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AIR-PURIFYING AND AIR-COMPRESSING APPARATUS

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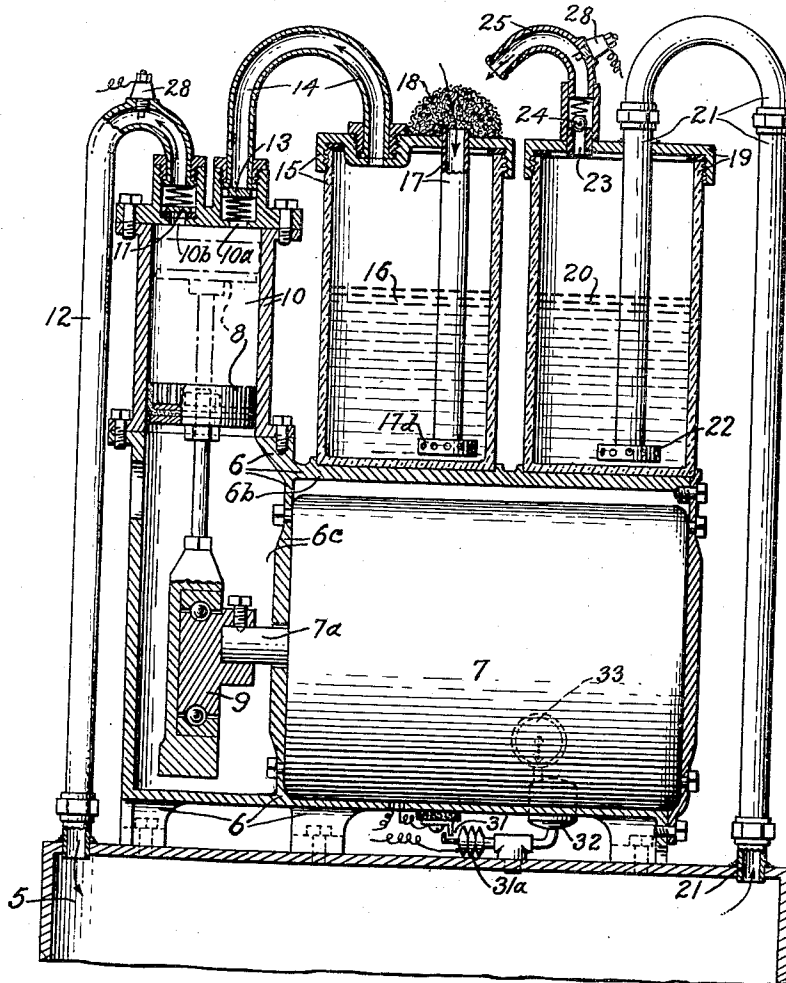


Fig. 1.

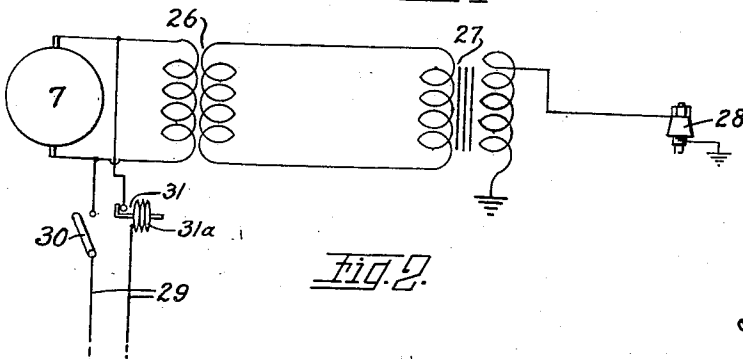


Fig. 2.

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AIR-PURIFYING AND AIR-COMPRESSING
APPARATUS

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8 Claims. (Cl. 21-74)

This invention relates to an air-purifying and air-compressing apparatus. It is susceptible of various uses, for instance, aerating and dispensing beer, or supplying purified air to a room, or suite of rooms in a residence, hospital or elsewhere.

One object of this invention is to not only rid the air from dust, grit and smoke, to prevent these things from entering and harming the pump; but also to rid the entering air from insects and from disease germs, and from fumes etc. which are generated from oil etc. in the pump-cylinder.

Another object of this invention is to combine in a unitary arrangement the practical and effective means for filtering, washing and sterilizing air, either at atmospheric pressure or super-atmospheric pressure, according to the various uses to which the apparatus may be put.

Another object is, when the air is to be under super-atmospheric pressure, to provide means to automatically cut off or eliminate the power when a predetermined pressure has been exceeded.

Another object is to minimize the necessary floor-space for containing the device, by superposing the motor on the air-pressure tank, and superposing the air-washing tanks over the motor, so the entire apparatus does not occupy more floor-space than is occupied by the air-pressure tank.

Other objects and important features are pointed out or implied in the following details of description, in connection with the accompanying drawing in which:

Fig. 1 is a vertical sectional view taken through the upper part of the air-pressure tank, the superposed frame and some of the other elements; the motor and some other elements being in side elevation; and the electrical connections being shown conventionally.

Fig. 2 is a diagrammatic view of the motor and its electric circuit including one of the spark plugs and its ground-contact, also the switches or circuit closers and breakers.

Referring to this drawing in detail, in which, similar reference numerals refer to similar parts in both views, the invention is described specifically as follows:

Though only the upper part of the air-pressure tank 5 is shown, it should be understood that it is not essentially different from other pressure tanks; but instead of its upper end being concavo-convex, as are high-pressure tanks, it is preferably level or horizontal and plane, consequently less expensive while affording a level

foundation or seat for a frame 6 that holds an ordinary type of motor 7 and whose feet are bolted or otherwise secured to the top of the tank 5 so as to truss or brace the tank's top against internal air-pressure.

The frame 6 is inclusive of a lower floor or motor-seat 6a, an upper floor 6b and a compressor-chamber 6c, the latter having therein a piston 8 operatively connected with an excentric 9 on the motorshaft 7a, preferably, but not essentially, by a ball-bearing connection. The piston is of a previously known flexible type that permits it to be conformed to the wall of the compressor-cylinder 10 while being oscillated by the excentric. The upper end or head of the cylinder is formed with two-valved ports 10a and 10b, the latter provided with a spring pressed valve 11 that permits air to flow from the compressor-cylinder into a pipe 12 and thence to the tank 5 to which its lower end is secured while its upper end is secured to the cylinder-head. The port 10a is provided with a spring-pressed valve 13 that permits air to be sucked into the cylinder 10 through a pipe 14 that has one end secured to the head of the cylinder 10 while its other end is secured to the top of a primary air-washing tank 15 having water or other appropriate liquid 16 therein. A pipe 17 has its upper end secured to and extending through the top or cover of the tank 15, while the lower end of this pipe is submerged in the liquid and is provided with a perforated distributor 17d near the bottom of the tank 15. An air-filter 18 covers the upper end of the pipe 17.

The air-washing tank 15 and a secondary air-washing tank 19 are seated on the upper floor 6b, directly over the motor 7, which latter is directly over the tank 5, so that the entire unitary device or apparatus occupies the minimum of floor space on which the tank 5 is seated.

The secondary air-washing tank 19 contains any suitable liquid 20, and a pipe 21 has an end portion secured to the air-pressure tank 5 while its other end-portion extends down through the cover of the tank 19 into the liquid 20 and terminates in a perforated air-distributor 22 near the bottom of the secondary tank. A valved outlet port 23 is normally closed by a spring-pressed valve 24 and communicates with an air-delivery pipe 25 of such form that it may either deliver the filtered and twice-washed air to a room in which the apparatus is located or may have a hose or other form of conduit connected thereto for delivery to another room or to any other receptacle, for instance, a beer-dispensing tank

(not shown). The main purpose of the spring-pressed pressure-opened valve 24 is to retain a predetermined pressure of air in the pressure-tank and the secondary tank, and to permit air to enter the pipe 25 and assume a lower pressure than in the pressure-tank when the tank-pressure exceeds the spring-pressure of valve 24; for it is desirable that a greater pressure, hence a greater amount of air, be retained in the pressure-tank 5 than is necessary in a container from which to dispense beer or other liquid.

The motor 7 is preferably an electric-motor whose circuit is diagrammatically shown in Fig. 2, and includes a transformer 26, a spark-coil 27, and one or more spark-plugs 28. The power-conductors 29 are electrically connected to the motor-circuit and are provided with a manually operated switch 30 and a pressure-operated switch 31 of any appropriate type; so, when pressure in the tank 5 exceeds a predetermined normal it opens the switch 31 and cuts out the motor-circuit, but when the air-pressure in the tank 5 is reduced below the predetermined normal, the inherent spring-action of the expansible and contractible switch-element 31a closes the switch 31, energizes the motor-circuit, and starts the motor, thus causing the air-pump or compressor 8-9-10 to suck air, from the atmosphere, through the filter 18, washer 15-16 and pipe 14; then to force the filtered and once-washed air through the port 10b and pipe 12, into the pressure-tank 5. This tank 5 traps particles of solid and heavy matter that goes to the bottom of the tank when the compressor has forced such matter into and down through the pipe 12 at a considerable momentum.

Pressure in the tank 5 causes the filtered and once-washed air to pass thru the pipe 21 and water 20 into the upper part of the secondary tank 19; and now, the air having been again washed, by the water 20, it remains under pressure until the predetermined amount of pressure is exceeded, whereupon, the valve 24 opens and permits the filtered and twice-washed air to be delivered to its destination.

Spark-plugs 28 are shown only in the pipes 12 and 25; and while only one spark-plug has a beneficial effect in sterilizing or ozonizing the air that comes into contact therewith, any appropriate number of spark-plugs or other heating devices may be similarly used in any one of the pipes 12, 14, 21 or 25, or in all of them; but for most purposes, the two shown in pipes 12 and 25 are sufficient and practical, for by them, the air is sterilized just before entering the air-pressure tank 5, and again sterilized just before being delivered through the pipe 25.

From the foregoing, it will be seen that the filter 18 obstructs the passage of insects, dust etc., that would otherwise enter the liquid 16 and make it impure; that the distribution and upward passing of the filtered air through the water or liquid 16 washes out very fine dust, smoke and fumes, also certain forms of bacteria or disease germs; and that the quick repetition of sparks, at the spark-plug in the pipe 12, kills most or many of the germs that may be present in the filtered and once-washed air. Moreover, in case of any possible entry of fumes or gas into the pressure tank 5, they are intercepted either by the liquid in the secondary tank 19 or by the electric sparks at the spark-plug 28 in the delivery pipe 25.

As an emergency precaution, a pressure-escape valve 32 of any appropriate kind may be provided in the tank 5; and in order that the user may

know the degree of pressure at any time, a pressure-gage or indicator 33 may be provided.

Although I have described this form of my invention quite specifically, I do not intend to limit my patent protection to these specific details of construction, arrangement or combination, for the invention is susceptible of numerous changes within the scope of the inventive ideas as herein implied and claimed.

I claim the following as my invention:

1. In an air-purifying apparatus, the combination of a primary tank for holding a body of air-washing liquid, a secondary tank for holding a second body of air-washing liquid, an air-inlet pipe having an open lower end in a position to be submerged in liquid when in said primary tank, air-moving means to draw air from the upper part of said primary tank and thereby draw air through said liquid when liquid is in and around said air-inlet pipe so as to primarily wash the air before it enters said air-moving means, air-conducting means that includes an air-pressure tank into which the primarily washed air is forced by said air-moving means, said air-pressure tank being in open communication with the lower part of said secondary tank and adapted to expel primarily washed compressed air into liquid when liquid is in said secondary tank so as to wash from the air any impurity it may have received from said air-moving means, said air-moving means being operable and effective for forcing the primarily washed air through said air-conducting means, said secondary tank being provided with an air-outlet port for delivering twice-washed air to a predetermined destination, and means in said air-outlet port to introduce electric sparks into the twice-washed air.

2. The combination defined by claim 1, and means to introduce electric sparks into the primarily washed air before it enters the pressure-tank.

3. In a compact unitary apparatus for supplying pure air under pressure, the combination of an air-pressure tank having inlet and outlet openings in its upper end, a frame united with the upper end of said air-pressure tank and being inclusive of a lower floor and an upper floor and an air-compressor-chamber, air-conducting means in communication with said air-compressor-chamber and in open communication with said inlet opening of said air-pressure tank, a motor seated and secured on said lower floor, a primary tank for holding a body of air-washing liquid, a secondary tank for holding a second body of air-washing liquid, said tanks being positioned on said upper floor above said motor, air-conducting means to conduct air into liquid in the primary tank and thereby primarily wash the air, air-conducting means to conduct the primarily washed air from the primary tank into said air-compressor-chamber, a piston in said air-compressor-chamber and operatively connected to said motor for forcing primarily washed air into the first-said air-conducting means and thence into said air-pressure tank, and air-conducting means to conduct air from the outlet-opening of said air-pressure tank into liquid in said secondary tank and thereby wash from said primarily washed air any impurities it has brought from said air-compressor-chamber.

4. The combination defined by claim 3, and means to introduce electric sparks into the twice-washed air as it flows from said secondary tank.

5. The combination defined by claim 3, and means in the first-said air-conducting means to

introduce electric sparks into the primarily washed air as it flows toward said air-pressure tank.

6. The combination defined by claim 3, means to introduce electric sparks into the primarily washed air as it flows from said air-compressor-chamber, and means to introduce electric sparks into the twice-washed air as it flows from said secondary tank.

7. In an air-purifying apparatus, the combination of a primary tank for holding a body of air-washing liquid, a secondary tank for holding a second body of air-washing liquid, an air-inlet pipe having an open lower end in a position to be submerged in liquid when in said primary tank, air-moving means to draw air from the upper part of said primary tank and thereby draw air through liquid when liquid is in and around said air-inlet pipe so as to primarily wash the air before it enters said air-moving means, and air-conducting means that includes an air-pressure tank into which the primarily washed air is forced by said air-moving means, said air-

pressure tank being in open communication with the lower part of said secondary tank and adapted to expel primarily washed compressed air into liquid when liquid is in said secondary tank so as to wash from the air any impurity it may have received from said air-moving means, said air-moving means being operable and effective for forcing primarily washed air through said air-conducting means, said secondary tank being provided with an air-outlet port for delivering twice-washed air to a predetermined destination.

8. In an air-purifying apparatus that includes a liquid-holding portion for washing air as it passes through liquid therein, air-conducting means to conduct air into said liquid-holding portion, air-conducting means to conduct air from said liquid-holding portion, means to introduce electric sparks into the first said air-conducting means, and means to introduce electric sparks into the second said air-conducting means, whereby the air is affected by the electric sparks both before and after being washed.

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