No. 771,610. PATENTED OCT. 4, 1904.

F. H. CHAPMAN.

POWER REGULATING MECHANISM.

APPLICATION FILED MAY 25, 1904.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 2.

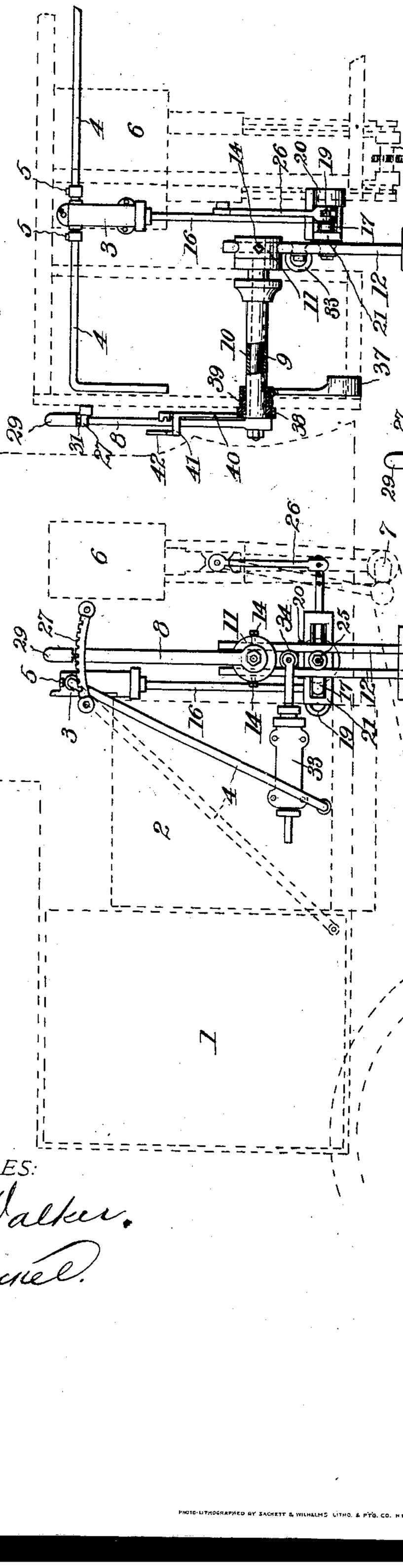

Fig. 3.

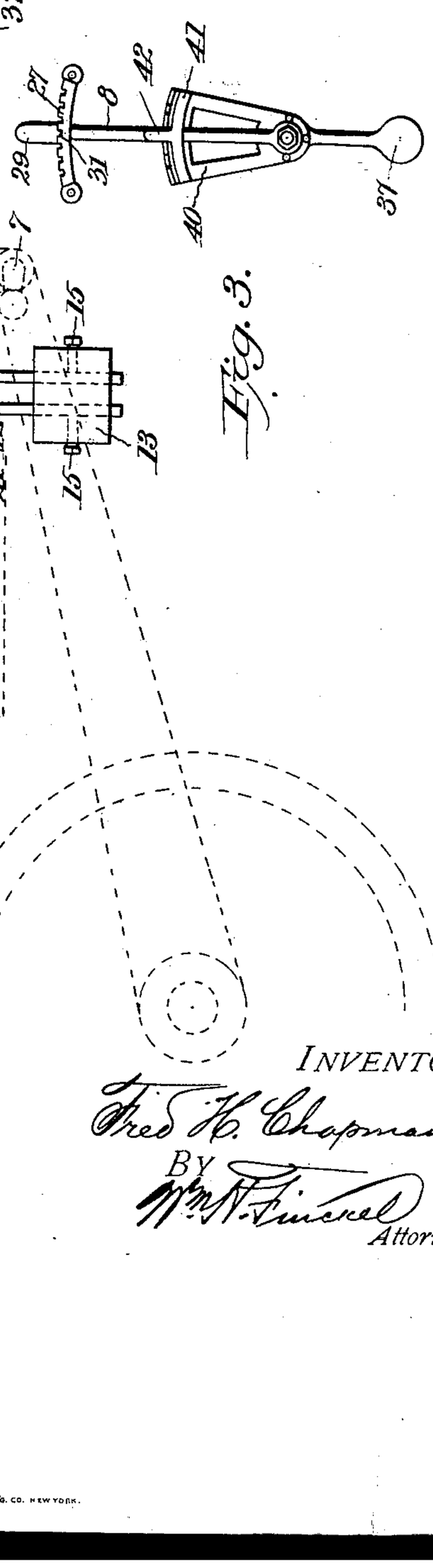

Fig. 1.

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INVENTOR

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BY

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Attorney

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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 5.

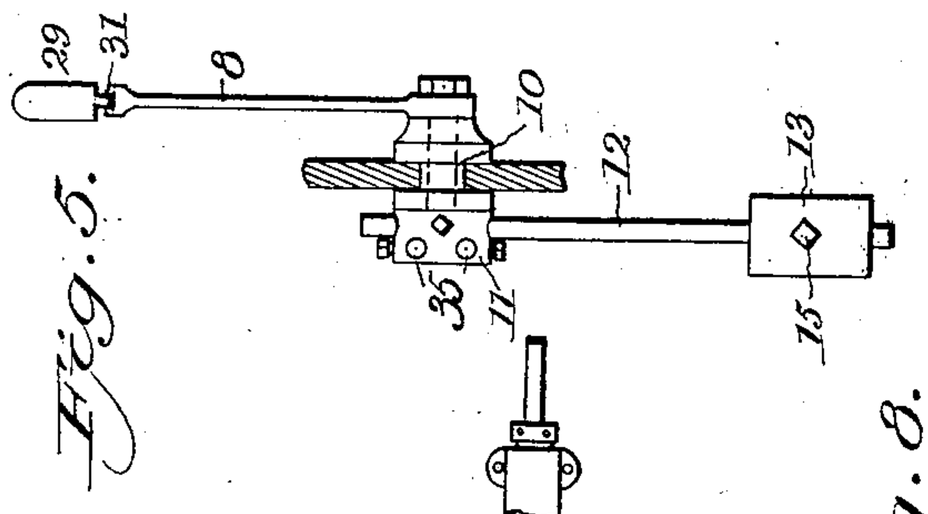

Fig. 4.

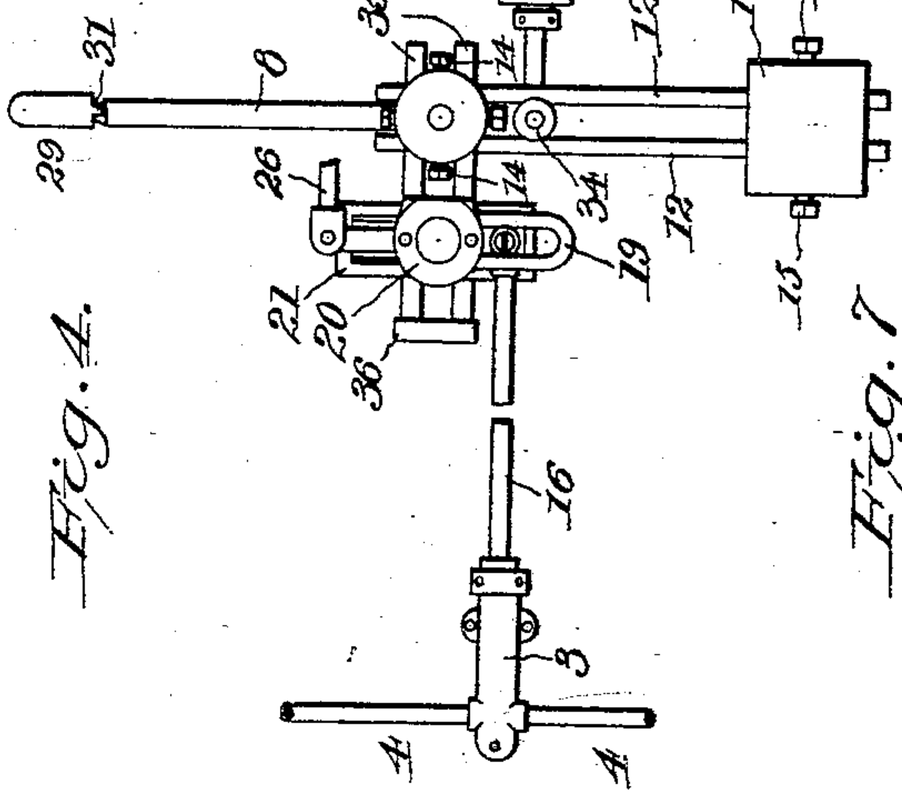

Fig. 6.

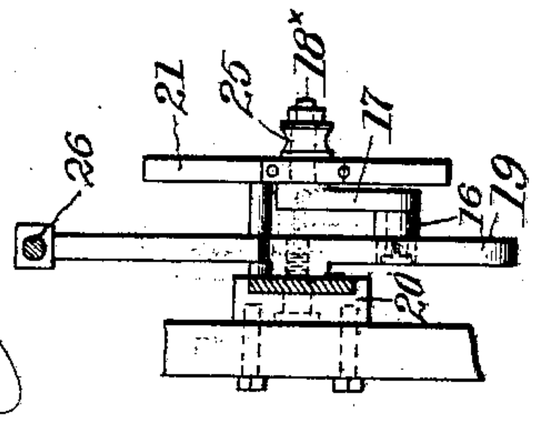

Fig. 14.

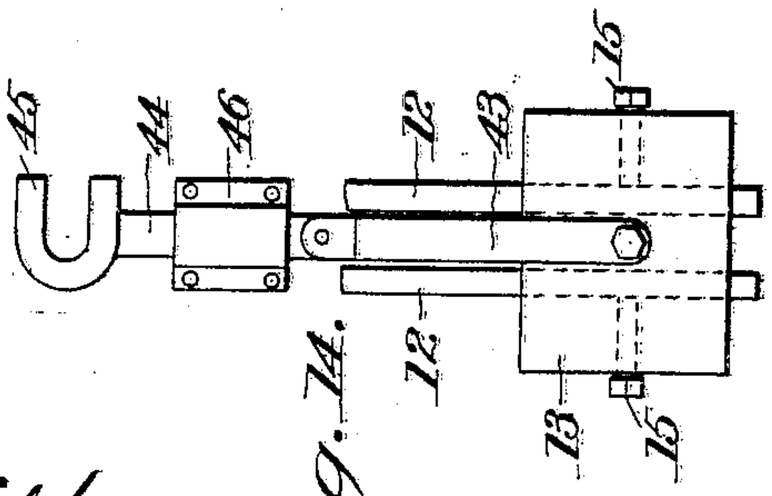

Fig. 8.

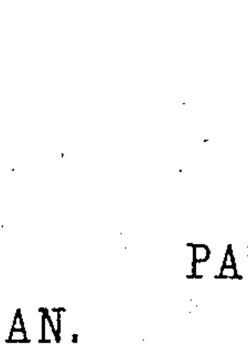

Fig. 7

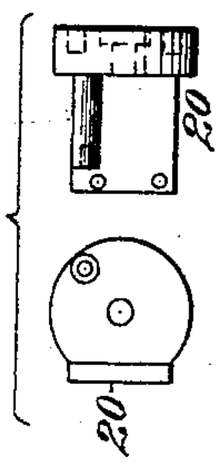

Fig. 12. Fig. 13.

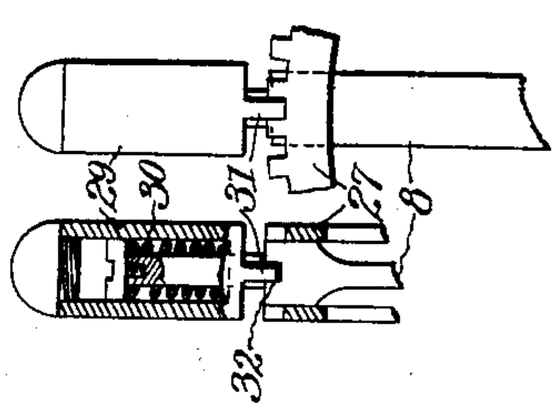

Fig. 11.

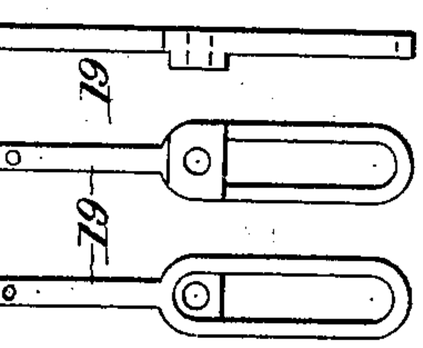

Fig. 9. Fig. 10.

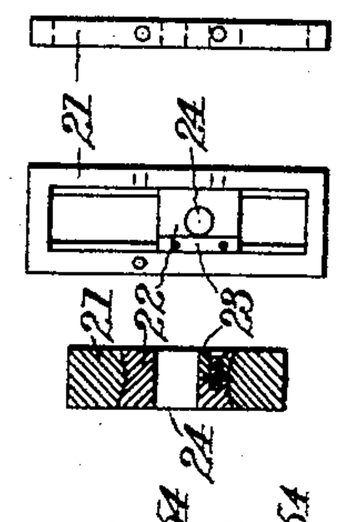

Fig. 15.

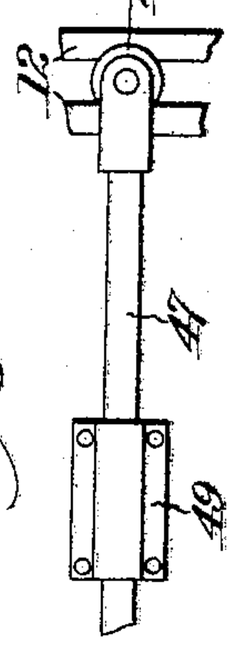

Fig. 16.

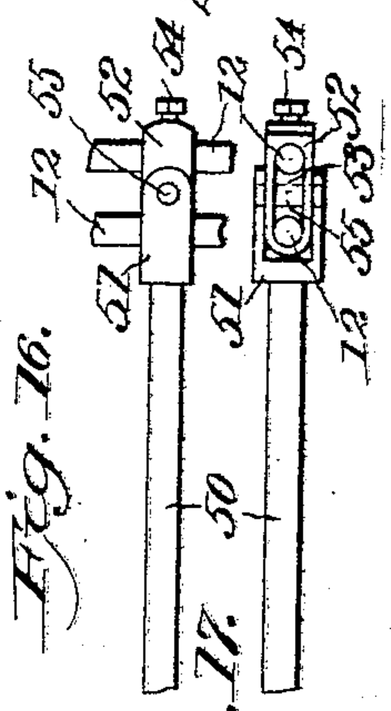

Fig. 17.

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No. 771,610. Patented October 4, 1904.

UNITED STATES PATENT OFFICE.

FRED H. CHAPMAN, OF GROTON, MASSACHUSETTS.

POWER-REGULATING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 771,610, dated October 4, 1904.

Application filed May 25, 1904. Serial No. 209,768. (No model.)

To all whom it may concern:

Be it known that I, FRED H. CHAPMAN, a citizen of the United States, residing at Groton, in the county of Middlesex and State of Massachusetts, have invented a certain new and useful Improvement in Power-Regulating Mechanism for Motor-Vehicles, of which the following is a full, clear, and exact description.

The object of this invention is to provide a gravity mechanism for controlling the power mechanism of motor-vehicles, tram-cars, and the like—as, for instance, regulating the supply of water to a flash-boiler or other steam-generator in accordance with the steam consumption and controlling the speed and power of vehicles propelled by gas, electric, and hydraulic motors.

The invention consists of a gravity mechanism applicable to the power appliances of a motor-vehicle, car, or other apparatus which operates automatically or may be controlled by hand, all as I will proceed now more particularly to set forth and finally claim.

In the accompanying drawings, illustrating the invention, in the several figures of which like parts are similarly designated, Figure 1 is a side elevation showing the application of the invention in connection with a vertically-arranged steam-engine for propelling a motor-vehicle, a portion of the vehicle being shown in conventional form, the counterbalancing device of Figs. 2 and 3 being omitted. Fig. 2 is a front elevation, partly in section, showing the invention of Fig. 1 in connection with the counterbalancing device. Fig. 3 is a side elevation of the counterbalancing device detached. Fig. 4 is a side elevation showing the invention arranged for a horizontal engine. Fig. 5 is a front elevation of the hand-lever, weight, and adjustable-crank attachment of Fig. 4. Fig. 6 is a sectional elevation, on a larger scale, showing the parts of the adjustable crank assembled. Fig. 7 is an end and side elevation, on a larger scale, of the bracket for attaching the adjustable crank to the vehicle. Fig. 8 is an elevation, on a larger scale, of the crank, showing the roller and pump-rod connection detached and in section. Fig. 9 is a front elevation and edge view, on a larger scale, of the crank-frame and its sliding block. Fig. 10 is a cross-section, on a larger scale, of the sliding block and frame of the adjustable crank. Fig. 11 is a front, rear, and edge view, on a larger scale, of the slotted rock-lever of the crank attachment. Fig. 12 is a longitudinal section, on a larger scale, of the locking and releasing handle for the shifting lever, the lever being in the released position. Fig. 13 is a side elevation, on a larger scale, of the locking and releasing handle, the parts being in the locked position. Fig. 14 is a side elevation showing the direct application of the weight for hydraulic propelling power. Fig. 15 is a side elevation showing another form of the direct application of the weight by means of a roller connection. Fig. 16 is a side elevation, and Fig. 17 a top plan view, showing a direct application of the weight by means of a pivotal connection.

In Figs. 1 and 2 the invention is shown as applied to a motor-vehicle propelled by steam. 1 is the water-tank; 2, the boiler; 3, the pump for supplying water to the boiler through pipe connections 4 with the water-tank, said pipes having the necessary check-valves 5. 6 is the engine connected to driving-shaft 7. 8 is a hand-lever suitably mounted upon the body of the vehicle within convenient reach of the operator and connected with a shaft 9, rotatably mounted upon the vehicle. As shown in Fig. 2, the shaft 9 extends through the side of the vehicle and is supported in a suitable sleeve or bushing 10, mounted in the body of the vehicle, and at its inner end the shaft 9 is provided with a hub 11, adapted to be rotated thereby. Suspended from the hub 11 by means of two rods 12 is a weight 13. The hub 11 and the weight 13 are provided with holes for the passage of the rods 12, and said parts are adjustably secured together by means of set-screws 14 and 15 or other suitable fastenings in the hub and weight, respectively. The rods 12 are suitably spaced apart to adapt them to receive various connections or attachments for operating the controlling parts of various kinds of power machinery, as will be hereinafter pointed out. The rods 12 are connected with the piston-rod 16 of the pump 3 by means of an adjustable crank mechanism

comprising the crank 17, Fig. 8, having one of its arms, 18, slidably mounted by means of a roller bearing in a slotted rocking lever 19, Fig. 11, supported in the vehicle by means of a bracket 20, Fig. 7. Also secured to the bracket 20 is a slotted frame 21, having the longitudinal edges of its slot of substantially V shape, and arranged within said frame is a sliding block 22, having its edges grooved to correspond with the edges of the slotted frame. In order to assemble the sliding block and its frame and secure the block 22 within the frame, one of the edges of the block, as 23, Fig. 10, is made detachable and secured in place by screws or other suitable fastenings. The block 22 is provided with a central perforation 24 to receive the other arm, $18^{\times}$, of the crank 17, and said arm $18^{\times}$ passes through the block 22 and is adapted to receive a roller 25, Fig. 6, for connection with its operating device, and, as shown in Figs. 1 and 2, said roller 25 is arranged between the rods 12 of the weighted shifting lever. The rocking lever 19 receives its motion from a rod 26, connected therewith and with the cross-head of the engine. The pump-rod 16 is connected to and receives its motion from the crank-arm 18. The hand-lever 8, connected with the shaft 9, extends upwardly through a slotted segmental rack 27 and at its upper operating end is provided with a rotatable hand-grip 29, fitted over the end of the lever and provided with a spring 30 for forcing it into engagement with the rack. The hand-grip 29 is provided with diametrically opposite teeth 31, adapted to engage the rack when in alinement therewith and adapted to be turned and supported upon the lever in suitable notches 32 therefor and out of engagement with the rack to permit a free movement of the hand-lever when desired.

A cushioning device 33 is arranged upon the body of the vehicle and is connected with the weighted attachment by means of a roller or sliding connection 34, arranged between the rods 12, by which jarring or vibration of the weighted attachment is prevented when the vehicle is running over rough roads. I have herein shown the cushioning device as of the hydraulic type, comprising a cylinder to contain oil or other fluid and a ported piston working in the cylinder. (See Fig. 4.)

Where the apparatus is to be used in connection with the vehicle propelled by a horizontally-arranged steam-engine, the pump is arranged horizontally and the pump-rod and the engine connection with the adjustable-crank mechanism are also arranged horizontally, and in order to make proper connections of these parts with the shifting lever I provide a right-angled attachment for the shifting lever, as shown in Fig. 4, and in this figure all the parts shown are the same as the corresponding parts above described excepting the right-angled attachment, which comprises two rods 35, rigidly connected at one end by a head 36 and suitably spaced apart and adapted to be attached to the hub 11 by passing said rods through holes therein and adjustably securing them in place by screws or other suitable fastenings. The rods 35 of this right-angle attachment are adapted to receive the roller 25, mounted on the arm $18^{\times}$ of the adjustable crank 17, and it will be observed that by the rotation of the hub 11 through the hand-lever or through the weighted attachment the rods 35 are raised or lowered, as the case may be, and the crank adjusted to vary the stroke of the pump.

In Figs. 2 and 3 I have shown a counterbalancing attachment for the weighted lever, comprising in its preferred form a weight 37, connected to a collar 38, loosely mounted upon the sleeve 10 and supported in a bushing 39, secured in the body of the vehicle. Secured to the collar 38 is a segmental spring-locking lever 40, having a series of notches in its upper edge and provided with a guard 41, inclosing the lever 8, and said lever 8 is adapted to be engaged by one or the other of the notches in the segmental lever to thereby lock the levers 8 and 40 together, and through such connection the counterbalancing effect of the weight 37 is transmitted to the weight 13 through shaft 9. The segmental lever 40 is provided with a handle 42, by which said lever may be pressed inwardly and disengaged from the hand-lever 8 and adjusted to thereby change the position of the locking-lever from one notch to another, and thus produce the desired effect of the counterbalancing-weight 37.

The operation of the regulating mechanism is as follows: The engine being in operation and the vehicle traveling upon a level road of medium condition and requiring a normal driving or propelling power, the parts are maintained in the position indicated in Figs. 1, 2, and 4—that is to say, the hand-lever 8 and the weight 13 and its rods 12 are maintained in a substantially vertical position, either by the weight 13 through the action of gravity or by engaging the teeth 31 of the hand-grip 29 with the rack 27. The boiler is supplied with water by the pump 3, its piston receiving its motion from the cross-head of the engine through the pump-rod 16, crank 17, rocking lever 19, and connecting-rod 26. When the hand-grip 29 is turned to disengage its teeth 31 from the rack 27 and the weight 13 is depended upon to maintain the parts in equilibrium when in operation, the cushioning device 33 will serve to prevent the oscillation of the rods 12 and their attached weight 13, and thus avoid irregularity in the operation of the pump, which would otherwise occur through oscillation of the parts due to irregularities in the road or momentum of the vehicle. When running upon roads of different conditions—such as muddy or sandy roads, medium roads, and State or extremely

good roads—it is desirable to provide a driving or propelling power to suit the several conditions, and this is obtained by adjusting the counterbalancing-weight 37. When running on medium roads, the counterbalancing-weight 37 is maintained in its central position or in alinement with the weight 13 by locking the hand-lever 8 in the central notch of the locking-lever 40, and thus the counterbalancing-weight has no effect upon the weight 13, and the engine and propelling machinery will run under normal conditions. When running on muddy or sandy roads, it is desirable to increase the propelling power, and to obtain this increase of power the locking-lever 40 is disengaged from hand-lever 8 and the hand-lever 8 placed in the notch to the right, Fig. 3, of the center notch, and the weight 37, having thus been thrown off the center of gravity, exerts its power on the lever 8 and through shaft 9 shifts weight 13 and its supporting-rods 12, and thus the crank 18 is shifted or adjusted in the slotted rocking lever 19, thereby increasing the radius of the pump-rod connection with the rocking lever 19 and increasing the stroke of the pump and causing the pump to supply an increased quantity of water to the boiler for the production of sufficient steam to effect an increased propelling or driving power by the engine. If the locking-lever 40 is engaged with the hand-lever 8 by its notch to the left, Fig. 3, of the central notch, the operation just described will be reversed and the stroke of the pump decreased, and consequently the driving or propelling power decreased, which adjustment is desirable when the vehicle is running upon good roads. When the vehicle is being operated under these conditions, the hand-lever 8 is left free to swing by disengaging the hand-grip 29 from the rack 27 and the parts maintained in equilibrium by the action of gravity upon the weight 13, and the parts are prevented from jarring or oscillating when running over obstructions or irregularities in the road by means of the cushioning device 33, hereinbefore referred to. When running on roads having considerable grades, the hand-lever 8 is left free to swing as above described, and when the vehicle approaches such grades the weight 13, due to the inclination of the body of the vehicle, will act to shift the regulating mechanism to increase or diminish the driving or propelling power of the engine in accordance with the inclination of an ascending or descending grade, respectively.

I have shown and described my invention in connection with a motor-vehicle propelled by steam-power, in which a pump and a shifting or adjustable crank mechanism are used in connection with the weighted lever, and I wish to be understood as not limiting the invention to this combination of devices, as it is equally applicable to other power machinery and to power-propelled vehicles of types other than those commonly known as "motor-vehicles," and I have herein shown in Figs. 14, 15 and 16, 17 several forms of motion attachments for use in connection with various kinds of motors or machines. In Fig. 14 a rod or link 43 is connected directly with the weight 13, and said rod 43 is loosely jointed with and adapted to reciprocate a connecting-rod 44, provided with a U-shaped coupling or connection 45 at its end, said rod 44 being guided in its movement by a guide-plate 46. It will be observed that inasmuch as the weight is connected directly to and in line with the rod 44 any movement of the weight to the right or the left of the rod 44 will have the same and not a different influence on the connected mechanism, as in the instances previously described, since as weight 13 moves aside from rod 44 said rod will be drawn down. This construction may be used for regulating the speed in hydraulic propelling power, and by means of it the speed may be reduced in both descending and ascending grades. In Fig. 15 a rod 47 is connected directly with the rods 12 by means of a grooved roller 48, interposed between said rods, the rod 47 being mounted to reciprocate in a guide-plate 49. In Figs. 16, 17 a rod 50, having a forked end 51, is pivotally connected with the rods 12 by means of a clamping device comprising a yoke 52, inclosing the rods 12, and a filling-block 53, interposed between the rods 12 within the yoke or loop. A set-screw 54 is provided for binding these parts upon the rods 12. The yoke and filling-block are provided with perforations to receive a pin or bolt 55 for connecting the forked end of the rod 50 with the clamping device and serving as a center of motion for the rod 50. These several attachments are designed for use in connection with various kinds of propelling motors or machines—such as electric, hydraulic, gas, or other power machines or motors—and the attachments may be used wherever found desirable and applicable to the controlling or regulating mechanism of such machines or motors. The weight 13 and the right-angled attachment 35 36 may be adjusted whenever desired or necessary by simply loosening their fastening devices and sliding their respective rods in the holes in the hub 11. The weight 13 may also be adjusted by loosening its fastening-screws and sliding it upon the rods 12. The cushioning device 33 permits an easy and gradual movement of the weight 13 upon the inclination of the body of the vehicle as it ascends or descends a grade.

The hand-lever 8 may be omitted and the weighted attachment depended upon solely to operate the regulating mechanism, and I wish to be understood as not limiting my invention to the use of the weighted attachment in connection with a hand-lever.

While a steam-boiler is conventionally rep-

resented and herein so described, it is to be understood that by that term or the term "generator" I mean to include a steam-producing apparatus generally suitable for the purposes presently in hand.

What I claim is—

1. In a power-regulating mechanism for motor-vehicles and the like, a hand-lever, a shaft to which said hand-lever is connected, and a motor mechanism, including a regulator, combined with a gravity attachment, comprising a weight suspended from and rigidly connected with said shaft, and connections between said gravity attachment and the regulator of the motor mechanism, whereby said motor-regulator may be positively operated by hand, or automatically as the vehicle ascends or descends a grade.

2. In a power-regulating mechanism for motor-vehicles and the like, a hand-lever, a shaft to which said hand-lever is connected, a weight suspended from and rigidly connected with said shaft, a pump and a pump-rod, and an adjustable crank interposed between said pump-rod and the hand-lever and weight, whereby the stroke of the pump may be varied either by hand as desired, or automatically as the vehicle ascends or descends a grade.

3. In a power-regulating mechanism for motor-vehicles and the like, a hand-lever, a rack adjacent to said hand-lever, a shaft to which said hand-lever is connected, a weight suspended from and rigidly connected with said shaft, connections between said weight and the motor-regulating mechanism, and a hand-grip movably connected with said hand-lever and adapted to be fixedly engaged with and disengaged from said rack, whereby the regulating mechanism may be arranged to be positively operated either by hand as desired, or automatically as the vehicle ascends or descends a grade.

4. In a power-regulating mechanism for motor-vehicles and the like, a hand-lever, a rack adjacent to said hand-lever, a shaft to which said hand-lever is connected, a weight suspended from and rigidly connected with said shaft, connections between said weight and the motor-regulating mechanism, and a rotatable hand-grip secured to said lever and provided with teeth adapted to engage said rack, and a spring interposed between said hand-grip and hand-lever to hold said hand-grip in engagement with and disengagement from said rack, whereby the regulating mechanism may be arranged to be operated either by hand as desired, or automatically as the vehicle ascends or descends a grade.

5. In a power-regulating mechanism for motor-vehicles and the like, a lever, means for operating said lever, a pump and pump-rod, and an adjustable connection interposed between said lever and pump-rod, and comprising a rock-lever having one arm connected with the motor and provided with a slot in its other arm, a stationary frame, a sliding block in said frame, a crank having one arm connected with said sliding block and its other arm fitted to slide in the slotted arm of said rock-lever and connected with the pump-rod, and connections between the lever and said sliding block for adjusting said block to thereby vary the stroke of the pump.

6. In a power-regulating mechanism for motor-vehicles and the like, a hand-lever, a shaft to which said lever is connected, a hub on said shaft, rods adjustably fitted in said hub, a weight adjustably secured to and suspended by said rods, and connections between said rods and the motor-regulating mechanism.

7. In a power-regulating mechanism for motor-vehicles and the like, a hand-lever, a shaft to which said lever is connected, a weight suspended from and rigidly connected with said shaft and adapted to maintain the mechanism in equilibrium when the lever is free to move, and a counterbalancing device for said suspended weight, comprising a weight loosely suspended from said shaft, a locking-lever connected with said weight and adapted to engage said hand-lever in adjusted positions, to thereby maintain the regulating mechanism in various adjusted positions for varying the power in accordance with the different conditions of roads.

8. The combination of a steam-engine, a steam-generator therefor, a water-tank and pump for supplying water to said steam-generator, connections between said engine and pump for operating the pump, including an adjustable crank, a hand-lever, a shaft to which said lever is connected, a weight suspended from and rigidly connected with said shaft, and connections between said weight and adjustable crank for adjusting said crank, to thereby vary the stroke of the pump either by hand as desired, or automatically by the action of gravity.

9. The combination of a steam-engine, a steam-generator therefor, a water-tank and pump for supplying water to said steam-generator, connections between said engine and pump for operating the pump, including an adjustable crank, a hand-lever, a shaft to which said lever is connected, a weight suspended from said shaft, a right-angled attachment connected with said shaft, and connections between said right-angled attachment and the adjustable crank for adjusting said crank to thereby vary the stroke of the pump either by hand as desired, or automatically by the action of gravity.

In testimony whereof I have hereunto set my hand this 21st day of May, A. D. 1904.

FRED H. CHAPMAN.

Witnesses:
THOS. MANNING,
JOHN A. HEALY.