J. KELLY.

HUMIDIFIER.

APPLICATION FILED OCT. 21, 1909.

956,103.

Patented Apr. 26, 1910.

3 SHEETS—SHEET 1.

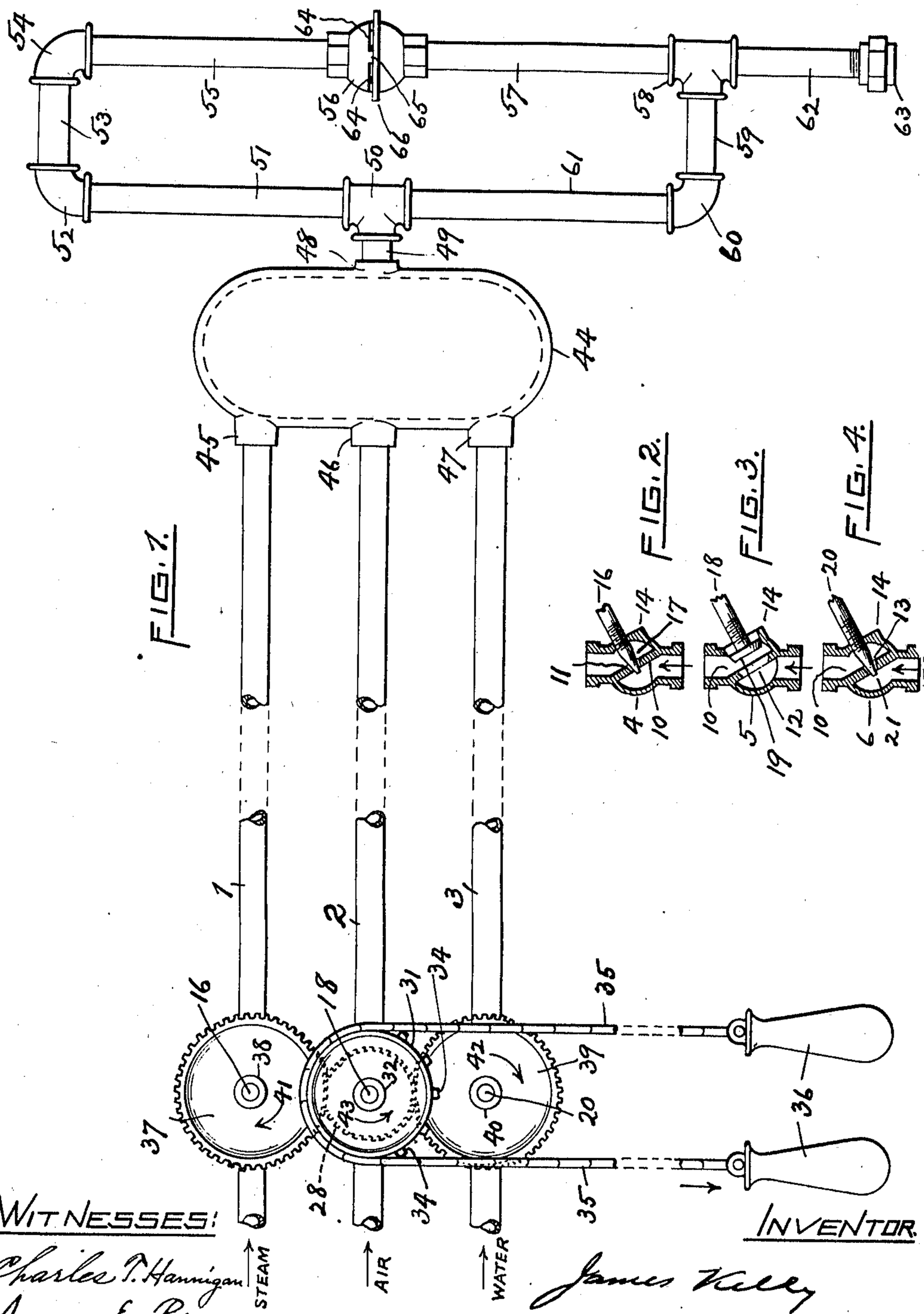


FIG. 1.

FIG. 2.

FIG. 3.

FIG. 4.

WITNESSES:

Charles T. Hannigan

Anne E. Perce

INVENTOR.

James Kelly

By Warren R. Perce

Attorney.

J. KELLY.

HUMIDIFIER.

APPLICATION FILED OCT. 21, 1909.

956,103.

Patented Apr. 26, 1910.

3 SHEETS—SHEET 2.

FIG. 7.

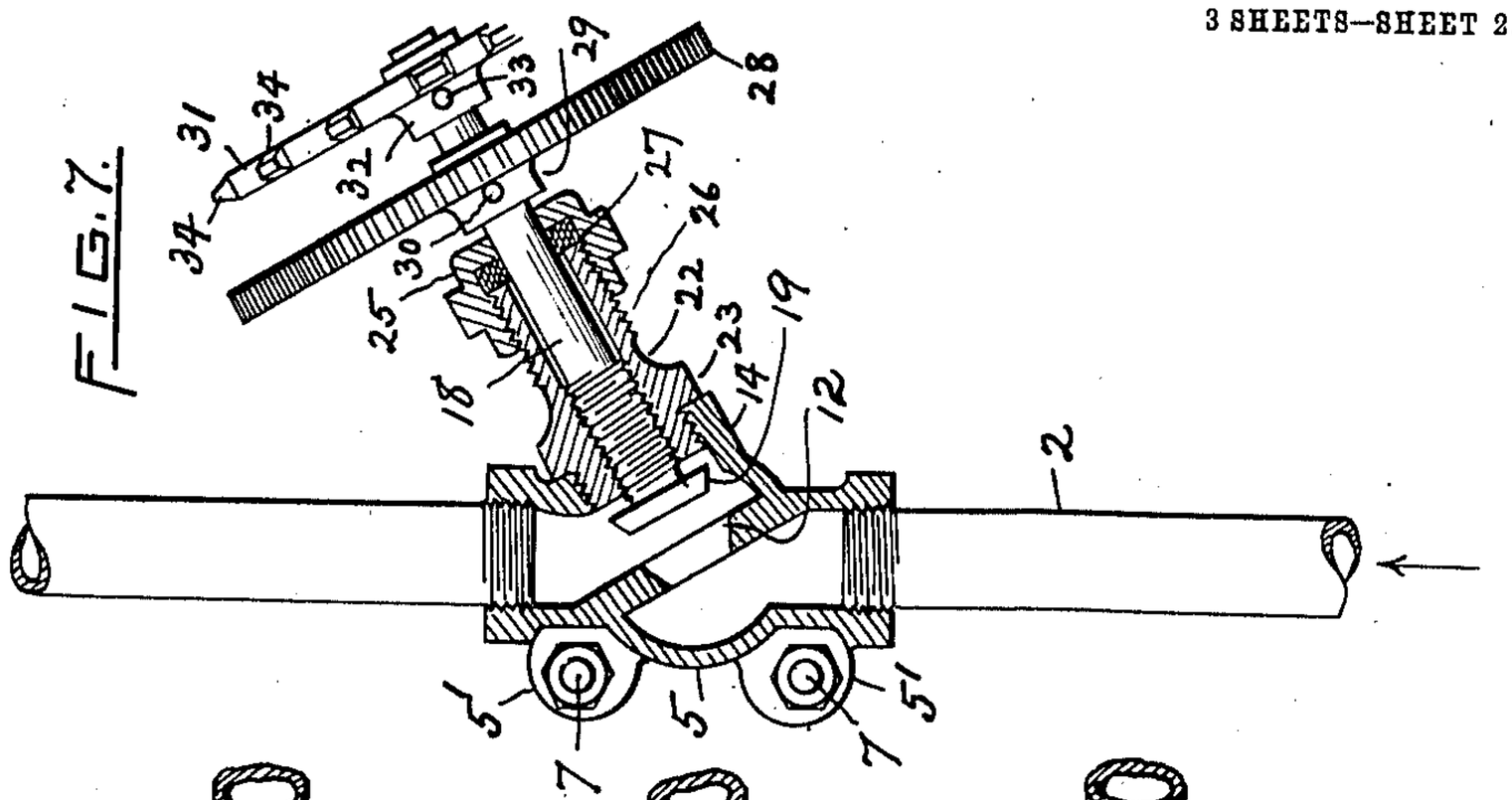


FIG. 6.

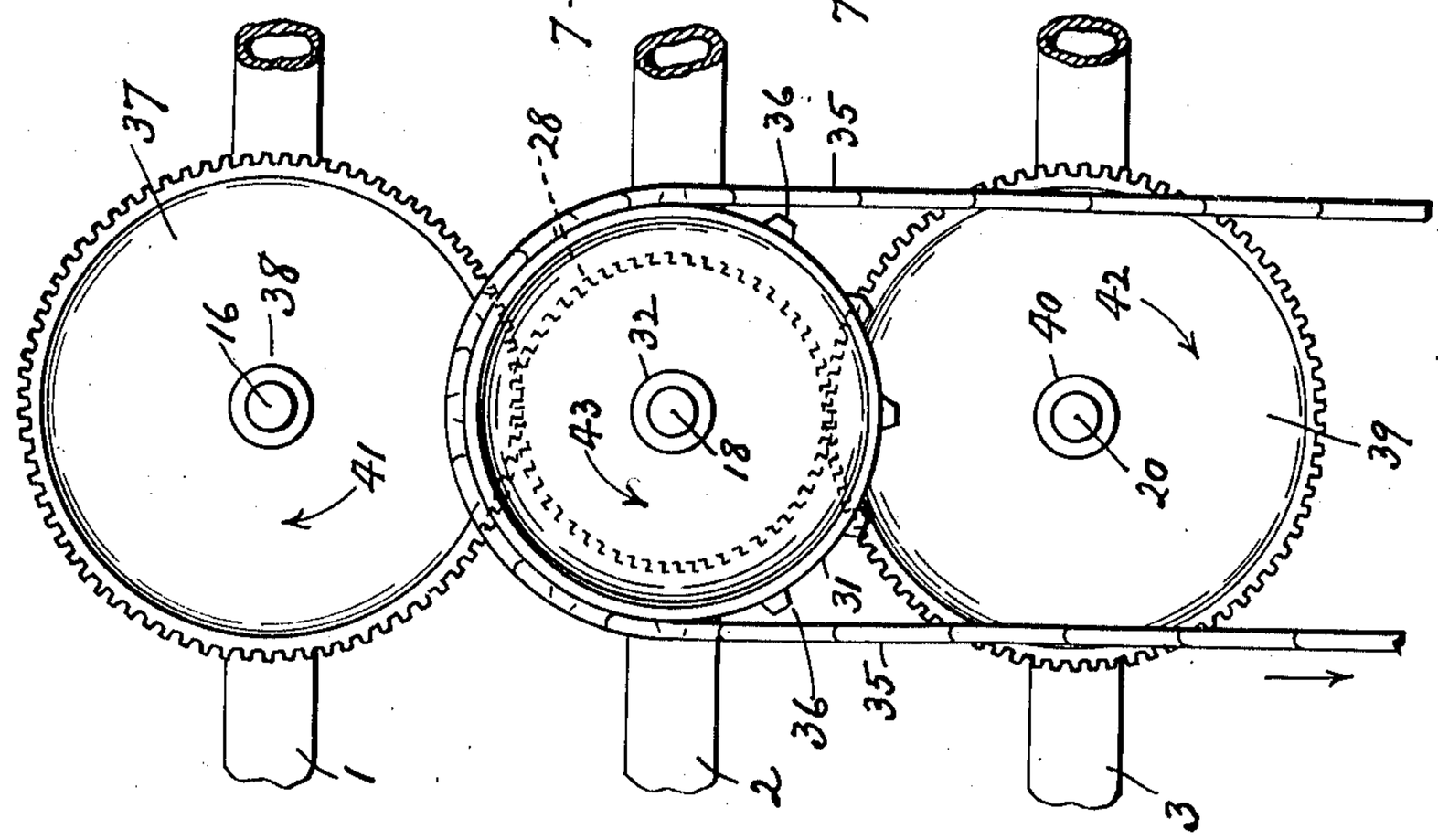
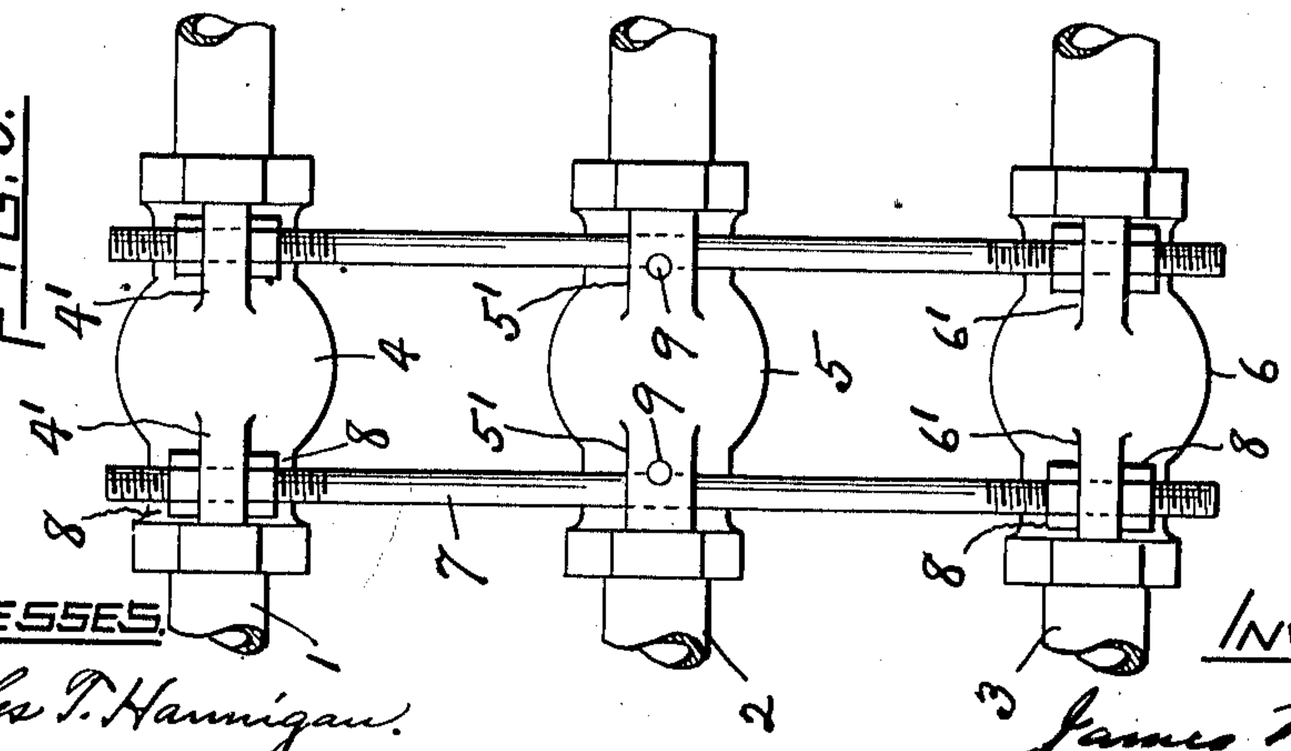


FIG. 5.



WITNESSES.

Charles T. Hannigan.

Annie E. Perce.

INVENTOR:

James Kelly

By Warren R. Perce

Attorneys.

J. KELLY.

HUMIDIFIER.

APPLICATION FILED OCT. 21, 1909.

956,103. **Patented Apr. 26, 1910.**

3 SHEETS—SHEET 3.

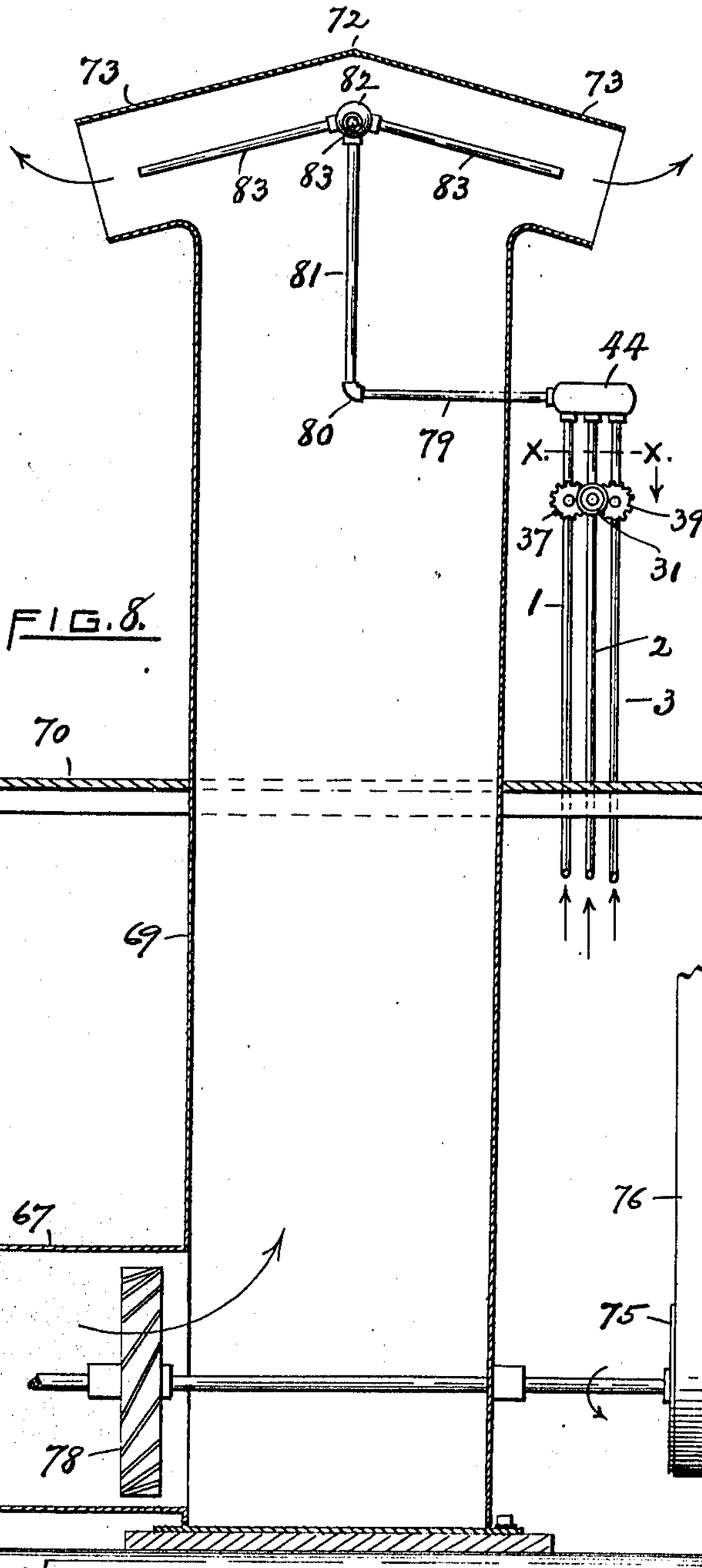


FIG. 8.

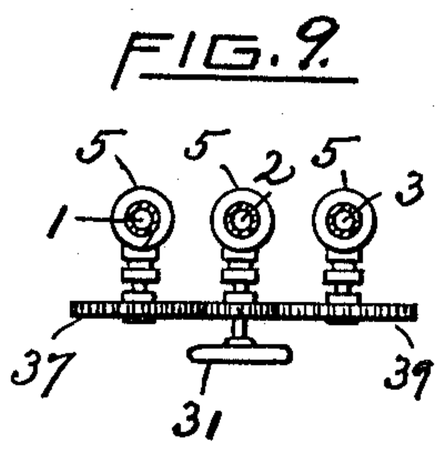


FIG. 9.

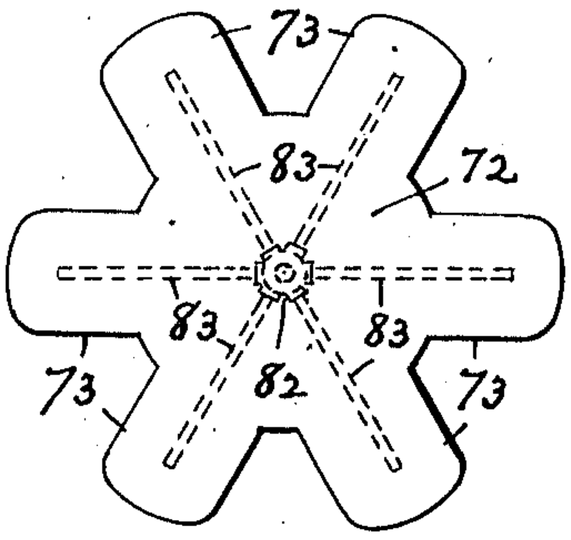


FIG. 10.

WITNESSES:

Charles P. Hannigan.

Annie E. Perce.

INVENTOR:

James Kelly

By Warren R. Perce

Attorney.

UNITED STATES PATENT OFFICE.

JAMES KELLY, OF PROVIDENCE, RHODE ISLAND.

HUMIDIFIER.

956,103. Specification of Letters Patent. Patented Apr. 26, 1910.

Application filed October 21, 1909. Serial No. 523,875.

To all whom it may concern:

Be it known that I, JAMES KELLY, a citizen of the United States, residing at Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Humidifiers, of which the following is a specification, reference being had therein to the accompanying drawings.

Like reference numerals indicate like parts.

Figure 1 is a view of my improved humidifier as seen in side elevation. Figs. 2, 3 and 4 are, respectively, views in diametrical section of the steam valve, air valve and water valve used in my said invention. Fig. 5 is a view in rear elevation of said valves and the means of mounting them. Fig. 6 is a view in front elevation of the gearing used in operating these valves. Fig. 7 is a view, partly in central section and partly in elevation, of the air valve of this system, showing the means and method of its operation. Fig. 8 is a view in elevation of my improved humidifier as applied to a blower system of ventilation, the air shaft of which is shown in central vertical section. Fig. 9 is a view in top plan of the system of valves and gears, as seen on line x x of Fig. 8, on a larger scale. Fig. 10 is a top plan of the hood of the air shaft and the radial distributing pipes of said hood.

My invention relates to the class of humidifiers for moistening the air of factories and other buildings, and it consists of the novel construction and combination of the several parts as hereinafter described and claimed.

In the drawings 1 designates a steam pipe, 2 an air pipe and 3 a water pipe, conducting, respectively, steam, air and water from a suitable supply, under pressure.

There is a valve 4 on the steam pipe 1, a valve 5 on the air pipe 2, and a valve 6 on the water pipe 3. Each of these valves has two ear pieces or lugs, designated, respectively, in the drawings as 4′, 5′ and 6′. Two rods or upright supports 7, 7, pass loosely through the ear pieces 4′, 5′ and 6′, as represented in Fig. 5, and are threaded on their ends. Nuts 8 engage with the threaded portions of the rods 7, and a pin 9 secures the lugs 5′ to said rods. The details of these valves are shown in Figs. 2, 3, 4 and 7. These valves are preferably of the kind called the Y-valve. The globular body of the valve is divided by a diagonally extending partition 10 which has a central aperture or seat valve. The valve seat in the valve 4 is designated as 11, that in valve 5 as 12, and that in valve 6 as 13. A tubular branch 14 extends angularly from the body of the valve, being secured thereto by screw threads, as shown in Fig. 7, or being cast integral therewith, as illustrated in Figs. 2, 3 and 4.

A valve stem or rod 16 is mounted movably on the threads of the branch pipe 14 and has a conical end or needle valve 17, which is capable of closing to the valve seat 11. A valve stem or rod 18 has a bevel-edged valve 19, which is capable of closing to the valve seat 12. A valve stem or rod 20 has a conical end or needle valve 21, which is capable of closing to the valve seat 13.

A valve bearing 22 has an annular shoulder 23, which is adapted to abut against the outer annular edge of the branch 14 of the valve body, and is also provided with a screw thread, which is engageable with the internal screw thread of the branch 14, as represented at 24. A stuffing box 25 is mounted on the valve stem 18 and engages by its internal screw thread with the exterior screw threads 26. A packing or gland 27 surrounds the valve stem 18 in the stuffing box 25. The valves shown in Figs. 2 and 4 are similarly mounted and furnished, but the foregoing details are omitted in said figures.

A gear 28 has a hub 29, which is secured upon the valve stem 18 by a pin 30, or in any other suitable manner. A sprocket wheel 31 has a hub 32, which is secured to the valve stem 18 by a pin 33, or otherwise. The wheel 31 has sprockets 34 and a sprocket chain 35 passes over the edge of the wheel 31, as illustrated in Figs. 1 and 6, and engages with the sprockets 34. At the ends of the chain 35 are handles 36.

A gear 37 is mounted by a hub 38 on the end of the valve stem 16, and a gear 39 is mounted by a hub 40 on the end of the valve stem 20. The gears 37 and 39 have preferably the same number of teeth, but the gear 28 has a less number of teeth than the gear 37 or the gear 39. Therefore, one revolution of the gear 28 causes less than one revolution of the gears 37 and 39, with which it is

in mesh, as shown in Figs. 1 and 6. As indicated in the drawings, the gears 37 and 39 turn in the same direction, shown by the arrows 41, 42, but the gear 28 turns in the opposite direction, as indicated by the arrow 43. Consequently, the valve stem 18 has a left-hand thread and the valve stems 16 and 20 have right-hand threads.

All the pipes 1, 2 and 3 enter a receiver 44 through tubular bosses 45, 46 and 47, respectively. The receiver has opposite the boss 46 a tubular boss 48, and a short tube 49 extends from the boss 48 into a T-union 50 at a right angle with the axial line thereof. A pipe 51 is secured into the T-union 50 at one end and at the opposite end is screwed into an elbow 52. A pipe 53 is screwed at one end into the elbow 52 and at the opposite end into an elbow 54. A pipe 55 is screwed at one end into the elbow 54 and at the opposite end into the distributer 56. A pipe 57 is screwed at one end into the distributer 56 and at the opposite end into a T-union 58. A pipe 59 is screwed at one end into the T-union 58 and at the opposite end into the elbow 60. A pipe 61 is screwed at one end into the elbow 60 and at the opposite end into the T-union 50. A drip pipe 62 is screwed at its upper end into the T-union 58 and its lower end has a screw cap or plug 63.

The distributer 56 has a globular body portion with an inlet tube and an outlet tube which are in alinement, as shown in Fig. 1. It has a plurality of radial orifices or discharges 64 (preferably four) separated one from the other by an intervening post 65. There is an equatorial flange 66, adjacent to the discharging orifices 64, and it is preferably dished or upwardly flared radially to give a slight upward direction to the jets which stream out through said orifices.

The gears 28, 37 and 39 are made sufficiently wide to allow them to slide axially, one upon another, as the screw motion of the valve stems 16, 18 and 20, in and out, will require.

This humidifying device may be used with great advantage and economy with a blower system, illustrated in Fig. 8. A chamber 67 has closely coiled steam pipes (not shown), from which chamber a vertical air shaft 69 extends, passing through the floor 70. The air pipe 69 has at its upper end (near the ceiling 71) a hood 72 with radially extending pipes 73.

A shaft 74 is mounted on suitable bearings and is rotated by the fast pulley 75, driven by the belt 76. The usual loose pulley is shown at 77. In the chamber 67 a rotary fan 78 is mounted fast on the shaft 74.

In Fig. 8 a pipe 79 is shown, leading from the receiver 44 to an elbow 80, from which a pipe 81 extends, which discharges into a chamber 82. A plurality of discharge pipes 83 lead radially from the chamber 82, and one of the pipes 83 extends into each of the radial pipes 73 of the hood 72 of the air pipe 69.

Having thus described the parts of my improved humidifying device, I will now explain its operation.

Steam, air and water, under pressure, enter, respectively, into the pipes 1, 2 and 3, but are prevented from flowing therethrough by the valves 4, 5 and 6, when said valves are closed. By pulling the proper handle 36, the air valve stem 18 is screwed outwardly by the wheel 31, which is turned by the engagement of the chain 35 with the sprockets 34. The valve stem or rod 18, so turned, causes the gear 28, which is fastened thereto, to turn with it, as indicated by the arrow 43. The driving gear 28, being in mesh at the same time with the gears 37 and 39, respectively, causes the gears 37 and 39 to rotate. When all these valves are opened, the steam, air and water, under pressure, rush through the pipes 1, 2 and 3, respectively, and discharge their contents simultaneously into the common receptacle or receiver 44, where they mix and mingle. These mingled currents, under their combined pressures, are discharged from the receiver 44, through the pipe 49 into the union piece 50, and there they are divided into two streams or currents. One stream or current passes through the pipe 51, elbow 52, pipe 53, elbow 54 and pipe 55 into the distributer. Another stream or current passes through the pipe 61, elbow 60, pipe 59, union 58 and pipe 57 into the distributer 56. These two streams or currents thus enter, with pressure, into the globular body of the distributer 56 in diametrically opposite directions and impinge upon one another violently, thus giving the air, water and steam a final forcible commingling, in which condition they are discharged immediately through the orifices 64 into the external atmosphere, in the form of the finest mist, and as the discharge is directed in slightly-upward, radial courses, the external atmosphere takes up this moisture and it is dissipated throughout the apartment or building without any drippage.

By my system of gearing, already described, it is possible to mix with the air, discharged by the air pipe 2 into the receiver 44, a proportionate and desired quantity of steam, through the steam pipe 1, into the receiver 44, and of water, through the water pipe 3, into the receiver 44. Thus my device enables the production and discharge of currents having whatever degree of humidity and heat is required. By detaching the gear 28 and sprocket wheel 34 (together with the valve 18, 19, and substituting therefor another valve 18, 19,) with a sprocket wheel 34 and a gear 28, having a different number of teeth, the ratio of the

driving gear to the driven gears is changed, as may be desired, thus changing the relative quantity of steam and water added to the mixture. These proportions are uniformly maintained without any skill on the part of the operator. If the water supply to the humidifier, for instance, were not thus regulated or regulable, too much water would be mixed with the air and would flood the system, and cause a greater water discharge than the atmosphere can absorb. The consequence in that case would be a considerable drippage and damage resulting therefrom.

The device shown in Figs. 1 to 7, inclusive, is efficient and satisfactory; but the amount of moisture diffused into the atmosphere can be greatly increased by connecting my humidifier with a blower system, such as is used in heating or ventilating buildings or apartments therein. A considerable volume of air, being moved by the blower, more readily takes up the moisture and carries it farther and dissipates it more uniformly than when the discharge of moisture is from the distributer directly into the more quiet volume of the atmosphere of the room.

When my improved humidifier is used with a blower ventilation system, as illustrated in Fig. 8, the final discharge of the mingled steam, water and air is through the pipes 83 into the air pipes 73, and thence into the apartment. As such vapor-discharge is in the midst of forcibly moving air currents, produced by the fan 78, a much greater amount of the moisture is taken up and absorbed by the air currents in the pipes 69, 73 than where the discharge is made into the more quiet atmosphere of the room, as represented in Fig. 1. The discharge from the open end of the pipe 83 may be made through a perforated cap thereon; or, if desired, the distributer 56, shown in Fig. 1, may be attached to the end of each pipe 83, or the distributer with the system of piping 50, 51, 52, 53, 54, 55, 57, 58, 59, 60 and 61 may be attached to the end of each pipe 83.

I claim as a novel and useful invention and desire to secure by Letters Patent:—

1. In a humidifier, the combination of a steam pipe adapted to discharge steam under pressure; a valve in the steam pipe operable by a gear; a water pipe adapted to discharge water under pressure; a valve in the water pipe operable by a gear; an air pipe adapted to discharge air under pressure; a valve in the air pipe operable by a gear; a distributer adapted to discharge under pressure said steam, water and air commingled; and means between said pipes and distributer to receive from said pipes steam, water and air, respectively, and to mingle said steam, water and air and the same to discharge into the distributer, said gears being meshed in series and operable together.

2. In a humidifier, the combination of a steam pipe adapted to discharge steam under pressure; an air pipe adapted to discharge air under pressure; a valve in the steam pipe having a gear; a valve in the air pipe having a gear, which is in mesh with the first named gear; a distributer adapted to receive said steam and air and to discharge the same under pressure; and means for receiving said steam and air from the pipes and to mingle the same and to discharge into the distributer.

3. In a humidifier, the combination of a water pipe adapted to discharge water under pressure; an air pipe adapted to discharge air under pressure; a valve in the steam pipe having a gear; a valve in the air pipe having a gear in mesh with the first named gear; a distributer adapted to receive said water and air and the same to discharge under pressure; and means for receiving said water and air from the pipes and to mingle and deliver the same to the distributer.

4. In a humidifier, the combination of a steam pipe adapted to discharge steam under pressure; a water pipe adapted to discharge water under pressure; a valve in the steam pipe having a gear provided with teeth; a valve in the water pipe having a gear provided with the same number of teeth; an air pipe located between the steam pipe and water pipe; a valve in the air pipe having a gear which is provided with a less number of teeth than either of the first named gears and which is in mesh with the two first named gears; a sprocket wheel on the valve of the air pipe; a sprocket chain engageable with the sprocket wheel; a distributer adapted to receive said steam, water and air and the same to discharge under pressure; and means for receiving the steam, water and air from said pipes and the same to mingle and deliver to the distributer.

5. In a humidifier, the combination of an air pipe adapted to discharge air under pressure; a rotatable valve in the air pipe having a stem; a gear on the valve stem; a sprocket wheel on the valve stem; a sprocket chain engageable with the sprocket wheel; a pipe adapted to discharge a watery fluid under pressure and extending parallel with the air pipe; a rotatable valve in the second named pipe, provided with a stem; a gear on the last named stem in mesh with the first named gear but having a larger number of teeth; a distributer adapted to receive and discharge under pressure said air and watery fluid; and means for receiving said air and watery fluid from the pipes and the same to mingle and deliver to the distributer.

6. In a humidifier, the combination of a steam pipe adapted to discharge steam under pressure; a Y-valve in the steam pipe having a rotatable screw-threaded stem; a gear

on said stem; an air pipe adapted to discharge air under pressure and located parallel to the steam pipe; a Y-valve in the air pipe having a rotatable screw-threaded stem; a gear on the last named valve stem meshing with the first named valve; a water pipe adapted to discharge water under pressure and located parallel to the air pipe; a Y-valve in the water pipe having a rotatable screw-threaded stem; a gear on the last named valve stem meshing with the second named gear; a distributer adapted to receive said steam, air and water and to discharge the same under said pressure; and means for receiving the steam, air and water from the pipes and the same to mingle and deliver to the distributer, the said gears being of sufficient width to allow a slight sliding movement of the gears one upon another in a direction parallel to the axis of said gears and valve stems.

7. In a humidifier, the combination of a plurality of pipes; means for forcing a liquid through each pipe; a mixing chamber into which said pipes discharge; a distributer feed pipe; a pipe connection between the mixing chamber and said feed pipe; a second distributer feed pipe parallel to the first distributer feed pipe; an elbow at the upper ends of said first and second distributer feed pipes; a pipe connecting said two elbows; a third distributer feed pipe in alinement with the second distributer feed pipe; an elbow at the lower ends of said first and third distributer feed pipes; and connecting the two last named elbows; and a distributer having a central chamber with a plurality of discharging apertures, into the upper end of which distributer the second named feed pipe enters and into the lower end of which the third named feed pipe enters.

8. In a humidifier, the combination of a mixing chamber; a plurality of pipes entering the chamber; two U-shaped pipes connected at their contiguous ends on one side by a T-union; a distributer connecting the other ends of the U-shaped pipes and having a central chamber provided with a plurality of discharging orifices; a pipe connecting the mixing chamber and said T-union; and a drip pipe extending downward from the lower portion of the lower U-shaped pipe.

In testimony whereof I affix my signature in presence of two witnesses.

JAMES KELLY.

Witnesses:
CASSIUS L. KNEELAND,
WARREN R. PERCE.