No. 710,155. Patented Sept. 30, 1902.

J. KARLIK & M. WITTE.

SAFETY APPLIANCE FOR ENGINES.

(Application filed Sept. 3, 1901.)

(No Model.) 4 Sheets—Sheet 1.

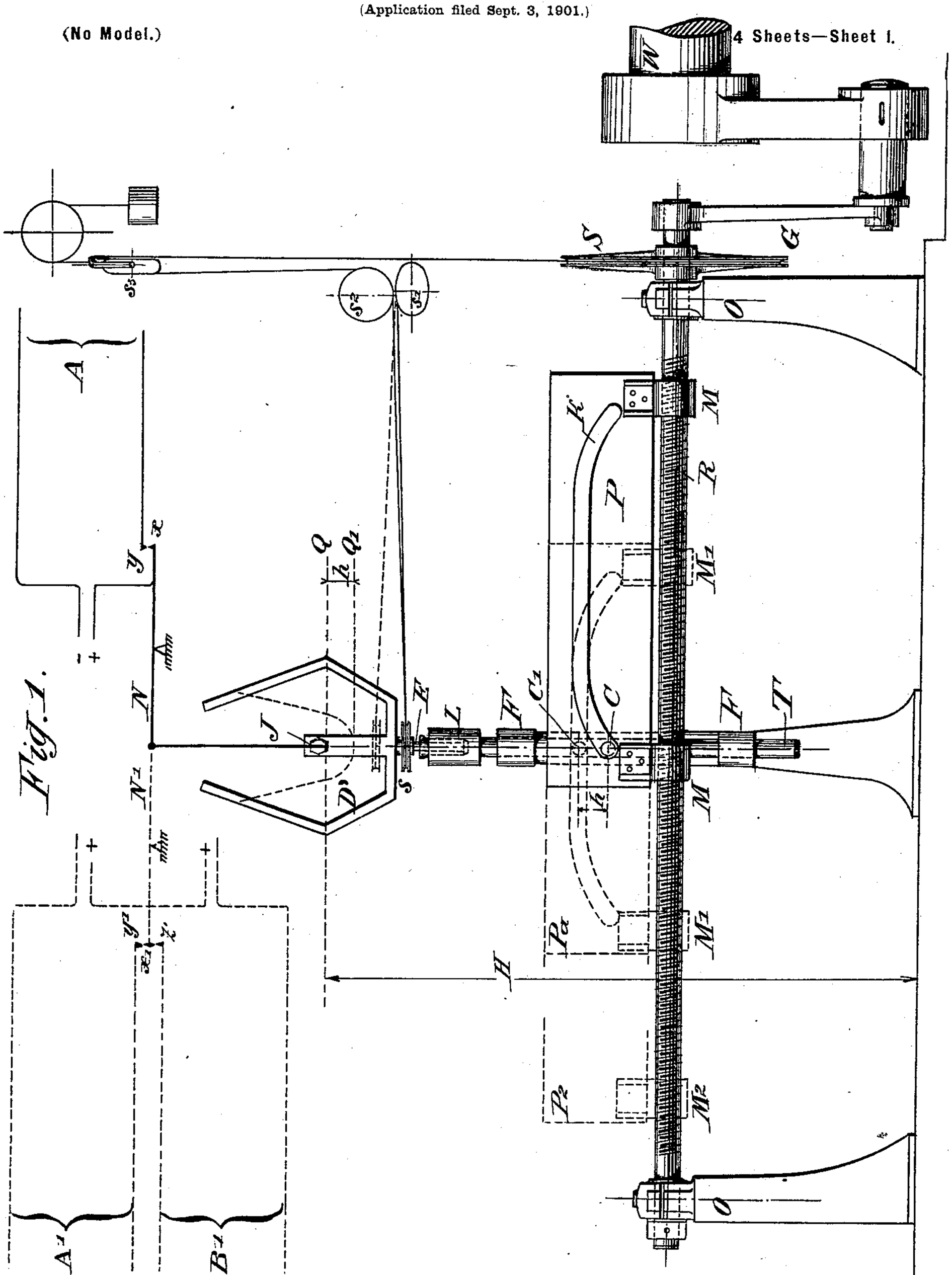

Fig. 1.

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Fig. 2.

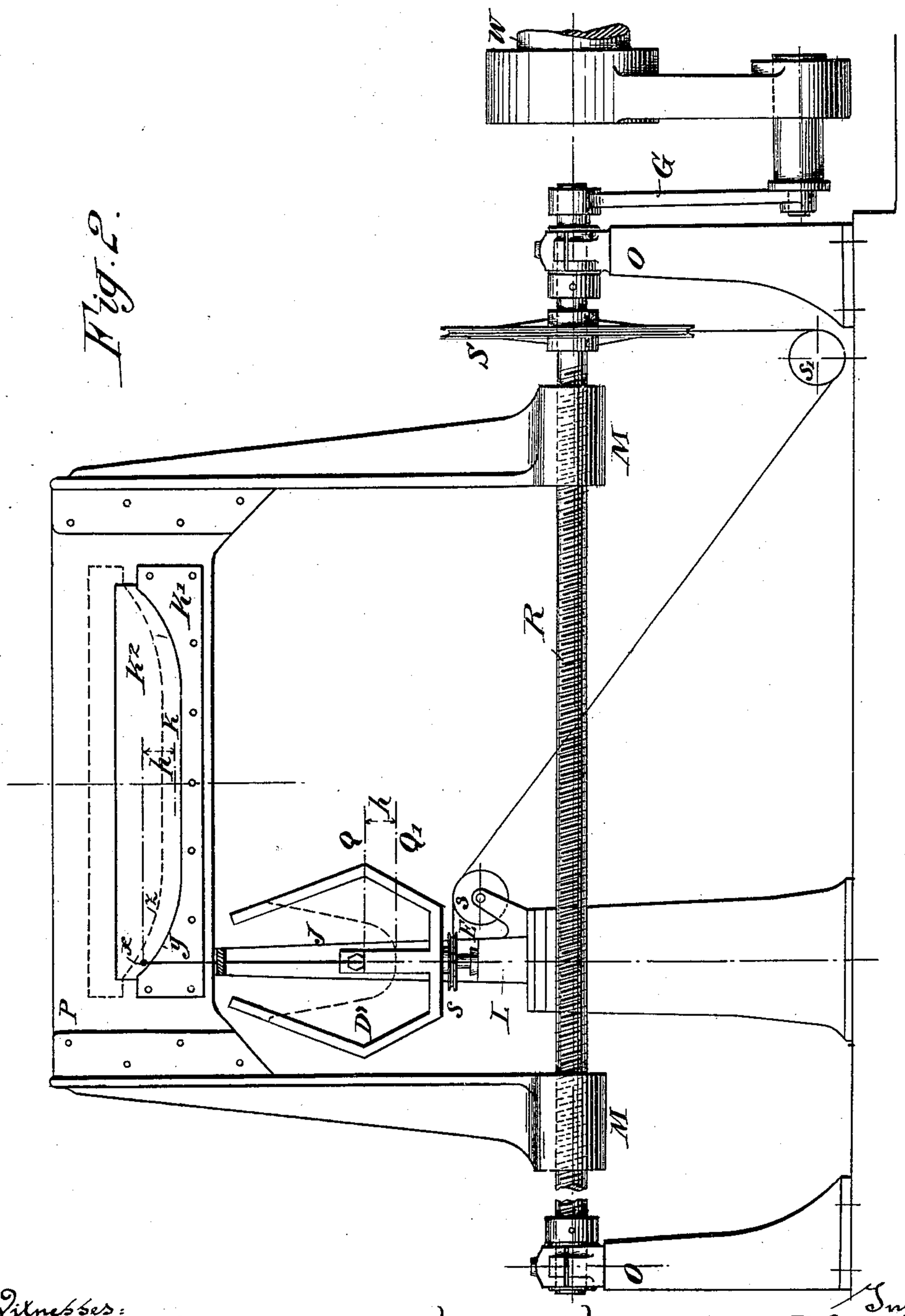

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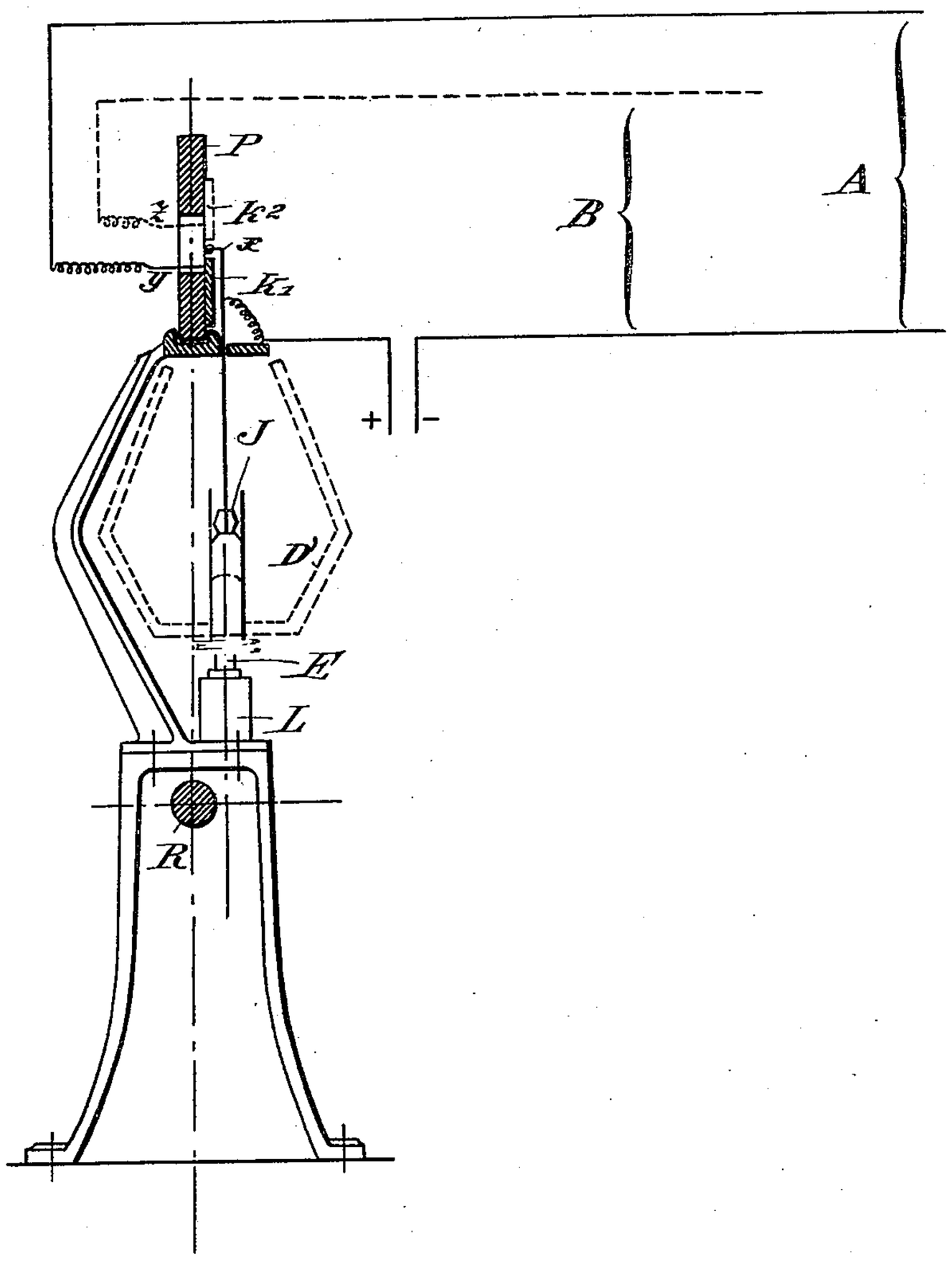
Fig. 3.



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(No Model.) 4 Sheets—Sheet 4.

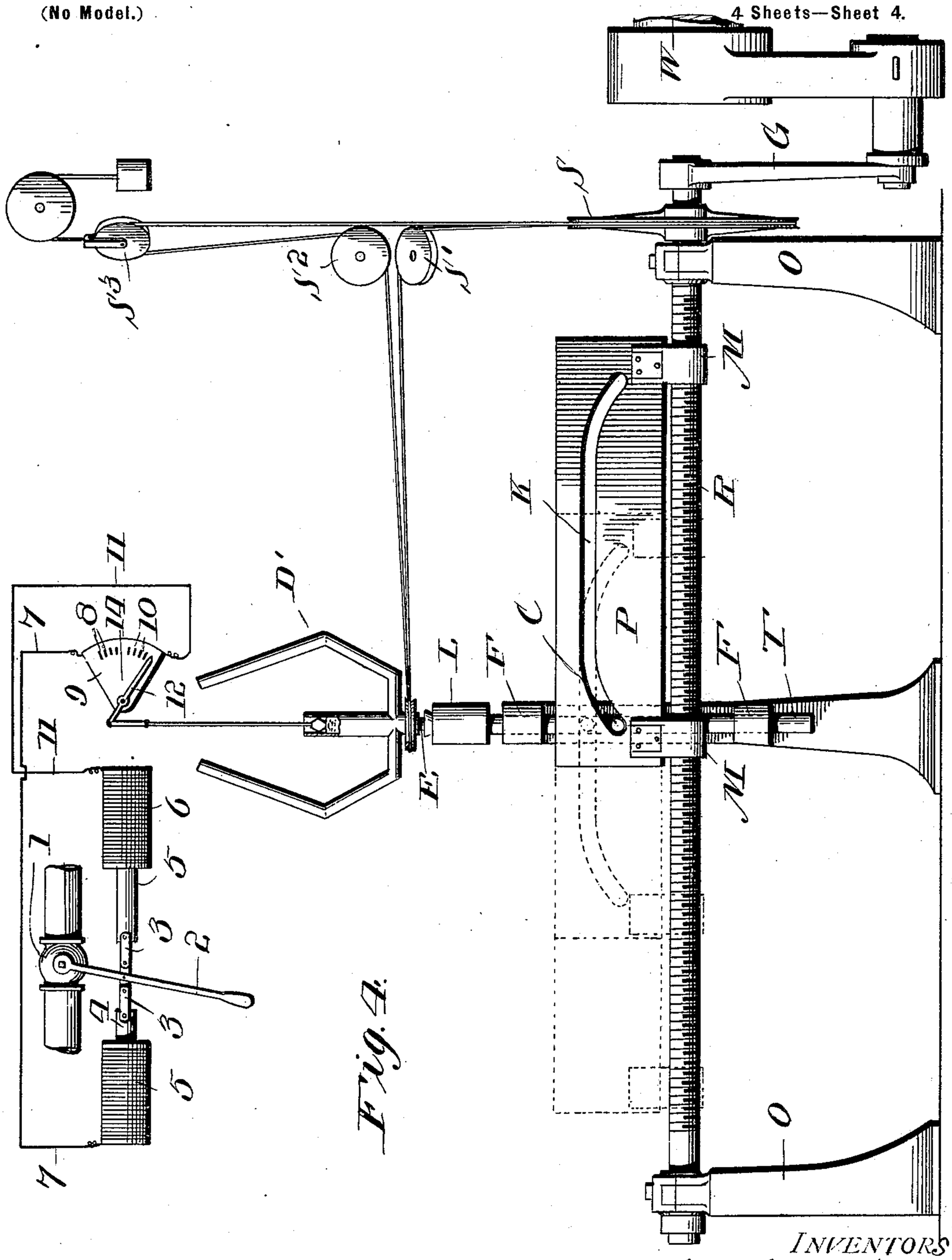

Fig. 4.

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UNITED STATES PATENT OFFICE.

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SAFETY APPLIANCE FOR ENGINES.

SPECIFICATION forming part of Letters Patent No. 710,155, dated September 30, 1902.

Application filed September 3, 1901. Serial No. 74,194. (No model.)

To all whom it may concern:

Be it known that we, JAROSLAV KARLIK, a subject of the Emperor of Austria-Hungary, and a resident of Gottesberg, Silesia, and MARTIN WITTE, a subject of the Emperor of Germany, and a resident of Waldenburg, Silesia, Germany, have invented certain new and useful Improvements in Safety Appliances for Engines, of which the following is a specification.

The object of this invention is a safety appliance for engines consisting of two devices connected to the engine—namely, a curved part moved horizontally by the engine and a three-branched tube rotated by the engine around a vertical shaft and working in the well-known manner. These devices coöperate, so that when the engine works in an irregular manner electric circuits are closed by means of a contact actuated by the mercurial level, the currents thus produced causing the engine-brakes to act or operating the steam-admission valve and eventually the distribution device, so that the engine is stopped immediately or its motion is regulated. The aforesaid curved part is so constructed that as long as the motion of the engine is regular the ordinates of the curve correspond to the level of the mercury contained in the middle division of the before-named three-branched tube which is rotated. If the exact speed of the engine is not maintained, a difference is produced between the level of the mercury in the three-branched tube and the ordinate of the curve. The electric circuits are thereupon closed by means of a contact actuated by a float resting on the surface of the mercury, these electric circuits immediately causing the modifications hereinbefore mentioned in the speed of the engine. Should it be necessary—as, for example, in hauling-engines—to cause the brakes to act immediately and without loss of time when the speed exceeds that required, the tension of an explosive gas ignited by an electric current is used as a force by means of which the brakes are actuated.

The principle of this invention may be carried out in various ways.

In the accompanying drawings, Figure 1 shows a manner of executing this invention in which the tube D′ is actuated by the curved part K′. Fig. 2 shows a side view of a different form of execution of this device. Fig. 3 shows a front view of the device represented in Fig. 2. Fig. 4 is a side elevation showing a means for controlling the steam-admission valve.

To the main shaft W is coupled, by means of a crank G, a screw-threaded shaft R, rotating in the bearings O O and which is provided with two nuts M M. The nuts M M are provided with a vertical plate P, the indent K of which is in the form of a curve obtained by taking as abscissa the depth of the mine-shaft and as ordinates the speeds corresponding to the momentary level of the cage. For one of the ascents the plate P^a moves from the extreme position P, passing through the mean position P′ to the other extreme position P^2. In the other ascent the reverse action takes place. In the indent K slides a bolt C, fixed to a rod T, which at each ascent moves, owing to the indent K being in the shape of the arc of a circle, from its lowermost position C to its highest position C′, to return afterward to C. In this way the rod T, guided by the two collars F F, is moved downwardly. The rod T is provided at its uppermost part with a bearing L, in which is placed the bearing E of the three-branched tube D′, filled with mercury. This tube D′ is rotated by the disk S, fitted to the screw-threaded shaft R by means of guide-rollers s' s^2, the tension-roller s^3, and the roller s, fixed to the bearing E and working in the usual manner—that is to say, the level of the mercury descends in the middle division proportionately to the rotative speed of the tube D′, while the mercury rises in corresponding degree in the two lateral tubes.

At the commencement of an ascent the tube D′ begins to rotate and the level of the mercury in the middle division falls. This fall, however, is only relative, because in the meanwhile the tube D′ has been raised by the indent K moving laterally in proportion to the fall of the mercury. The actual level of the mercury remains, therefore, the same during an ascent effected in a regular manner. It is only when the desired speed is exceeded that the mercury descends lower than the

curve K has risen. The measure H decreases and the contact-stud x, connected by the lever N to the float J, touches the contact-stud, whereby the electric current is closed in the circuit A and immediately causes the steam-brake to operate.

Instead of the contact $x\,y$ a double contact $x'\,y'\,z'$ may be provided, and thus the device for automatically controlling the engine may be used, the circuit A′ being closed when the speed becomes too great, the circuit B′ being closed when the speed is insufficient. The circuit A′ also effects, by means of well-known appliances, the closing of the steam-valve, while the circuit B′ opens it—that is to say, these two currents actuate the controlling-lever in opposite directions.

Figs. 2 and 3 show a method of execution in which the contact y is curved. In this case the tube D′, rotated by the screw-threaded shaft R, is neither raised nor lowered, but remains stationary, and the screw-threaded shaft R imparts, by means of two nuts M M, a reciprocating motion to a metal plate K′ for each ascent of the engine. This metal plate is shaped to agree with the above-described speed curve, and it is arranged upon a suitable insulating-plate P. This metal plate as well as the float-spindle with the contact x are movably connected to the circuit A and operate in the before-described manner. If the desired speed is exceeded, the contact x touches the contact-plate K′ and the circuit A becoming operative the brake is closed. An upper contact-plate K^2 may also be arranged to close the circuit B when the speed is insufficient, and thus produce an increase of speed. In this form of execution the circuit A does not immediately cause the engine to stop, but only slackens the speed.

The latter form of execution may be applied to engines which have to furnish a uniform number of revolutions. The contact curve y of the lower contact-plate K′, as well as the curve x of the upper contact-plate K″, become straight lines which are parallel to the screwed shaft R. The lateral movement of the contact-plates is therefore dispensed with and the latter may be replaced by fixed contact-studs, as shown in Fig. 1. In this case the circuit A, if the number of revolutions of the engine is too great, causes a slackening of the speed. The circuit B, on the contrary, increases the speed.

In Fig. 4 of the drawings is illustrated a means for controlling the steam-admission valve 1, the lever 2 being connected thereto, as shown. Pivoted to the lever 2 are links 3 3, which are also pivoted to the cores 4 5, operating within the magnets 5 6. The magnet 5 has connected thereto a wire 7, which is connected to the contact-points 8, the latter, of course, being unconnected to each other. The plate 9 is of course formed of insulating material, and also carries a second series of contact-points 10, which are connected to the magnet 6 through the medium of wire 11. Pivoted onto plate 9 is a contact-finger 12, connected to the float J, as shown. When the mercurial tube is in motion, the mercury will naturally, owing to centrifugal force, enter the outer arms of the tube and permit the float to descend, thereby actuating the contact-finger and completing the circuit and causing the core 5 to move inwardly, thereby pulling the lever and partially opening the valve. When the contact-finger, owing to the further descent of the mercury in the central tube, has reached the point 14, the current will be cut off from the magnet 6 and the valve at that time will be wide open. Should, however, the engine have too great a speed when the valve is in this position, the mercury and float will descend farther and cause the contact-finger to engage one of the contact-points 8, energizing the magnet 5 and causing the lever to partially close the valve.

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

1. In a safety appliance for engines, a screw-threaded shaft or rod connected to the crank thereof, a plate having a detent form therein mounted on said rod, and a vertically-movable shaft carrying means engaging in said detent, and a three-branched mercurial tube at its upper end, means connected to said rod or shaft for actuating said vertical rod, and means operating in the middle of said three-branched mercurial tube for establishing an electrical current, substantially as described.

2. In a safety appliance for engines, a screw-threaded rod connected to the crank thereof, a plate having a detent formed therein and carrying nuts engaging said screw-threaded rod, a vertically-movable shaft carrying a bolt operating in said detent, a mercurial three-branched tube carried at the upper extremity of said shaft, a pulley carried by said shaft, a pulley carried by the said screw-threaded rod and connected to said first-named pulley, and a float operating in the middle of said three-branched mercurial tube and suitably connected in an electrical contact.

In testimony that we claim the foregoing as our invention we have signed our names in presence of two subscribing witnesses.

JAROSLAV KARLIK.
MARTIN WITTE.

Witnesses:
HERMANN BARTSCH,
ALBERT SCHENK.