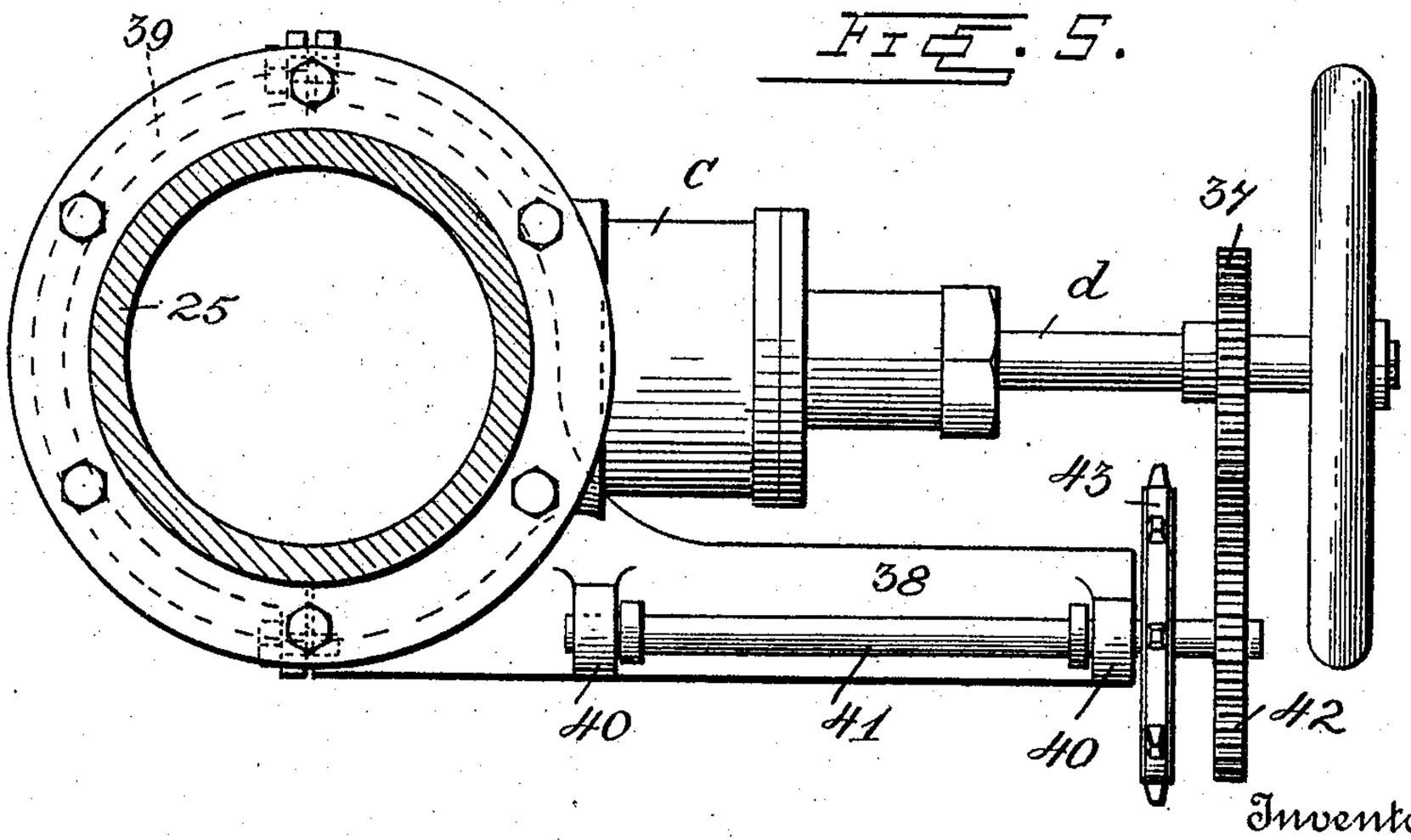

FIG. 5.

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UNITED STATES PATENT OFFICE.

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STOP MECHANISM FOR STEAM-ENGINES.

No. 814,838. Specification of Letters Patent. Patented March 13, 1906.

Application filed April 27, 1905. Serial No. 257,650.

To all whom it may concern:

Be it known that I, JOSEPH E. J. GOODLETT, a citizen of the United States, residing at Memphis, in the county of Shelby and State of Tennessee, have invented certain new and useful Improvements in Stop Mechanism for Steam-Engines; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention is an improved stop mechanism for steam-engines adapted to automatically stop an engine when its motion becomes too rapid by closing the throttle-valve by means of a steam-pressure-actuated mechanism; and my invention consists in the construction, combination, and arrangement of devices hereinafter described and claimed.

In the accompanying drawings, Figure 1 is an elevation of a portion of a steam-engine provided with my improved stop mechanism. Fig. 2 is a side elevation of the steam-pressure-actuated mechanism for closing the throttle-valve and the controller for said mechanism. Fig. 3 is a sectional view of the same. Fig. 4 is a horizontal sectional view of the same, taken on the plane indicated by the line 4 4 of Fig. 3. Fig. 5 is a detail plan view showing the exterior of the throttle-valve, the gearing connected thereto, and showing the steam-feed pipe in cross-section; and Fig. 6 is a detail sectional view of the centrifugally-operating circuit-closer which actuates the electromagnet forming part of the controlling mechanism of the steam-pressure-actuated mechanism for closing the throttle-valve.

I will first describe the centrifugally-operating circuit-closer which forms a part of my improved stop mechanism.

A frame 1, which may be either of the form here shown or of any other suitable construction, is secured, as at 2, to the bearing *a* of the engine drive-shaft *b* or to any other suitable part of the engine or frame thereof. A sleeve 3 is journaled in a bearing 4 with which the frame 1 is provided. Said frame has at a suitable distance above the said bearing 4 a guide 5 and has an arm 6 above said guide. A spindle 7 revolves with the sleeve 3, is vertically movable therein, projects downwardly therefrom, and also projects upwardly therefrom through the guide 5. A pair of governor-arms 8 are pivotally connected, as at 9, to the sleeve on opposite sides of the spindle and have near their pivotal ends tappet-arms 10, which engage an annular transverse groove 11 with which the spindle is provided. Said governor-arms have centrifugally-actuating weight-balls 12 at their outer ends, which are here shown as connected together by a suitable coil-spring 13. It will be understood that as the centrifugally-actuating balls move outwardly the arms 8 will serve to raise the spindle 7. The latter constitutes an electrode and is in electrical connection with the frame 1, a conductor 14 from a battery 15 being connected to the said frame. In the arm 6 is screwed an adjusting-nut 16, having a bore in which is placed an insulating-bushing 17, an electrode 18 of the battery being in said insulating-bushing and adapted to be engaged and disengaged by the electrode-spindle 7. On the lower portion of the spindle, below the sleeve 3, is an adjusting-spring 19, the upper end of which bears against the lower end of the said sleeve. Adjusting-nuts 20 are screwed on the lower portion of the spindle, one of them engaging the lower end of the said spring 19, and by means of said nuts the tension of the said spring may be regulated at will. Fixed to the sleeve 3 is a bevel-gear 21, which is engaged by a similar gear 22, that is fixed to the shaft *b* of the engine. Hence the rotation of the engine-shaft is communicated to the spindle, and when the revolution of the engine-shaft exceeds the required predetermined speed the centrifugally-actuating governor-balls 12 and their coacting devices cause the electrode-spindle 7 to come in contact with the electrode 18, and hence close the electric circuit. In the said circuit is included an electromagnet 23. The said electromagnet forms part of the controlling mechanism of a steam-pressure-actuated mechanism for automatically closing the throttle-valve of the engine, which mechanism I will now describe.

A steam-cylinder 24 of suitable size is connected to the steam-feed pipe 25 of the engine by means of a pipe 26, in which is a valve 27, which serves to control the admission of steam from the feed-pipe 25 to the said cylinder 24. The said valve 27 is operated by a lever 28. In the cylinder 24 is a piston 29, which has a rack-rod 30, that projects through a guide 31 in the upper head 32 of the cylinder. The said head 32 is provided with bearings 33 for a shaft 34, which shaft is provided with a spur-gear 35, which is engaged by the rack-

rod 30, and said shaft is also provided with a sprocket-wheel 36. The throttle-valve of the engine, which is of the usual construction and is indicated at *c*, has its stem *d* provided with a spur-gear 37. A frame 38 of suitable construction is secured to the feed-pipe 25 of an engine by means of a suitable clamp 39 or other device and has bearings 40 for a shaft 41, which is provided with a spur-gear 42, that engages the gear 37 of the throttle-valve spindle. Said shaft 41 is further provided with a sprocket-wheel 43, which is connected to the sprocket-wheel 36 by means of an endless sprocket-chain 44. On the upper side of the piston 29 are cushioning-plungers 45, here shown as disposed on opposite sides of the rack-rod 30 and which enter the lower end of and coact with cushioning-cylinders 46, with which the head 32 of the cylinder 24 is provided to check the movement of the piston 29 when the latter is raised by the pressure of the steam admitted to the lower end of the cylinder by the valve 27 and cause the piston to be pneumatically cushioned, so as to prevent injury to any of the parts of the device. The cushioning-cylinders 46 are provided with petcocks 47 to control the escape of compressed air therefrom, as will be understood.

To the cylinder 24 is secured a supporting-bracket 48. A frame or support 49 is secured on the upper side of the bracket 48 and is covered by a casing 50, which is removable from the said bracket and is here shown as provided with screws 51 and nuts 52 to detachably secure it thereto. A bolt 53 has its lower end pivotally connected to the lever 28, as at 54, and is provided at its upper end with a shoulder 56, which overhangs a notch 57. A spring 58 serves when released to move the lever 28 to the position required to open the valve 27. Said spring is compressed when the lever is in the position required to close the said valve, and the said lever is locked in this position by means of a trigger 59, which has an arm 60 to engage the shoulder 56 of the bolt 53. Said trigger has an extended arm 61, is pivoted, as at 62, has a counterbalancing-weight 63 to normally maintain the arm 61 in an elevated position, and the downward movement of said arm is limited by a stop 64, with which the bracket 48 is provided. Pivotally connected to the frame or support 49 is a hammer 65. The said hammer has a weighted head 66 at its upper end provided with a striking portion 67, adapted to engage the head of the trigger-arm 61, and is further provided with a detent-shoulder 68. The armature 69 of the electromagnet 23 is carried by a detent-arm 70, which is pivoted to the frame 49, as at 71, has a point 72 to engage the shoulder 68 of the hammer 66 and normally maintain the latter in an elevated position, and said detent-arm is further provided with a counterbalancing-weight 73 to maintain the same in position to engage the hammer.

When the engine is running at the desired rate of speed, the lever 28 remains locked in its elevated position required to close the valve 27. When the speed of the engine becomes excessive and the electric circuit is automatically closed, as hereinbefore described, the action of the electromagnet 23 serves to attract the armature 69, and thereby raise the detent-arm 70, hence tripping the hammer 66, which falls and delivers a blow upon the arm 61 of the trigger, causing the latter to release the bolt 53, whereupon the spring 58 acts on the lever to cause the latter to open the valve 27 and admit steam to the cylinder 24. Thereupon the piston 29 is raised in the cylinder, causing the rack-rod 30 and the gear 35 to rotate the shaft 34. The motion of the said shaft is communicated to the shaft 41 by means of the sprocket-wheels 43 36 and sprocket-chain 44, and the gears 42 37 cause the motion of the shaft 41 to be transmitted to the spindle *d* of the throttle-valve and to close the latter, thereby stopping the engine. As the trigger is forced down by the blow of the hammer it closes the contact-points 74 of an electric circuit which includes an electric gong 75, thereby causing the said gong to be sounded to notify the engineer that the engine has stopped.

To enable the steam-pressure mechanism to be manually operated to cause the closing of the throttle-valve, I provide a push-pin 76, which when pressed upwardly contacts with the trigger 56 to cause the latter to release the bolt 53, as hereinbefore described.

To enable the controlling mechanism to be reset after the engine has stopped, I provide a crank-shaft 77, which has its bearings in the frame 49 and is provided with a handle 78, whereby it may be turned to cause it to engage and raise the hammer 65. When the hammer has been thus raised, the weights with which the trigger and detent are provided serve to restore them to their normally operative positions to lock the bolt and the hammer in position for operation.

From the foregoing description, taken in connection with the accompanying drawings, the construction and operation of the invention will be readily understood without requiring a more extended explanation.

Various changes in the form, proportion, and the minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of this invention.

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

1. In combination with a steam-operated mechanism to close the throttle-valve of a steam-engine, a valve to admit steam to said throttle-valve-closing mechanism, a spring to

open said valve, a locking-bolt for said valve, a trigger to hold said bolt in locking position, and means to disengage said trigger from said bolt.

2. In combination with a steam-operated mechanism to close the throttle-valve of a steam-engine, a valve to admit steam to said throttle-valve-closing mechanism, a spring to open said valve, a locking-bolt for said valve, a trigger to hold said bolt in locking position, a hammer to actuate said trigger, a detent to hold the hammer in operative position and having an armature, an electromagnet to attract said armature, and a centrifugally-operated circuit-closer for the circuit in which the electromagnet is included, substantially as described.

3. A steam-actuated throttle-valve closer for a steam-engine, comprising a cylinder, means to admit steam thereto, a piston in the cylinder, a rack-rod operated by the piston, a gear engaged by the rack-rod, and means to convey power from said gear to the throttle-valve to close the latter.

4. A steam-actuated throttle-valve closer for a steam-engine, comprising a cylinder, means to admit steam thereto, a piston in the cylinder, a rack-rod operated by the piston, a gear engaged by the rack-rod, means to convey power from said gear to the throttle-valve to close the latter, and means to cushion the piston at the end of its stroke.

5. A steam-actuated throttle-valve closer for a steam-engine, comprising a cylinder, means to admit steam thereto, a piston in the cylinder, a rack-rod operated by the piston, a gear engaged by the rack-rod, means to convey power from said gear to the throttle-valve to close the latter, and pneumatic means to cushion the piston at the end of its stroke.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

JOSEPH E. J. GOODLETT.

Witnesses:
C. E. MISMORQUE,
J. A. WATSON.