No. 719,091. PATENTED JAN. 27, 1903.

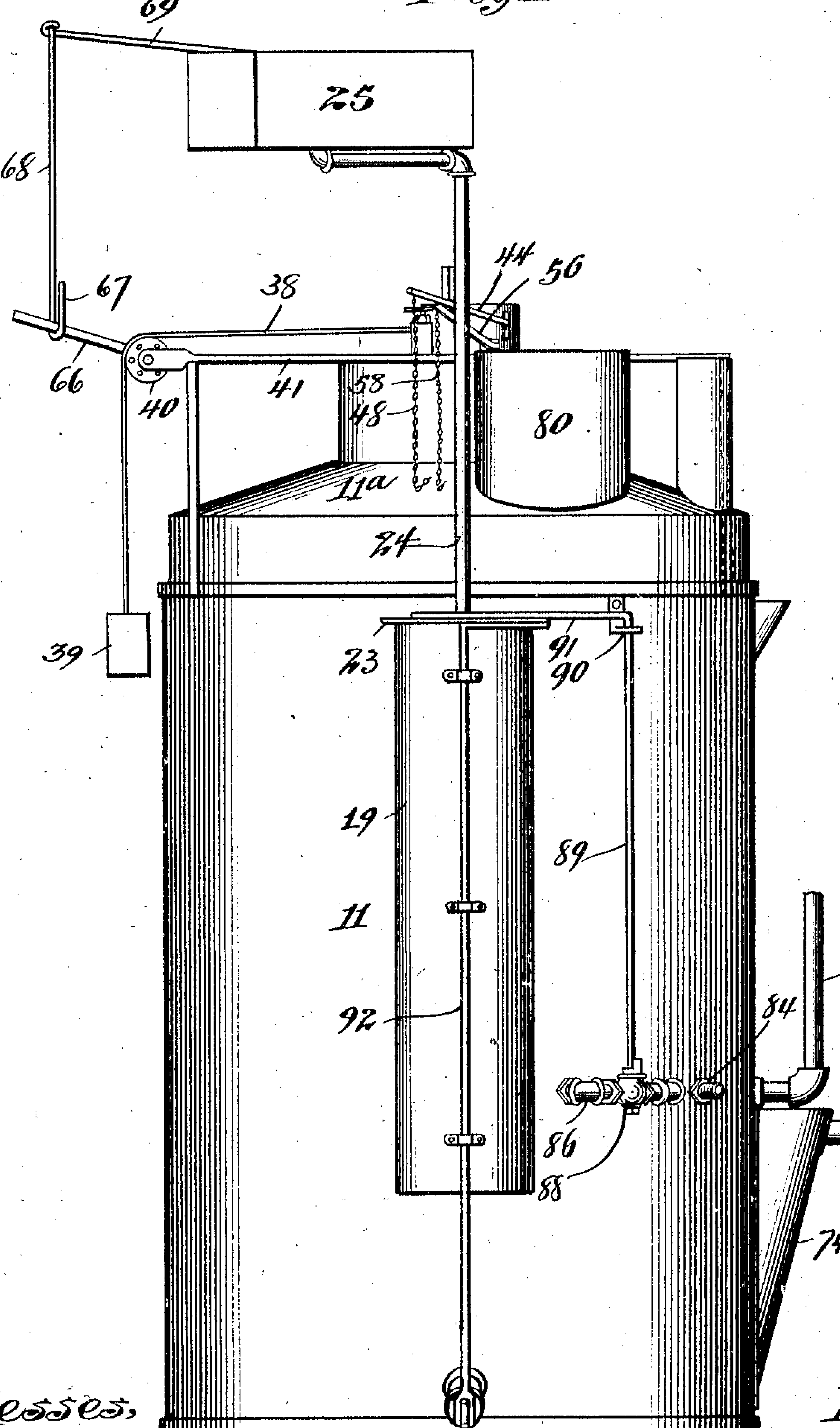
A. DAVIS.

ACETYLENE GAS GENERATOR.

APPLICATION FILED JAN. 20, 1902.

NO MODEL. 6 SHEETS—SHEET 1.

Fig. 1.



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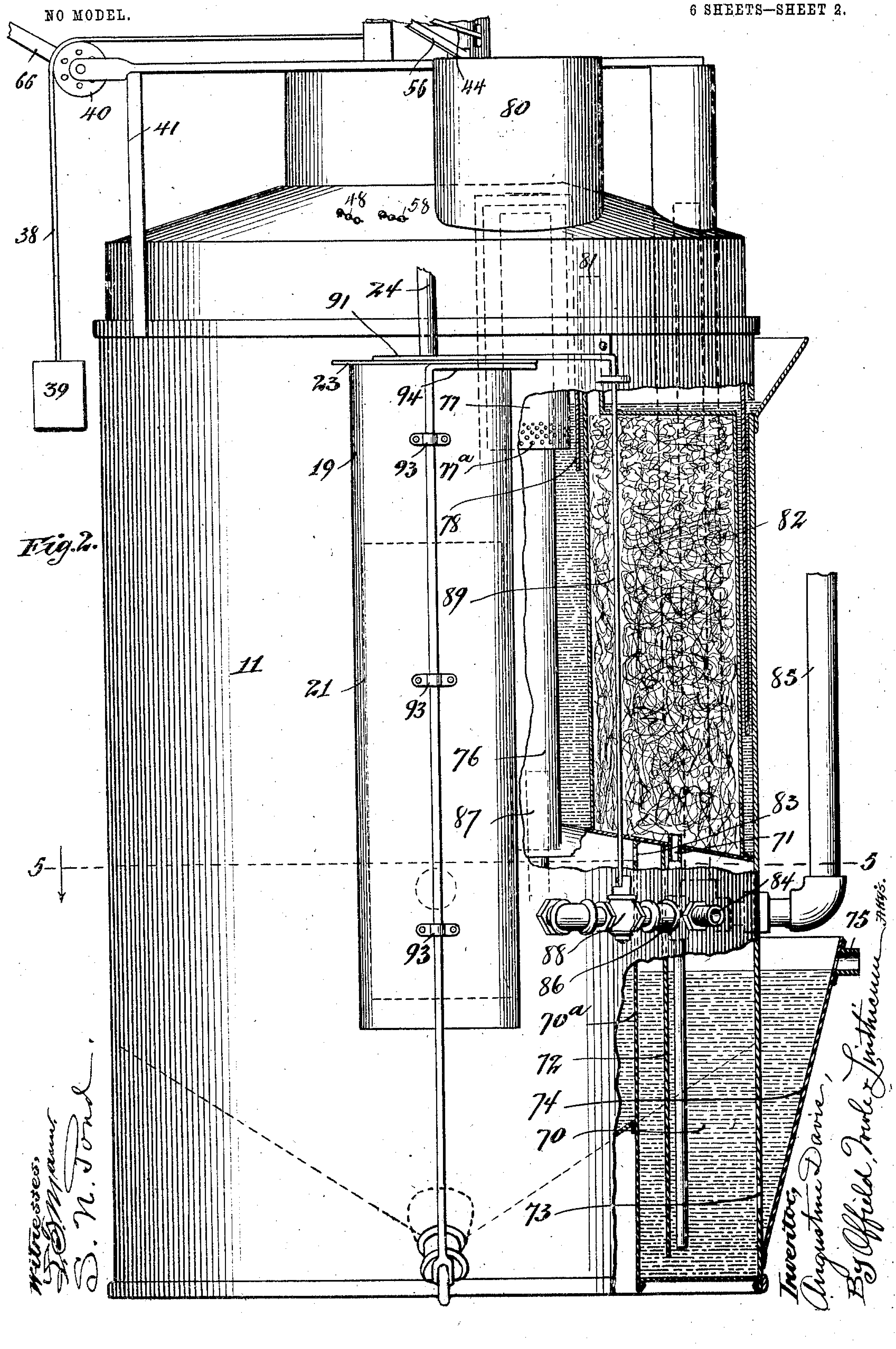
NO MODEL. 6 SHEETS—SHEET 2.



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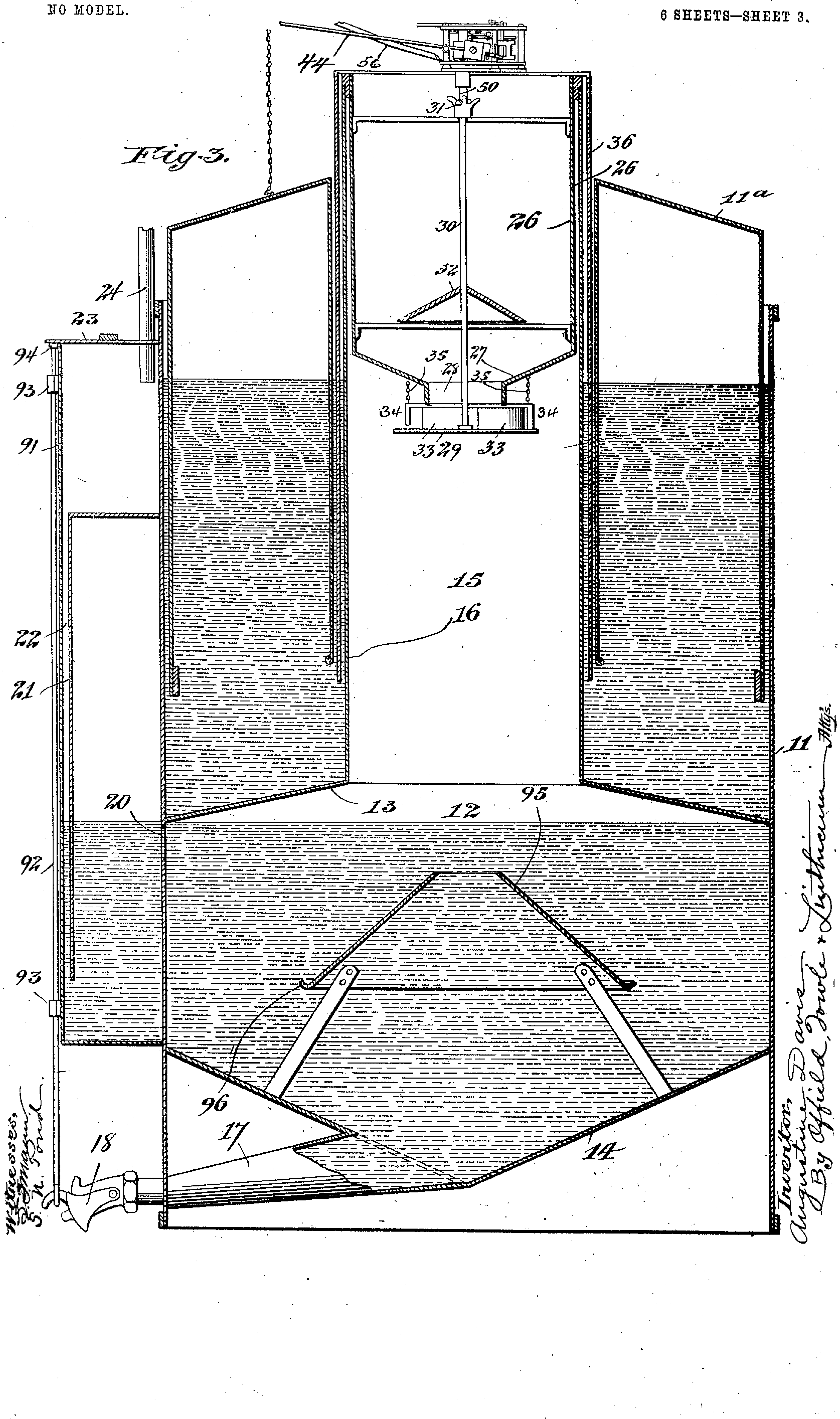
NO MODEL. 6 SHEETS—SHEET 3.



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NO MODEL. 6 SHEETS—SHEET 4.

Fig. 4.

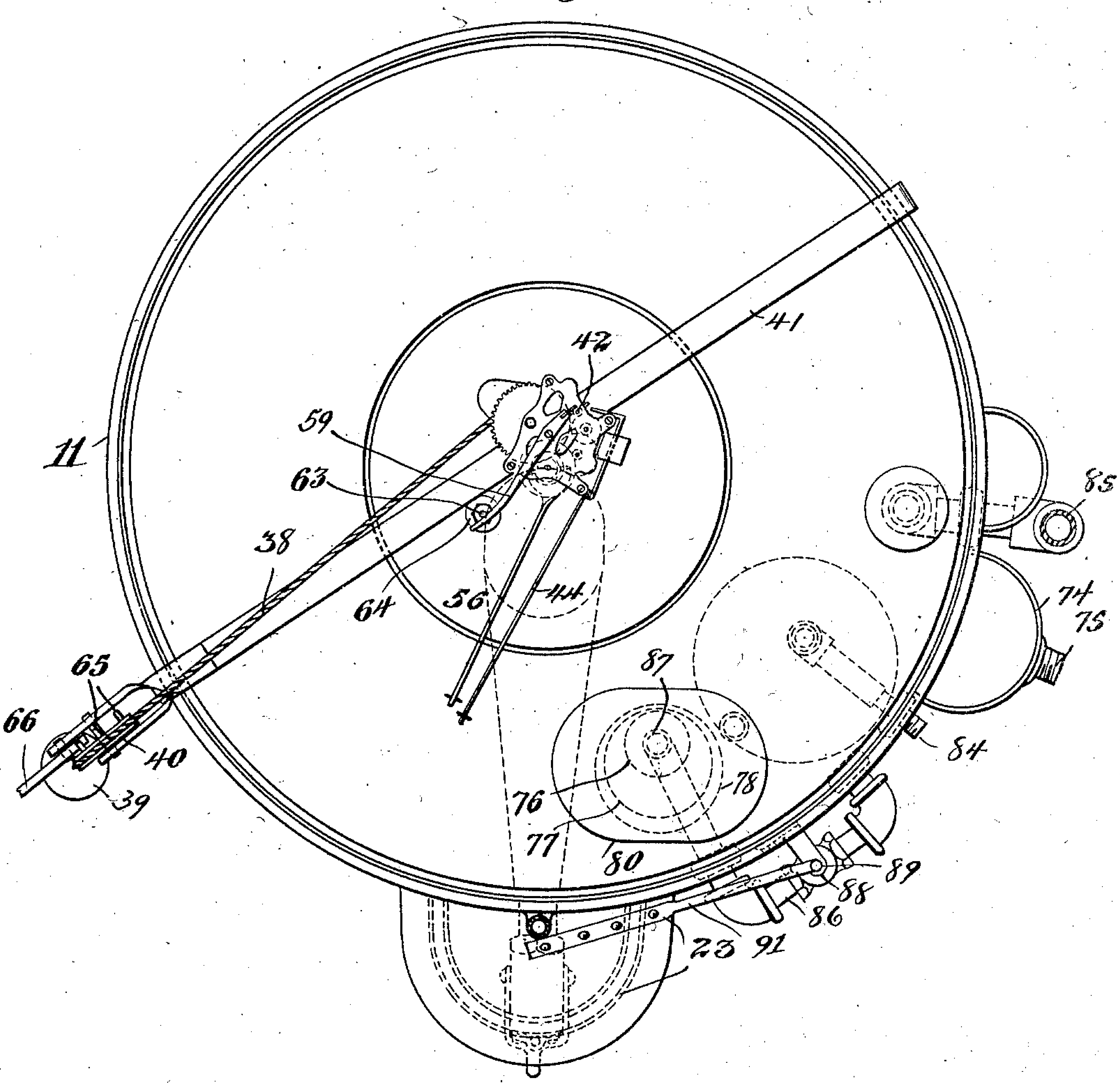
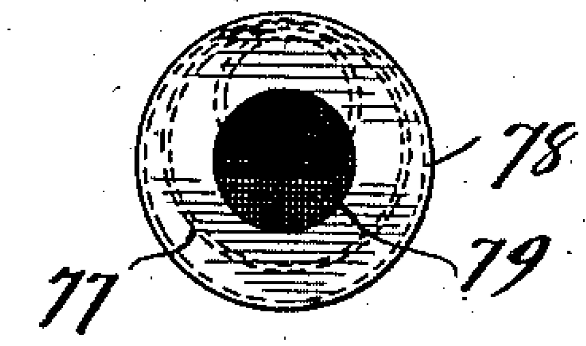


Fig. 6.



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NO MODEL. 6 SHEETS—SHEET 5.

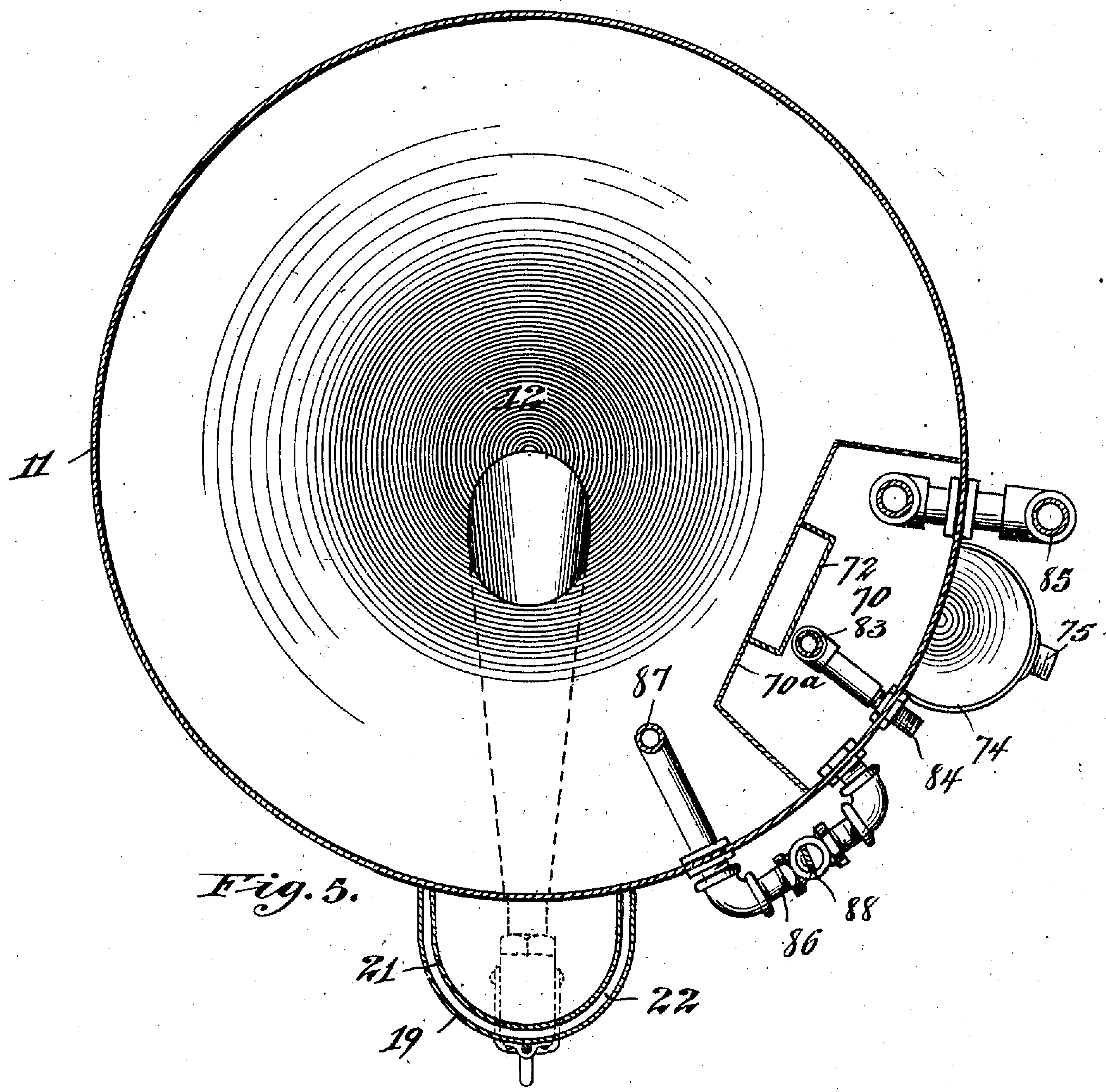

Fig. 5.

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NO MODEL. 6 SHEETS—SHEET 6.

Fig. 7.

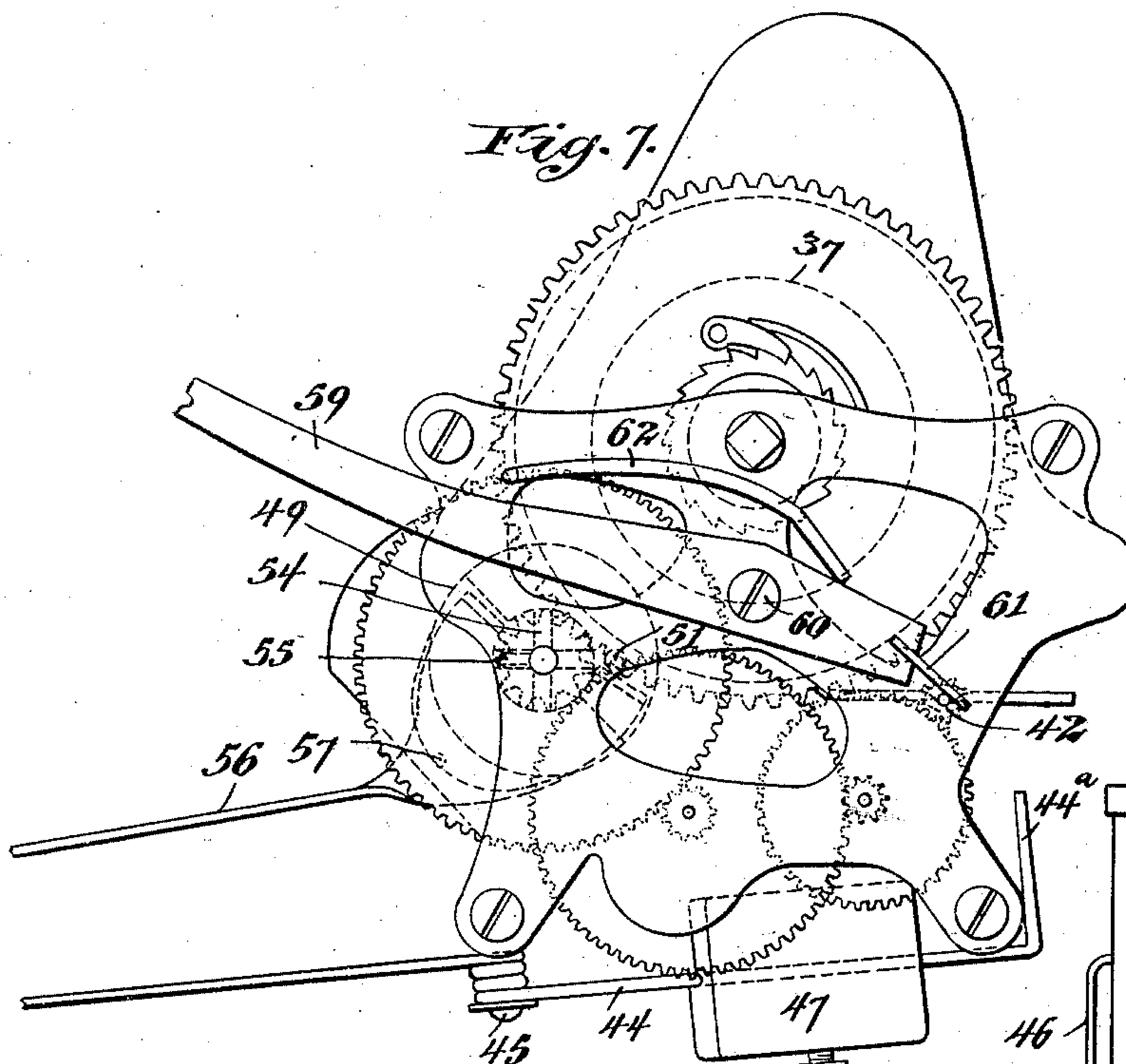


Fig. 9.

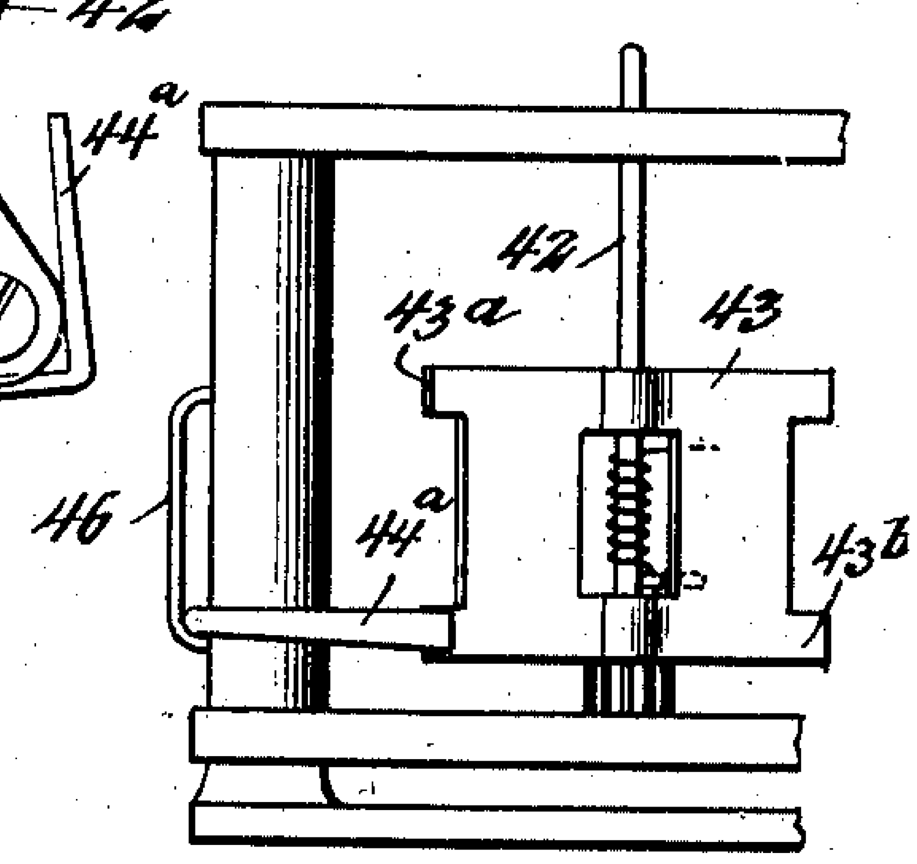


Fig. 8.

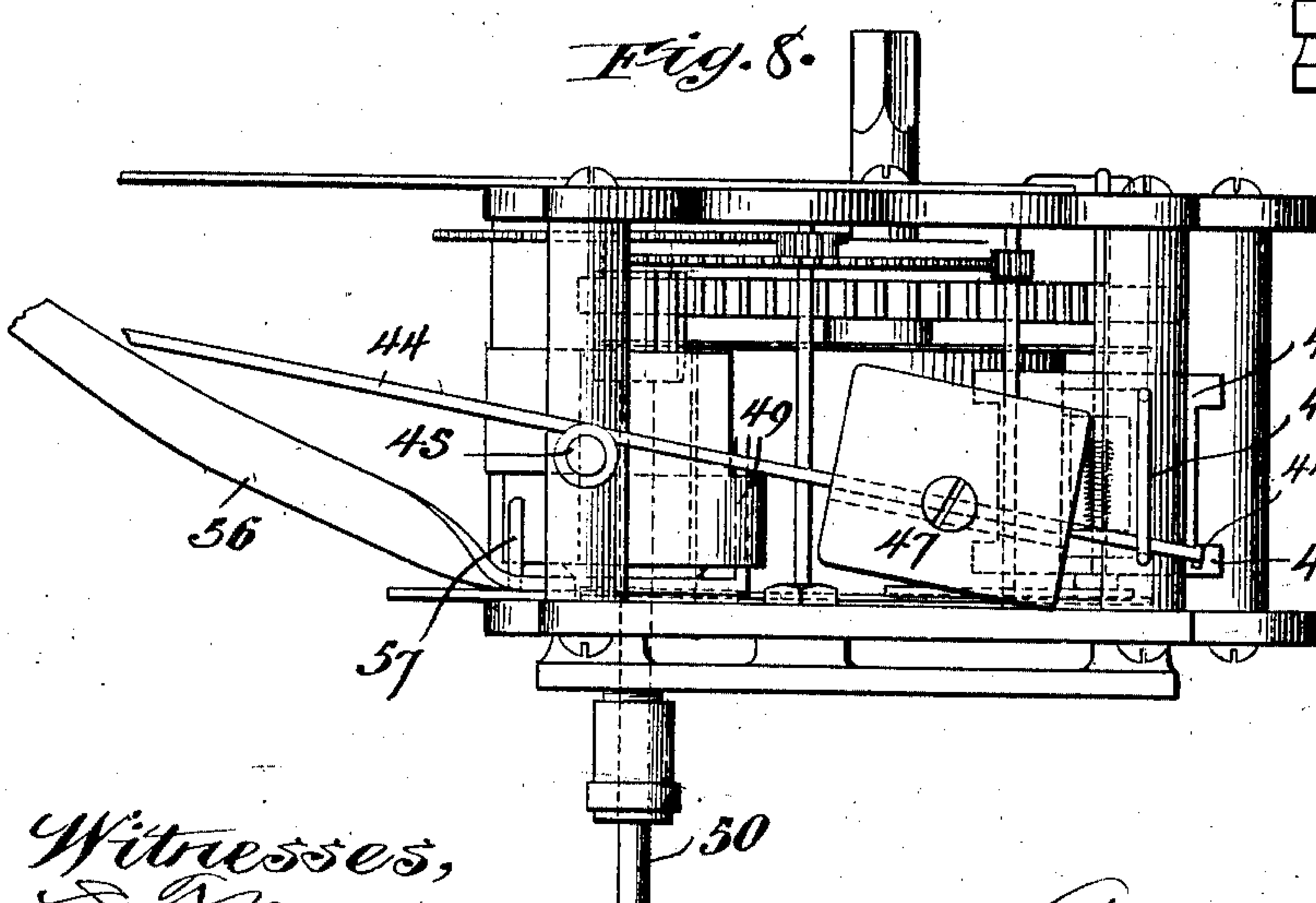
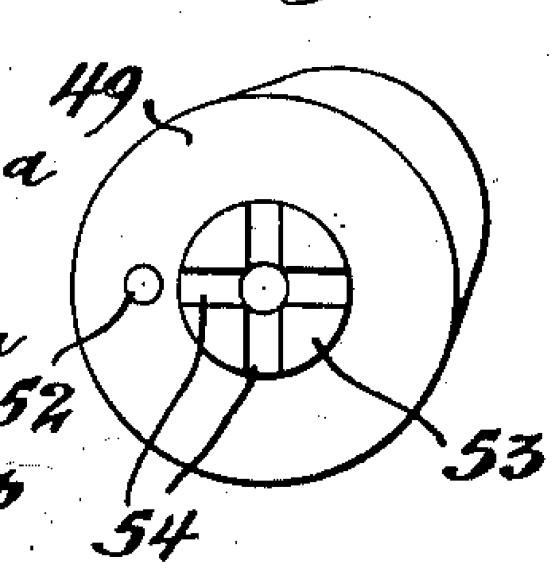


Fig. 10.



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UNITED STATES PATENT OFFICE.

AUGUSTINE DAVIS, OF CHICAGO, ILLINOIS, ASSIGNOR TO DAVIS ACETYLENE COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF SOUTH DAKOTA.

ACETYLENE-GAS GENERATOR.

SPECIFICATION forming part of Letters Patent No. 719,091, dated January 27, 1903.

Application filed January 20, 1902. Serial No. 90,464. (No model.)

To all whom it may concern:

Be it known that I, AUGUSTINE DAVIS, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Gas-Generators, of which the following is a specification.

This invention relates to gas-generators, and more particularly that class of devices designed to generate acetylene gas by the union of calcium carbid and water, this invention further belonging to that class or type of such generators in which the carbid of calcium is fed to the water, and consisting of certain improvements upon an acetylene-gas generator of this type forming the subject-matter of an application of Augustine Davis and Paris L. Davis, filed on April 16, 1901, Serial No. 13,103.

The improvements forming the subject-matter of my present application have reference to the automatic control of the motor by the action of the gas-holder bell, an auxiliary control of the motor determined by the presence or absence of the carbid-filling plug, the automatic supply of water to the generation-chamber in proportion to the consumption of carbid, which forms an important function in keeping down the heat, the automatic discharge of the bulk of the residuum from the generation-chamber without the use of valves, the automatic sealing of the generation-chamber whether filled or only partially filled, the establishment of a predetermined water-level in the generation-chamber without the use of valves and in such a manner as to prevent all possibility of flooding the apparatus, a locking device for the residuum-discharge gate and the vent-valve in connection with the water-filling tube, and other minor features of improvement which will hereinafter appear.

The principal and general object of my invention is to provide an acetylene-gas generator of the type referred to which shall be characterized by increased reliability and efficiency in action, increased safety through the provision of an adequate number of controlling devices, which are entirely automatic in their operations, and increased purity and uniformity in the character of the product. Other minor objects of the invention will hereinafter appear.

A generator constructed in accordance with my invention is illustrated in the accompanying drawings, in which—

Figure 1 is a side elevational view of the complete apparatus. Fig. 2 is a similar side elevational view, enlarged, of the apparatus, omitting the flushing-tank and having portions of the outer containing-tank broken away to disclose interior mechanism. Fig. 3 is a central vertical section through the parts shown in Fig. 2 in a vertical plane at right angles to the plane of said figure. Fig. 4 is a top plan view of the apparatus drawn to the same scale as Figs. 2 and 3. Fig. 5 is a transverse sectional view on the line 5 5 of Fig. 2 looking downwardly, showing parts of the interior mechanism. Fig. 6 is a detail plan view of a portion of the interior mechanism indicated in dotted lines in Figs. 2 and 4. Figs. 7 and 8 are plan and side elevational views, respectively, of the motor mechanism; and Figs. 9 and 10 are detail views of portions of the motor mechanism.

In my present invention, as distinguished from the invention forming the subject-matter of the application hereinabove referred to, the generation-chamber is disposed directly under and coaxially of the bell rather than to one side thereof.

In the drawings, 11 designates the stationary outer tank or shell of the device, which is preferably in the cylindrical form shown. The upper open end of the tank 11 is entered by an annular-shaped bell 11^a. Within said tank is located the generation-chamber 12, the side walls of said chamber being constituted principally by the cylindrical walls of the outer shell or tank 11 and its upper and lower walls being constituted by conical plates or partitions 13 and 14, respectively. The generation-chamber 12 opens freely into the lower end of a carbid-feed chamber 15, disposed thereabove and coaxially therewith, this chamber being preferably formed by a tube or cylinder 16, resting upon or formed integral with the upper partition 13, extending upwardly and coaxially through the bell 11^a, and having a sufficient diameter to admit the carbid-receptacle and feed mechanism, hereinafter described, in the upper end thereof and permit the unobstructed fall of the carbid therefrom into the generation-chamber. The concave bottom plate 14 has a downwardly-inclined lateral outlet-tube 17, the outer end of which is closed by a pivoted gate-valve 18.

Describing first my improved mechanism for supplying water to the generation-chamber 12, 19 indicates a vertical filling-tube secured to one side of the main shell or tank 11 exteriorly thereof and communicating with the generation-chamber through an aperture 20, Fig. 3, formed through the side wall of the latter near its upper end. Within the tube 19 and also secured to the wall of the tank 11 is a hood 21, corresponding in form with the walls of the tube 19, but of less longitudinal and transverse dimensions, and having an open lower end which extends to a considerable distance below the horizontal plane of the opening 20, thereby creating between the outer curved walls of the parts 19 and 21 a substantially semi-annular passage-way 22 of restricted transverse area for the incoming water. The top of the tube 19 is closed by a flat plate 23, constituting a cover, which latter is notched or slotted at its inner edge to receive the lower end of a water-pipe 24, leading from an elevated flushing-tank 25, which is in communication with a hydrant or any other source of water-supply. The generation-chamber is filled with water by swinging the cover 23 outwardly, as hereinafter more particularly described, and pouring water into the upper end of the tube 19, this water descending through the semi-annular passage-way 22, and thus flooding the lower end of the latter and the interior of the hood 21 until it rises to the aperture 20, whence it overflows into and fills the generation-chamber, as indicated in Fig. 3. The hood 21, in association with the tube 19 and the aperture 20, thus forms a complete and effective seal for the generation-chamber against the escape of gas on the water-admission side of the latter.

The carbid-feed mechanism, exclusive of the motor, is substantially the same as that forming in part the subject-matter of the application hereinabove referred to, and consists, briefly stated, of a cylindrical carbid-receptacle 26, secured to and fitting within the upper end of the chamber 15, said receptacle having a conical bottom 27, provided with a discharge-throat 28, beneath which latter is located a horizontal disk 29, serving as a feed-plate and given a continuous rotation by means of a vertical shaft 30, extending axially through the receptacle and at its upper end connected by a clutch 31 with the driving-shaft of a motor, hereinafter described. One or more conical baffles 32 serve to prevent clogging of the carbid in the discharge-throat of the receptacle. In conjunction with the rotating feed-plate 29 there are employed a series of displacers 33 in the nature of non-rotating sweeps or scraper-blades disposed obliquely with reference to the radius of the disk 29, and consequently at an angle to the path of motion of the surface of the disk. These displacers are carried by an annulus 34, suspended by chains 35 from the bottom of the carbid-receptacle, a slight distance above the upper surface of the plate 29.

The driving-shaft 30 of the feed-plate 29 is actuated by means of a clockwork mechanism, which in the form of my invention herein shown is adapted to be driven by a weight and cord. My invention comprehends, among other features of improvement, certain controlling and regulating devices which are thrown into and out of operation by the travel of the bell and which will now be described. The motor is seated upon the top plate or cover of a hood 36, resting upon and exteriorly telescoping the tube 16, as shown in Fig. 3. Referring now to Figs. 7 to 10, inclusive, which illustrate the details of the motor and the connection and relation of my controlling devices thereto, 37 indicates the main winding-drum, around which is wound the cord 38, carrying at its lower end the operating-weight 39, Fig. 1, the cord being trained over a guide-pulley 40, journaled in a supporting-frame 41, mounted on the upper end of the main tank 11. The motor is provided with the usual fly-staff 42, connected to the shaft of the winding-drum through the usual train of gears and pinions and carrying a fly 43, the outer vertical edges of which have wide notches, as best shown in Fig. 9, thereby providing top and bottom projections 43^a and 43^b. A lever 44, pivoted at 45 on an element of the motor-fly, has an inwardly-bent end 44^a, Figs. 7 and 9, constituting an extension of its short arm, which inwardly-bent end projects into the path of travel of the fly 43 to such an extent that it will be engaged by the projections 43^a and 43^b of the fly when in the path of travel of the latter, but when lying in the notched area intermediate said projections will not interfere with the rotation of the fly. The short arm of this lever may be guided in a vertical staple 46, secured in one of the fixed elements of the motor-frame, and serve to limit the sweep of the lever to the vertical extent of the fly. The short arm of the lever is further provided with an adjustable counterbalance 47. The long arm of the lever (see Fig. 1) is connected wtih the top of the bell 11^a by means of a chain 48, this chain being of such a length that when the bell is elevated above the height normally occupied thereby in the operation of generating and supplying gas the inwardly-bent end of the lever abuts one of the lower projections 43^b of the fly, thus stopping the operation of the motor, while should the bell for any reason sink to the bottom of the gas-holder tank and come to rest upon the top wall of the generation-chamber the lever would then be drawn into the path of the upper projections 43^a of the fly, thus stopping the operation of the motor until released by the operator. Variations in the height of the bell, such as occur during the normal generation and utilization of the gas, will not occasion the travel of the bent end of the lever outside of the notched area of the fly lying between the top and bottom projections thereof, and thus will not interfere with the operation of the motor. It will thus be seen that the device above described automatically stops the motor, and consequently interrupts the feed of the carbid both when the generation of gas is proceeding at a faster rate than desired, thereby creating an excess volume within the bell, and likewise when the generation of gas falls below the point required for efficient service. The locking of the motor in this latter position of the bell is desirable in order that if the bell should come to rest and cause the gas-lights to be extinguished from lack of pressure when a portion of the carbid charge still remained in the carbid-magazine through clogging or from other causes it would not be possible for the generator to start automatically and without the aid of the operator, who would thus be in a position to first ascertain if the burners had been left open when the gas-supply ceased and could close them before starting gas generation. It will thus be observed that the notching of the fly, forming the upper and lower projections which lie within the path of the lever, governs the range or zone in which the bell may move without stopping the motor.

I have also provided an additional or auxiliary controlling device adapted to automatically lock the feeding-shaft of the motor against rotation except when the bell has fallen to such a point as to insure the delivery of gas at a proper pressure. This device includes a weight 49, (shown in bottom plan view in Fig. 10,) which encircles and rides upon the feeding-shaft 50 of the motor and is held against rotation with freedom for vertical movement by sliding engagement with a pin 51, which enters a vertical hole 52, formed through the weight to one side of the center thereof. The lower face of the weight has a boss 53 of reduced diameter, across the lower face of which are formed a series of transverse grooves 54, which when the weight is at rest in its lowermost position are adapted to engage a pin 55, fixed in and projecting horizontally from the feeding-shaft just above the bottom plate of the motor-frame. This pin of course partakes of the rotation of the feeding-shaft, so that when the latter has rotated to bring the pin into registration with any one of the grooves 54 the weight at once drops, carrying the groove into engagement with the pin, and thus locking the feeding-shaft against further rotation. A bent lever 56, fulcrumed over an upstanding pin 57 in the base of the motor-frame, has its forked short arm lying under the weight 49 and straddling the shaft 50. The long arm of this lever is connected, as best shown in Fig. 1, by a chain 58 with the bell 11^a, the chain 58 containing less slack than the chain 48, whereby on the descent of the bell the lever 56 is actuated to raise the weight and unlock the feeding-shaft slightly in advance of the similar release of the fly 43 by the actuation of the lever 44. By means of this device the motor is prevented from operating at all times when the gas-holder bell is above a predetermined point, with the result that no carbid can be fed to the generation-chamber irrespective of the control afforded by the lever 44 and any accident that may occur to the latter.

I have also devised a mechanism having the function of guarding against accident to the apparatus and waste of gas which might result from a continued feeding of the carbid when the carbid-receptacle was not completely closed against the escape of gas. This mechanism, which performs its function in connection with the filling-plug of the carbid-receptacle, includes a lever 59, Fig. 7, fulcrumed at 60 on the top plate of the motor-frame, the short arm of this lever carrying at its outer end a brake-shoe in the nature of a thin spring-plate 61, one side of which is pressed against an extension of the fly-staff 42 by means of a spring 62, secure at its rear end on the top plate of the motor-frame and having its forward end or nose overlying and pressing against the short arm of the lever. The long or rear arm of the lever 59, as best shown in Fig. 4, abuts laterally against a pin 63, fixed in the top of a plug 64, which closes the filling-aperture of the carbid-magazine 26. The lever 59 is so fulcrumed relatively to the fly-staff 42 and the pin 63 that when the plug is in place and the tail of the lever engages the pin 63 the nose 61 of the lever is held out of frictional contact with the fly-staff, as shown in Fig. 4; but when the plug is removed, thereby withdrawing the pin 63 out of restraining engagement with the lever, the nose of the latter is instantly carried into engagement with the staff of the fly, and thus stops the operation of the motor. It will thus be seen that this device normally prevents the operation of the motor and the consequent feeding of carbid at all times, except when the carbid filling-plug is in place.

I provide for a uniform intermittent flow of water to the generation-chamber from the flushing-tank 25 during the feeding of the carbid by the mechanism which will next be described. Referring to Fig. 4, it will be observed that one face of the guide-pulley 40, over which the cord 38, carrying the weight 39, is trained, is provided with a series of laterally-projecting pins 65, spaced apart at equal intervals and at equal radial distances from the center of the pulley. To the extremity of one arm of the bracket or fork carrying the pulley 40 is pivoted an arm 66, the heel of which lies within the circular path of travel of the pins 65 and the outer end of which (see Fig. 1) lies in a stirrup 67, formed at the lower end of a link 68, which is pendent from the outer end of the trip-lever 69, which actuates the flushing apparatus in the tank 25. The pulley 40 turns on its axis at a slow but continuous and practically uniform speed of rotation, whereby the pins 65 successively trip the heel of the arm 66, thereby slowly elevating the latter in the stirrup 67, and upon passing out of engagement with said heel allowing the arm to drop suddenly with a momentum sufficient to actuate the trip-lever 69, and thus discharge the water contained in the flushing-tank into the generation-chamber by the course already described. It is here noted that the cord 38 and its weight 39 bear such a relation to the capacity of the carbid receptacle or magazine 28 and the carbid-feeding device that the descent of the weight from its highest position to the point at which it will come to rest on the ground or floor is just sufficient to cause the motor and feed mechanism to discharge the complete contents of the magazine into the generation-chamber. In this way the weight 39 serves as a register to indicate the proportionate amount of the full charge of carbid that may have been fed or that may still remain in the magazine at any given time in the operation of the apparatus.

I will next describe the means I have devised for effecting the automatic discharge of water and the residuum held in solution thereby from the generation-chamber without the use of valves and in a manner to maintain a constant seal against the loss of gas on the discharge side of the generation-chamber.

Referring more particularly to Figs. 2 and 5, 70 designates a drainage-chamber which lies within and at one side of the generation-chamber 12, the top wall of which is constituted by a portion of the top of the generation-chamber, said drainage-chamber extending through the bottom of the generation-chamber to the base of the tank 11. This drainage-chamber communicates with the generation-chamber only through an aperture 71, formed at the upper end of the partition 70^a, which divides the two chambers. To the drainage-chamber side of the partition 70^a and inclosing the aperture 71 is a hood 72, the lower end of which extends downwardly nearly to the bottom of the drainage-chamber. The outer wall of the drainage-chamber constituting a part of the wall of the tank 11 is apertured near the lower end thereof, as at 73, this aperture being inclosed outside of the wall by a cup 74, provided with a discharge tap or drain 75 at its upper end. From the foregoing it will be seen that the water in the generation-chamber will rise until it reaches the level of the overflow-aperture 71, whereupon it will flow through the latter, down through the hood 72, thence around the lower end of the latter into the main portion of the drainage-chamber, and thence around the aperture 73 into the cup 74, the water maintaining a constant level in the hood, drainage-chamber, and cup by reason of the fact that these three receptacles are always in free and unvalved communication with each other. The overflow water from the generation-chamber will thus rise simultaneously in the hood, drainage-chamber, and cup until it reaches the level of the overflow 75, at which point it will be discharged into a drain or sewer. It will thus be observed that the elements last described constitute an effective water seal against the escape of gas from the generation-chamber on its discharge side, while permitting the free overflow and discharge of water and dissolved carbid therefrom coextensively with the supply of water thereto, and this without the use of any valves whatever. This arrangement provides for the establishment of a predetermined normal level of water in the generation-chamber and prevents the possibility of its being overfilled or flooded, and this without the aid of any indicator devices. It also permits cool water to be passed through the generation-chamber without disturbance of the apparatus even when the generator is in operation.

As will be observed by reference to Fig. 3, the lower ends of the bell 11^a and hood 36 are sealed by a body of water contained within the annular chamber constituting the upper portion of the main water shell or tank 11, thus creating within the bell and above the sealing liquid a hermetically-inclosed gas-chamber. As the gas is generated in the chamber 12 it rises upwardly through a pipe 76, secured in the roof of the generation-chamber, the open upper end of this pipe being surrounded by a hood 77, fastened to the top of the pipe, the lower end of which hood extends below the level of the sealing liquid and is provided with a series of minute perforations, through which the gas passes, bubbling up inside a second hood 78 of slightly-larger diameter than and surrounding the hood 77, this hood 78 being also secured to the top of the pipe 76 and provided in its top or cover with a number of minute perforations, (indicated at 79, see Fig. 6,) the function of which is to prevent the transmission to the bell of the vibrations in pressure ordinarily caused by the bubbling up of the gas in comparatively large masses into the bell, which causes the lights to flicker. Thence the gas flows into the interior of the gas-holder bell and of a dome 80, surmounting the roof of the same above the hoods 77 and 78. From the gas-chamber of the bell the gas is free to flow downwardly through a pipe 81 into a filter 82, which latter is simply a receptacle located within the upper annular chamber of the tank 11 and containing a filling of mohair or equivalent straining material, through which the gas percolates, being freed therein from solid particles and other impurities. A discharge-pipe 83, tapping the base of the filter, communicates with a laterally-extending service-pipe 84, extending out through the wall of the tank.

The relative disposition of the gas-conducting pipe 76 and the hoods 77 and 78, telescoping the upper end thereof, is clearly shown in Fig. 6, wherein it will be seen that the pipe 76 and inner hood 77 are eccentrically disposed with relation to each other and to the outer hood 78. This arrangement affords an easy method of connecting said parts besides affording in practice more satisfactory results with respect to the flow of gas therethrough than a concentric arrangement of the same parts. Referring to Fig. 2, it will be observed that the inlet-pipe 81 to the filter is also so located as to be surrounded by the dome 80 when the bell is at or near its lowermost position.

The emptying and filling of the generation-chamber with water necessarily involves the introduction and discharge, respectively, to a certain extent of air within the chamber and above the water. It is undesirable that this air in the filling of the generation-chamber should be allowed to pass off through the gas-discharge conduit, and thus injuriously dilute the gas. In order to prevent this, I have placed the interior of the drainage-chamber 70 above the maximum water-level therein into free communication with the atmosphere through a blow-off pipe 85. I also tap the interior of this portion of the drainage-chamber with a pipe 86, located exteriorly of the wall of the generation-chamber, but having its opposite end piercing said wall and passing up a certain distance into the lower open end of the gas-discharge pipe 76, as indicated by dotted lines at 87 in Fig. 2. That portion of the pipe 86 lying outside the generation-chamber is provided with a vent-valve, (indicated at 88,) which valve has an operating-rod 89, extending vertically upward through a guide 90, this rod terminating in an arm or handle 91, bent at right angles thereto, which arm is secured fast upon the top of the cover 23 of the water-sealing tube 19, as plainly shown in Figs. 1 and 2. The obvious result of this connection of the parts 91 and 23 is that the generation-chamber cannot be filled with water without necessarily opening the vent-valve 88, and thus permitting the displaced air to escape from the generation-chamber by way of the pipe 86, valve 88, the drainage-chamber 70, and the blow-off pipe 85. Not only is the opening of the cover 23 and the filling of the generation-chamber thus controlled by the means for operating the vent-valve just described, but the cover 23 in itself constitutes a controlling agent governing the withdrawal of the sludge or residuum which settles in the bottom of the generation-chamber. As will be observed by reference to Figs. 1, 2, and 3, the residuum-gate 18 has connected therewith an operating-rod 92, extending vertically upward through guides 93 to a position directly beneath the cover 23 when the latter is in its closed position, the upper end of said rod being preferably bent at right angles to form a convenient handle 94 for raising the rod and gate, which handle lies directly under the overhanging lip of the cover, as best shown in Fig. 3. Since the cover 23 cannot be opened without simultaneously opening the vent-valve, and since the residuum-gate cannot be opened without first opening the cover, it thus becomes impossible to open the residuum-gate and empty the generation-chamber without automatically providing for a replacement of the water and sludge drawn off by air, which will be drawn in through the blow-off and the vent-valve, this admission of air obviously being necessary in order to drain off the water and its contained residuum. Conversely, when the generation-chamber is refilled with water, the vent-valve necessarily being open during this operation, provision is thereby insured for the free displacement to the atmosphere of the air and gas mixture existing in the generation-chamber. This vent-valve 88 also provides for a condition of the apparatus under which a small portion of carbid can be fed into the generation-chamber for the purpose of making gas designed to replace the small amount of remaining air which has been admitted during the process of recharging the carbid mechanism. This is done by leaving the vent-valve open for a short time after the recharging of the apparatus and the commencement of gas-generation. Also when the carbid charge is about exhausted and is to be replaced by a new charge by opening this vent-valve before withdrawing the filling-plug the compressed gas remaining in the generation-chamber is allowed to expand and exhaust through the vent-valve and the blow-off, thus obviating any danger which might result from withdrawing the filling-plug when a considerable pressure of gas remained in the apparatus. If left open, it also provides for the escape of gas displaced when carbid is poured into the magazine through the filling-opening. It will be seen from the foregoing that this vent-valve performs four functions—providing a vent when the residuum is discharged, allowing the escape of air or air and gas mixture when the generation-chamber is refilled with water, permitting the escape of compressed gas before the filling-plug is withdrawn, and allowing the mixture displaced by recharging to escape to the outer air.

In order to obtain a maximum result in respect to the volume of gas generated from a given amount of carbid and water, it is essential to effect a thorough dispersion of the carbid throughout the body of water in order that the chemical process resulting in the liberation of the gas may take place in an effective and thorough manner. I have found that this result is facilitated in an apparatus like that above described by providing in the generation-chamber and somewhat below the normal water-level therein a conical baffle-plate 95, Fig. 3, disposed coaxially with the chamber itself and having around its lower margin an outwardly and upwardly turned flange 96. The baffle-plate serves in an obvious manner to spread and disperse the lumps and particles of carbid as they fall into and through the water of the generation-chamber, while the flange 96 serves to retard and partially arrest the descent of the carbid through the water. In this way not only does the water most effectively get at and attack the carbid from all sides, but the packing of the carbid in a partially-consumed condition in the bottom of the generation-chamber is prevented.

The operation of the apparatus, briefly summed up, is as follows: By removing the cover 23 and pouring water into the filling-tube 19 the generation-chamber is filled with water to the level of the overflow 71. In this operation the vent-valve 88 is necessarily opened, thus permitting the escape through the blow-off of air forced out by the entrance of the water. The filling-plug being removed, which operation automatically permits the application of the brake 61 and the stopping of the motor if it be in operation, carbid is poured into the magazine 26, in which operation any gas within the latter that may be displaced by the incoming carbid is driven off through the blow-off. The cover of the filling-tube and the filling-plug having then been replaced and the motor wound up until the weight is at the starting-point, the machine may be started in operation. As the weight descends, operating the motor, the carbid is fed by the carbid-feed mechanism to the generation-chamber, the generation of gas instantly resulting therefrom. The gas rises through the tube 76, descends through the hood 77, forcing down the water-level therein until it escapes through the apertures 77ª, and bubbles up through the surrounding water between the hoods 77 and 78, passing through the perforated top 79 of the latter and entering the annular chamber of the bell. Thence the gas descends through the tube 81 into and through the filtering or scouring chamber 82, whence it passes by the pipe 83 to the service-pipe 84.

Referring first to the operation of those controlling devices for the motor which are governed by the movement of the bell, so long as the volume of the gas generated maintains the bell at a height which does not vary sufficiently to rock the inner end of the lever 44 into the path of travel of either the top or bottom projections of the fly the generation of gas will continue uninterruptedly. Should the generation of gas take place in amounts above the demands of service to such an extent as to raise the bell so high as to permit the inner end of the counterweighted lever 44 to fall into the path of travel of the lowermost projections 43ᵇ of the fly, the motor will be stopped until the volume of gas has fallen sufficiently to raise the inner end of the lever through the descent of the bell. Similarly, should the generation of gas cease through failure of the carbid-feed mechanism to operate properly or at all the bell would come to rest in its lowermost position, and this would carry the inner end of the counterweighted lever 44 into the path of travel of the upper projections 43ª of the fly, thus stopping the motor. This automatic stopping of the apparatus would be a notice to the operator that the lights had been extinguished from lack of pressure, and he would thus be in a position to ascertain whether the burners had been left open when the gas-supply ceased and could close them before renewing gas generation by restarting the apparatus.

In all positions of the bell indicating an abnormally large volume of gas the lever 56 will be free to assume a position to permit the settling of the weight 49, and consequently the locking of the feeding-shaft 50. The motor is thus normally locked against operation at all times, except when the bell of the gas-holder has risen or fallen to a position indicative of normal gas producing and delivering conditions. In practice the controlling-levers 44 and 56 will be connected to the bell in such a manner that the motor will be unlocked by the raising of the weight 49 just prior to the release of the fly by the raising of the notched end of the counterweighted arm of the lever 44. As the weight 39 descends, the guide-pulley 40 is uniformly rotated and the pins 65 trip the heel of lever 56 at regular intervals, thus producing intermittent flushing of the tank 25 and corresponding intermittent deliveries of water therefrom to the generation-chamber. As the cable attached to the motor travels a certain distance to discharge a proportionate amount of carbid, the pins in the pulley can be so placed as to discharge a relative amount of water, thus automatically supplying water for gas-generation purposes as may be required. The introduction of each fresh volume of water to the generation-chamber in the manner described is of course accompanied by a discharge of a like amount of water and dissolved carbid on the opposite side of the generation-chamber through the overflow 75, the liquid flowing freely through the several sealed openings, through which the filling-tube, the generation-chamber, the drainage-chamber, and the overflow-cup are all in free communication without the use of valves. The arrangement just described permits of the automatic supply and discharge of the water necessary for gas generation and cooling purposes, and as the entering water, being cool, sinks to the lower portion of the generator it automatically displaces the warmer water at the upper surface, causing it to overflow and carry a large portion of the residuum which is in solution with it. It also has a tendency to prevent the formation of "floating islands" so frequently present when fine carbid is used. It also greatly reduces the labor required in caring for gas plants and renders it feasible to make such plants of much smaller dimensions than would otherwise be possible. In connection with this automatic flushing and cooling of the generation-chamber it will be noted that the hood 21 in the filling-conduit forms an effective trap or water seal, which prevents the gas from escaping when the generation-chamber is empty or only partially filled with water. This water seal is so devised that the area inside the hood is many times greater than the area between the wall of the hood and the wall of the filling-tube. Consequently the water on the outside of the hood must rise to a considerable height before the water on the inside is depressed sufficiently to break the water seal. Moreover, the placing of the water seal in the water-filling tube insures the renewal of the seals every time water is introduced into the generation-chamber.

What I regard as the most noteworthy feature of the above-described apparatus resides in the combination of the generation-chamber with the filling and discharging mechanism so constructed and operating that the major portion of the residuum, which is held in solution by the water, is automatically discharged and gotten rid of at regular intervals without interrupting the sealed condition of the generation-chamber and without the use of floats or valves. I am aware that an automatic periodical flushing of the generation-chamber has heretofore been proposed, but I believe myself to be the first to perform this operation in such a manner as to effect a considerable discharge of the residuum simultaneously therewith and at the same time maintain a constantly-sealed condition of the generation-chamber without the use of valves.

I do not wish to be understood as limiting myself to the precise details of construction shown and described as constituting one embodiment of my invention, since it is obvious that various modifications in the structure might be made without departing from the principle of my invention.

I claim—

1. In an acetylene-gas generator, the combination with the generation-chamber, a carbid-feed mechanism disposed thereabove, and a motor for operating said feed mechanism, of means for intermittently flushing said generation-chamber with water, said means being operated by the actuating agent of the motor, substantially as described.

2. In an acetylene-gas generator, the combination with a generation-chamber having a sealed overflow, a carbid-feed mechanism disposed thereabove, and a motor for operating said feed mechanism, of a flushing-tank connected with the water-inlet of the generation-chamber, and means for intermittently discharging the contents of said flushing-tank operated by the actuating agent of the motor, substantially as described.

3. In an acetylene-gas generator, the combination with a generation-chamber having a sealed inlet and overflow, a carbid-feed mechanism disposed thereabove, and a weight-motor for operating said feed mechanism, of a flushing-tank connected with the water-inlet of the generation-chamber, a lever for discharging the contents of the flushing-tank, and means for intermittently actuating said lever operated by the cord and weight of the motor during the descending movement of the weight, substantially as described.

4. In an acetylene-gas generator, the combination with a generation-chamber having a sealed inlet and overflow, a carbid-feed mechanism disposed thereabove, and a weight-motor for operating said feed mechanism, of a suitably-mounted guide-pulley over which the weight-cord is trained, a series of tripping devices on the face of the pulley, an elevated flushing-tank connected with the water-inlet of the generation-chamber, a lever for discharging the contents of the flushing-tank, and mechanism intermediate said lever and pulley and intermittently actuated by the tripping projections on the latter to trip said lever and discharge the contents of the flushing-tank into and through the generation-chamber, substantially as described.

5. In an acetylene-gas generator, the combination with a gas-holder tank, of a generation-chamber in the lower portion thereof, said chamber having a filling-aperture formed through its side wall near its upper end, a filling-tube secured to the side of said tank exteriorly thereof and extending over and below said aperture, and a hood of slightly less transverse area than said tube also secured to the side wall of the tank within said filling-tube, the lower open end of which extends below said aperture, thereby providing on opposite sides of said hood water-containing chambers of widely varying transverse areas constituting a liquid seal, substantially as described.

6. In an acetylene-gas generator, the combination with the gas-holder tank and the generation-chamber formed in the lower portion thereof, of a water-filling tube communicating with the generation-chamber, a cover for said filling-tube, a pipe connection connecting the interior of the generation-chamber with the atmosphere, a vent-valve in said pipe connection, and a valve-operating device fast with the cover of said filling-tube, the parts being so relatively disposed that the opening of the cover to fill the generation-chamber simultaneously opens the valve to vent the air in the generation-chamber, substantially as described.

7. In an acetylene-gas generator, the combination with the gas-holder tank, of a generation-chamber occupying the lower portion thereof and having water inlet and discharge openings formed through its side walls near their upper ends, a water-filling tube secured to the side wall of the tank exteriorly thereof and covering said inlet-opening, a hood also secured to the side wall of the tank within

said tube and extending over and below said opening, thereby providing between said tube and hood a semi-annular water-admission conduit of constricted area, a drainage-chamber communicating with the generation-chamber through said discharge-opening, a hood within said drainage-chamber and covering said opening, and an overflow cup or basin in free communication with said drainage-chamber, whereby the generation-chamber is constantly sealed with provision for the free flow of water and dissolved residuum therethrough and therefrom, substantially as described.

8. In an acetylene-gas generator, the combination with the gas-holder tank and the generation-chamber constituting the lower portion thereof, of an outlet-tube connecting the lower end of the generation-chamber with the exterior of the tank, a valve controlling the outer end of said outlet-tube, a filling-tube for the generation-chamber provided with a removable cover, and a valve-operating connection so positioned with respect to said cover as to be incapable of operation while the cover is closed, substantially as described.

9. In an acetylene-gas generator, the combination with the gas-holder tank and the generation-chamber constituting the lower portion thereof, of an outlet-tube connecting the lower end of the generation-chamber with the exterior of the tank, a valve controlling the outer end of said outlet-tube, a filling-tube for the generation-chamber applied to the side of said tank directly above the valved end of said outlet-tube, a removable cover for said filling-tube, and a valve-operating link extending upwardly to a position directly beneath the margin of said cover, whereby said valve is incapable of being opened without first opening said cover, substantially as described.

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Witnesses:
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