No. 852,122. PATENTED APR. 30, 1907.

J. H. KINEALY.

AIR PURIFYING APPARATUS.

APPLICATION FILED AUG. 31, 1905.

3 SHEETS—SHEET 1.

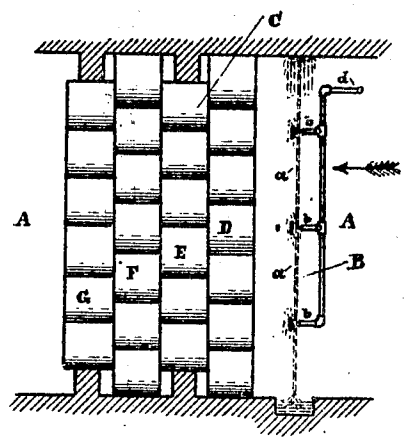

Fig. 1.

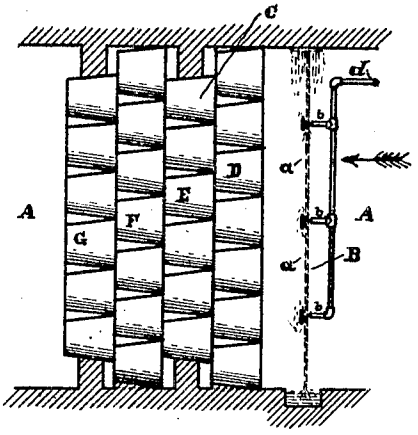

Fig. 4.

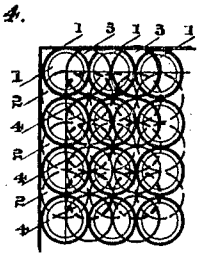

Fig. 9.

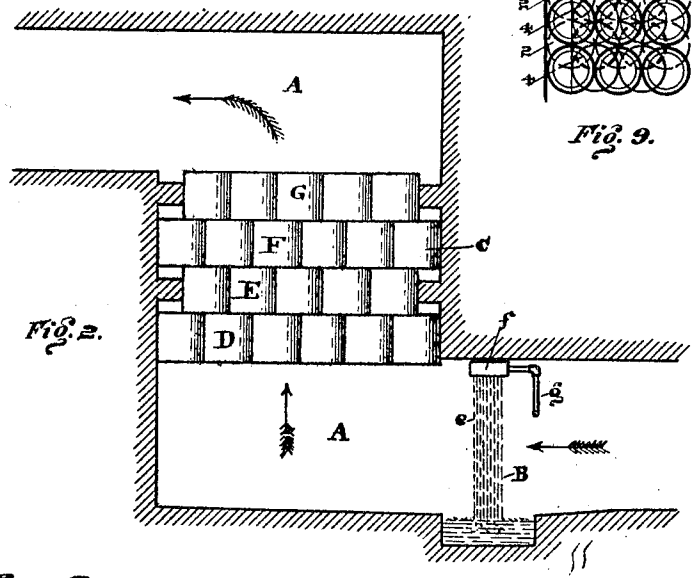

Fig. 2.

Fig. 11.

Fig. 10.

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2 SHEETS—SHEET 2.

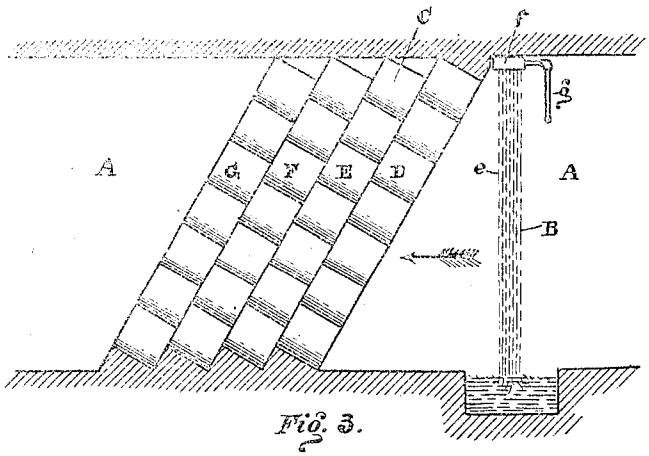


Fig. 3.

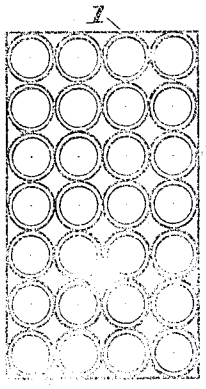
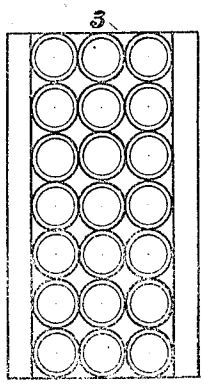


Fig. 5.

Fig. 7.



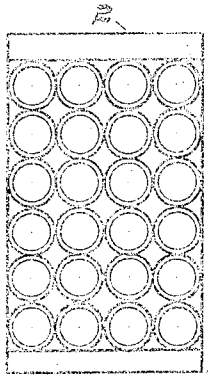


Fig. 6.

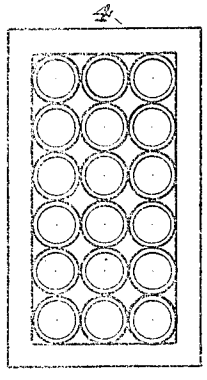


Fig. 8.

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UNITED STATES PATENT OFFICE.

JOHN H. KINEALY, OF FERGUSON, MISSOURI.

AIR-PURIFYING APPARATUS.

No. 852,122. Specification of Letters Patent. Patented April 30, 1907.

Application filed August 31, 1905. Serial No. 276,536.

To all whom it may concern:

Be it known that I, JOHN H. KINEALY, a citizen of the United States, residing at Ferguson, county of St. Louis, State of Missouri, have invented a new and useful Improvement in Air-Purifying Apparatus, of which the following is a full, clear, and exact specification, reference being had to the accompanying drawings, which form a part thereof.

My invention relates to that type of air purifying apparatus used in connection with heating and ventilating systems wherein the air is freed of impurities by being washed and then the moisture taken up by the air during the washing process is extracted by means of a water eliminator.

The object of my invention is to make the air supplied to buildings for ventilating purposes clean and sanitary by freeing it of impurities. And a further object of my invention is to prevent damage to furniture of schools and other ventilated buildings by avoiding the introduction of dust and dirt. And a still further object of my invention is to cool the air introduced for ventilating purposes in warm weather so as to make the air inside of the building cooler than the air outside. These several objects are attained by an apparatus by means of which the air is washed so as to free it of dirt and impurities and is then freed of entrained water by means of a water eliminator consisting of tubes formed and arranged as hereinafter described and specifically claimed.

My invention is fully shown in the accompanying drawings where similar letters are used to designate similar parts.

Figures 1, 2, and 3 show a form of the apparatus in which the tubes of the eliminator are short cylindrical tubes of circular cross-section. Fig. 1 shows a form of apparatus when the flow of air is in a horizontal direction. Fig. 2 shows a form of apparatus when the flow of air through the washer is in a horizontal direction and the flow of air through the eliminator is in a vertical direction. Fig. 3 shows a form of the apparatus where the flow of air is in a horizontal direction and where the tubes of the eliminator are inclined. Fig. 4 shows a form of the apparatus wherein the tubes of the eliminator are short frustums of cones. Figs. 5, 6, 7, and 8 show details of the apparatus shown in Fig. 1. Fig. 9 shows a view of one corner of the eliminator of Fig. 1, as seen by an observer directly in front of the ends of the tubes. Figs. 10 and 11 show two forms of the tubes used in the eliminator.

Referring to Figs. 1, 2, 3, and 4, A is thoroughfare for the passage of the air; B is the washer; and C is the eliminator. The tubes forming the eliminator are arranged in sections one back of the other as shown. D is the first section, that close to the washer; E, the second; F, the third; and G, the fourth.

Fig. 5 shows the arrangement of the tubes in the first section of the apparatus shown in Fig. 1; it is 7 tubes high and 4 tubes wide.

Fig. 6 shows the arrangement of the tubes in section E of Fig. 1; it is 6 tubes high and 4 tubes wide.

Fig. 7 shows the arrangement of the tubes in section F of Fig. 1; it is 7 tubes high and 3 tubes wide.

Fig. 8 shows the arrangement of the tubes in section G of Fig. 1; it is 6 tubes high and 3 tubes wide. The arrangement of the tubes in the sections is such that when the sections are in place the tubes of the second section are eccentric with regard to the tubes of the first, and those of the third are eccentric with regard to those of the second, and so on: the tubes of one section being arranged so that they are eccentric as regards the tubes of the section immediately in front toward the washer.

When the sections are in place, an observer standing directly in front of the first section and looking into the eliminator sees the tubes one back of the other as shown in Fig. 9, where numerals are used to show to which of the four sections the various circles representing the ends of the tubes belong.

The eliminator in Fig. 4 differs in its construction from the eliminator in Fig. 1, in that the sections are made up of frustums of cones instead of cylindrical tubes, and I have used the word "tube" to cover broadly this conical shape as well as the true cylindrical shape.

In Figs. 1 and 4 the washer consists of a sheet or veil of water *a* through which the air is blown. This sheet is formed by means of the nozzles *b*, which are supplied by water under pressure through the pipe *d*.

In Figs. 2 and 3 the washer consists of what I term a "wall" of downward falling water in a sprayed or finely divided condition. The water is made to fall vertically in drops or streams. The air in passing through this wall zigzags back and forth between the drops or streams of downward falling water coming in contact, however, with some of the

water, and it is not necessary to blow a hole through it as it is when a screen or veil of water, such as is shown in Figs. 1 and 4, is used, and therefore the air is likely to be more thoroughly washed and freed of dirt than when a screen or veil is used. This "wall" is formed by making the water pass from the bottom of a spray box *f* through a number of holes of small diameter. Water is supplied under pressure to the spray box through the pipe *g*. In every case the veil or wall of water whichever be used, always extends transversely across the entire thoroughfare A.

In Fig. 10 is shown a longitudinal section and end view of a cylindrical tube of a circular cross-section for use in the eliminator. It has at one end of the cylindrical side *h* an inward turned lip *i* which prevents whatever moisture may be deposited on the inside of the tube from being blown through it when the tube is placed so that the air flows from the end without the lip toward the end with the lip.

Fig. 11 shows a longitudinal section of the tubes used in Fig. 4. These tubes are frustums of cones of circular cross-section.

The operation of the apparatus is as follows: The air passing through the thoroughfare A enters the washer B where it is washed by the sheet of water as shown in Figs. 1 and 4, or the "wall" of water as shown in Figs. 2 and 3. By the washer the air is freed of dust and dirt, but has put into it a greater or less quantity of moisture, in the form of drops of water which is carried forward with the air. After leaving the washer the air enters the eliminator where it comes in contact with the surface of the tubes and by rubbing on these surfaces it is made to deposit the moisture. The arrangement of the tubes is such that the air passes along the outside as well as the inside of the tubes so that a large surface for the deposit of moisture is presented by this form of eliminator. By arranging the tubes as shown in the drawings so that the tubes of one section are eccentric as regards the tubes of the section immediately in front, eddies are created so that all of the air is made to come in contact with the surface of some of the tubes, thus making sure that the air is thoroughly freed of moisture. Whatever moisture is deposited on the surfaces of the tubes runs off at the ends and drops to the floor of the apparatus. After leaving the eliminator the air passes on through the thoroughfare A to where it is to be used.

When the tubes are inclined as shown in Fig. 3 whatever moisture is deposited on them runs off more quickly and the tubes are kept freer of water than when not inclined to such a degree. And when tubes with inward turned lips such as shown in Fig. 10 are used the lips prevent moisture from being blown through the tubes and make it more certain that no moisture will be allowed to pass the eliminator.

By using cold water in the washer in warm weather, the air may be cooled so that it will be at a lower temperature when leaving the apparatus than when entering it and thus air supplied to a building for ventilating purposes may be made cooler than the air outside.

In the drawings, four sections of tubes are shown, but the number of sections and the number of tubes in a section may be varied to suit different conditions; and the thoroughfare for the air may be made of any suitable material, and its size and shape may be varied to suit each particular case. The tubes may be made of any material and their size and shape may be varied to suit different conditions. The thickness of the "wall" E of water for washing the air and the amount of water flowing out of the spray box *f* may be varied to suit the requirements of each particular case.

What I claim as new and desire to secure by Letters Patent for, is:

1. In combination in an air purifying apparatus, a thoroughfare for the passage of air, an air washer, and a water eliminator consisting of tubes provided with a lip at one end and arranged in sections, the sections being placed one back of the other in such a way that the tubes of one section are eccentric as regards the tubes of the section immediately in front, substantially as described.

2. In combination in an air purifying apparatus, a thoroughfare for the passage of air, an air washer, and a water eliminator consisting of cylindrical tubes provided with a lip at one end and arranged in sections, the sections being placed one back of the other in such a way that the tubes of one section are eccentric as regards the tubes of the section immediately in front, substantially as described.

3. In combination in an air purifying apparatus, a thoroughfare for the passage of the air, an air washer, and a water eliminator consisting of tubes provided with an inward turned lip at one end and arranged in sections, the sections being placed one back of the other in such a way that the tubes of one section are eccentric as regards the tubes of the section immediately in front, substantially as described.

4. In combination in an air purifying apparatus, a thoroughfare for the passage of air, an air washer, and a water eliminator consisting of cylindrical tubes provided with an inward turned lip at one end and arranged in sections, the sections being placed one back of the other in such a way that the tubes of one section are eccentric as regards the tubes of the section immediately in front, substantially as described.

5. In combination in an air purifying apparatus, a thoroughfare for the passage of air, an air washer, and a water eliminator consisting of cylindrical tubes provided with an inward turned lip at one end and inclined so that moisture will drain from them, said tubes being arranged in sections, and the sections being placed one back of the other in such a way that the tubes of one section are eccentric as regards the tubes of the section immediately in front, substantially as described.

6. In combination in an air purifying apparatus, a thoroughfare for the passage of air, means for forming a transverse wall of downward falling water in a sprayed or finely divided condition, and a water eliminator consisting of cylindrical tubes provided with an inward turned lip at one end and arranged in sections, the sections being placed one back of the other in such a way that the tubes of one section are eccentric as regards the tubes of the section immediately in front, substantially as described.

7. In combination in an air purifying apparatus, a thoroughfare for the passage of air, means for forming a transverse wall of downward falling water in a sprayed or finely divided condition, and a water eliminator consisting of cylindrical tubes provided with an inward turned lip at one end and inclined so that moisture will drain from them, said tubes being arranged in sections, and the sections being placed one back of the other in such a way that the tubes of one section are eccentric as regards the tubes of the section immediately in front, substantially as described.

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

JOHN H. KINEALY.

Witnesses:

GEO. W. PRESCOTT,

LILLIE MAURER.