No. 745,603. PATENTED DEC. 1, 1903.

J. S. HARGER & R. B. BALDWIN.

ACETYLENE GAS GENERATOR.

APPLICATION FILED MAR. 27, 1902.

NO MODEL. 4 SHEETS—SHEET 1.

Fig. 1.

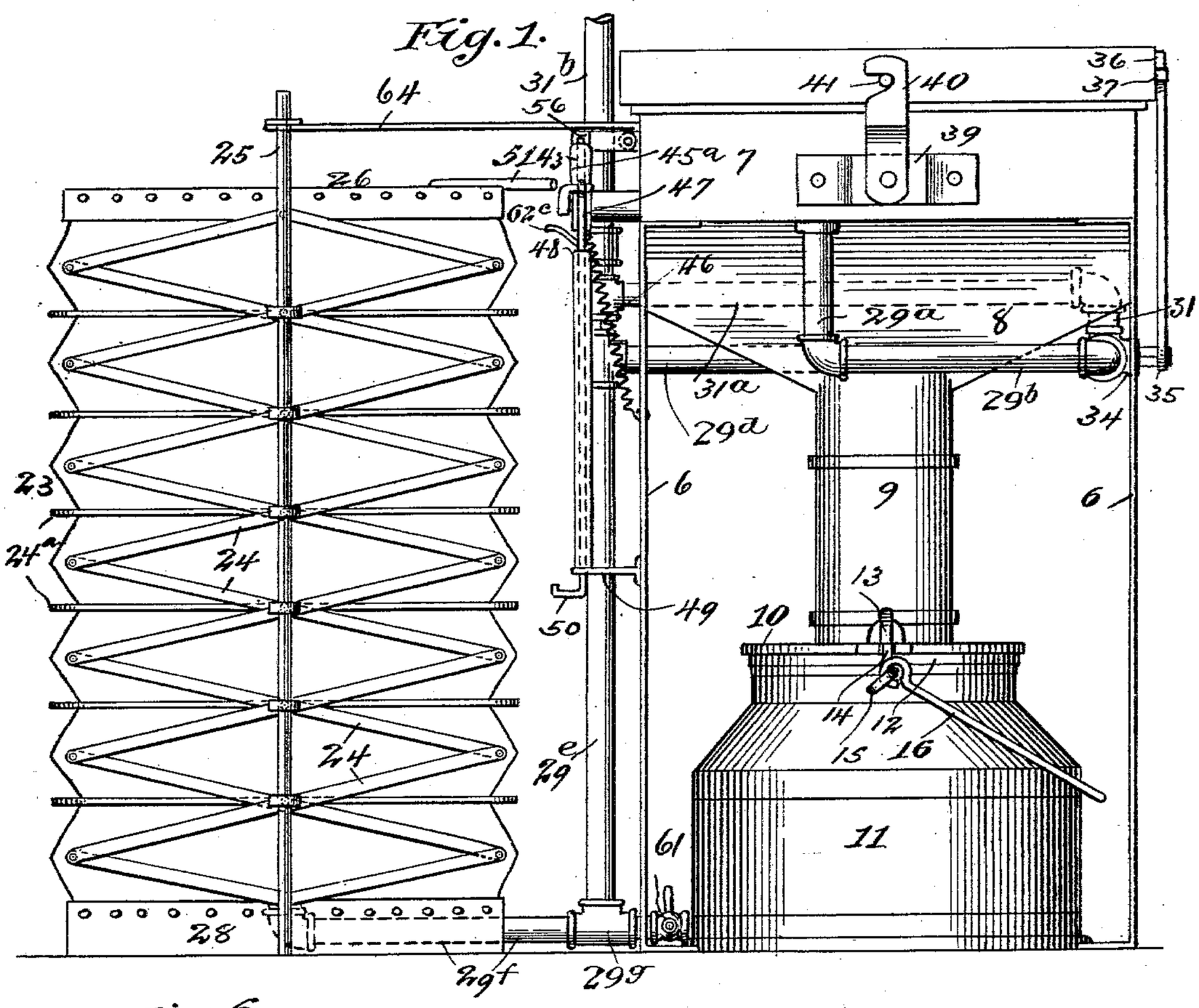


Fig. 6.

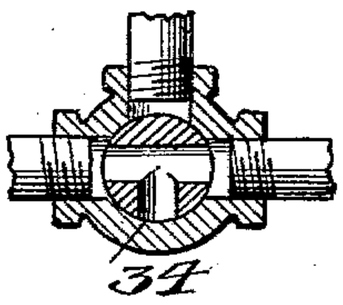
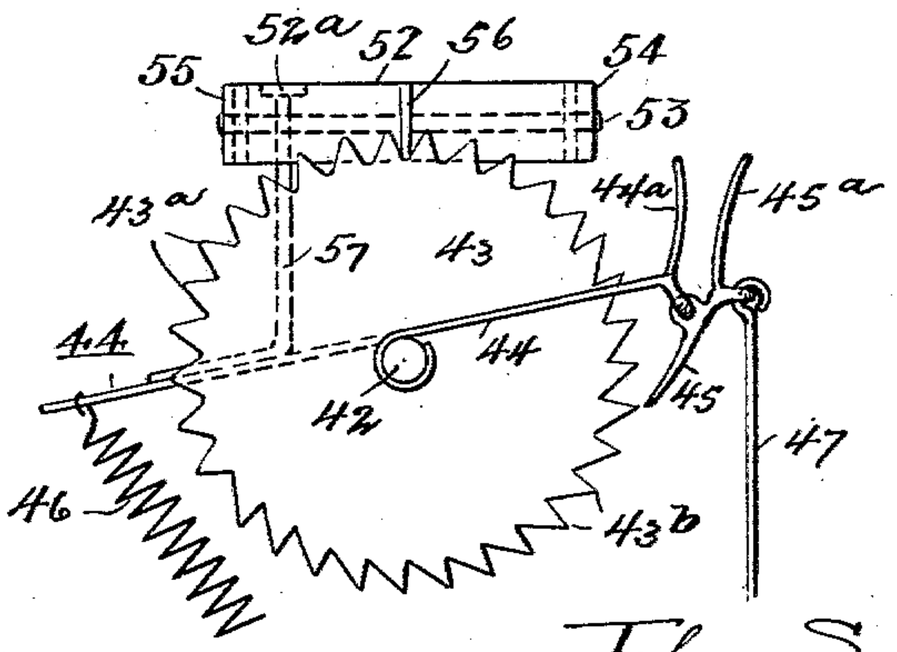


Fig. 5.



Witnesses,
F. D. Mann,
S. N. Ford.

Inventors,
John S. Harger,
Robert B. Baldwin,
By Offield, Towle & Linthicum
Attys.

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NO MODEL. 4 SHEETS—SHEET 2.

Fig. 3.

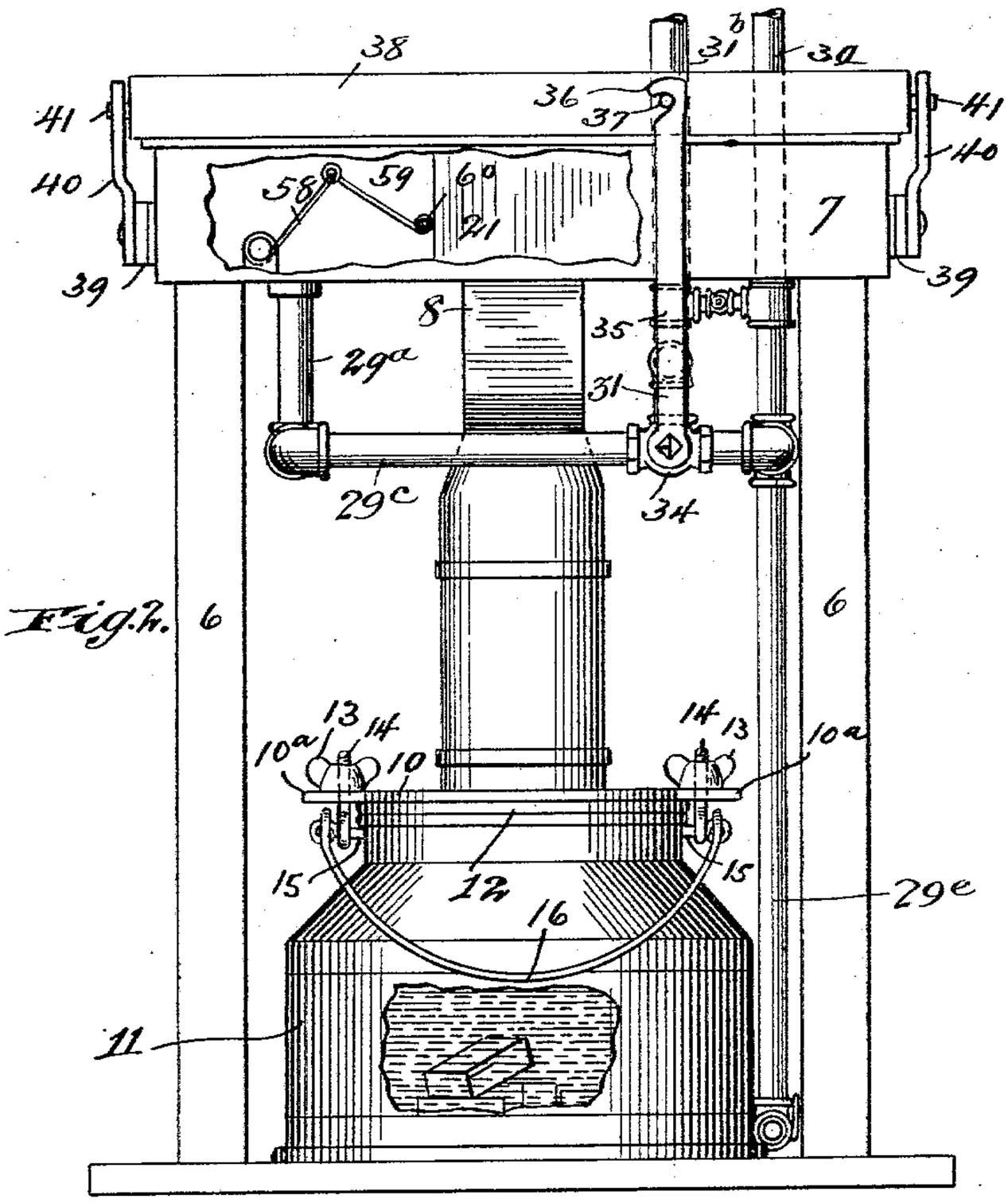
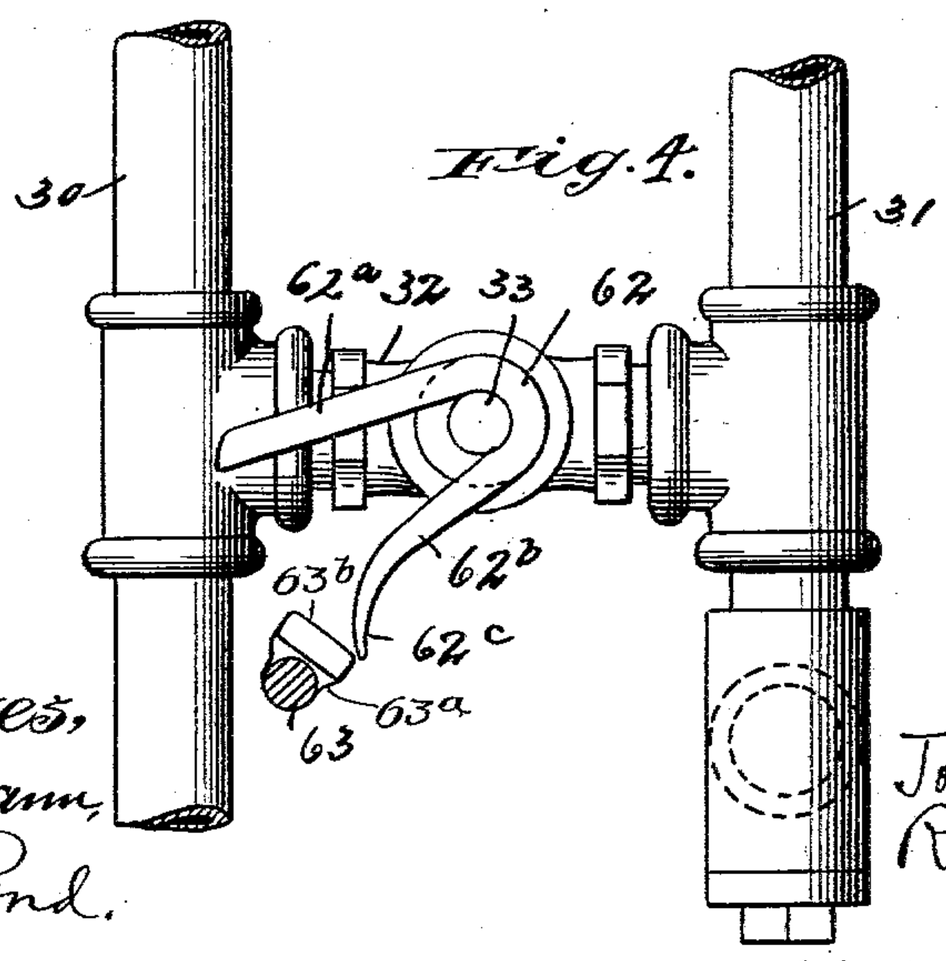


Fig. 4.



Witnesses,
F. S. Mann,
S. N. Stud.

Inventors,
John S. Harger,
Robert B. Baldwin,
By Offield, Towle & Linthicum
Attys.

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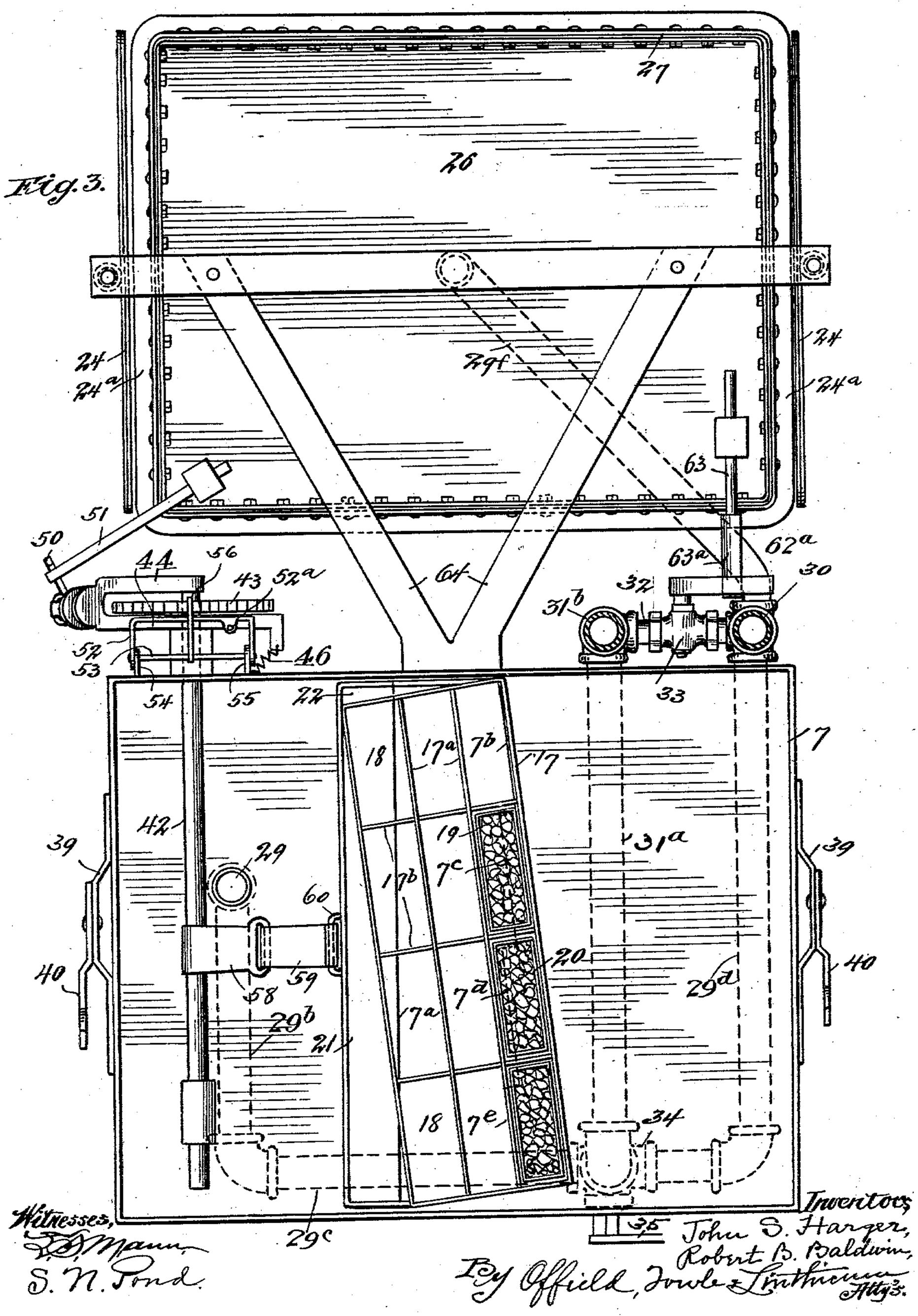
NO MODEL. 4 SHEETS—SHEET 3.

Fig. 3.



Witnesses,
D. D. Mann,
S. N. Pond.

Inventors,
John S. Harger,
Robert B. Baldwin,
By Offield, Towle & Linthicum
Attys.

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NO MODEL. 4 SHEETS—SHEET 4.

Fig. 9.

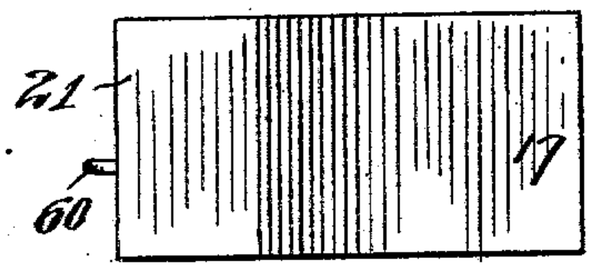


Fig. 10.

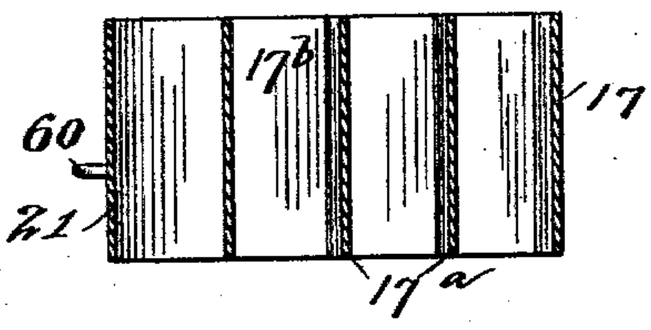


Fig. 8.

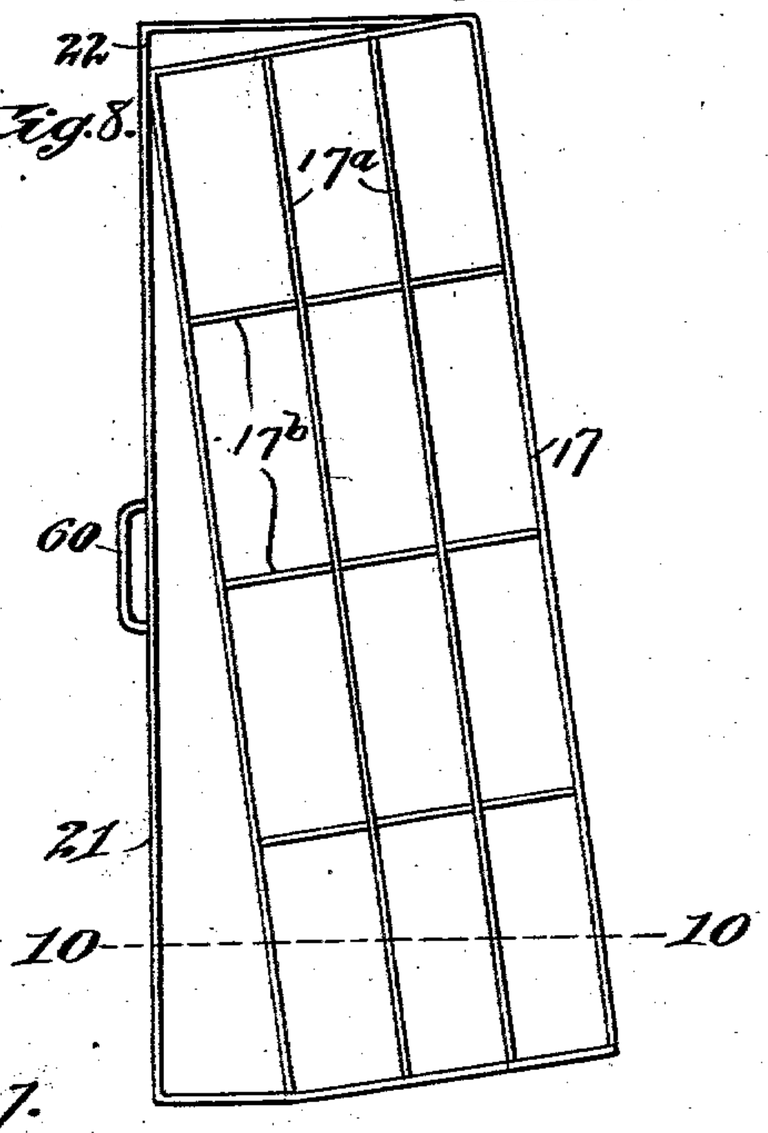
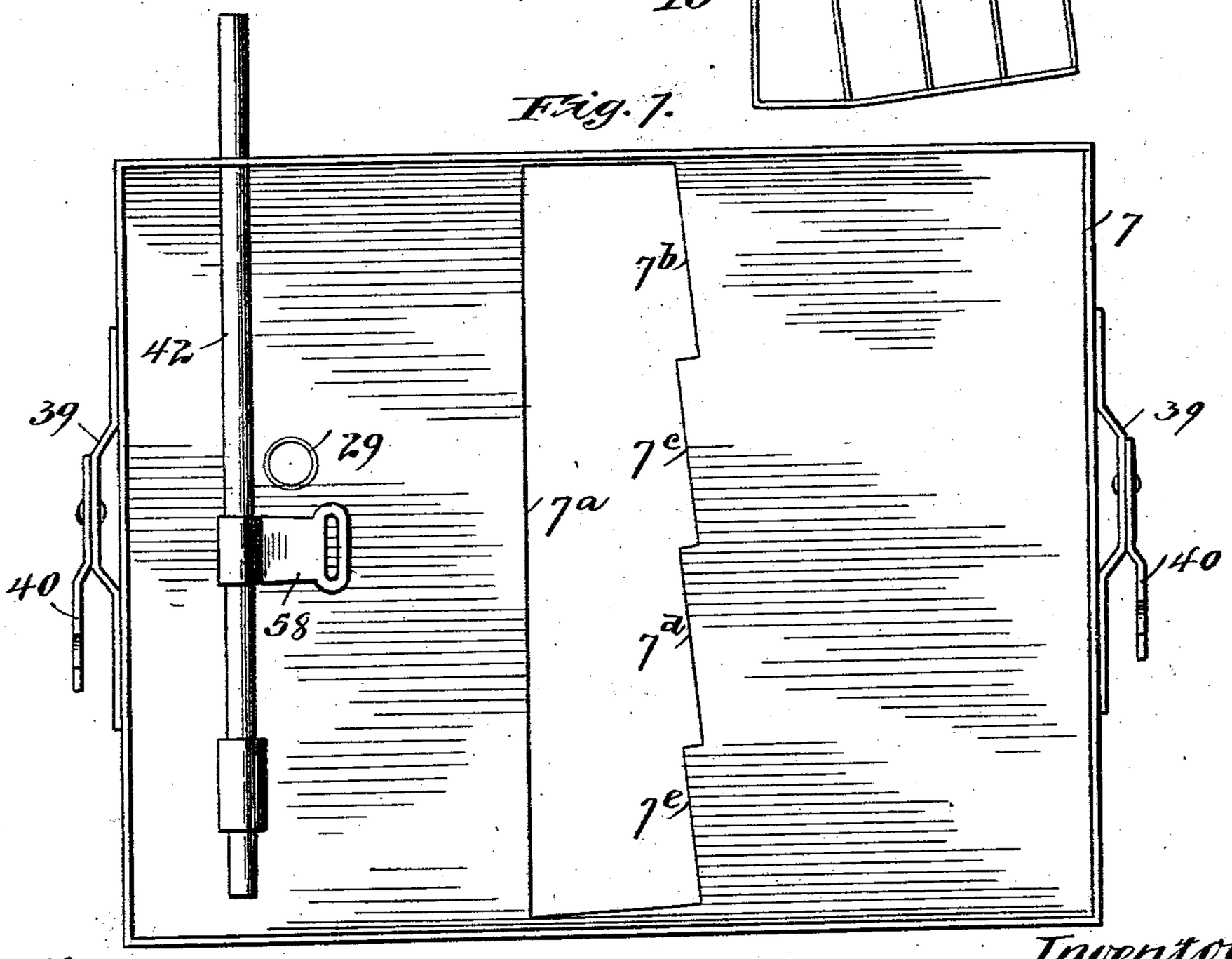


Fig. 7.



Witnesses,
F. D. Mann.
S. N. Pond.

Inventors
John S. Harger,
Robert B. Baldwin,
By Offield, Towle & Linthicum
Attys.

No. 745,603. Patented December 1, 1903.

UNITED STATES PATENT OFFICE.

JOHN S. HARGER AND ROBERT B. BALDWIN, OF CHICAGO, ILLINOIS.

ACETYLENE-GAS GENERATOR.

SPECIFICATION forming part of Letters Patent No. 745,603, dated December 1, 1903.

Application filed March 27, 1902. Serial No. 100,318. (No model.)

To all whom it may concern:

Be it known that we, JOHN S. HARGER and ROBERT B. BALDWIN, both citizens of the United States, and residents of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Acetylene-Gas Generators, of which the following is a specification.

This invention relates to machines for generating acetylene gas and supplying the same in regulated quantities to a source of utilization.

The machine embodying our invention is of that type wherein the calcium carbid is fed to a body of water at intervals, the carbid being contained in boxes or cartridges, preferably of uniform size and capacity, and being introduced to the water at intervals which are regulated by the consumption of the gas produced, the feeding of the carbid and the control of the gas generated being rendered entirely automatic.

The principal object of our invention is to provide a machine of this type characterized by simplicity and compactness of construction, economy of cost, and reliability and safety in operation.

Our invention has been more especially designed with reference to its use as furnishing a headlight for locomotives and for car-lighting purposes; but its use is by no means confined to such applications of the device.

To such and other minor ends our invention consists in an acetylene-generator having the novel features of construction and mode of operation hereinafter described, and more particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a side elevation of an apparatus embodying our invention in a preferred form. Fig. 2 is an end elevation thereof. Fig. 3 is a top plan view. Fig. 4 is a detail of an automatically-operated valve controlling the connection between the service and blow-off pipes. Fig. 5 is a detail of a portion of the mechanism through which the intermittent feed of the carbid is effected, showing also a controlling device therefor governed by the rise and fall of the gas tank or reservoir. Fig. 6 is a detail of a three-way valve and connections. Fig. 7 is a detail top plan view of the carbid-crate holder, the same being shown empty to more clearly illustrate the formation of the opening in its base. Fig. 8 is a top plan view of the carbid-crate removed from its containing box or holder. Fig. 9 is an end view of the carbid-crate, and Fig. 10 is a transverse vertical section thereof on the line 10 10 of Fig. 8.

Referring to the drawings, 6 designates the individual members of a group of four uprights arranged to constitute the corner members of a rectangular frame which is surmounted by a shallow rectangular box or casing 7. The floor or bottom of this box has formed therethrough a transverse opening extending entirely thereacross, which opening, as shown in Fig. 3, has a straight margin on one side thereof, as indicated at 7^a, while the opposite margin of the opening has a staggered or stepped formation in a direction slightly oblique to the straight opening 7^a, as shown at 7^b, 7^c, 7^d, and 7^e. To the under side of the floor or bottom of the box 7 is secured a narrow hopper 8, having downwardly-converging end walls, the open receiving-mouth of the hopper being located beneath and surrounding the opening in the base of the box. The lower contracted end of the hopper 8 terminates in a discharge-spout 9, which is preferably a tube or cylinder of considerable diameter and formed of yielding or flexible material, as rubber or canvas, or a combination of these two. The lower end of the tube 9 is secured fast to a cap or cover 10, forming a closure for an underlying bucket 11, disposed centrally between the uprights of the frame and constituting the generating-chamber of the device. The cap 10 hermetically closes the open mouth of the bucket through the intervention of a suitable gasket 12 and a pair of oppositely-located thumb-nuts 13, screwing down over the upper ends of threaded pins 14, which latter are mounted at their lower ends on laterally-projecting pins 15, on which the bail 16 is hung, the pins 14 extending upwardly through holes or slots formed in lateral ears 10^a of the cap 10.

Within and transversely of the box or casing 7 is located a rectangular crate 17, which latter rests upon the bottom of the box and is disposed somewhat obliquely to the end walls thereof, as shown in Fig. 3, and is subdivided by longitudinal partitions 17^a and

transverse partitions 17[b] into a series, herein shown as twelve, of compartments 18, open at top and bottom and each adapted to contain a rectangular box or cartridge 19, containing a quantity of calcium carbid, (indicated at 20.) One side of the crate 17 is provided with a triangular-shaped lateral extension 21, and one end thereof has a similar triangular endwise extension 22, these two extensions together constituting a guide for the reciprocations of the crate across the base of its containing-casing 7 in such a manner as to maintain constant the angle of inclination of the crate to the casing. In practice the crate 17, with its contained cartridges, is designed to be drawn over the base of the box or casing 7 entirely across the transverse opening therein, already described, and the relation of the several compartments 18 of the crate to the staggered or stepped edge of the opening is such that the cartridges will fall out of the crate through said opening one by one from the longitudinal compartments in successive order as the crate is advanced across the opening.

The gas holder or reservoir (designated as an entirety by 23) is, as shown in Fig. 1, disposed alongside of the generator already described, and, as herein shown, consists of a vertically-disposed bellows-like structure, the opposite end walls of which are framed up from a series of superposed lazy-tongs 24, mounted to slide vertically over a pair of vertical supports 25, disposed centrally thereof. The ends of the gas-holder are closed by covers 26, embraced within top and bottom rectangular metal frames 27 and 28, thereby providing a gas-reservoir capable of expanding and contracting longitudinally or vertically thereof to accommodate varying volumes of gas therein. A pipe (designated as an entirety by 29) taps the base of the casing 7 and extends thence in suitably-disposed horizontal and vertical sections to the bottom wall or floor of the gas-holder centrally thereof, as shown in Figs. 1 and 3, this pipe serving to convey the gas produced in the generator from the upper chamber 7 thereof to the gas holder or reservoir. The several sections of this pipe are disposed as follows: A short vertical section 29[a], Figs. 1 and 2, tapping the base of the casing 7; a horizontal section 29[b], Figs. 1 and 3; a second horizontal section 29[c], extending at right angles thereto, Figs. 2 and 3; a third horizontal section 29[d], extending at right angles to the section 29[c] and parallel with the section 29[b], Figs. 1 and 3; a vertical section 29[e], Figs. 1 and 2, and finally a horizontal section 29[f], disposed obliquely of the base of the gas-holder hereinafter described. A vertically-extending service-pipe 30 taps the pipe 29 at the junction of the horizontal and vertical sections 29[d] and 29[e] thereof, as shown in Figs. 2 and 3, while a blow-off pipe taps the horizontal section 29[c] of the gas-conductor pipe, said blow-off pipe consisting, as herein shown, of a short vertical section 31, superposed on the pipe-section 29[c], Figs. 1 and 2, a horizontal section 31[a], Figs. 1 and 3, and another vertical section 31[b], Figs. 1, 2, and 3. The blow-off and service pipes are united, preferably, at a point slightly above the junction of the service-pipe with the conductor-pipe to the gas-holder by a short section of pipe 32, in which latter is interposed a cut-off valve 33, normally kept closed but adapted to be automatically opened to bring the blow-off pipe into communication with the service-pipe and gas-holder upon the creation of a dangerous pressure in the gas-holder. In the conductor-pipe 29, at the junction of the blow-off pipe therewith, is a three-way valve 34, Figs. 3 and 6, which in one position cuts out the blow-off and in the other closes the conductor pipe. To the stem of this valve is secured an arm 35, the free end of which terminates in a hook 36, adapted to engage a pin 37, located in the margin of a cover 38, that serves to hermetically close the top of the generator box or casing 7. As additional means for locking said cover in place the opposite end walls of the casing 7 are provided with brackets 39, to which latter are pivoted, respectively, a pair of latches 40, adapted to be swung upwardly into vertical position to hook over and engage pins 41 in the opposite ends of the cover 38. The relation of the valve 34 to its operating-arm 35 is such that when the arm is in the elevated and hooked position (shown in Fig. 2) the pipe 29 is open and the blow-off pipe cut out; but when the arm is turned down into a horizontal position the pipe 29 is closed and the generator is thrown into communication with the blow-off 31.

Referring now to the means whereby the feed of the carbid to the water-chamber is automatically affected by the rise and fall of the gas-holder, 42 designates a rock-shaft, which is journaled transversely of and upon the base of the casing 7 at one end thereof, one end of this shaft overhanging the side of the casing and being provided with a combination star and ratchet disk 43, fast thereon. As will be seen by reference to Fig. 5, this disk has formed upon substantially one half of its periphery a series of star-teeth 43[a] and upon the other half of its periphery a corresponding series of ratchet-teeth 43[b]. On the shaft 42 and lying in a transverse plane across the face of the disk 43 is a forked lever 44, which lever straddles the disk, as shown in Fig. 3, and has pivotally suspended from its closed end a dog 45, which is adapted to coöperate with the ratchet-teeth of the disk. As stated, this lever is fulcrumed upon the rock-shaft 42, (see Fig. 5,) and the oppositely-projecting end thereof is connected to one end of a tension-spring 46, the lower end of which spring is secured to any fixed point of attachment, as one of the frame-supports 6. The heel of the dog 45 has loosely suspended therefrom a downwardly-hanging rod 47, guided in keepers 48 and 49 and at its lower end terminating in

a stirrup 50, which lies in the path of the outwardly-projecting extremity of a finger 51, secured to and overhanging the periphery of the top plate or cover of the gas-holder. The closed end of the lever 44, to which the dog 45 is pivoted, has one member 44^a of an upstanding thumb-clamp, the companion member (indicated at 45^a) being formed on the heel of the dog 45. The mechanism thus far described constitutes the means for turning the rock-shaft intermittently in a direction to cause the advance of the carbid crate or carrier and the successive discharge of the carbid-cartridges to the generating-tank.

We will next describe the means we have devised for controlling the rotation of the disk 43, locking the same against movement at all times except when it is to be positively advanced, thereby locking the carbid-holder against movement in either direction between the intermittent advance movements positively imparted thereto.

Referring to Figs. 3 and 5, 52 designates a bail-shaped detent-support, the inwardly-extending parallel side arms of which are fast on the extremities of a pivot-rod 53, rotatably mounted in a pair of lugs 54 and 55, extending horizontally from the outer face of the side wall of the casing 7, which is adjacent the gas-holder. As shown in Fig. 3, this detent-support is pivoted directly above the overhanging end of the rock-shaft 42 and its actuating mechanism already described, and said support sustains the outer portion of a horizontally-extending detent-finger 56, having its inner end pivoted on the rod 53, while its outer end projects over the periphery of the disk 43 and is adapted to lie transversely between adjacent star-teeth 43^a of the disk 43. To the support 52 is connected, as at 52^a, the upper end of an actuating-rod 57, the lower end of which rests upon and is suitably secured to one arm of the lever 44 on the opposite side of the fulcrum from the dog 45, as plainly shown in Fig. 5. Hence it will be observed that the mechanism last described constitutes an automatic escapement for the combined star and ratchet disk to prevent the turning of the disk in either direction at all times except when the ratchet-teeth thereon are positively engaged by the dog for the purpose of advancing the disk. The oscillations of the rock-shaft set up and controlled by the mechanism last described are conveyed to the carbid-tray by any suitable connections, those herein shown consisting of an arm 58, keyed fast on the shaft 42 within the box 7 and at its outer end pivotally connected to a link 59, the opposite end of which link is pivoted in a staple 60, secured in the adjacent edge of the tray-guide 21.

61, Fig. 1, designates a drain-valve applied to the elbow-casting 29^e, which unites the vertical and horizontal sections 29^e and 29^f of the main conductor-pipe at the base of the apparatus for the purpose of draining the gas-holder and gas-conductor pipe of condensed moisture when found necessary or desirable.

Assuming that the cut-off valve 33, controlling the connection between the service and blow-off pipes, is closed, so as to cut the blow-off pipe out of the system, the operation of the apparatus is substantially as follows: The crate 17 being filled with cartridges loaded with carbid, (herein shown as twelve in number,) the foremost cartridge, or that occupying a position nearest to the rock-shaft 42, as herein shown, is permitted to drop through the opening in the bottom of the casing or box 7 into the chute 8, by the converging walls of which it is guided and directed into the flexible discharge-tube 9, through which it falls into the body of water contained within the bucket or tank 11. The gas generated by the contact of this carbid with the water rises through the tube 9, hopper 8, opening in the base of the box 7, and the empty compartments of the carbid-crate, and passes thence down through the conductor-pipe 29, traversing successively the several vertical and horizontal sections 29^a to 29^f thereof, and finally emerging into the gas-holder 23 through the bottom of the latter. The generation of gas and its supply to the gas-holder takes place rapidly, and the increasing volume of gas in the holder causes the latter to expand and the top thereof to rise until the holder is nearly or entirely filled to its highest limit and occupies a position substantially as illustrated in Fig. 1. Upon the subsequent consumption of the gas through the service-pipe 30 the volume of gas in the holder of course decreases and the holder gradually collapses, the top thereof slowly settling and carrying with it the projecting finger 51. This continues until the top of the holder has dropped to a position where the finger 51 engages the stirrup 50 of the dog-actuating rod 47. The further downward movement of the top of the holder through the connections described rocks the dog 45 into engagement with the ratchet-teeth of the disk 43, at the same time rocking the lever 44 on its pivot and through the push-rod 57 lifting the detent 56 out of engagement with the star-teeth of the said disk. Upon the continued fall of the top of the holder the disk 43 is thus partially rotated, thus effecting the corresponding partial rotation of the rock-shaft 42 and through the arm 58 and link 59 advancing the carbid-crate over the opening in the bottom of its containing-box sufficiently to cause the next cartridge to fall through the opening and into the generating-tank. The additional volume of gas thus generated soon causes a reëxpansion of the gas-holder, and upon the rise of the finger or tappet 51 from the stirrup 50 the spring 46 contracts, tilting the lever 44 in the opposite direction, permitting the detent 56 to drop into engagement with the star-teeth of the disk and at the same time permitting the dog 45 to be rocked out of engagement with the coöperat-

ing ratchet-teeth of the disk. The supply of gas to the service-pipe then continues as before until the holder has again collapsed to a point sufficient to carry the finger 51 into engagement with the stirrup 50, whereupon the rock-shaft 42 is given a further partial rotation, still further advancing the carbid-crate, causing the fall of a third cartridge, with the results already described. This operation is continued until the last cartridge contained within the crate 17 has been discharged. The cover 38 is then removed, and by clamping together the members 44^a and 45^a of the thumb-clamp and at the same time depressing that end of the lever 44 the detent 56 and the dog 45 are simultaneously withdrawn from the periphery of the disk, thus enabling the carbid-crate to be drawn back by hand into initial position. The tray is then reloaded, the cover 38 replaced and locked, and the hereinabove-described operations repeated. In this operation of refilling the tray the valve-arm 35 is of course turned down to a horizontal position before the cover 38 can be removed, thus through the three-way valve 34 placing the generator and the tray-holder 7 and their connections into communication with the blow-off, and so venting these parts before the same are opened to the atmosphere by the removal of the cover 38. In this operation the three-way valve 34 at the same time automatically closes the discharge-pipe 29 against escape therethrough of gas in the gas-tank to the atmosphere.

Our invention contemplates the provision of means whereby in case of the presence of an abnormal and dangerous volume or pressure of gas in the holder the blow-off pipe will be automatically placed in communication with said holder to relieve the abnormal pressure existing therein, this means also preferably comprehending a means whereby on the reduction of the volume and pressure in the holder to normal or therebelow the blow-off pipe will be likewise automatically cut off again from communication with the gas-holder. The means we have devised for this purpose are best illustrated in Figs. 3 and 4, wherein it will be seen that the horizontally-extending stem of the cut-off valve 33 is provided with an actuating device in the form of a substantially V-shaped member 62, secured at its contracted or closed end on the valve-stem and having its outwardly-divergent arms 62^a and 62^b lying in the same vertical plane. It will be observed that the outer extremity of the arm 62^b is downwardly turned or curved, as shown at 62^c, for a purpose that will hereinafter appear. To the top of the gas-holder and projecting over the edge thereof is secured a finger 63, the projecting portion of which is provided with a suitably-formed contact-bar 63^a, designed for engagement alternately with the arms 62^a and 62^b of the valve-actuating member 62, already described. The valve 33, which is normally closed, is located at such a height that its actuating-arm will not be reached by the contact-bar 63^a in the normal expansions and contractions of the gas-holder; but when the latter is expanded to an abnormal height the finger 63, with its contact-bar 63^a, will be carried upwardly into engagement with the arm 62^a and through the rocking of said arm will open the valve and permit the gas to escape to the blow-off. Upon the subsequent descent of the top of the gas-holder, resulting from the above-described relief of the high pressure, the finger 63 will fall and in so doing will contact the free curved end 62^c of the lower arm 62^b, rocking the latter sufficiently to close the valve and thereafter riding idly over and past the curved end of the arm. By giving to the outer end of the lower arm 62^b the downwardly-turned formation and by forming that face of the contact-bar 63^a which rides past and contacts the curved end 62^c of said arm obliquely thereto, as shown at 63^b in Fig. 4, the contact-bar will be sprung laterally by said lower arm in passing the same without danger of being blocked thereby on its upward movement and on its downward movement will insure a full closing of the valve. This device affords, in effect, an automatic safety-valve to prevent danger to the apparatus from the presence therein of a pressure exceeding that normally designed to be maintained.

It will be observed that the generator-tank 11 is in the nature of a portable bucket or pail and can readily be removed for the purpose of emptying the sludge and replenishing the water. In order to remove said bucket, it is necessary only to loosen the thumb-nuts 13 and withdraw the pins 14 from the slots of the ears 10^a without disturbing the relative positions of any of the superposed parts. It will also be observed that we do away with all water seals, there being no water about the apparatus except what is contained within the generator itself. The provision of a flexible discharge tube or conduit between the carbid-holder and the water-tank has a distinct function and advantage in connection with a car-lighting system, since in case of an accident involving the overturning of the car and of the carbid-holder and its supporting-frame the flexibility of the connecting-tube 9 will serve to prevent the overturning of the water-tank and the consequent admission of water to the carbid-chamber.

The gas-holder may obviously be located on any side of the generator, though preferably closely adjacent thereto, in order that the rise and fall thereof may conveniently effect the operation of the carbid-feed mechanism attached to the generator. For the sake of greater rigidity and stability of the parts we preferably connect the upper ends of the generator and gas-holder frames by a suitable horizontal brace—as, for instance, the Y-shaped brace 64. (Shown in Figs. 1 and 3.)

It will be observed that with reference to the feed of carbid to the water-tank our in-

vention provides a stop or brake mechanism in the form of the combined star and ratchet wheel 43 and the detent-finger 56, which locks the actuating mechanism of the carbid-tray against movement in either direction except at and during the intervals when the tray is positively advanced for the discharge of a fresh supply of carbid. This feature is of peculiar importance in view of the fact that the machine of our invention has been designed more especially for use in connection with the lighting of railway-cars, locomotive-headlights, &c., wherein the jar and vibration to which the machine is subjected would be liable to create accidental movements of the tray and discharges of carbid therefrom were the tray-actuating mechanism not positively locked against movement in any direction.

We claim—

1. In an acetylene-gas machine, the combination with a water-tank, a superposed casing having an opening formed transversely through its base one margin of which is of stepped or staggered formation, and a carbid-delivery chute connecting said opening with the top of the water-tank, of an open-bottomed carbid-tray divided by longitudinal and transverse partitions into a plurality of carbid-compartments disposed transversely of and mounted to reciprocate in said casing over said opening, and means for effecting an intermittent travel of said carbid-tray over said opening to effect the successive falls of the carbid charges over the stepped margin of the opening into the water-tank, substantially as described.

2. In an acetylene-gas machine, the combination with a water-tank, a superposed casing having an opening formed transversely through its base one margin of which is of stepped or staggered formation, and a carbid hopper and chute connecting said opening with the top of the water-tank, of an open-bottomed carbid-tray divided by longitudinal and transverse partitions into a plurality of carbid-compartments disposed transversely of and mounted to reciprocate in said casing over said opening, and automatic means for effecting a step-by-step travel of said carbid-tray over said opening to effect the successive falls of the carbid charges over the stepped margin of the opening into the water-tank, substantially as described.

3. In an acetylene-gas machine, the combination with a water-tank, a superposed casing having an opening formed transversely through its base one margin of which is of obliquely stepped or staggered formation, and a carbid hopper and chute connecting said opening with the top of the water-tank, of an open-bottomed carbid-tray divided by longitudinal and transverse partitions into a plurality of carbid-compartments obliquely disposed and mounted to reciprocate in said casing over said opening, and means actuated through the contraction of the volume of gas generated below a predetermined point for effecting an intermittent travel of said carbid-tray in one direction over said opening to effect the successive falls of the carbid charges over the stepped margin of the opening into the water-tank, substantially as described.

4. In an acetylene-gas machine, the combination with a generating-chamber and an expansible gas-holder in communication therewith, of an open-bottomed carbid-holder adapted to contain separate charges of carbid, a support for said carbid-holder having an opening in its base over which the carbid-holder is caused to travel by a step-by-step sliding movement, driving connections for said carbid-holder, an actuating device for said driving connections carried by the gas-holder and operating upon the collapse of the latter, and an automatic detent coöperating with said driving connections and normally locking the latter against movement in either direction, substantially as described.

5. In an acetylene-gas machine, the combination with a generating-chamber and an expansible gas-holder in communication therewith, of an open-bottomed carbid-holder adapted to contain separate charges of carbid, a support for said carbid-holder having an opening in its base over which the carbid-holder is caused to travel by a step-by-step sliding movement, a rock-shaft mounted in said support, an arm-and-link connection between said shaft and the carbid-holder, a ratchet-wheel on said shaft, an actuating-dog therefor pivoted adjacent thereto, a vertically-movable finger projecting from a movable portion of the gas-holder, and a dog-actuating rod so disposed as to be engaged by said finger upon the contraction of the gas-holder below a predetermined height, substantially as described.

6. In an acetylene-gas machine, the combination with a generating-chamber and an expansible gas-holder in communication therewith, of an open-bottomed carbid-holder adapted to contain separate charges of carbid, a support for said carbid-holder having an opening in its base over which the carbid-holder is caused to travel by a step-by-step sliding movement, a rock-shaft mounted in said support, an arm-and-link connection between said shaft and the carbid-holder, a combined star and ratchet wheel on said shaft, a detent-finger normally locking the latter against movement in either direction, an actuating-dog therefor pivoted adjacent thereto, a vertically-movable finger projecting from a movable portion of the gas-holder, and a dog-actuating rod so disposed as to be engaged by said finger upon the contraction of the gas-holder below a predetermined height, substantially as described.

7. In an acetylene-gas machine, the combination with a generator, a gas-holder disposed alongside thereof, and a discharge-pipe connecting the two, of a service-pipe tapping said discharge-pipe, a blow-off pipe likewise

communicating with said discharge-pipe, a pipe connection between said blow-off and service pipes, a cut-off valve therein, a valve-actuating device on the stem of said cut-off valve, and a finger mounted on the movable portion of the gas-holder adapted to engage said actuating device of the cut-off valve on the expansion of the gas-holder beyond a predetermined limit, substantially as described.

8. In an acetylene-gas machine, the combination with an upright frame, of a carbid-holder and feed mechanism supported at the top thereof, a hopper connected to and communicating with the bottom of said carbid-holder, a flexible tube constituting a guide-chute secured to the discharge-mouth of the hopper, and a portable generator-tank removably connected to the lower end of said tube, substantially as described.

9. In an acetylene-gas machine, the combination with an upright frame, of a carbid-holder and feed mechanism supported at the top thereof, a hopper connected to and communicating with the bottom of said carbid-holder, a flexible tube constituting a guide-chute secured to the discharge-mouth of the hopper, a portable generator-tank disposed directly beneath said hopper and guide-chute, a tank-cover fast on the lower end of said flexible tube, and means whereby said cover may be applied to and removed from the tank, substantially as described.

JOHN S. HARGER.
ROBERT B. BALDWIN.

Witnesses:
SAMUEL N. POND,
FREDERICK C. GOODWIN.