

No. 637,252.

Patented Nov. 21, 1899.

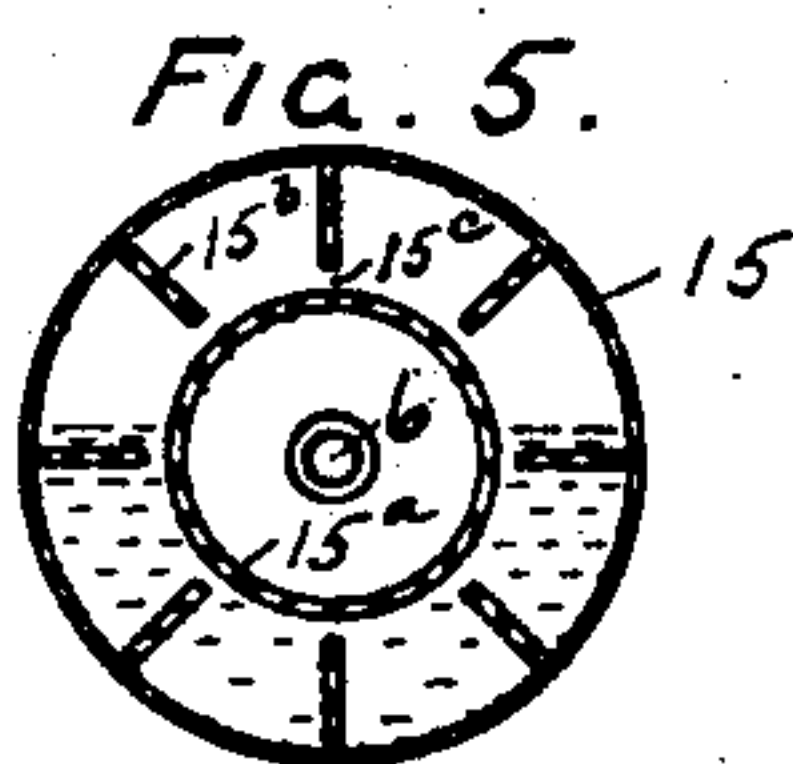
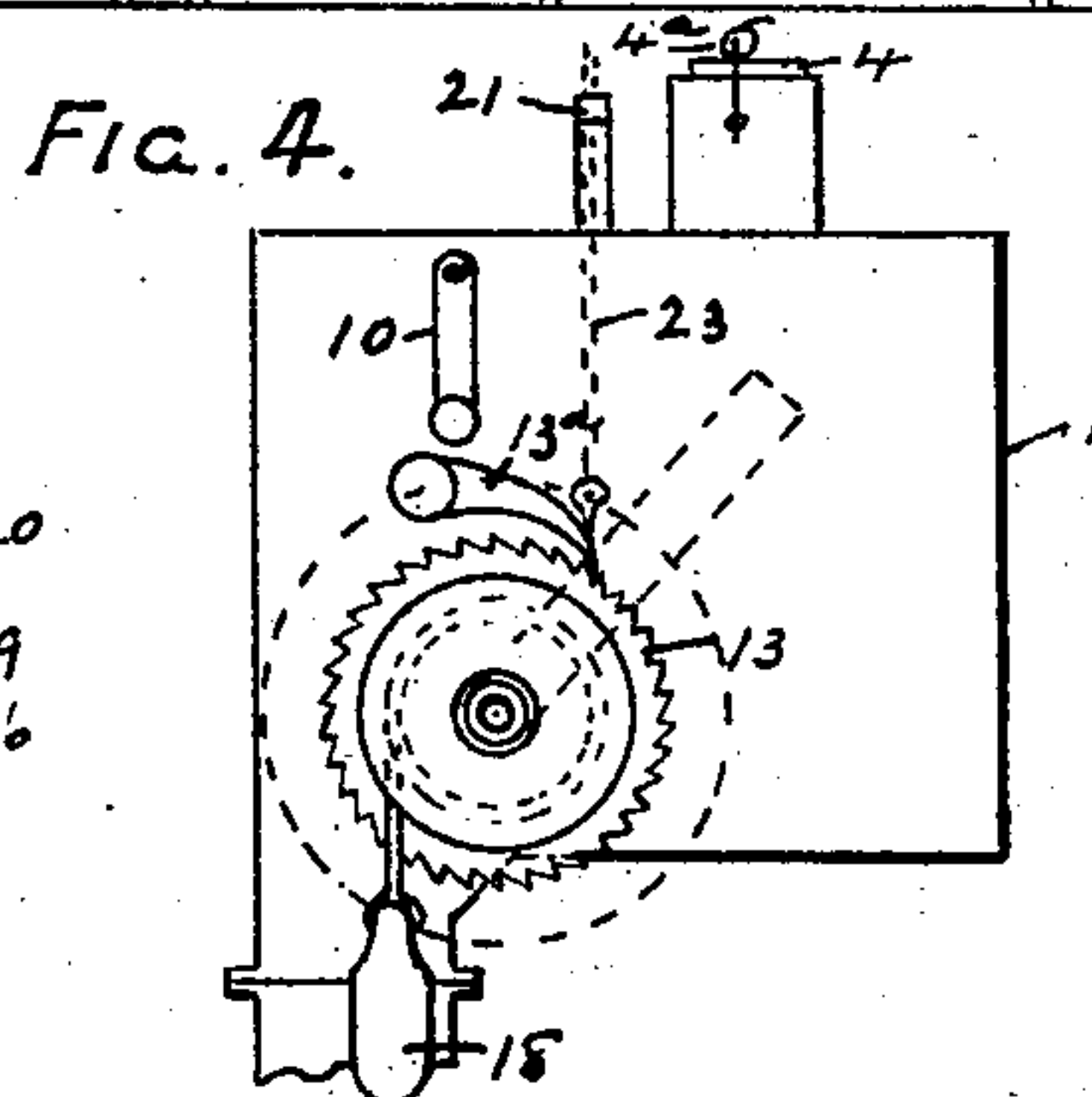
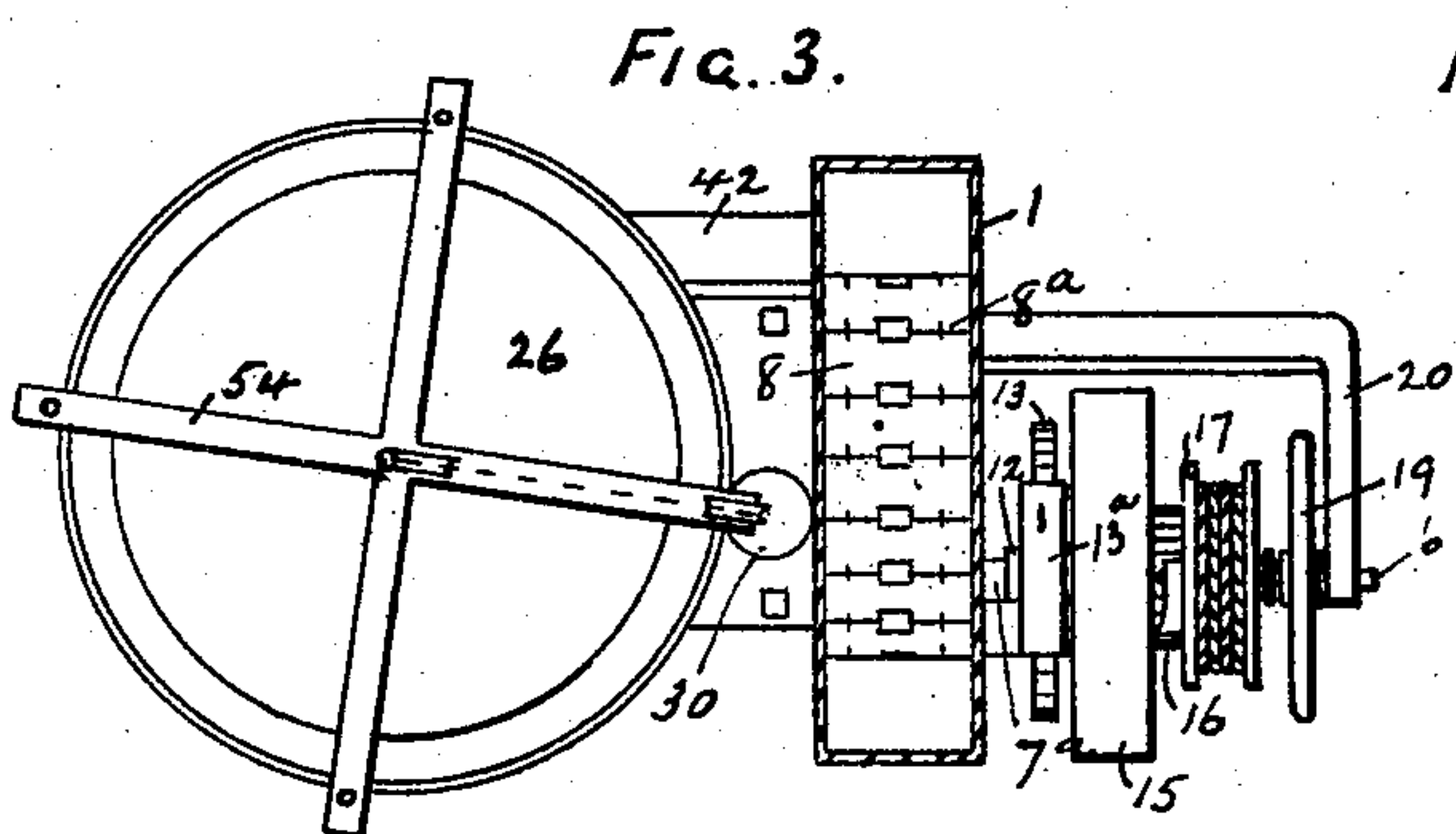
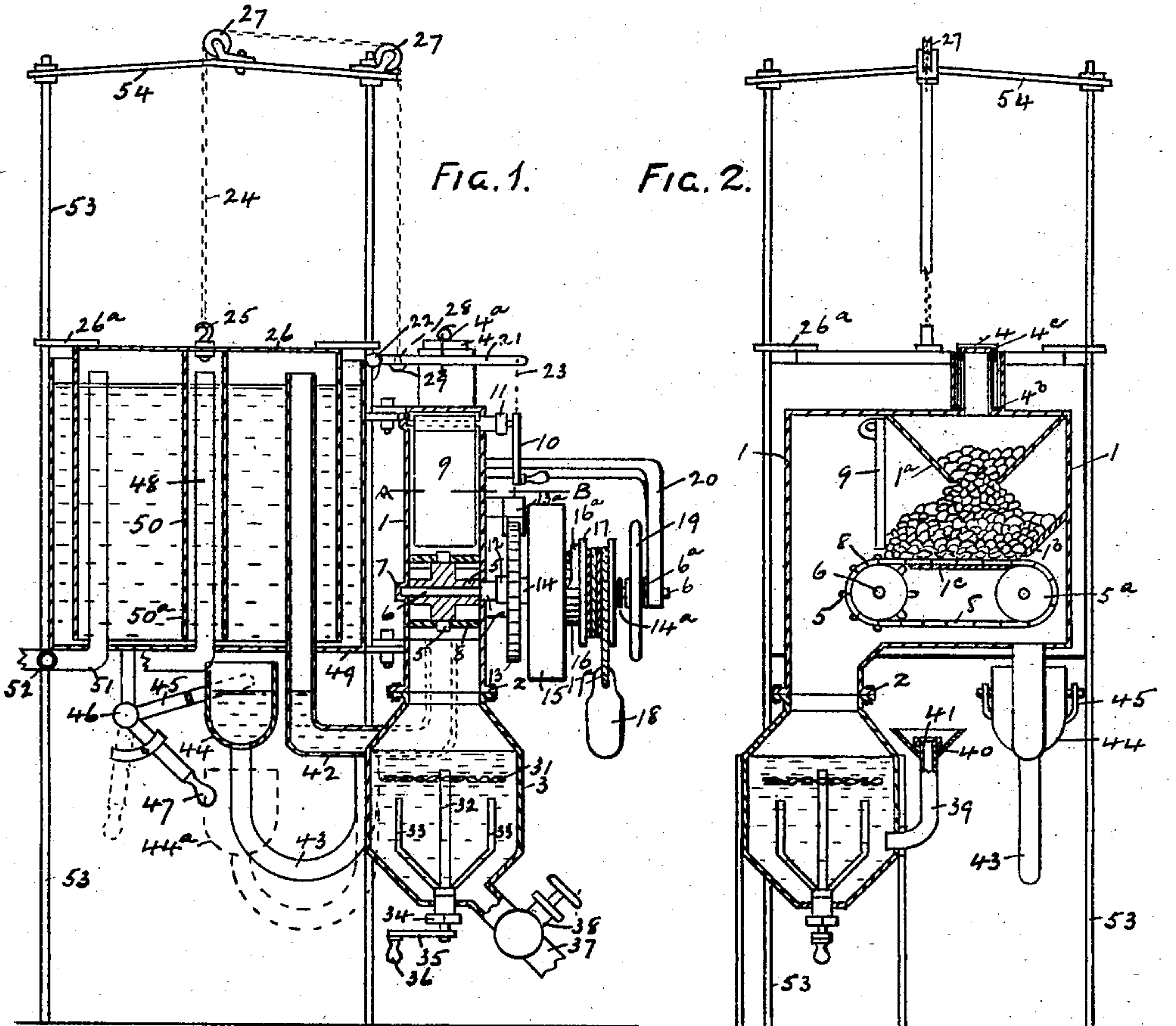
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APPARATUS FOR GENERATING ACETYLENE GAS.

(Application filed Mar. 6, 1899.)

(No Model.)

2 Sheets—Sheet 1.



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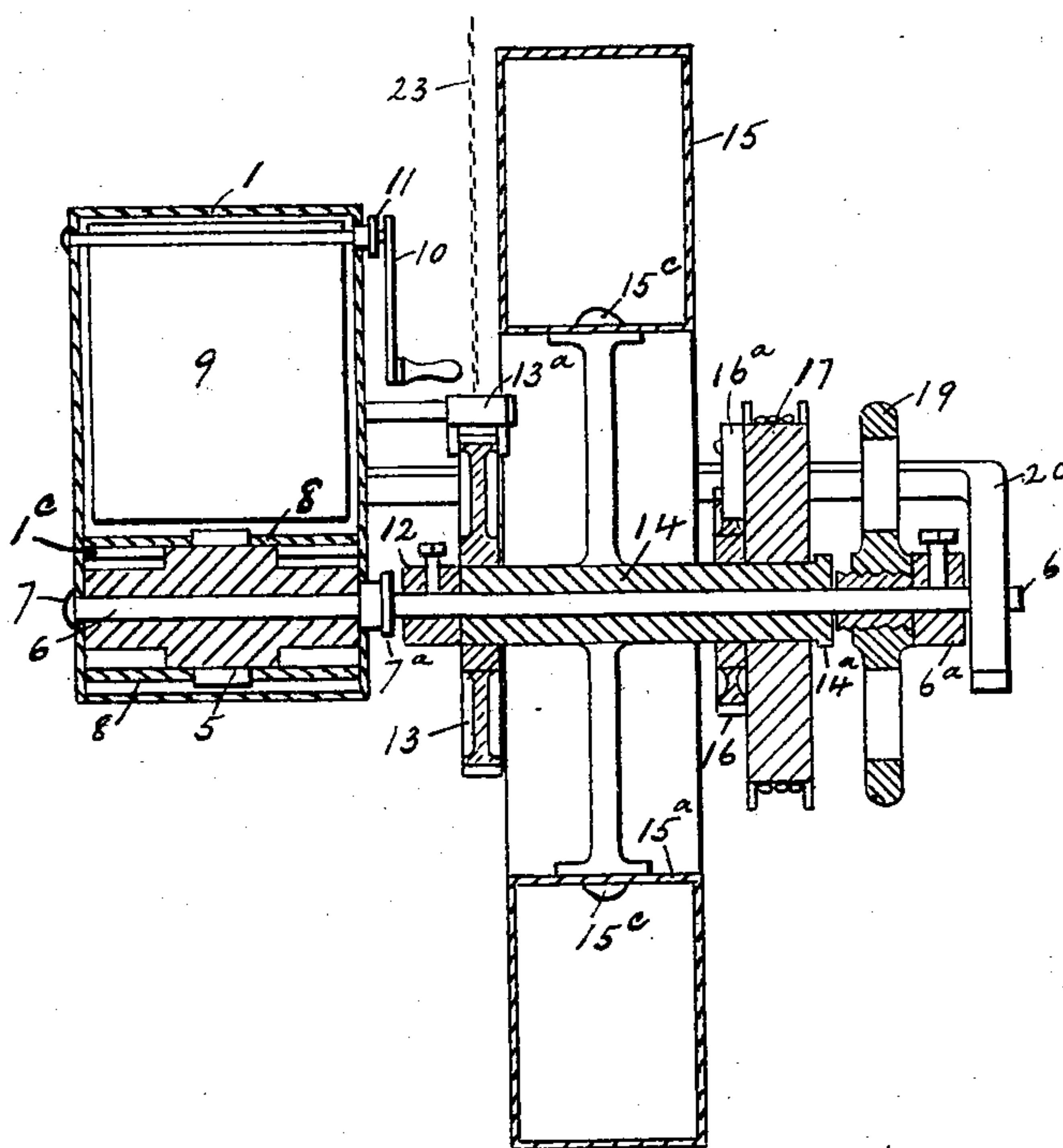
## APPARATUS FOR GENERATING ACETYLENE GAS.

(Application filed Mar. 6, 1899.)

(No Model.)

**2 Sheets—Sheet 2.**

*Fig. 6*



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## APPARATUS FOR GENERATING ACETYLENE GAS.

SPECIFICATION forming part of Letters Patent No. 637,252, dated November 21, 1899.

• Application filed March 6, 1899. Serial No. 707,854. (No model.)

*To all whom it may concern:*

Be it known that I, ISAAC L. HARRIS, a citizen of the United States, residing at Jacksonville, in the county of Duval and State of Florida, have invented certain new and useful Improvements in Acetylene-Gas Generators, of which the following is a specification.

My invention relates to a machine for generating illuminating-gas from the reaction of calcium carbid and water; and the object of my invention is to bring the two compounds referred to into contact in such a manner as will produce the most effective results, and particularly in the amount or volume of gas generated.

In the accompanying drawings, Figure 1 is a vertical section through the entire machine. Fig. 2 is a vertical section through the generator-chamber at right angles to Fig. 1. Fig. 3 is a plan, with the carbid-chamber in section, through the line A B. Fig. 4 is an elevation showing the outside mechanism of the carbid-feeding device. Fig. 5 is a section of the water-escapement check-drum, and Fig. 6 is an enlarged view in section of the carbid-feed and means for operating the same.

Similar figures refer to similar parts in the several views.

1 is the casing of the gas-generator chamber, connected with a flanged joint 2 to the water-tank 3. At the top is a small dome 4, constituting a water-seal opening for introducing the calcium carbid into the generator. Inside the generator is a hopper 1<sup>a</sup>, into which the carbid is placed.

5 is a sprocket-wheel inside the generator, fastened to the shaft 6. This shaft works in a sealed journal 7 at one end, while the other passes through a stuffing-box 7<sup>a</sup> to the outside.

8 is a belt. My drawings show a flat-link chain belt, with links notched out at the joint to receive the sprockets of the sprocket-wheel 5. The flat notched links 8 are held together by small wire links 8<sup>a</sup>, Fig. 3, which pass through small holes bored in the larger flat links. The chain belt 8 encompasses or works around the sprocket-wheel 5 and a smooth-barrel drum 5<sup>a</sup>, which works loosely on a fixed bar fastened to the inner sides of the generator-chamber. Any other kind of belt may be used.

9 is a door inside the generator operated by the crank 10 outside. One end of the bar to

which the door is fastened at the top works in a sealed bearing, while the other end passes through a stuffing-box 11.

12 is a collar outside the generator, fastened to the sprocket-shaft 6, near to but not touching the stuffing-box 7<sup>a</sup>.

13 is a ratchet-wheel fastened to the end of a movable sleeve 14, which works on the sprocket-shaft 6, but is not fastened thereto, having a slight lateral movement thereon.

13<sup>a</sup> is a pawl attached to the outside of the generator-casing which engages in the ratchet-wheel 13.

15 is a water-escapement check-drum also fastened onto the movable sleeve 14, with which it revolves. This drum is inclosed at the ends. It is also provided inside with a circular casing 15<sup>a</sup>, Fig. 5, concentric with the outside face. The space between the concentric casings is divided into compartments by radiating divisions 15<sup>b</sup>, communicating with each other by small openings 15<sup>c</sup>.

16 is a smaller ratchet-wheel fastened onto the movable sleeve 14, with which it also revolves. Thus the ratchet-wheel 13, the water-escapement drum 15, and the ratchet-wheel 16 are each and all fastened onto the movable sleeve 14, which works loosely on the sprocket-shaft 6.

17 is a flanged drum working loosely on the movable sleeve 14, but not fastened thereto, about which is wound a rope 17<sup>a</sup>, carrying a weight 18. On the inner side of the rope-drum is fastened a pawl 16<sup>a</sup>, which engages in the small ratchet-wheel 16.

19 is a hand-wheel working in a screw-thread turned on the sprocket-shaft 6. The center boss of this hand-wheel touches against a shoulder 14<sup>a</sup> on the movable sleeve 14, and when the wheel 19 is screwed up against the shoulder the ratchet-wheel 13 is pressed up tight against the collar 12, locking the movable sleeve 14 and all the parts fastened onto it to the sprocket-shaft 6. This locking does not include the rope-drum 17.

20 is a bracket fastened to the casing of the generator, into the end of which the sprocket-shaft 6 is journaled for support.

21 is a lever working on a fulcrum 22, at the end of which is a short chain 23, connecting the lever with the pawl 13<sup>a</sup>, Fig. 4.

24 is a chain fastened to the hook 25 in the



center of the top of the gasometer-bell 26, passing thence over two pulleys 27 to a hole 28 in the lever 21, where it is held by a stop 29. The circular opening 30, Fig. 3, allows the stop to lower the proper distance when the bell of the gasometer rises.

31 is a shaking-grating located near and beneath the surface of the water in the tank 3 and of smaller diameter than the tank. This grating prevents the newly-dumped carbid from descending to the bottom of the water and being buried in the residuum slime. It also prevents heating during the chemical reaction which immediately takes place in the generation of acetylene gas and enables a pure acetylene gas to be produced, which otherwise is not always the case. The grating is supported on a center shaft 32, which also carries bent arms 33 for agitating the water and slime in the bottom of the tank. The shaft 32 passes through a stuffing-box 34 and is connected with a crank 35 and a handle 36 for agitating the contents of the tank.

37 is a mud-outlet, with a valve 38.

39 is a bent tube on the outside of the water-tank 3, into which it opens, having a funnel-shaped top 40 to receive water and a screw-cap 41 inside the funnel.

42 is a pipe for carrying the newly-generated gas from the generator-chamber to the gasometer. The lower part of this pipe, including the horizontal portion, is converted into a water-trap valve by the addition of a piece of flexible pipe 43, which opens into it, and a cup 44, containing water. The cup is suspended on the branching ends of a lever 45, working on a fulcrum 46, and when the handle 47 of the lever is placed over to the right, as shown on the drawings, a portion of the water in the cup gravitates through the flexible pipe into the lower portion of the gas-pipe, closing the communication between the generator and the gasometer. When the handle of the lever is placed over to the left, the cup is lowered to the position 44<sup>a</sup>, (shown in dotted lines,) and the water in the gas-pipe then gravitates back again into the cup, leaving the pipe open for the passage of gas.

48 is a relief-pipe communicating with the open air outside the building. This pipe is secured to the bottom shell of the gasometer-tank 49, whence it passes upward to a point above the level of the water seal, where it is open at the top, but without communicating with the gas-space of the gasometer. This it is prevented from doing by a larger pipe 50, secured to the crown of the gasometer, with which it rises and falls and which is open at the bottom. The pipe 50 is outside of and concentric with pipe 48, and the water seal formed between them prevents the escape of gas.

50<sup>a</sup> are a number of small holes near the bottom of the larger pipe 50, through which any excess of gas can escape into the open air when the holes are raised above the surface of the water seal.

51 is an outlet-supply pipe regulated by a valve 52 for conveying the acetylene gas from the gasometer to the consumer.

53 are iron supports fastened to the machine for holding its various parts at convenient heights above the floor. The supports are brazed to the sides of the gasometer-tank and continued upward as guides for the guide-forks 26<sup>a</sup>, and they are finally connected together at the top by yokes 54, which support the pulleys 27. The gas-generator is bolted fast to the gasometer.

The operation of the machine is as follows: Water is introduced into the tank 3 until it stands level with the bottom of the funnel 40. The water is then at the proper level in the tank and the cap 41 is screwed on. The crank 10, controlling the door 9 inside the generator, is placed in a truly vertical position, with the handle down, as shown on the drawings, and held fast there by a catch. (Not shown.) This fixes the door 9 rigid over the center of the sprocket-wheel. The dome 4 is then removed from its water seal and calcium carbid is introduced through the opening into the hopper 1<sup>a</sup>, through which it passes, and is afterward spread by the hand-wheel 19 on the belt 8, where it rests. The operation of spreading the carbid on the belt 8 is as follows: The hand-wheel 19 is unscrewed, unlocking the movable sleeve 14 from the shaft 6, and the unscrewing being continued brings the wheel into contact with another shoulder or collar 6<sup>a</sup> of the sprocket-shaft. Still continuing to turn the hand-wheel in the same direction causes the sprocket-shaft to revolve, which moves the belt inside the generator until the carbid is brought against the door 9. An apron 1<sup>b</sup> prevents any carbid from falling off at the end of the chamber, and a floor 1<sup>c</sup> under the belt prevents any falling through any openings or off the sides of the belt. The dome 4 is then replaced in its water seal, where it rests on a flexible seat 4<sup>b</sup>. A screw-cap 4<sup>c</sup> is also placed on the opening under the dome 4. The dome 4 is fastened by a simple eccentric 4<sup>a</sup>. The crank 10 is then released and moved to the left, thus liberating the door 9 inside the generator. The pawl 13<sup>a</sup> is now lifted by hand. This releases the ratchet-wheel 13 and allows the weight 18 to descend. The descent of the weight 18 causes the rope-drum 17 to revolve by virtue of the rope 17<sup>a</sup>, with which it is wound, and the pawl 16<sup>a</sup>, engaging the smaller ratchet-wheel 16, communicates its motion through the ratchet-wheel to the movable sleeve 14, which, being previously locked to the collar 12, communicates the motion to the sprocket-shaft 6 and to the sprocket-wheel 5 inside the generator-chamber. The motion of the sprocket-wheel moves the belt 8, on which the carbid rests, until a portion of the carbid falls over the descending face of the belt into the water-tank, and the generation of a relative quantity of gas is the result. After entering the water in the tank the carbid is supported near the



surface by the grating 31, where a chemical reaction takes place, the products of which are acetylene gas, which rises out of the water, and hydrate of lime, which falls through the grating and settles at the bottom of the tank. The newly-generated gas enters the gasometer 49 by the pipe 42, the water-trap being open, and the bell 26 of the gasometer rises upward. In the event of the amount of gas generated being in excess of the capacity of the gasometer to contain it and the lower end of the pipe 50 rises so near the surface of the water in the gasometer-tank as to expose the small holes 50<sup>a</sup> above the water-level all excess of gas will escape through those holes into the pipe 48 and pass thence into the open air. When the gasometer lowers, owing to the consumption of its contents, the chain 24 is drawn upward through the hole 28 in the lever 21 until the stop 29 reaches it. Then the chain lifts the lever by means of the stop, and the lever in its turn lifts the pawl 13<sup>a</sup> by means of the short chain 23, and the generation of a relative quantity of gas is repeated. When the bell of the gasometer rises and the stop 24 lowers, the lever 21 and the short chain 23 also lower until the pawl 13<sup>a</sup> reengages the ratchet-wheel 13. This stops the entire mechanism operating the carbide-feed for the time being. To prevent a too rapid descent of the weight 18 and the consequent overcharge of carbide into the water-tank, the water-escapement check-drum is fastened onto the sleeve 14, (now locked,) with which it revolves. This drum is partly filled with water, and when it revolves the water passes from one compartment to another with a velocity limited by the size of the small openings 15<sup>c</sup>. This controls the motion of the drum, and consequently the motion of the entire mechanism of the carbide-feed, and prevents an overcharge of carbide into the water-tank. The weight 18 can be wound up at any time without interfering with the working of the generator; but its position may be useful as an indicator, thus: When nearly run down, it is an indication that the machine requires recharging. When all the carbide has been used by the repeated rising and falling of the gasometer, it is necessary to recharge the machine as before. To accomplish this without permitting the escape of gas from the gasometer, the handle 47 of the lever 45 is placed over to the right, as shown on the drawings. This raises the cup 44, containing water, from its position in 44<sup>a</sup> and causes a portion of its contents to enter the gas-pipe 42, creating a water-trap and effectually shutting in the gas within the gasometer. The water-cup 44 also serves the purpose of drip-cup for any water condensed in the gas-pipe from the newly-generated gas.

When it is desired to clean out the water-tank 3, the bent arms 33 are caused to rotate back and forth inside the tank by means of the crank 35 and the handle 36. This agitates the water in the tank and stirs up the slime deposited from the calcium carbide. Then on

opening the valve 38 the contents of the tank are discharged through the mud-outlet 37.

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

1. In an acetylene-gas generator a calcium-carbide-feeding device and a water-tank in combination with a gasometer, the carbide-feeding device consisting of a hopper inside the generator, a moving floor beneath the hopper composed of an endless belt revolving around a sprocket-wheel and a smooth barrel-drum, a revolving shaft onto which the sprocket-wheel is fastened, a ratchet-wheel fastened onto a movable sleeve encircling the sprocket-shaft but not fastened thereto, a pawl attached to the casing of the generator which engages the ratchet-wheel, a lever carrying a short chain attached to the pawl, a chain attached to the bell of the gasometer working in combination with the lever, another ratchet-wheel also fastened onto the movable sleeve, a rope-drum revolving loosely on the movable sleeve carrying a pawl which engages in the last-named ratchet-wheel, a rope wound around the rope-drum carrying a weight at one end with means for locking and unlocking the movable sleeve to and from the sprocket-shaft, substantially as described.

2. In an acetylene-gas generator a calcium-carbide-feeding device and a water-tank in combination with a gasometer, the carbide-feeding device consisting of a hopper with a moving floor beneath a sprocket-wheel fastened to a revolving shaft, a movable sleeve encircling the revolving shaft but not fastened thereto, a rope-drum revolving loosely on the movable sleeve carrying a pawl which engages a ratchet-wheel fastened onto the movable sleeve, a rope wound around the rope-drum carrying a weight which causes the rope-drum to revolve, an inclosed water-escapement drum divided into compartments to hold water but communicating with each other also fastened onto the movable sleeve, with means for locking and unlocking the movable sleeve to and from the revolving shaft all substantially as described.

3. In an acetylene-gas generator a calcium-carbide-feeding device and a water-tank in combination with a gasometer, the carbide-feeding device consisting of a hopper with a moving floor beneath, a sprocket-wheel fastened to a revolving shaft, a movable sleeve encircling the revolving shaft but not fastened thereto, a rope-drum revolving loosely on the movable sleeve carrying a pawl which engages a ratchet-wheel fastened onto the movable sleeve, a rope wound around the rope-drum carrying a weight, a water-escapement drum fastened onto the movable sleeve, with means for locking and unlocking the movable sleeve to and from the revolving shaft, a gas-pipe communicating between the generator and the gasometer with means for creating a water-trap valve in the gas-pipe when required, a flexible seat under the dome of the generator



and a screw-cap under the dome, substantially as shown and described.

4. In an acetylene-gas generator, a calcium-carbid-feeding device and a water-tank in  
5 combination with a gasometer, the carbid-feeding device consisting of a hopper with a moving floor beneath, a sprocket-wheel fastened to a revolving shaft, a movable sleeve encircling the revolving shaft but not fastened  
10 thereto, a ratchet-wheel fastened onto the movable sleeve, a pawl attached to the generator-casing which engages the ratchet-wheel together with means for disengaging it, a rope-drum revolving loosely on the movable sleeve  
15 but carrying a pawl which engages in a ratchet-wheel fastened onto the movable sleeve, a rope

wound around the rope-drum carrying a weight, a water-escapement drum fastened onto the movable sleeve, with means for locking and unlocking the movable sleeve to and 20 from the revolving shaft, a shaking-grating near and beneath the surface of the water in the water-tank supported by an upright shaft, a stuffing-box at the bottom of the tank through which the upright shaft passes, a 25 crank outside with a handle, as and for the purposes specified.

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Witnesses:

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