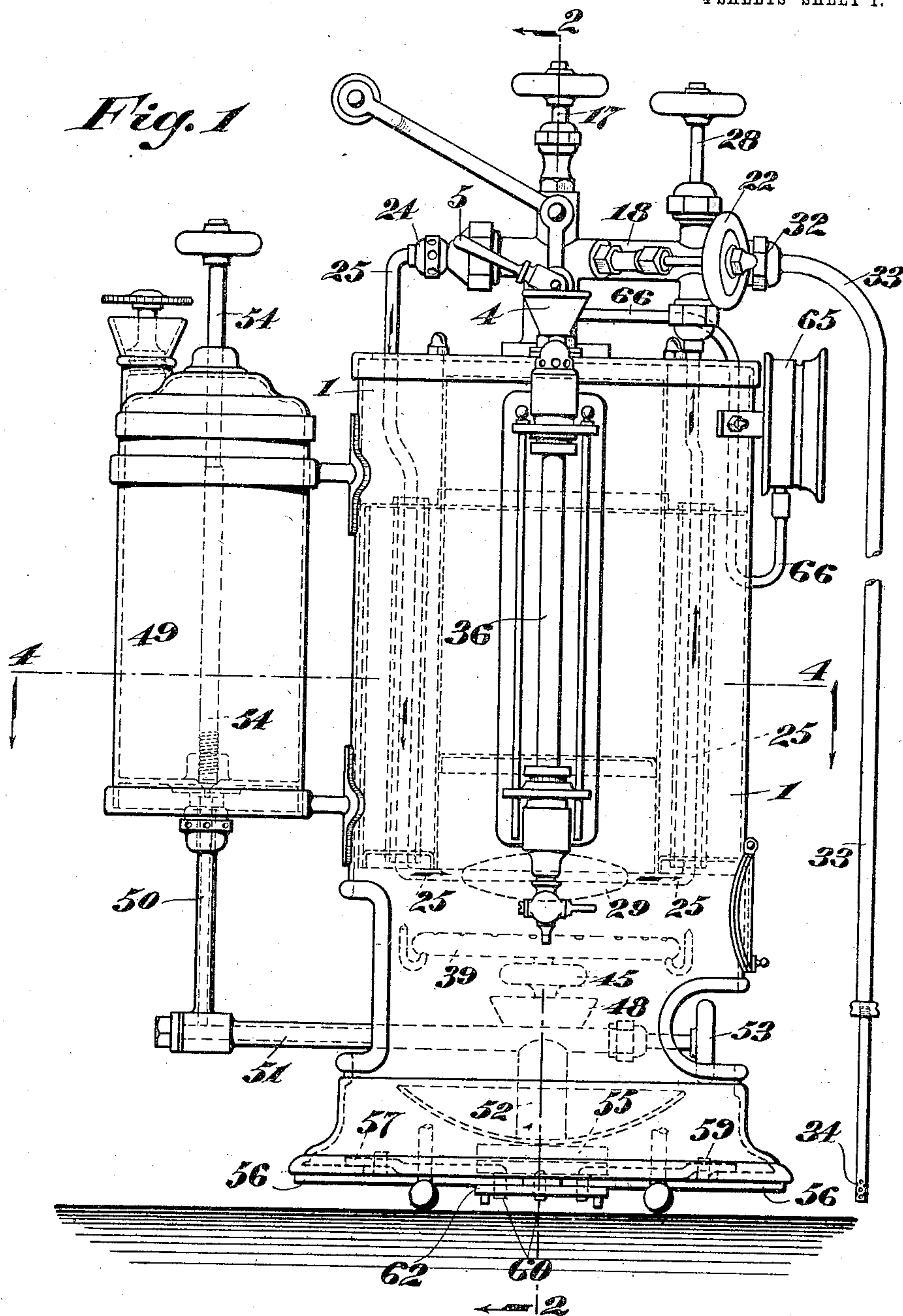


965,966.

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FORMALIN VAPORIZER.
APPLICATION FILED NOV. 22, 1909.

Patented Aug. 2, 1910.

4 SHEETS—SHEET 1.



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4 SHEETS—SHEET 2.

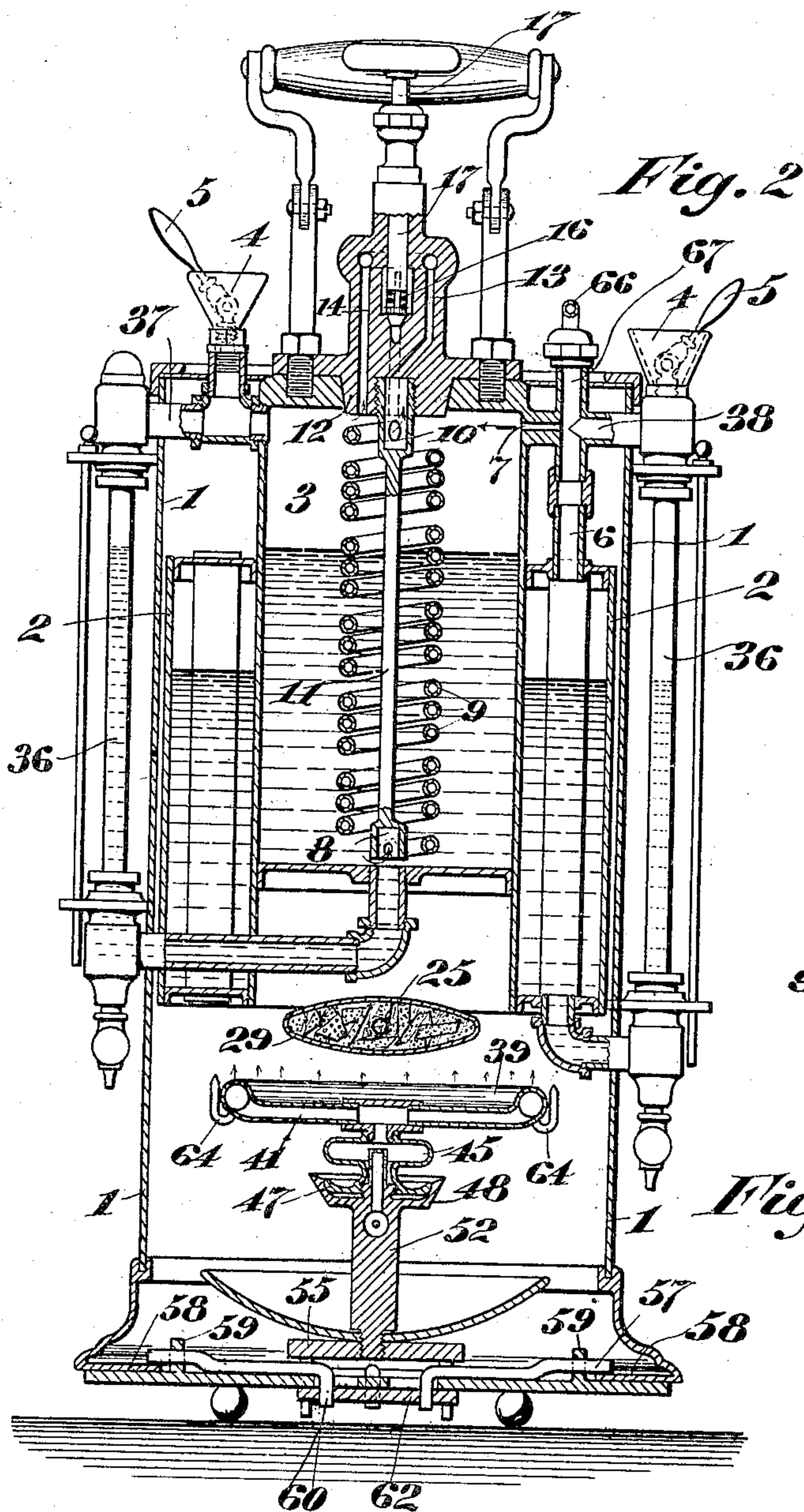


Fig. 11

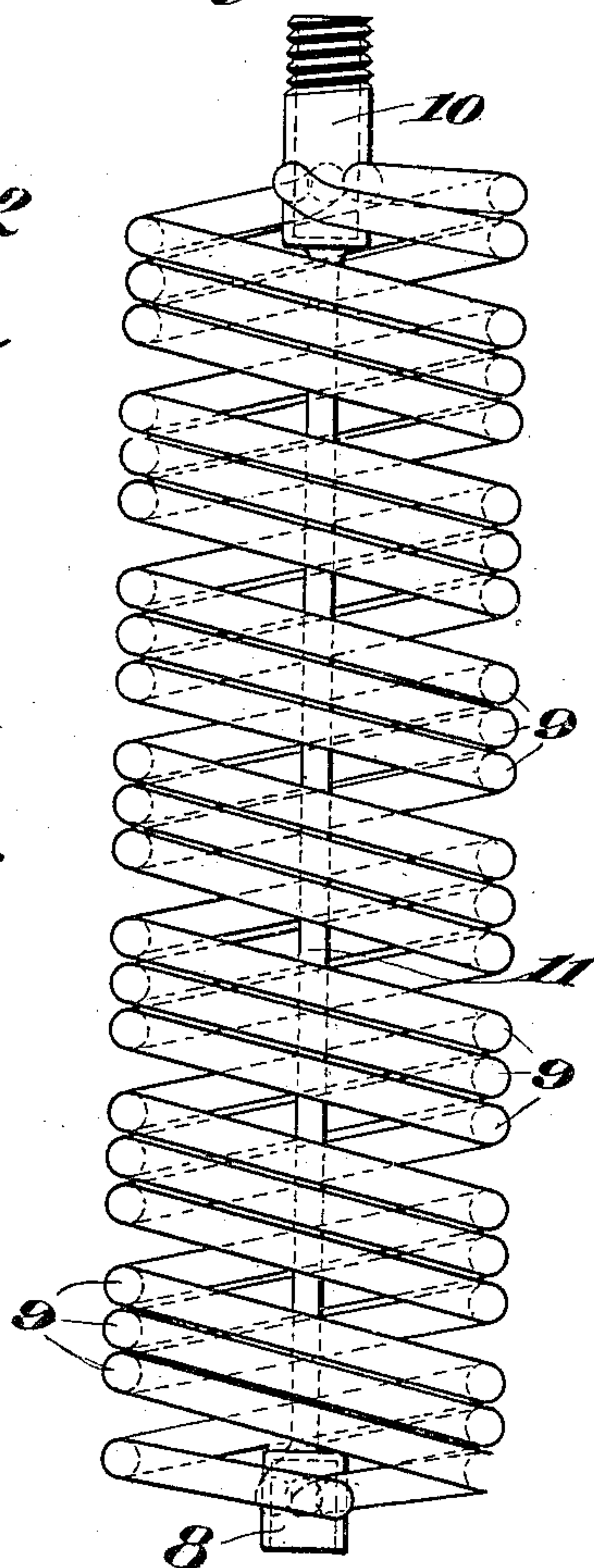
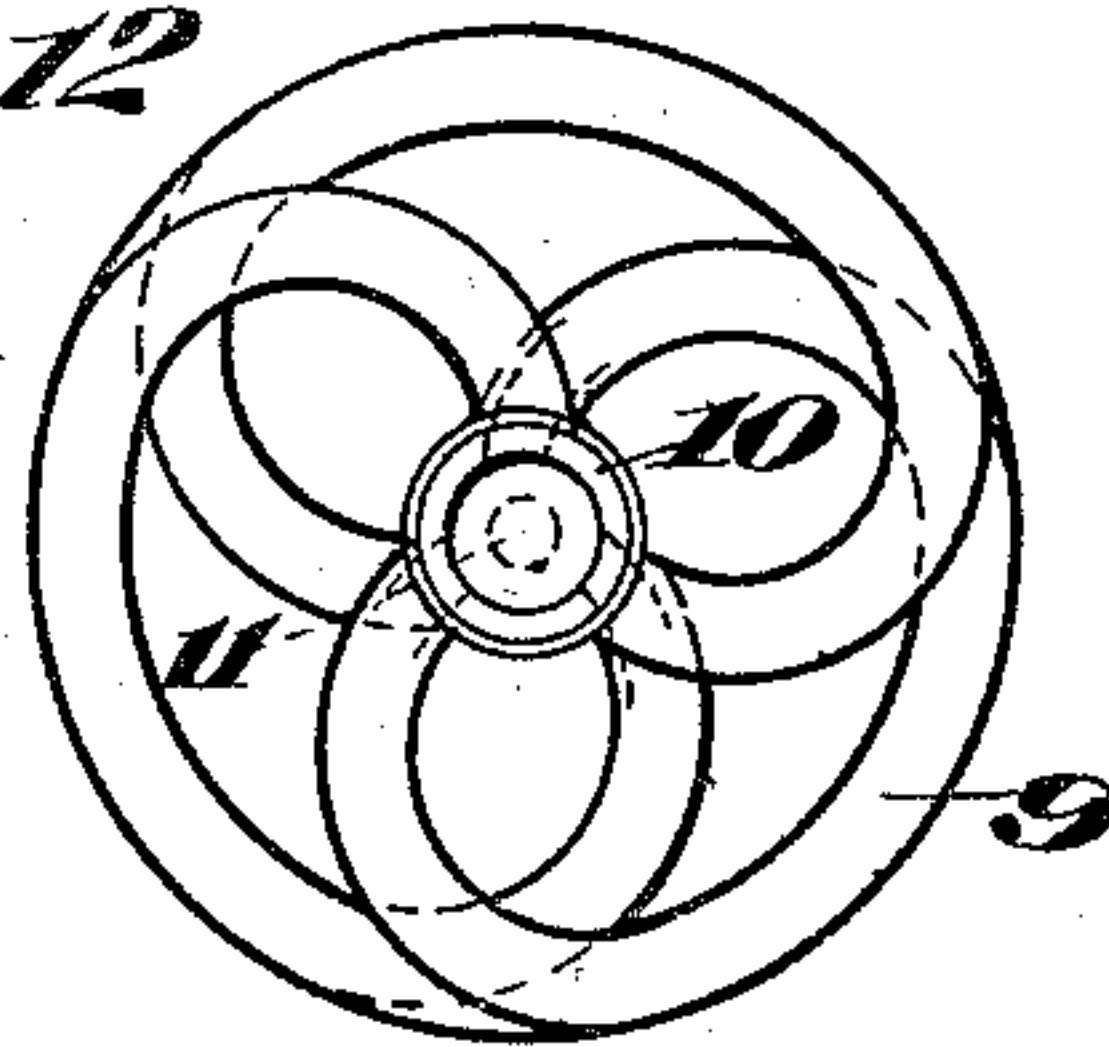


Fig. 12



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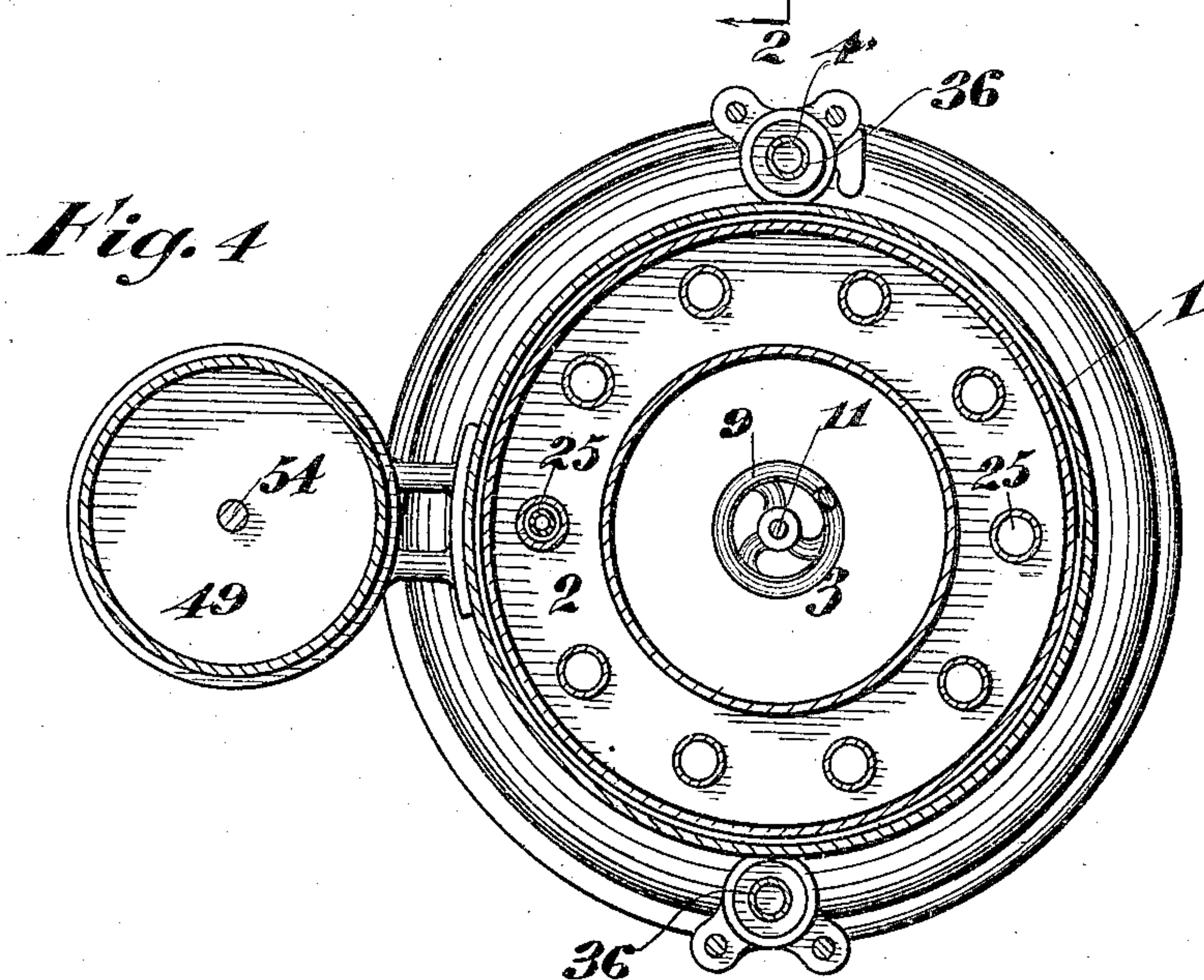
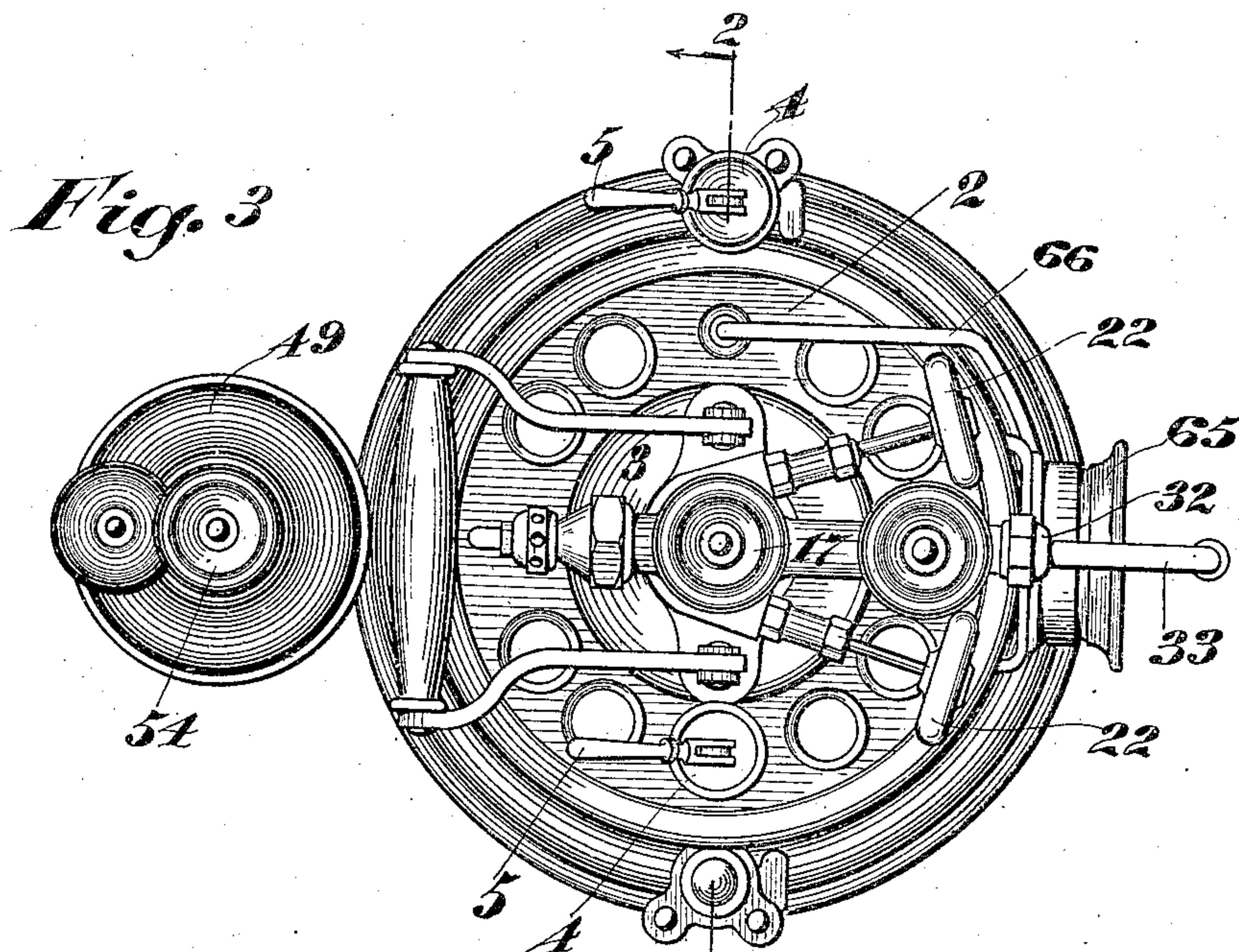
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4 SHEETS—SHEET 3.



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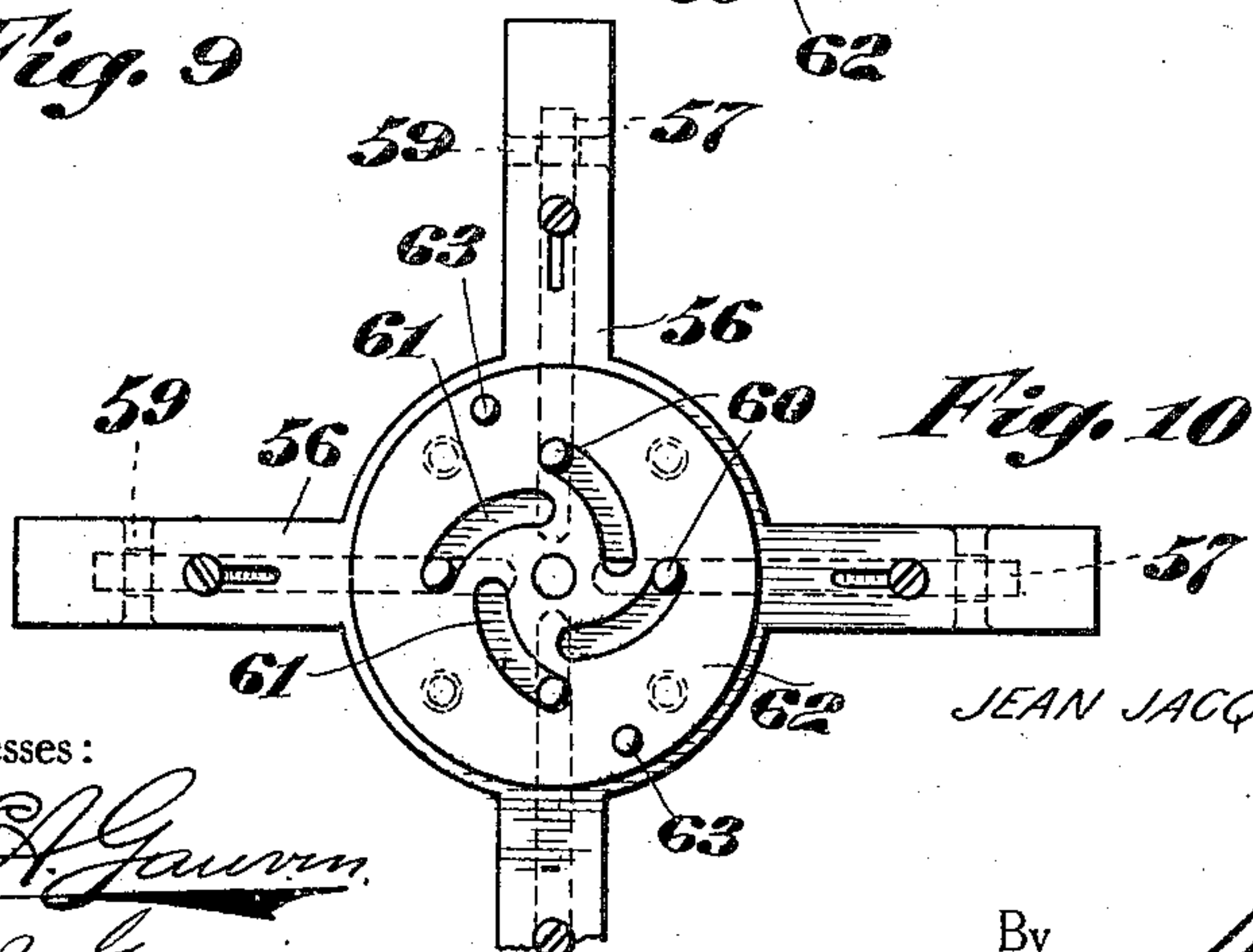
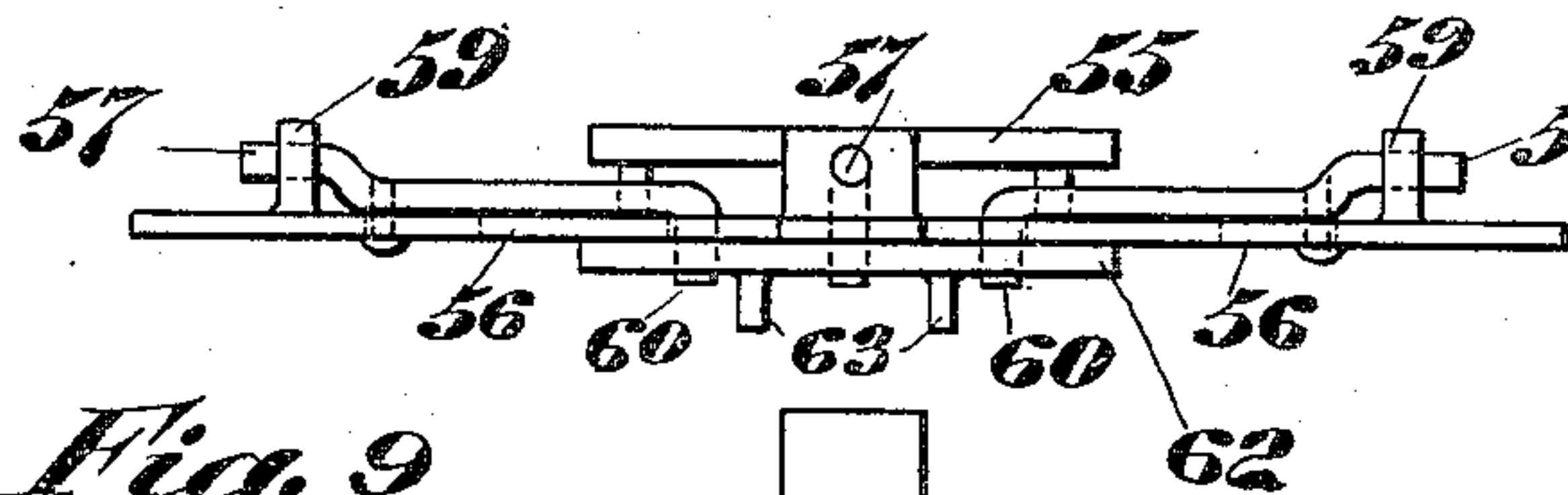
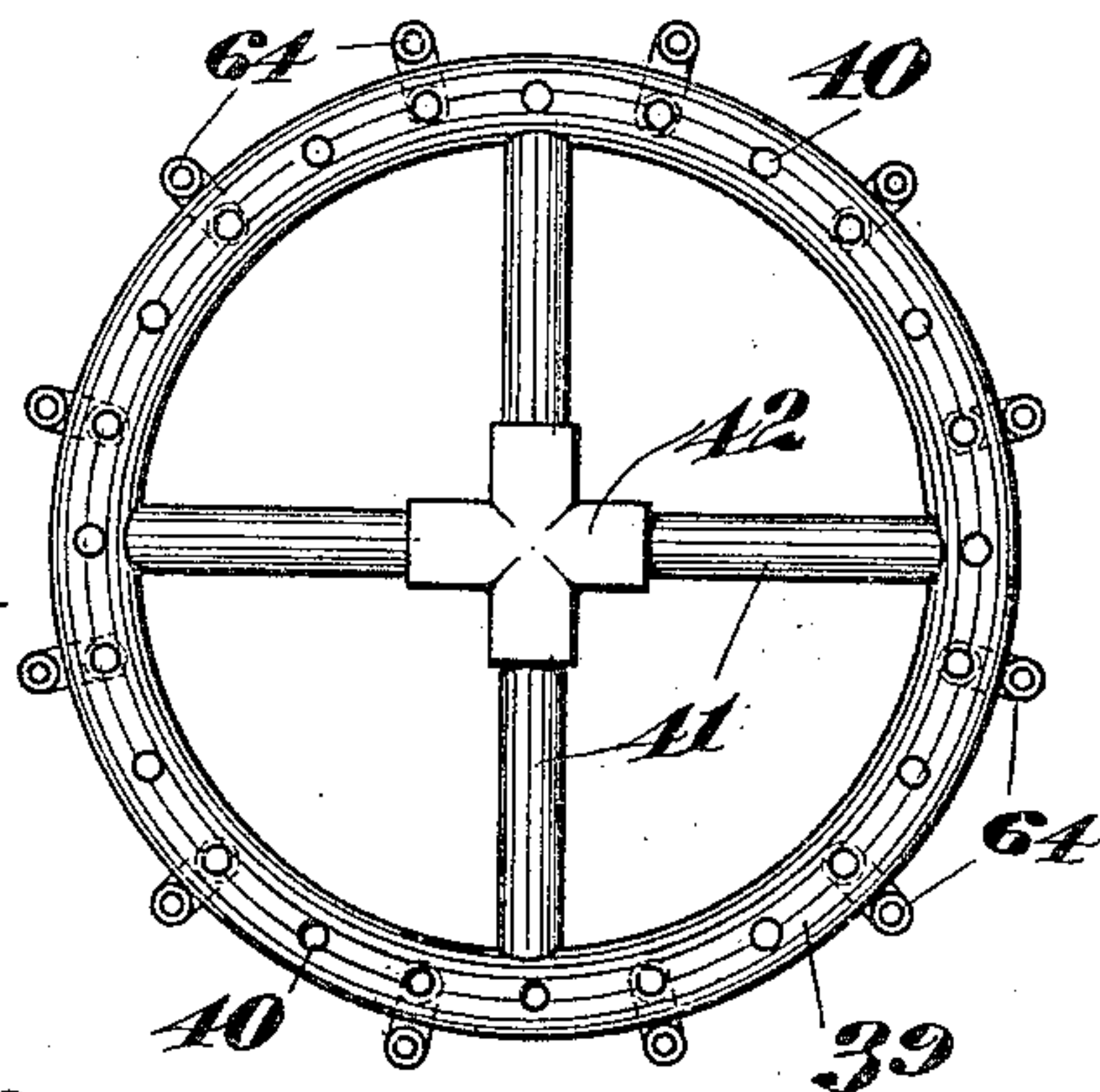
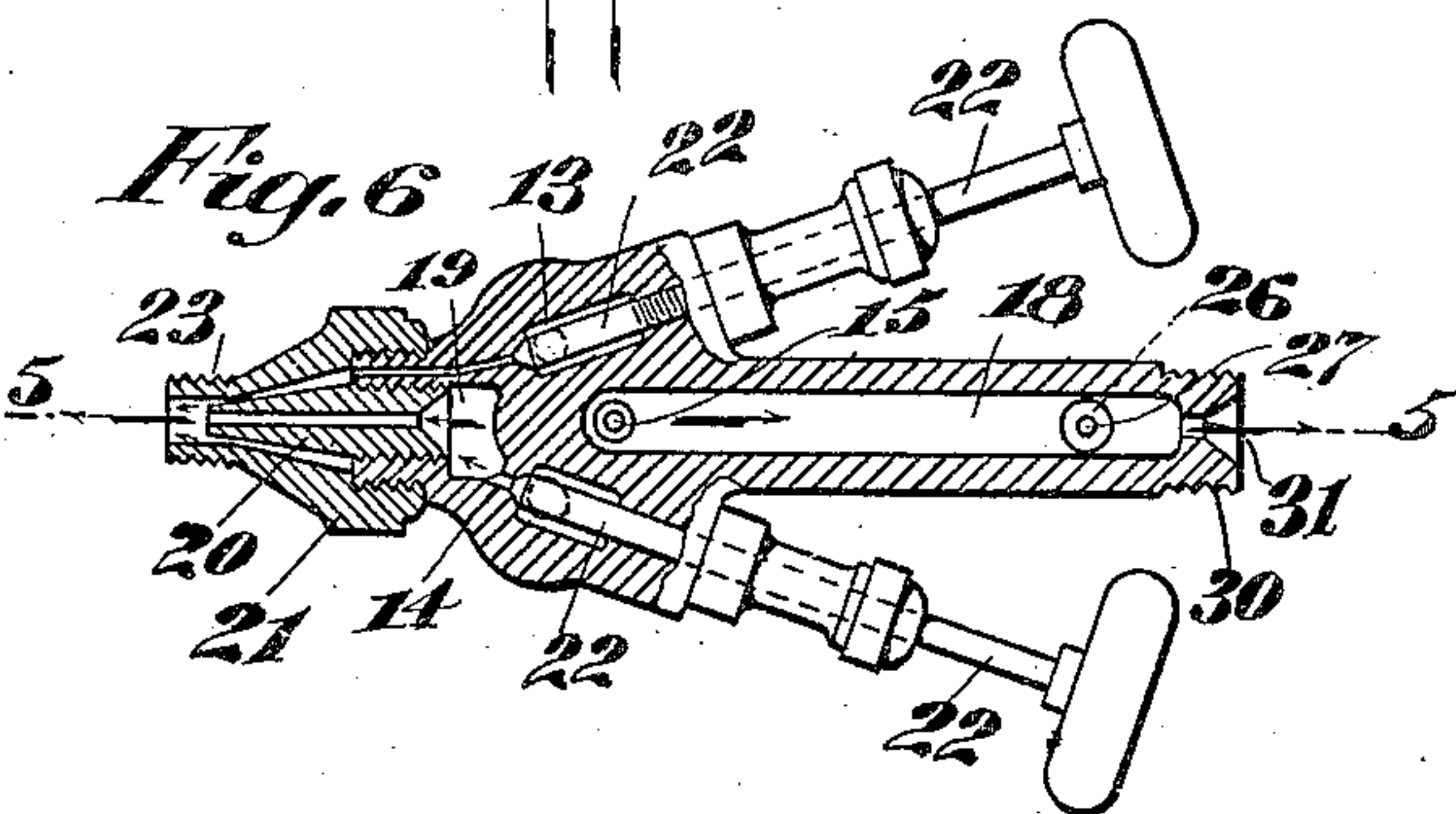
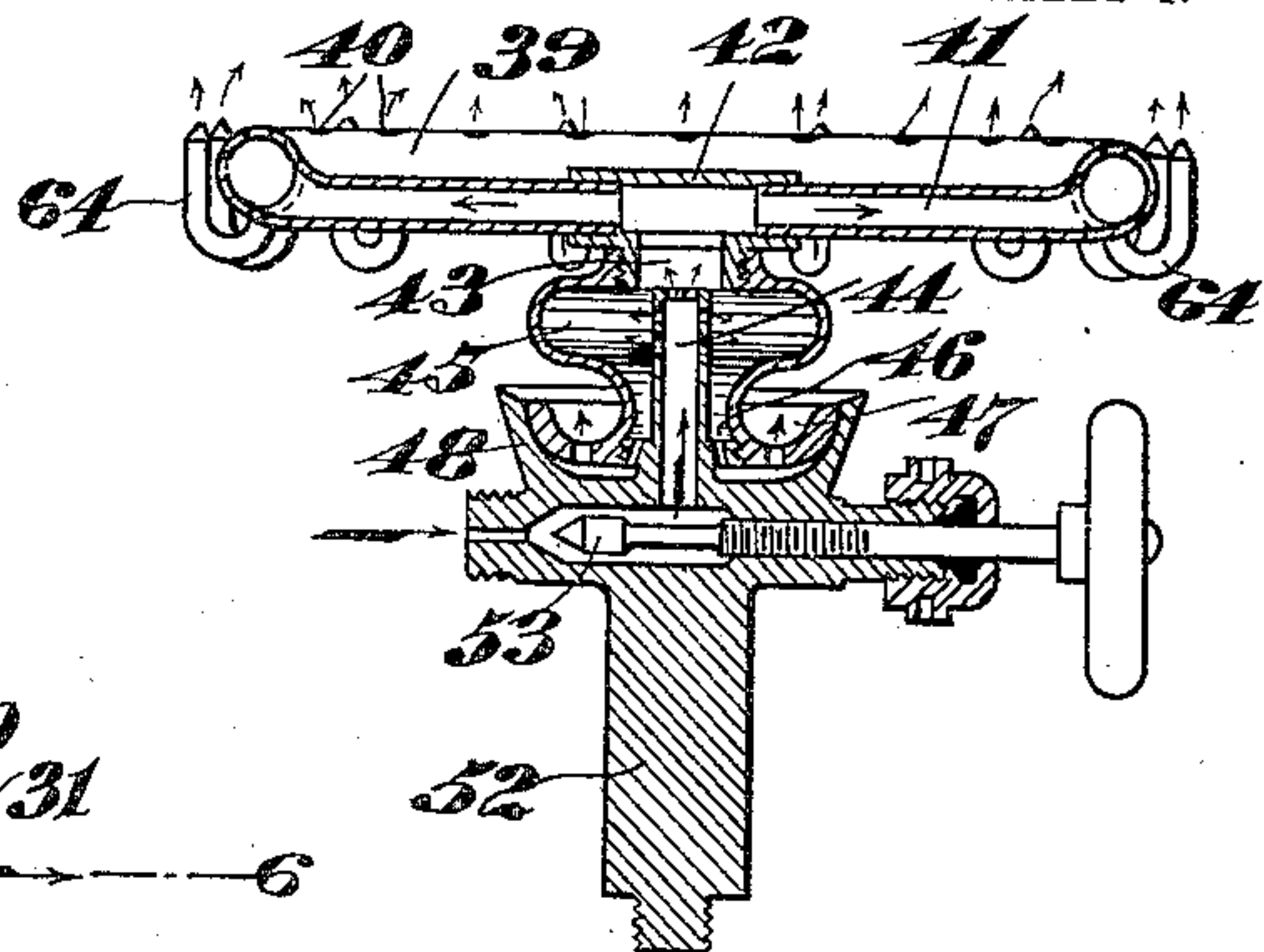
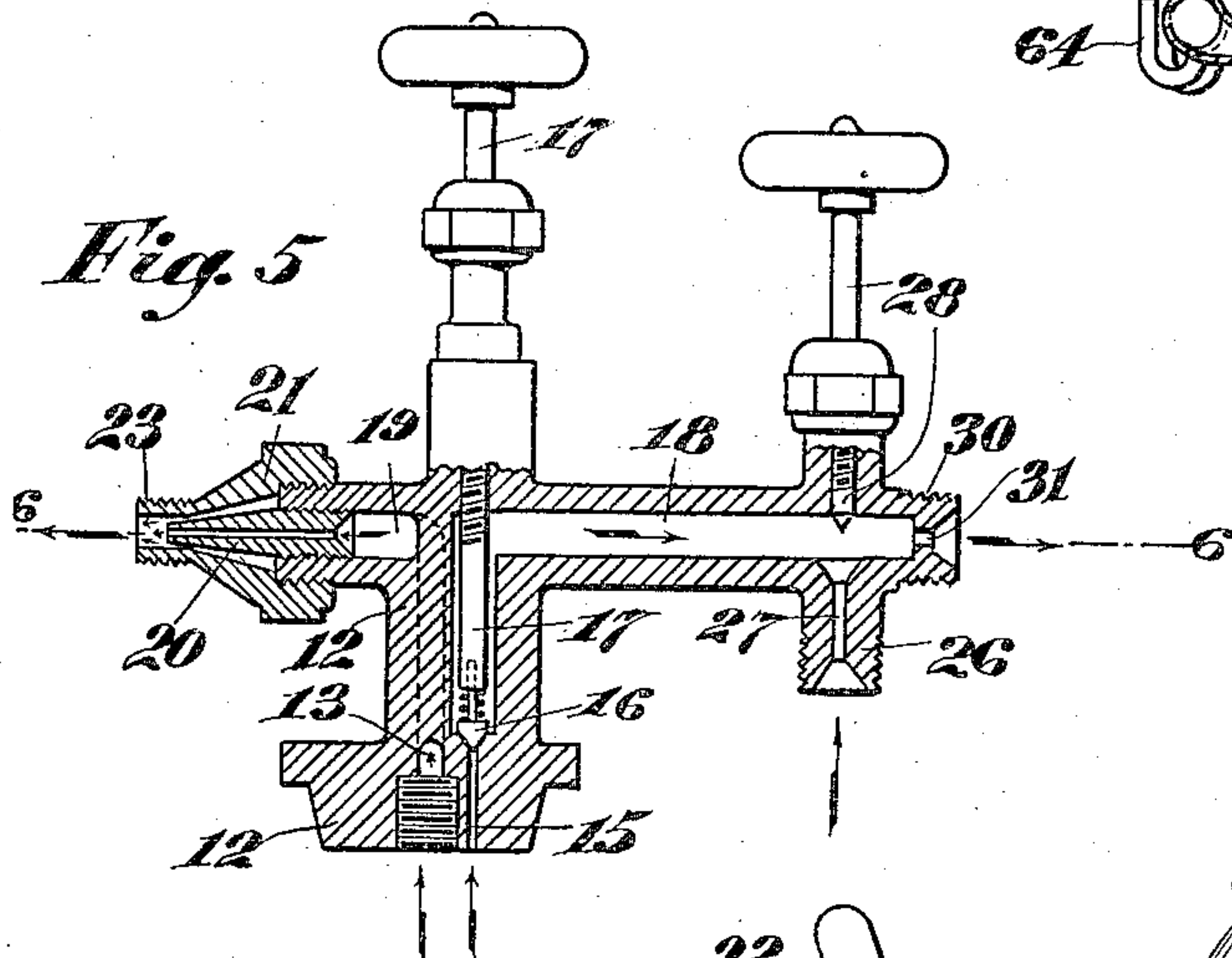
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4 SHEETS—SHEET 4.



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UNITED STATES PATENT OFFICE.

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FORMALIN-VAPORIZER.

965,966.

Specification of Letters Patent.

Patented Aug. 2, 1910.

Application filed November 22, 1909. Serial No. 529,488.

To all whom it may concern:

Be it known that I, JEAN JACQUES VAN DANDAIGUE, a subject of the King of Great Britain, residing in the city and district of Montreal, in the Province of Quebec, Canada, have invented certain new and useful Improvements in Formalin-Vaporizers; and I do hereby declare that the following is a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The invention to be hereinafter described relates to vaporizers, and more particularly to formalin vaporizers.

Broadly speaking, it comprises a casing adapted to support the several working parts of the machine, a water tank in the casing, a formalin tank in the casing, a heater for the water tank adapted to generate steam therein, a coil pipe or tube for delivering formalin from the tank to a mixing jet nozzle, means for delivering steam from the water tank to the upper part of the formalin tank, means for delivering steam to the mixing nozzle, a scrubbing or purifying device, means for delivering the mixture from the mixing nozzle to the scrubbing device, a delivery tube, connections between the scrubbing device and the delivery tube, a shut-off valve in the delivery pipe, and a steam safety valve governing communication between the delivery pipe and the upper part of the formalin tank.

In order to more clearly disclose the construction, operation and use of the invention, reference should be had to the accompanying drawings forming part of the present application.

Throughout the several figures of the drawings, like reference characters designate the same parts.

In the drawings: Figure 1 is a side elevation of the invention, complete; Fig. 2 is a vertical section on line 2—2 of Fig. 1; Fig. 3 is a top plan view of Fig. 1; Fig. 4 is a cross section on line 4—4 of Fig. 1; Fig. 5 is a central vertical longitudinal section through the mixing jet nozzle and the delivery pipe; Fig. 6 is a horizontal cross section on line 6—6 of Fig. 5; Fig. 7 is a central vertical cross section through the heating burner; Fig. 8 is a plan view of the heating burner; Fig. 9 is a side elevation of the catch for the bottom plate of the casing; Fig. 10 is a bottom plan view of the catch

for the bottom plate of the casing; Fig. 11 is a side elevation of the formalin tube; and, Fig. 12 is a plan view of the formalin tube.

Referring to the drawings in detail, 1 indicates a suitable casing of any desired construction and adapted to support the several working parts of the apparatus. Within the casing is mounted an annular water tank 2. In the center space of the water tank 2 is formed or arranged a formalin tank 3. The two tanks may be filled through suitable funnel openings 4, each closed by a screw plug provided with a pivoted handle 5.

In operating the apparatus, of course, it is desired to deliver a mixture of formalin and steam. To this end, steam is generated in the water tank and delivered from the water tank into the formalin tank to act as a pressure agent on the surface of the formalin. Steam generated in the upper part of the water tank will rise in the filling pipe 6 and pass through the passage 7 into the upper part of the formalin tank. As the steam pressure on the formalin increases, it will force the formalin upward into a cup 8, through openings in the wall of the cup and into the concentric spiral tubes or pipes 9, through the tubes and into an upper cup 10. The upper and lower cups are connected by a suspension rod 11; and the upper cup is threaded to engage a threaded socket formed in a nozzle head 12, removably secured to the top of the casing. The head is provided with three passages 13, 14 and 15. The passage 13 communicates directly with the upper cup 10 and receives formalin therefrom. The passage 14 communicates directly with the upper part of the formalin tank and receives steam therefrom. The passage 15 also communicates with the upper part of the formalin tank and is provided with a check valve 16 the spring pressure of which may be regulated by a screw spindle 17. When the steam pressure in the upper part of the formalin tank exceeds a predetermined degree, the valve 16 will be unseated and the excess steam will escape by way of the passage 15 and delivery pipe 18. The passage communicates with a steam pocket 19, formed in the end of the nozzle head 12 and provided with a socket having both interior and exterior threads. The interior threads receive the threads of a detachable conical jet nozzle 20, while the exterior threads receive the threads of an exterior conical sleeve 21. The interior taper

of the sleeve and the exterior taper of the jet nozzle are of different degrees of taper, thus leaving a conical space between the tubes. The passage 13 communicates
 5 with the conical space between the nozzle and sleeve. The sleeve and nozzle thus act together as a mixing nozzle for delivering a mixture of steam and formalin. Needle valves 22 are pro-
 10 vided in the horizontal arms of the formalin and steam passages to regulate the amount of formalin and steam passing to the mixing nozzle. The outer end of the sleeve 21 is threaded as at 23 to receive a threaded
 15 coupling 24, by which a circulating pipe 25 is connected to the mixing nozzle. This circulating pipe extends down through a passage through one side of the water tank, connects with a scrubber or purifier beneath
 20 the formalin tank, continues across and up through a passage through the opposite side of the water tank, and is connected to a threaded branch 26 of the delivery pipe 18, the branch being provided with a passage
 25 27 which communicates with the interior of the delivery pipe 18, and may be closed or regulated by a needle valve 28.

In order to scrub or purify the mixture of formalin and steam, a well known form
 30 of purifier 29 is inserted in the circuit of the circulating pipe 25, where it crosses beneath the formalin tank, the branches of the pipe being connected to opposite sides of the scrubber.

35 The outer end of the delivery tube 18 is provided with a jet passage 31, and is threaded, as at 30, to receive a threaded coupling 32, to which is connected a flexible tube 33 provided with a spray tip 34.

40 It is desirable, of course, to know the quantity of water in the water tank and the quantity of formalin in the formalin tank, at all times. To this end, a sight glass or gage 36 is provided for each tank, with suitable
 45 connections. The steam pressure on the top of the liquid in each gage, of course, must be equal to the steam pressure in the top of the water tank and formalin tank. To this end, steam passages 37 and 38 are
 50 provided, which lead from the upper part of the formalin tank to the respective gages.

In order to generate the necessary steam for the apparatus, it is necessary, of course,
 55 to provide an adequate heating burner which will heat the water in the water tank without heating the formalin in the formalin tank. The fuel, preferably, is alcohol. The burner comprises a circular tube or pipe 39, provided with a plurality of vapor jet open-
 60 ings 40, and fed by branch pipes 41, which lead from a T-coupling 42 provided with a passage 43 adapted to receive gaseous or fluid fuel from a perforated supply tube 44. The lower part of the T coupling is threaded
 65 to receive the upper threaded end of the

vaporizing bulb 45, the lower end of which is threaded to engage a threaded perforated shoulder or collar 46 formed about the lower part of the tube 44. A perforated cup flange
 70 47 is formed integrally with the lower part of the bulb 45, and is adapted to be seated in a cup or basin 48 extending upwardly from the base of the tube 44. The inner bottom part of the basin 48 is cut out slightly below
 75 the shoulder 46 to form a shallow annular chamber beneath the bottom of the cup flange 47, and communicating both with the perforations through the shoulder and the perforations through the flange. The tube 44 re-
 80 ceives alcohol or other liquid fuel from a tank 49 through pipes 50 and 51 and the chambered head 52. The head 52 is provided with a chamber communicating with the lower end of the tube 44 and adapted to
 85 receive fluid fuel from the pipe 51 through a suitable passage, a needle valve 53 being provided to regulate the flow of fuel from the pipe 51 to the chamber of the head 52. A needle valve 54 is also provided in the
 90 pipe 50, to regulate the feed of fuel from the tank to the pipe 51. The feed pipe 51 is adapted to be removably connected to the head 52 by simple screw thread connections, and the lower end of the head post is thread-
 95 ed for engagement with a threaded socket in a base plate 55 supported by pins or the like from a spider 56 on the arms of which are slidably mounted catches 57 adapted to en-
 100 gage the upper face of the bottom flange 58 of the casing. The outer ends of these catches are offset and slide through guide loops or eyes 59 on the spider arms. The in-
 105 ner ends of the catches are bent at sharp angles to form pins or fingers 60, which are seated in cam slots 61 in a rotatable disk 62 journaled on a pin or stud extending from the lower face of the center of the spider. This disk is provided with suitable grips 63, by which it may be rotated to operate the
 110 catches. Should the liquid alcohol pass from the end of the tube 44 into the branches 41 and burner tube 39, before being vaporized, it will be desirable, of course, to vaporize it after it passes into the burner tube, so that
 115 it may not be wasted. To this end, a plurality of small curved drain pipes or tubes 64 are provided. Each of these pipes is connected, at one end, to the lower face of the burner tube 39, so that liquid alcohol may
 120 drain from the burner tube 39 into the drain pipes. The opposite ends of the drain pipes are formed as jets and turned upward, so that they lie close to alternate perforations
 125 40. This arrangement vaporizes the alcohol in the drain tubes and ignites the vapor as it issues from the jet.

In order to prevent explosion and to avoid excessive steam pressure within the appa-
 ratus, a steam gage 65 has been provided. This gage is of any well known type, and is 130

connected by a pipe 66 to the upper end of a tube 67, which is in communication with a steam passage 38 leading from the upper part of the formalin tank 3.

Assuming all of the parts of the apparatus to be assembled in operative position, the operation of the invention is as follows. The needle valves 53 and 54 will be opened, allowing liquid alcohol to pass through the perforations in the upper end of the tube 44 to the interior of the bulb 45. From the bulb 45 it passes through the perforations in the shoulder at the base of the tube 44, through the shallow annular chamber between the cup flange 47 and the bottom of the basin 48, and through the perforations in the bottom of the flange 47, collecting in the cup of the flange. As soon as the cup flange is about half full, the liquid alcohol will be lighted and the valve 53 temporarily closed. The burning alcohol in the cup flange heats the metal bulb 45 to a high temperature. When the alcohol in the cup flange has almost burned out, the needle valve 53 will be slightly opened again to allow passage of more alcohol to the tube 44. As the alcohol flows from the perforations in the upper end of the tube 44, it will be instantly vaporized by the high temperature of the inside of the bulb, and the vapor will pass into the T coupling 42 and thence through the branches 41 to the burner tube 39. The vapor issuing through the perforations 40 may then be lighted, and the burner will be in full operation. Such alcohol as may not be vaporized will flow into the cup flange, as previously described, and so continue the flame for heating the vaporizing bulb 45. Some of the vaporized alcohol also finds its way into the cup flange, and so continues the heating flame. Should any unvaporized alcohol be carried into the burner tube, and should the vapor therein condense, it will flow into the small drain pipes or tubes 64 and be again vaporized by the heat of the flames from the perforations 40. The heat from the burner generates steam in the water tank, and this steam flows into the upper part of the formalin tank 3 by way of the passage 37, creating a pressure which forces the formalin upward through the spiral tube 9 into the formalin passage 13. At the same time, steam passes from the upper part of the tank 3 upward through the steam passage 14. From the passages 13 and 14, the formalin and steam pass through the sleeve 21 and jet nozzle 20, combining to form a single jet or stream of the mixture. This mixture passes through the first branch of the circulating pipe 25 and into the scrubber or purifier, where it is freed of all impurities. From the scrubber, the purified mixture passes into the second branch of the circulating pipe 25 and through the passage 26

into the delivery pipe 18 and thence out and through the spray nozzle 34. Should the steam pressure increase beyond the maximum, the check valve 16 will be unseated and the excess steam will flow through the passage 15 and delivery pipe 18 and pass out through the jet passage 31 with the mixture. The proportions of steam and formalin may be readily varied by adjusting the needle valves 22.

By formalin is meant an aqueous solution of formaldehyde, which may be of about 40% strength.

It is clear that changes may be made in the construction, arrangement and disposition of the several parts of the invention, without in any way departing from the field and scope of the same, and it is meant to include all such within this application, wherein only a preferred form has been disclosed.

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

1. A vaporizer of the character described, comprising a casing, a water tank in the casing, a formalin tank within the water tank, means for generating steam in the water tank, a nozzle head connected to the top of the formalin tank and provided with steam and formalin passages, a steam passage leading from the top of the water tank to the top of the formalin tank, means for delivering formalin from the formalin tank to the formalin passage in the nozzle head, a mixing jet nozzle connected to the nozzle head, and passages through the nozzle head adapted to deliver formalin and steam to the separate parts of the mixing nozzle.

2. A vaporizer of the character described, comprising a casing, a water tank in the casing, a formalin tank within the water tank, means for generating steam in the water tank, a nozzle head connected to the top of the formalin tank and provided with steam and formalin passages, a steam passage leading from the top of the water tank to the top of the formalin tank, means for delivering formalin from the formalin tank to the formalin passage in the nozzle head, a mixing jet nozzle connected to the nozzle head, passages through the nozzle head adapted to deliver formalin and steam to the separate parts of the mixing nozzle, and means for regulating the amount of steam and formalin so delivered.

3. A vaporizer of the character described, comprising a casing, a water tank in the casing, a formalin tank within the water tank, means for generating steam in the water tank, a nozzle head connected to the top of the formalin tank and provided with steam and formalin passages, a steam passage leading from the top of the water tank to the top of the formalin tank, means for delivering formalin from the formalin tank to

the formalin passage in the nozzle head, a mixing jet nozzle connected to the nozzle head, passages through the nozzle head adapted to deliver formalin and steam to the separate parts of the mixing nozzle, a circulating pipe, connections between the circulating pipe and mixing nozzle, a delivery pipe, and connections between the circulating and delivery pipes.

4. A vaporizer of the character described, comprising a casing, a water tank in the casing, a formalin tank within the water tank, means for generating steam in the water tank, a nozzle head connected to the top of the formalin tank and provided with steam and formalin passages, a steam passage leading from the top of the water tank to the top of the formalin tank, means for delivering formalin from the formalin tank to the formalin passage in the nozzle head, a mixing jet nozzle connected to the nozzle head, passages through the nozzle head adapted to deliver formalin and steam to the separate parts of the mixing nozzle, a circulating pipe, connections between said circulating pipe and said mixing nozzle, a scrubber inserted in said circulating pipe, a delivery pipe, and connections between said circulating and delivery pipes.

5. A vaporizer of the character described, comprising a casing, a water tank in the casing, a formalin tank within the water tank, means for generating steam in the water tank, a nozzle head connected to the top of the formalin tank and provided with steam and formalin passages, a steam passage leading from the top of the water tank to the top of the formalin tank, means for delivering formalin from the formalin tank to the formalin passage in the nozzle head, a mixing jet nozzle connected to the nozzle head, passages through the nozzle head adapted to deliver formalin and steam to the separate parts of the mixing nozzle, a

circulating pipe, connections between the circulating pipe and mixing nozzle, a delivery pipe, connections between the circulating and delivery pipes, and means for regulating or shutting off the flow of mixture from the circulating to the delivery pipe.

6. A vaporizer of the character described, comprising a casing, a water tank in the casing, a formalin tank within the water tank, means for generating steam in the water tank, a nozzle head connected to the top of the formalin tank and provided with steam and formalin passages, a steam passage leading from the top of the water tank to the top of the formalin tank, means for delivering formalin from the formalin tank to the formalin passage in the nozzle head, a mixing jet nozzle connected to the nozzle head, passages through the nozzle head adapted to deliver formalin and steam to the separate parts of the mixing nozzle, an escape passage from the upper part of the formalin tank for excessive steam, a check valve controlling said passage, and means for regulating the resistance of the check valve.

7. In combination with a vaporizer of the character described, a rod provided with upper and lower cups having ports, a nozzle head provided with a passage, means for connecting the upper cup to the nozzle head so as to establish communication between the cup and the passage through the head, and a plurality of coil tubes communicating at their opposite ends with ports in the respective cups.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

JEAN JACQUES VAN DANDAIGUE.

Witnesses:

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