

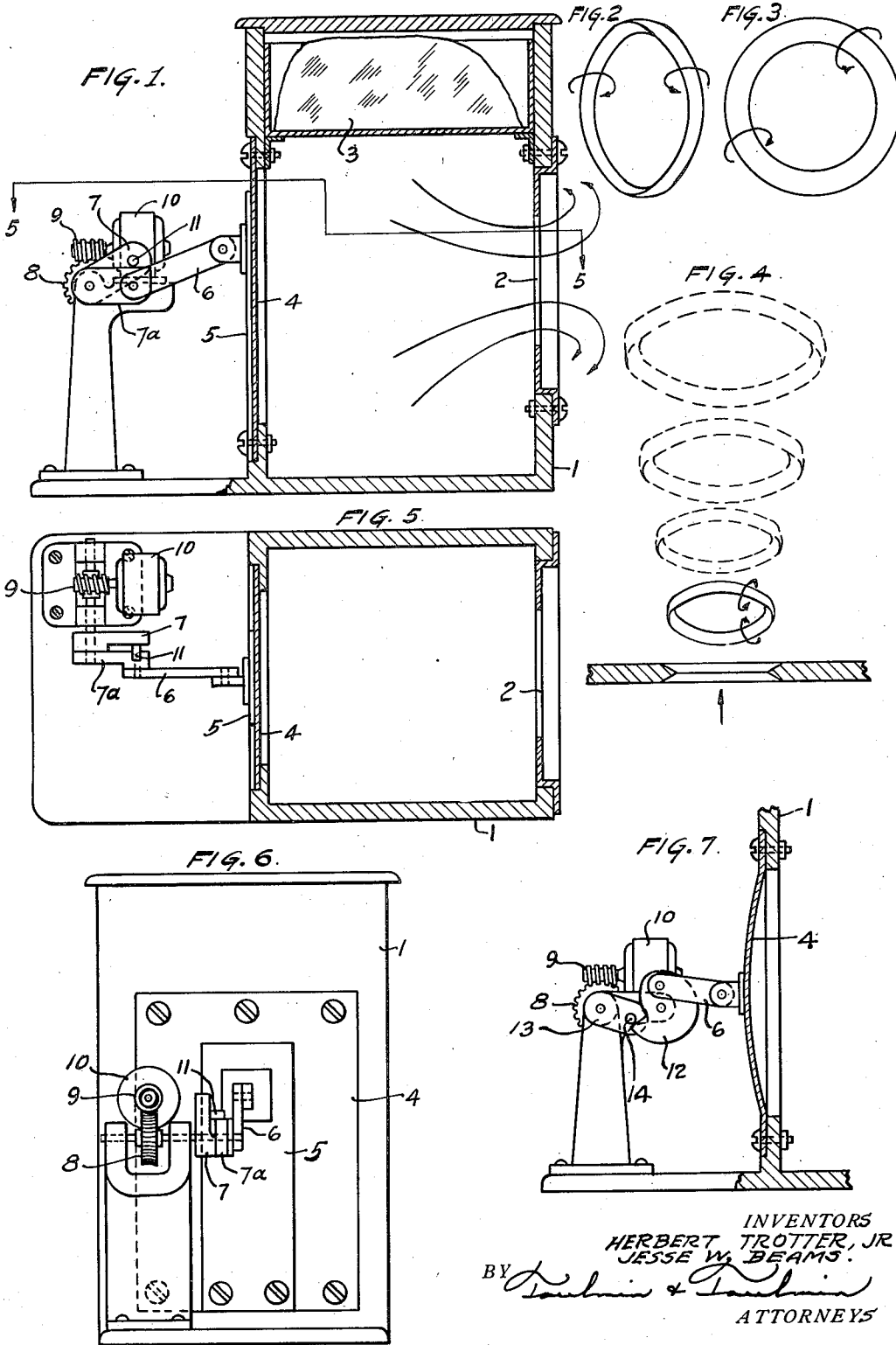
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AIR CONDITIONING

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AIR CONDITIONING

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Our invention relates to air conditioning.

It is the object of our invention to provide small bodies of conditioned air or air treated in a predetermined manner, which may be applied individually and in controlled rapidity of succession around any given person or object.

It is our object to provide a succession of vortex rings of treated air which may be applied around a person or object so as to avoid the treatment of the vast body of air in an enclosure in which the person or object may be.

The conditioning of air is expensive. The securing of a uniform result of conditioned air is expensive. Heretofore, it has been customary in apparatus of this type to control uniformly in an enclosure the condition of conditioned air and to supply a large bulk of such air and to maintain it in constant circulation in order to secure the adequate conditions of relative humidity, temperature, circulation and fresh air introduction to reduce odors and to provide comfort. Heretofore, the area immediately adjacent a person or object in the enclosure in which the air so conditioned would affect the person or object in the enclosure was a relatively small area as compared to the vast area of the rest of the enclosure where the air had to be also maintained in the same condition even though much of it would never affect, encounter or engage the person or the object. Thus, an enormous waste has arisen in many installations through the application of conditioned air necessary to large enclosures, such as theaters or auditoriums, in tremendous volumes for the purpose of applying it to a number of limited areas adjacent each person, the total of which areas is relatively small compared to the total volume of the enclosure.

Again, the problem has always arisen in the air conditioning of large enclosures where numerous persons are gathered of preventing drafts due to the fact that a constant circulation is necessary for suitable evaporation and mixing of the contents of the enclosure to maintain uniformity of temperature and humidity and to maintain distribution of the fresh air as well as the conditioned air. Necessarily, this circulation has to be a constant one and, being constant, has set up the problem of drafts. To avoid the effect of drafts, it has been necessary not only to reduce the velocity of the air so circulated which reduces the rate in evaporation of the person over whom the air is passing, but it has also been necessary to increase the temperature of the air so circulated to prevent the effect of cold drafts.

Our invention provides for the delivery of a

series of vortex rings which constantly expand in area as they progressively proceed from the point of exit from the apparatus producing them outwardly into the room.

It is our invention to deliver successively small quantities of air around the object to be treated with the air. We can deliver these rings in small quantities and with great frequency or relatively high velocity due to the fact that there is no continuity between them in the sense of a blast of air which would cause a draft. By eliminating this drafty feeling, we are enabled to reduce the temperature while, at the same time, to increase the volume of air actually applied to the person or object without any of the disadvantages of a cold draft. By our invention, we are able to apply a closely-regulated and accurately-conditioned relatively small body of air directly to the person or object affected so that substantially all of the air which we apply is applied effectively to the person and the large bulk of conditioned air which is not so effectively applied in the present air conditioning systems is eliminated. The corresponding savings and the corresponding accuracy of application will be immediately apparent. By breaking up the bodies of air so applied and emitting them in the form of vortex rings at intervals, we get away from the continuity of the draft effect; we provide for evaporation by successive applications of the conditioned air and we reduce the cost because we only use that amount of air in a particular area in which the person or object stands and, by our vortex rings, we surround the person or object with a gentle bath of the conditioned air to give the effect of a light summer breeze on an early June morning—a result that has hitherto been long sought but not attained in the art of regulating the condition of air according to the needs of an object or a human being.

Our invention has the further advantage that, as the vortex rings enter an enclosure, they tend not to diffuse with the unconditioned air but travel in a straight line until they strike persons or objects and then to diffuse over them. Thus, the air that is conditioned remains so until it strikes persons or objects. Of course, the rings have a finite range which depends on the manner in which they are produced. After the vortex rings reach the end of their range they diffuse the air more thoroughly than has been conditioned with the air that has not been conditioned without the creation of drafts because these vortex rings are constantly expanding and moving bodies of conditioned air pre-

senting the maximum surface for distribution and contact with the untreated air.

Our invention is useful for merely circulating the air when it is not otherwise conditioned. It takes the place of an electric fan without the disadvantages of handling large volumes of air and without drafts.

Referring to the drawing:

Figure 1 is a diagrammatic view showing how the vortex rings of air can be produced;

Figure 2 is a perspective of one of our vortex rings showing the general direction of rotation of the ring of air thus produced which results in its constantly expanding character. The air in the ring rotates while the ring moves forwardly;

Figure 3 is another view of the ring indicating the same characteristics;

Figure 4 is a section through a floor showing an opening as in the case of theater ventilation with the vortex rings making their exit and ascending around a person seated in the theater adjacent the opening;

Figure 5 is a section on the line 5-5 of Figure 1;

Figure 6 is a rear elevation of Figure 1;

Figure 7 is a vertical section through the diaphragm for creating vortex rings: this is a modified form.

Referring to the drawing in detail, 1 is a box having a vortex opening 2 supplied with cool air from the ice block 3. The rear wall of the box is provided with a diaphragm 4 which is actuated by the pusher plate 5 through the pitman 6, crank 7, gears 8 and 9 and electric motor 10. The exact details of this arrangement are of no importance as our vortex rings can be produced in any one of a number of manners. They may be produced with or without the treatment of the air. The pin 11 on the crank 7 serves to actuate its companion link 7a attached to the pitman 6.

In Figure 7 we have shown an alternative form in which the diaphragm 4 is directly connected to the pitman 6 which, in turn, is connected pivotally eccentrically to a cam 12 which is operated in association with the cam arm 13 and follower pin 14.

As will be seen in Figures 2, 3 and 4, the vortex rings of air are discharged in succession, the rapidity of which can be controlled. The air in the ring rotates as indicated by the arrows while the ring moves forward and, at the same time, the ring expands. The person or object is thus surrounded by a series of disconnected, encircling, rotating and expanding bodies of air and is, therefore, bathed with the air and may be heated or cooled or otherwise treated with the air without the creation of drafts and with the application of the air to the person or object only rather than the gross waste of it generally in the enclosure.

It will be understood that we desire to comprehend within our invention such modifications as may be necessary to adapt it to varying conditions and uses.

Having thus fully described our invention, what we claim as new and desire to secure by Letters Patent, is:

1. In a method of conditioning and discharging air, cooling a body of air, and moving the air in a plurality of vortex rings about an object.

2. In a method of conditioning and discharging air, cooling a confined body of air, and delivering to an enclosure such cooled air in

a plurality of vortex rings about an object in the enclosure in an area materially less than the total area of the enclosure.

3. In a method of air conditioning and air discharging, conditioning air, delivering it over an object to be conditioned in a plurality of successive vortex rings, and thereby treating the object progressively by successive waves of conditioned air.

4. In a method of air conditioning and air discharging, conditioning air by cooling it, and delivering it over an object in the presence of air of higher temperature to be conditioned in a plurality of successive vortex rings, and permitting said rings to expand and rotate on the annular axis thereof to progressively cool by small increments the object without sudden reduction of temperatures.

5. In a method of conditioning objects in an enclosure, such as persons, where the persons occupy a total area much less than the total area of the enclosure and the air in the enclosure is of higher temperature than the conditioned air, delivering over each person a plurality of conditioned air vortex rings of lower temperature than the area of the enclosure in small increments to cool the person without chilling the person.

6. In a method of conditioning and discharging air, confining a body of air and cooling it while so confined, compressing the body of air successively at intervals while so confined, and discharging the compressed cooled air in successive vortex rings into a locality of higher temperature other than the area of compression.

7. In a method of air conditioning in an enclosure having a relatively large body of air in which a number of objects are located, delivering over each object a plurality of vortex rings of intensively conditioned air of an amount sufficient to treat the object but insufficient to condition the air in the entire enclosure.

8. In an apparatus for conditioning air, means to cool air, means to compress air at intervals, and means to regulate the discharge of air outside of the area of compression and cooling in a plurality of vortex rings.

9. In combination in an air conditioning apparatus, means of intensively conditioning a limited body of air, means of compressing said body at intervals, means for discharging the compressed air in a series of vortex rings into a separate enclosure of much greater area than the area of compression of the intensively conditioned air.

10. In combination, an enclosure having a restricted port on one side, a pulsation means for pulsating the air and discharging it through the port, and means between the restricted port and pulsation means for cooling the air in the enclosure whereby a plurality of vortex rings of cooled air will be discharged through said port.

11. In combination, an enclosure having a restricted port on one side, a pulsation means for pulsating the air and discharging it through the port, and means between the restricted port and pulsation means for cooling the air in the enclosure whereby a plurality of vortex rings of cooled air will be discharged through said port, said pulsation means comprising a flexible diaphragm wall constituting one wall of the enclosure.

12. In an air conditioning apparatus, an enclosure having a restricted port on one side, means for cooling air on another side, and a pulsation means comprising a movable wall on

the side opposite the side of the enclosure with the opening to cause the air to move across the air cooling means and out of the restricted opening in a succession of vortex rings.

5 13. In an air conditioning apparatus, a box having a restricted opening on one side, a movable wall on another side opposite the side with the restricted opening, means to cool the air in

the box located between said sides so that the air moving from one side to the other will pass over said cooling means, and means to actuate said movable wall to cause the discharge of vortex rings of cooled air from said box.

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