

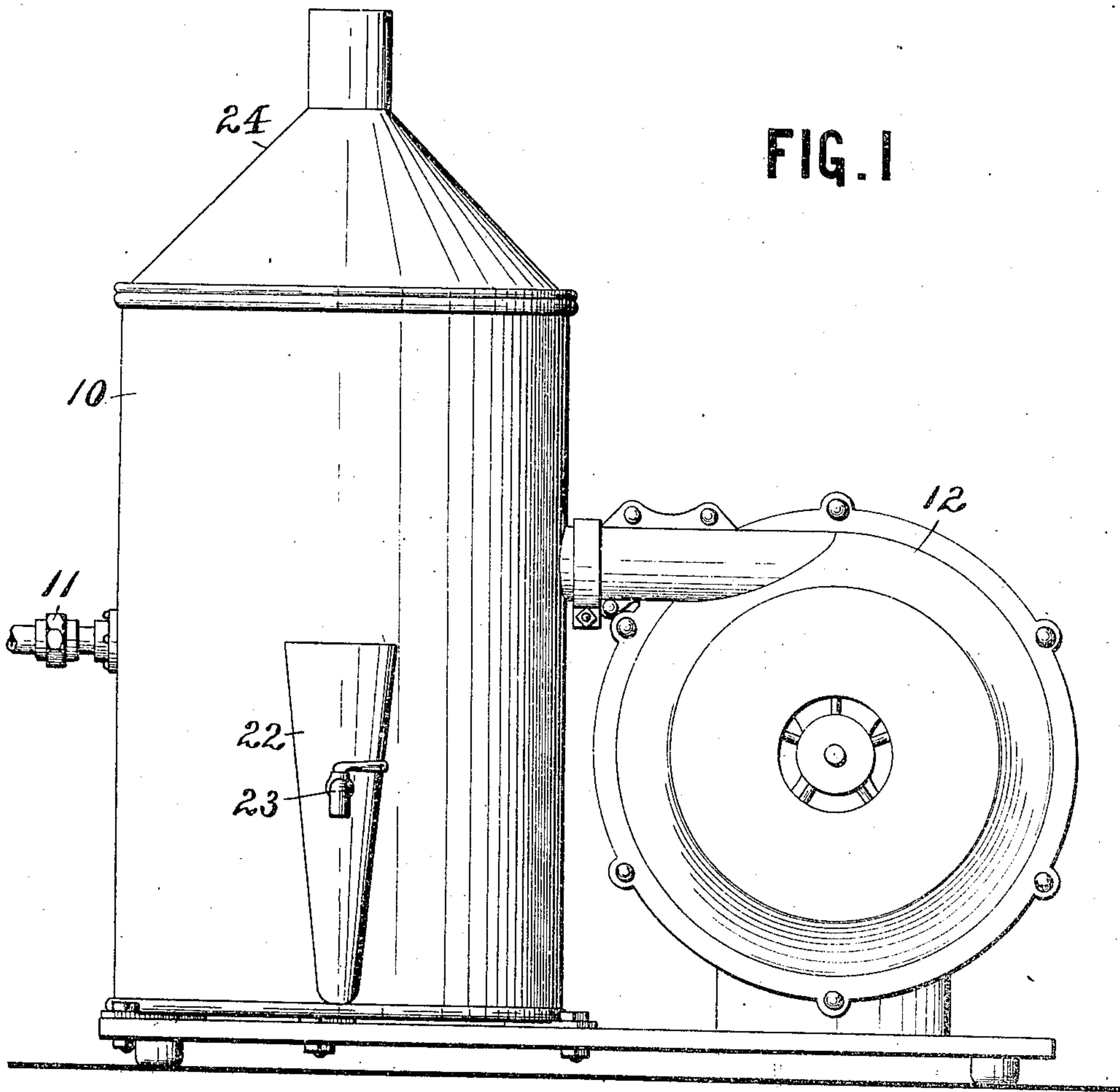
No. 848,341.

PATENTED MAR. 26, 1907.

H. BENTZ.
APPARATUS FOR MOISTENING AIR.

APPLICATION FILED JAN. 18, 1907.

3 SHEETS—SHEET 1.



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FIG. 2

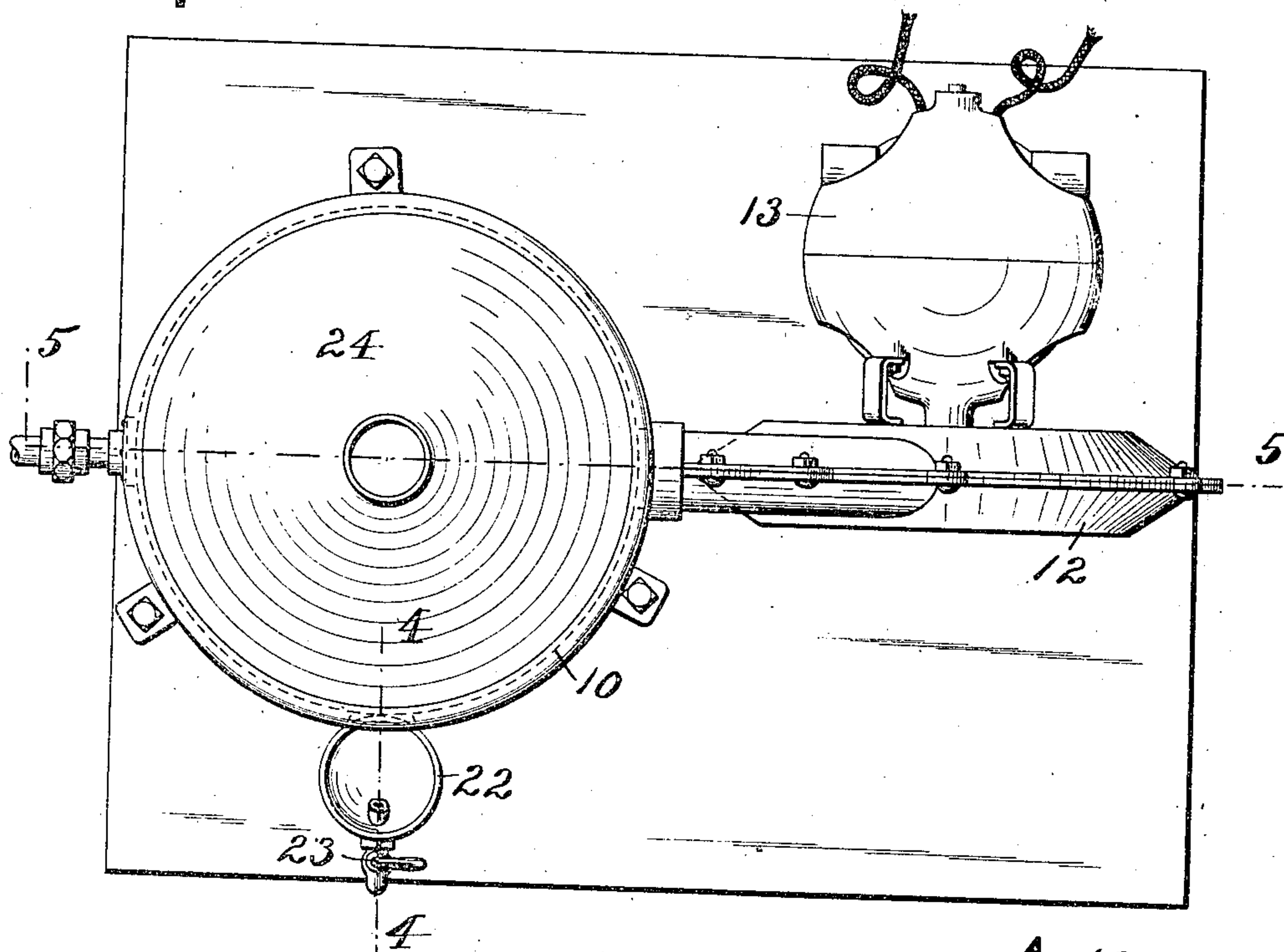
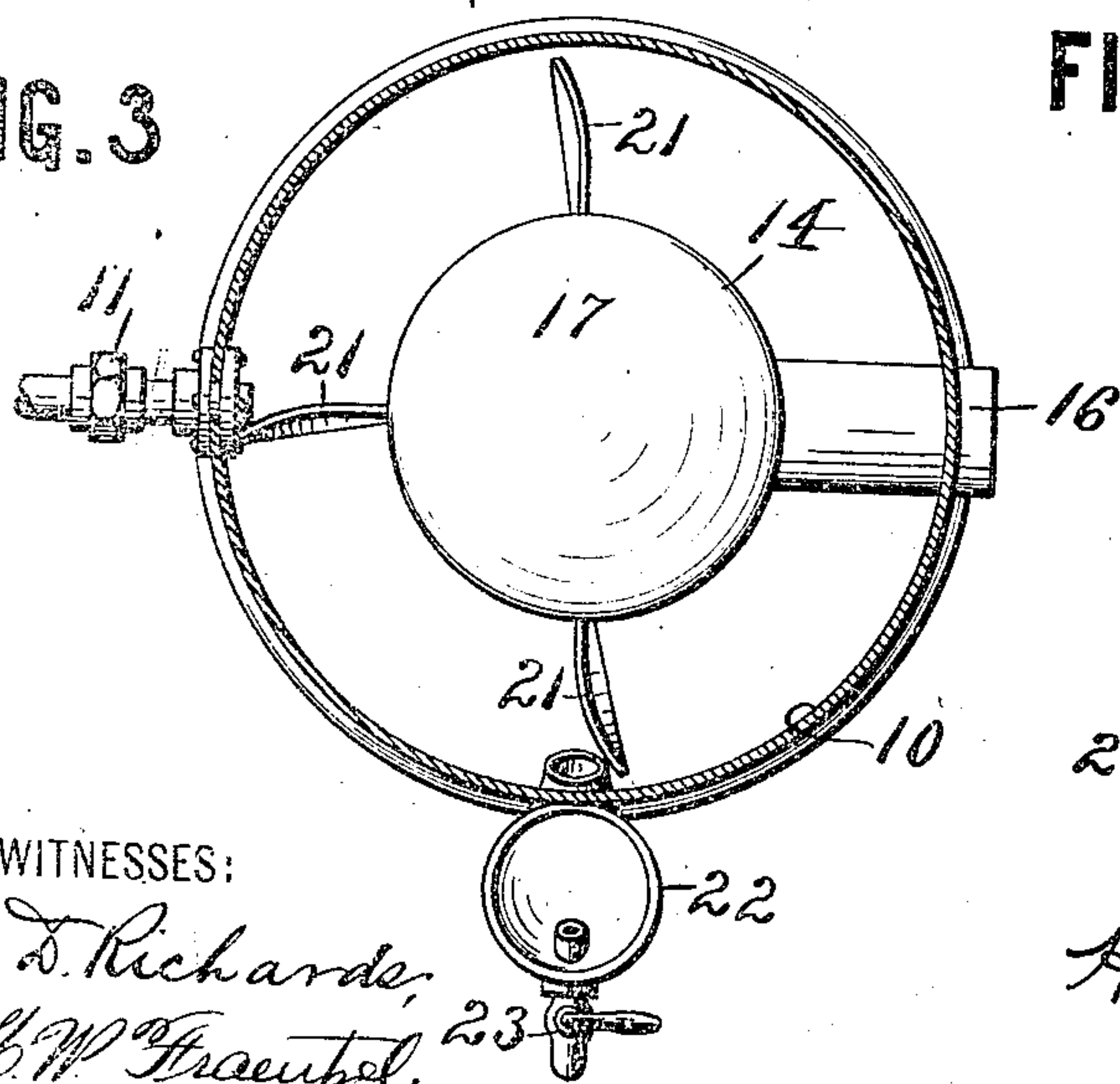


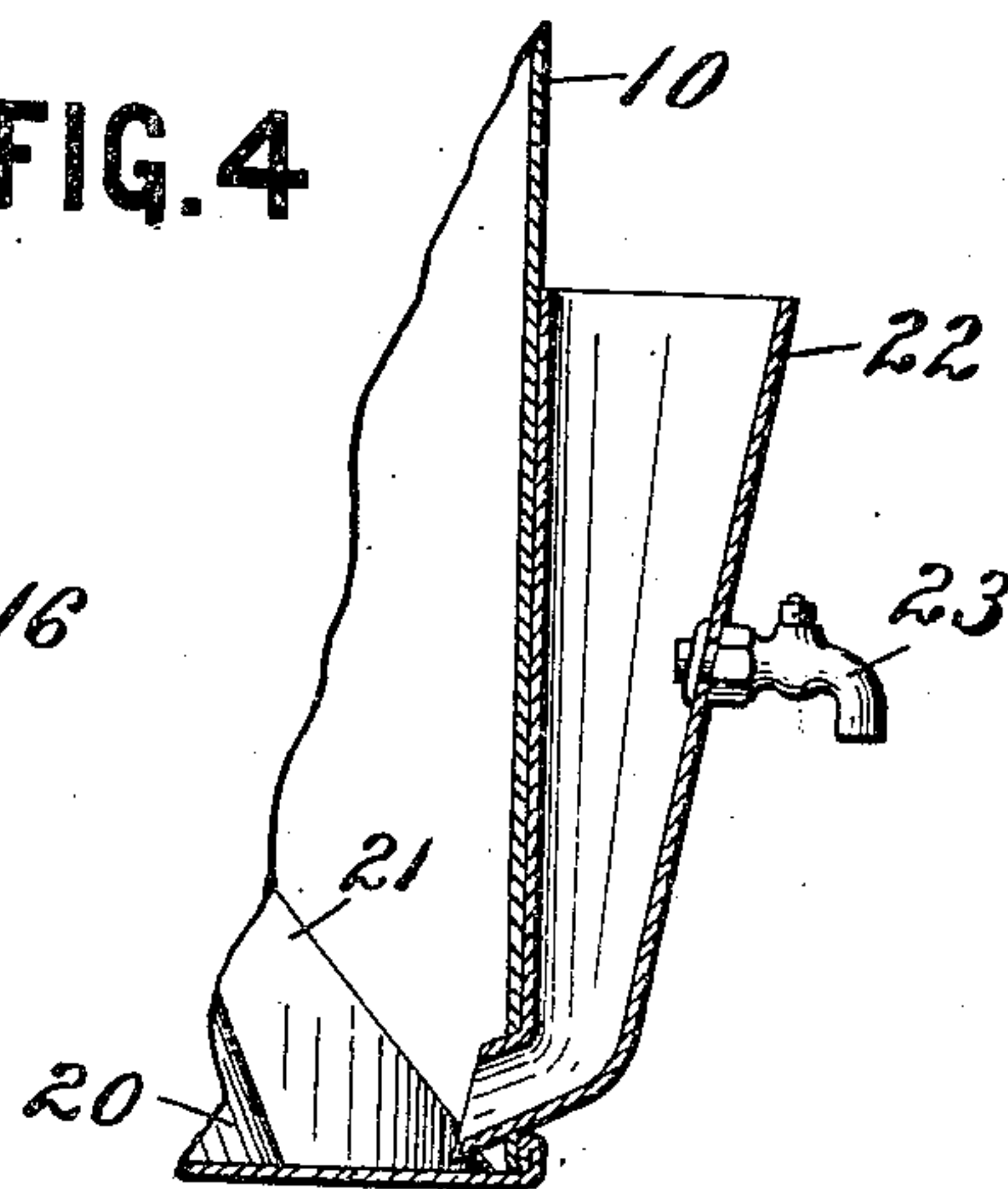
FIG. 3



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FIG. 4



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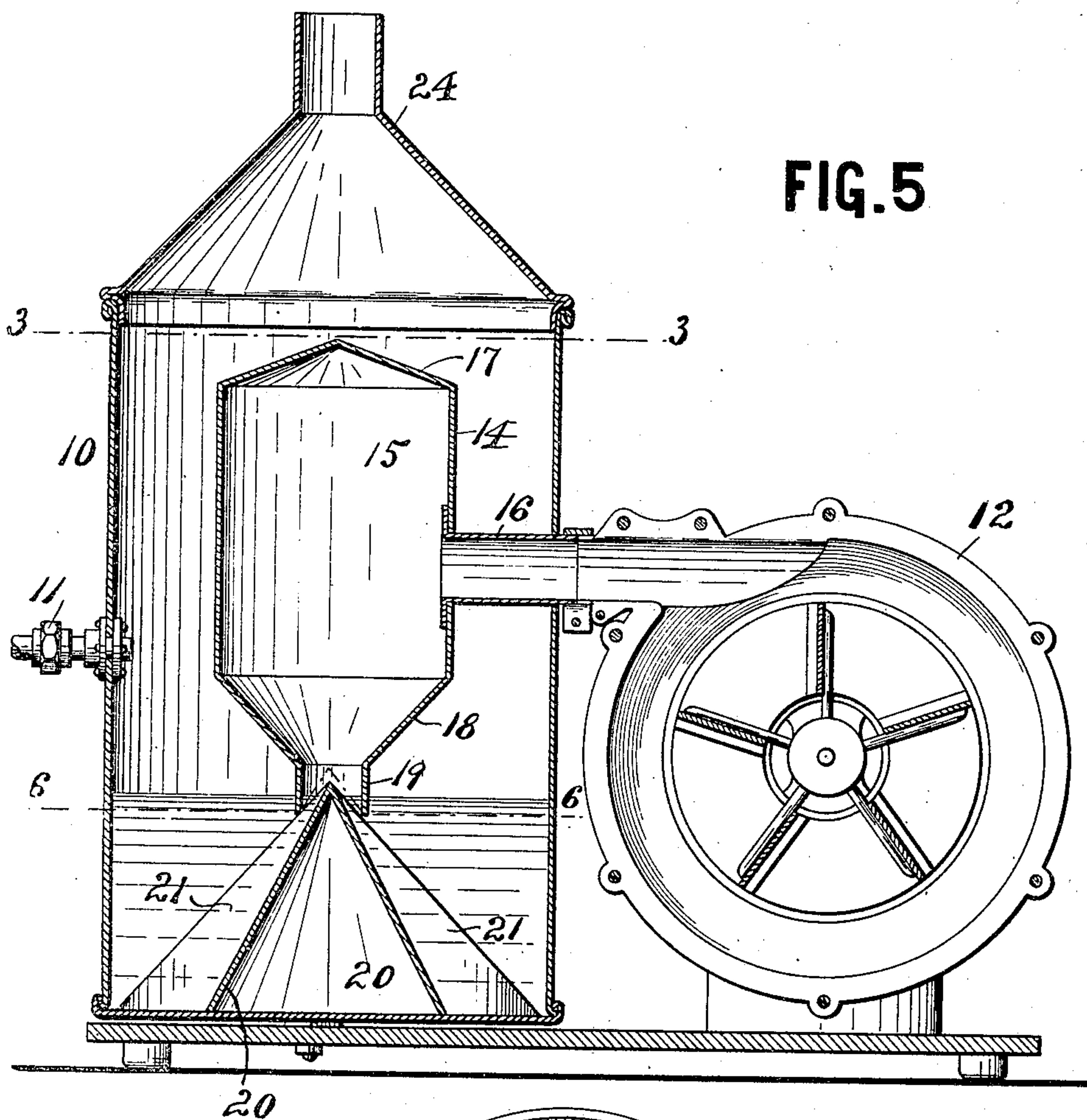


FIG. 5

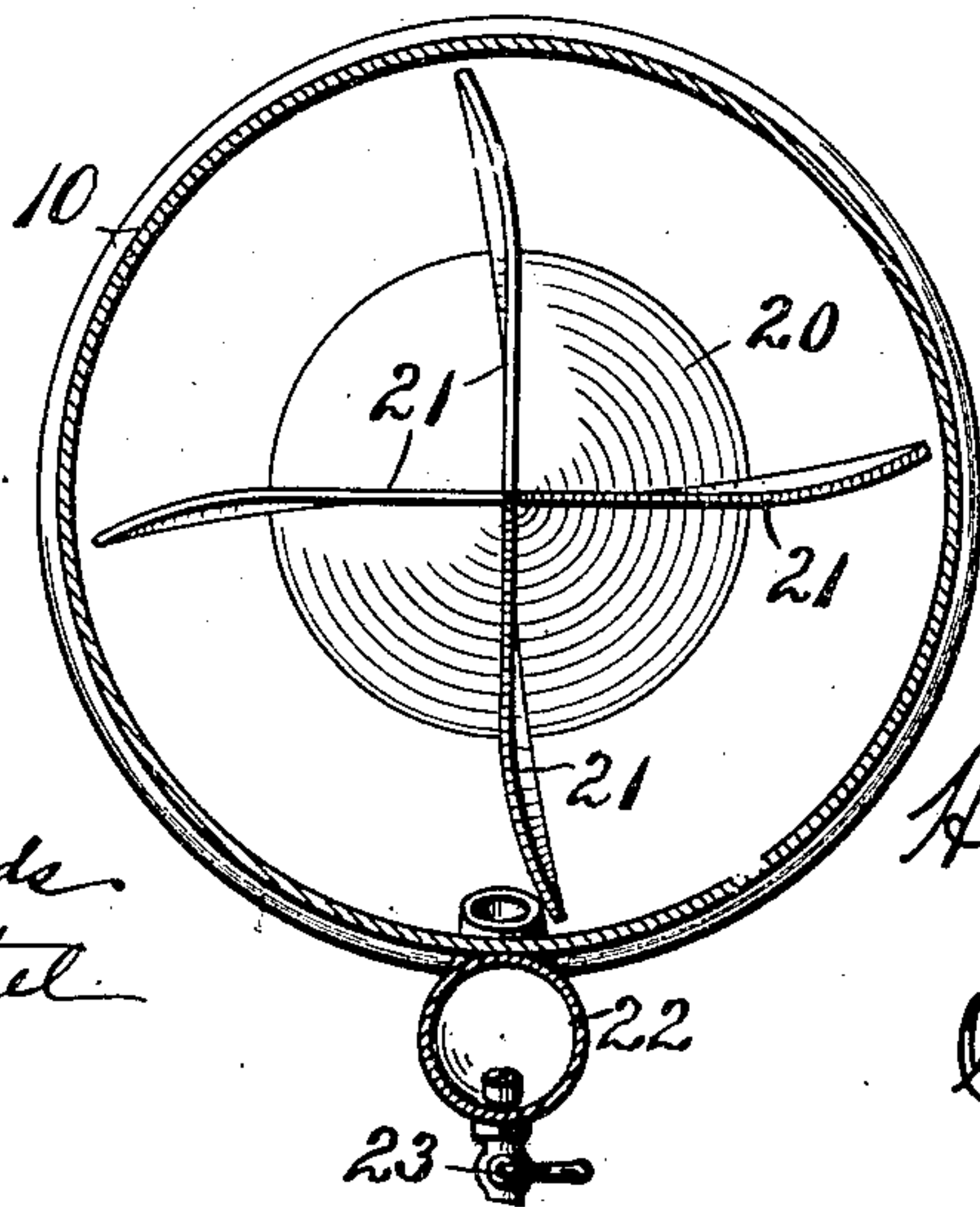


FIG. 6

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UNITED STATES PATENT OFFICE.

HARRY BENTZ, OF LARCHMONT, NEW YORK.

APPARATUS FOR MOISTENING AIR.

No. 843,341.

Specification of Letters Patent.

Patented March 26, 1907.

Application filed January 13, 1907. Serial No. 352,868.

To all whom it may concern:

Be it known that I, HARRY BENTZ, a citizen of the United States, and a resident of Larchmont, in the county of Westchester and State of New York, have invented certain new and useful Improvements in Apparatus for Moistening Air, of which the following is a specification.

The invention relates to improvements in apparatus for moistening air for use in factories, rooms, compartments, and other places where moistened air is required, as in spinning and weaving rooms, tobacco factories, stores, and show-cases; and it consists in the novel features and combinations of parts hereinafter described, and particularly pointed out in the claims.

It is well known that many attempts have heretofore been made to moisten air by causing the same to pass through a body of water or against fabrics saturated with water, whereby the air is caused to absorb moisture, and it is also well known that in commercial use many difficulties have been encountered in the use of the methods and means heretofore devised for moistening air and conveying it to the place or places intended to receive the same. It is a familiar fact that many devices produced for the purpose of moistening air have proved to be failures when attempts were made to place them in practical use, that many of such devices are complex and involve an expensive equipment, that many of them are only adequate for moistening the air for a medium-sized room, and that many of them have to be placed in operation for at least several hours to accomplish the first moistening of the air for a factory-room. The broad principle of moistening air by moving the same through water or against a saturated fabric has been known for many years, and the desirability of providing moistened air for spinning and weaving rooms and other places has long been recognized and many attempts have been made to afford adequate means for accomplishing the moistening of the air for such rooms and other places. The methods and means heretofore devised for moistening air have not, however, been universally or entirely satisfactory, and a demand has existed for means which would more rapidly and effectually moisten air for factory use.

The object of the present invention is to meet this demand and to afford a simple, adequate, and rapid process, with means for car-

rying the same into effect, whereby the air for a factory may be moistened rapidly and effectually to any desired degree.

In accordance with my invention I provide novel apparatus by means of which I am enabled to cause the air to pass into and from a body of water in such manner as to create a new principle of operation resulting in the air being very efficiently and rapidly moistened and under initial pressure driven into the room within which the air is to be employed, and said apparatus comprises a vertically-disposed receptacle to contain a body of water, means for supplying the water to said receptacle, a pipe leading from without into an air-pressure chamber or reservoir located within said receptacle and having its discharge end or pipe connection below the surface of the water therein, means for driving the air under pressure into said chamber and thence down through the same into the body of water, and means below said chamber for compelling a lateral and radial distribution of the descending volume of air through the water, the volume of air passing downwardly being comparatively large in proportion to the size of the receptacle and body of water contained therein and not being subdivided into jets or fragmentary confined divisions by mechanical means, but being compelled in large volume and with great force to tear downwardly directly through the body of water in such manner that the water is thoroughly agitated and maintained in a state of violent ebullition and the air caused to pass into direct contact with the maximum extent of the water and become rapidly, thoroughly, and uniformly moistened. The air reservoir or chamber provided within the main receptacle is of advantage in assuring the carrying out of my process in the most successful manner, and the lower end of the said reservoir or chamber is in the shape of an inverted cone, whose upwardly and outwardly inclined walls extend over the central portion of the body of water and in near relation thereto and are of benefit in the general operation of the apparatus.

The invention will be fully understood from the detailed description hereinafter presented, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation of an air-moistening apparatus embodying the invention. Fig. 2 is a top view of the same. Fig. 3 is a

horizontal section of the same on the dotted line 3 3 of Fig. 5. Fig. 4 is a vertical section through a portion of the apparatus on the dotted line 4 4 of Fig. 2. Fig. 5 is a central vertical longitudinal section through the apparatus on the dotted line 5 5 of Fig. 2, and Fig. 6 is a horizontal section of the same on the dotted line 6 6 of Fig. 5.

In the drawings, 10 designates a suitable vertical casing or receptacle, preferably constructed of sheet metal, adapted to contain the water for use in moistening the air; 11, the supply-pipe for conveying water to said receptacle; 12, a suitable pressure-fan or compressor for driving the air into said receptacle and down through the body of water contained therein, and 13 a motor for driving the compressor 12.

Centrally within the receptacle 10 is provided a vertical cylindrical casing 14, forming within it an air-pressure chamber or reservoir 15, which is in communication with the fan or compressor 12 through a pipe 16, the latter leading from the fan-casing into the side of the casing 14, preferably at a point considerably below its upper end. The casing 14 is preferably formed with a cone-shaped top or dome 17 and has a lower end which is in the form of an inverted cone 18, at whose lower end is a downwardly-extending pipe-section 19, which serves as the discharge for air from said chamber 15 and has its lower end below the surface of the body of water in the receptacle 10, as shown in Fig. 5. The casing 14 and discharge-pipe 19 may be regarded as a portion of the air-delivery pipe 16, the casing 14 forming an enlargement interposed in said pipe for creating a pressure-chamber for the air. The dome-shaped top 17 of the casing 14 increases the capacity of said casing, and the upwardly and outwardly inclined walls of the inverted cone 18 at the lower end of said casing 14 serve to receive the impact of the water thrown upwardly in sprays and waves by the air without materially retarding the upward progress of the air, which is important with my invention, since it is my purpose to rapidly moisten the air and deliver the same at a distance, if required, under the initial force generated by the fan or compressor 12. The reservoir 14 is provided so that there may be maintained between the fan 12 and the water within the receptacle 10 a considerable body of air under pressure, said body of air being added to by the fan as the discharge takes place from the pipe 19.

Below the discharge end of the pipe 19 is secured upon the bottom of the receptacle 10 a cone-shaped deflector 20, provided with downwardly and outwardly extending blades or ribs 21 and having its upper end set within the discharge end of the pipe 19. The blades 21 are radially disposed and inclined

downwardly and outwardly from the upper to the lower end of the cone 20, and said blades increase in depth from their upper to their lower ends, which are deflected slightly in a spiral course for the purpose of imparting a corresponding movement to the air directed by them. The upper edges of the blades 21 at the upper end of the cone 20 enter the discharge-pipe 19, and the lower edge of said pipe may rest upon them, as shown in Fig. 5. The cone 20 is of substantial proportions compared with the size of the other parts of the apparatus, and its purpose is to deflect the air passing from the pipe 19 downwardly, laterally, and radially and effect a uniform distribution of the same throughout the body of water and also to compel the air to move against the maximum extent of the water rather than to permit it to take a vertical course downwardly and immediately ascend, which would have the effect of causing the air to contact with the middle portion of the body of water within the receptacle 10. The presence of the downwardly and outwardly extending surfaces of the cone 20 causes the air to be deflected laterally during its descent and to travel a considerable distance from the center toward the outer edges of the body of water before it ascends. The blades or ribs 21 serve to equalize the distribution of the air throughout the body of water in that they, without unduly dividing the air into streams or currents, assure the downward passage of the air on all sides of the cone 20, and in this result they are aided by the presence of the air-chamber 15, whose effect is to deliver the air with substantial uniformity of pressure and volume upon the upper end of the cone 20 and blades 21. I regard the presence of the deflecting-cone 20 as of considerable importance in obtaining the maximum efficiency from the apparatus, since by the use thereof I am enabled to compel the air to flow so thoroughly throughout the body of water that the latter during the use of the apparatus is maintained in a state of violent ebullition, this being the effect of causing the air to move laterally and downwardly in a violent manner and against or throughout the entire body of the water.

Upon one side of the casing 10 I provide a tube 22, which opens into the bottom of the receptacle 10, as shown in Fig. 4, and is provided with an outlet-cock 23 at the point at which it is desired to maintain the level of the water within the casing 10. In supplying the casing 10 with water the latter is allowed to flow into said casing through the pipe 11, while the cock 23 is open until the attendant observes that the water is issuing through said cock, and thereupon the supply of water will be cut off. Various means have heretofore been devised for automatically maintaining a definite water-level within a receptacle, and any of these means may be em-

ployed for maintaining the water-level in the receptacle 10, my invention not being confined to any special means for accomplishing such purpose.

5 In the employment of the invention water is first allowed to flow into the receptacle 10 to the proper level therein, and then the motor 13 is set in operation, with the result that the fan 12 will be rapidly driven and force
10 the air through the pipe 16 into the air-chamber 15 and thence down through the pipe 19 into the body of water within said receptacle. The first part of the operation of the fan 12 will result in the chamber 15 becoming
15 charged with air under pressure, and thereupon the fan continuing in motion the air under pressure will discharge from the lower end of the pipe 19 and tear its way down along the sides of the cone 20 into and
20 through the body of water and finally ascend through the water and pass from the contracted top 24 of the receptacle to the room within which it is desired to utilize the moistened air. The receptacle 10 may be located
25 within the room whose air it is desired to moisten, or it may be located in a different room and connected therewith by a pipe leading from the top 24 of the receptacle. The air descending from the pipe 19 is de-
30 flected downwardly, laterally, and radially by the sides of the cone 20, so that before it ascends it is compelled to travel laterally, as well as downwardly, through the body of water from the central toward the outer por-
35 tions of same, a part of the air ascending somewhat near the pipe 19 and other portions of the air ascending considerably beyond the vertical plane of said pipe and substantially uniformly throughout the outer
40 portions of the body of water. The air ascends from the body of water with great force and drives the water upwardly in the form of heavy sprays which, falling back-
45 wardly into the body of water, serve to baffle and mix with the ascending air and increase the percentage of moisture the latter is compelled to absorb. The action of the air is also to create waves moving concentrically
50 outwardly against the walls of the receptacle 10 and then inwardly and breaking up against the incline walls of the cone 18. The air passing into the water greatly agitates the same and passes into contact with the water to the maximum extent, said air moving
55 against the water during its descent, its lateral movements and its ascent, and then through the thick sprays of water, which constantly ascend from and fall back into the body of same. I regard it as important in
60 attaining the greatest efficiency that the upwardly-moving air about the middle portions of the receptacle passes through those portions of the water which constantly break against the upwardly and outwardly inclined
65 walls of the cone 18, since the air slightly

baffled by said walls and moving against the same is compelled to contact with the water on and falling backwardly from said walls without having its upward force unduly dis- 70 sipated. I have found in use that the inverted cone 18 is of very great advantage when I have omitted the pressure-chamber 15 and led the pipe 16 directly to the discharge-pipe section 19. I prefer, however, to build upon the cone 18 the pressure-cham- 75 ber 15, so as to obtain the benefit of an equalized air-pressure at the discharge end of the pipe 19. My invention comprises, therefore, an apparatus which not merely causes air to pass through water for absorbing moisture 80 therefrom, but involves a new principle of operation in that by means thereof the air in large volume and under pressure is driven down into and laterally through the body of water with sufficient force to maintain the 85 water in a state of violent ebullition and cause the air to the maximum extent to move throughout the entire body of water and become rapidly and efficiently moistened, one purpose of the invention being that the 90 air for a room shall be moistened to the proper degree within a comparatively few minutes in lieu of requiring several hours for the purpose. The water within the receptacle should be warm in order to obtain the most rapid re- 95 sults, and the air should be driven into the body of water with such force that the moistened air will under the pressure thereby created and without any additional or facilitating means naturally leave the upper end 100 of the receptacle and pass to the room where it is desired to use it, my invention rendering unnecessary the use of suction or other means for withdrawing the moistened air from the receptacle. 105

What I claim as my invention, and desire to secure by Letters Patent, is—

1. An apparatus for moistening air comprising a receptacle adapted to contain a body of water, a pipe for delivering air down- 110 wardly into the body of water, means for forcing air through said pipe and downwardly into the water, and a deflector for causing the air to travel laterally while moving down- 115 wardly through the water, said deflector being in the form of a cone with its apex at the discharge end of said pipe; substantially as set forth.

2. An apparatus for moistening air comprising a receptacle adapted to contain a 120 body of water, a pipe for delivering air downwardly into the body of water, means for forcing air through said pipe and downwardly into the water, and a deflector for causing the air to travel laterally while moving down- 125 wardly through the water, said deflector being in the form of a cone having blades on its sides and its apex at the discharge end of said pipe; substantially as set forth.

3. An apparatus for moistening air com- 130

prising a receptacle adapted to contain a body of water, a pipe for delivering air downwardly into the body of water, means for forcing air through said pipe and downwardly into the water, and an inverted cone surrounding said pipe close to the upper surface of the water; substantially as set forth.

4. An apparatus for moistening air comprising a receptacle adapted to contain a body of water, a pipe for delivering air downwardly into the body of water, means for forcing air through said pipe and downwardly into the water, an upright cone-shaped deflector directly below said pipe for causing the air to travel laterally while moving downwardly through the water, and an inverted cone surrounding said pipe close to the upper surface of the water; substantially as set forth.

5. An apparatus for moistening air comprising a receptacle adapted to contain a body of water, a pipe for delivering air downwardly into the body of water, a commodious air-pressure chamber interposed in said pipe, and means for forcing air into said chamber and therefrom downwardly into the water; substantially as set forth.

6. An apparatus for moistening air comprising a receptacle adapted to contain a body of water, a pipe for delivering air downwardly into the body of water, a commodious air-pressure chamber interposed in said pipe, and means for forcing air into said chamber and therefrom downwardly into the water, combined with a deflector for compelling the air to travel laterally while moving downwardly through the water; substantially as set forth.

7. An apparatus for moistening air comprising a receptacle adapted to contain a body of water, a pipe for delivering air downwardly into the body of water, a commodious air-pressure chamber interposed in said pipe, and means for forcing air into said chamber and therefrom downwardly into the water, combined with a deflector for compelling the air to travel laterally while moving downwardly through the water; substantially as set forth.

wardly through the water, and an inverted cone surrounding the discharge for air into the water, and located close to the upper surface of the water; substantially as set forth.

8. An apparatus for moistening air comprising a receptacle adapted to contain a body of water, a casing within said receptacle forming a commodious air-chamber having a discharge at its lower end, and means for forcing air into said chamber and therefrom downwardly into the water, combined with a deflector for compelling the air to travel laterally while moving downwardly through the water; substantially as set forth.

9. An apparatus for moistening air comprising a receptacle adapted to contain a body of water, a casing within said receptacle forming a commodious air-chamber having a discharge at its lower end, and means for forcing air into said chamber and therefrom downwardly into the water, combined with a deflector for compelling the air to travel laterally while moving downwardly through the water, the lower end of said casing being close to the upper surface of the water and in the form of an inverted cone; substantially as set forth.

10. An apparatus for moistening air comprising a receptacle adapted to contain a body of water, a casing within said receptacle forming a commodious air-chamber having a discharge at its lower end, and means for forcing air into said chamber and therefrom downwardly into the water, combined with a cone-shaped deflector below the discharge from said chamber and having directing-blades on its surface for compelling the air to travel laterally while moving downwardly through the water; substantially as set forth.

Signed at New York city, in the county of New York and State of New York, this 17th day of January, A. D. 1907.

HARRY BENTZ.

Witnesses:

CHAS. C. GILL,
ARTHUR MARION.