

May 18, 1926.

1,585,358

G. A. ARKWRIGHT

APPARATUS FOR PURIFYING MINES, TUNNELS, AND SUBWAYS

Filed Sept. 24, 1924

2 Sheets-Sheet 1

Fig. 1.

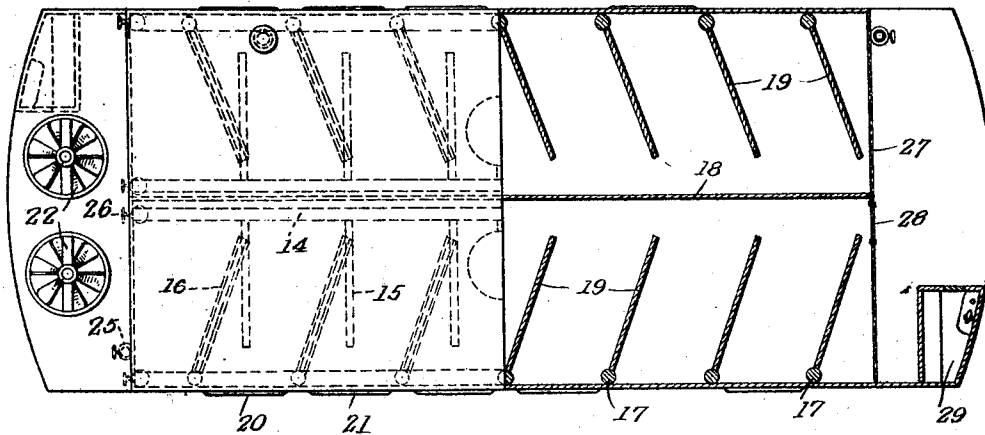
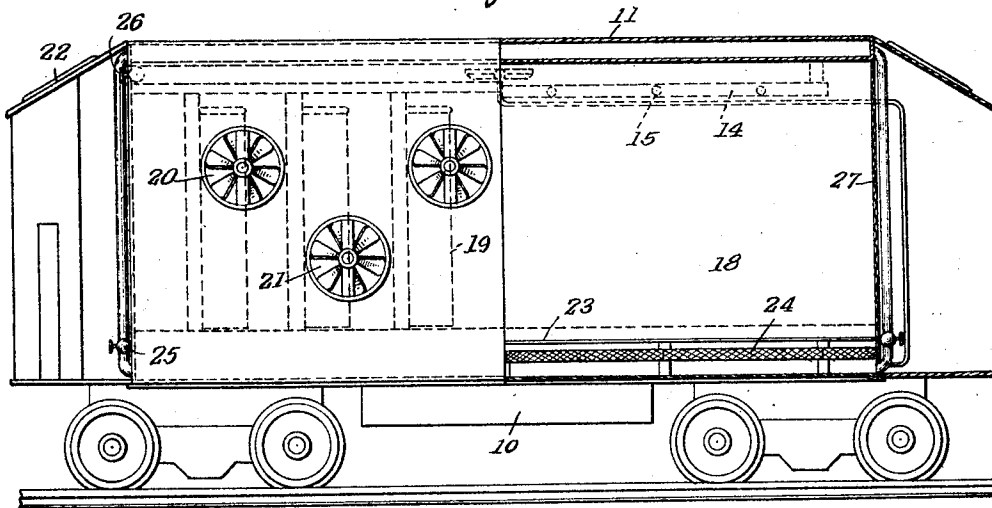


Fig. 2.



INVENTOR

George A. Arkwright

ATTORNEY

May 18, 1926.

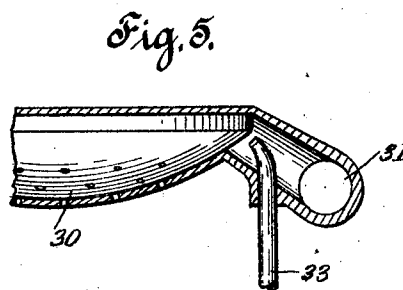
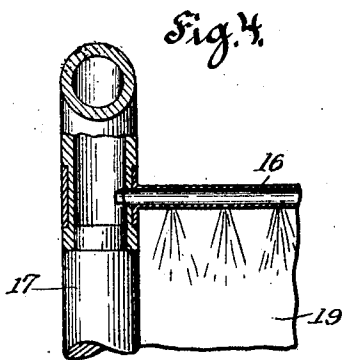
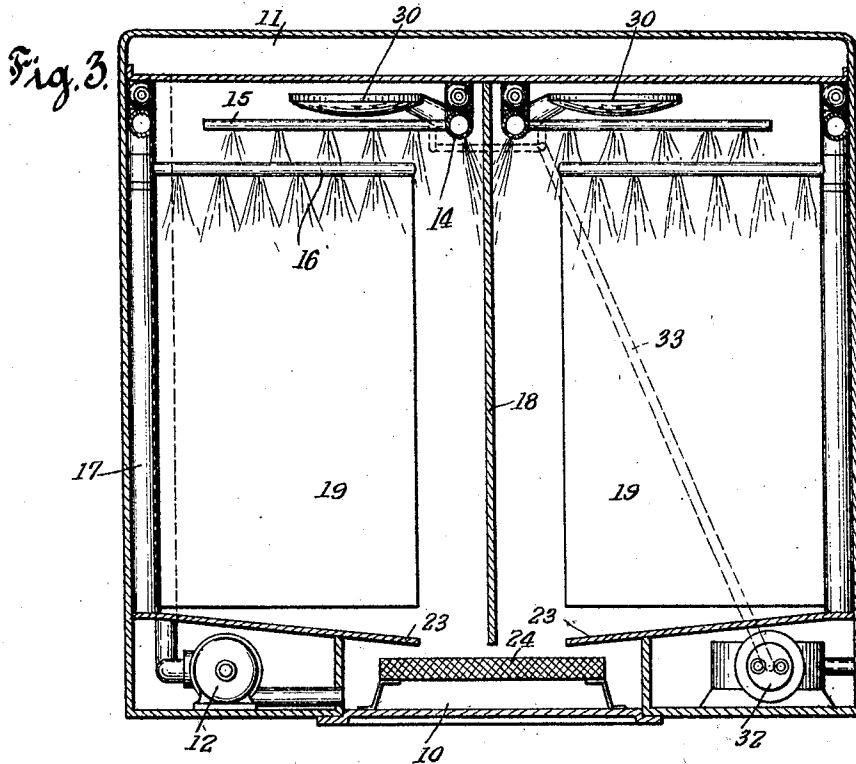
1,585,358

G. A. ARKWRIGHT

APPARATUS FOR PURIFYING MINES, TUNNELS, AND SUBWAYS

Filed Sept. 24, 1924

2 Sheets-Sheet 2



INVENTOR
George A. Arkwright
F. J. [Signature] - ATTORNEY

UNITED STATES PATENT OFFICE.

GEORGE A. ARKWRIGHT, OF BROOKLYN, NEW YORK.

APPARATUS FOR PURIFYING MINES, TUNNELS, AND SUBWAYS.

Application filed September 24, 1924. Serial No. 739,505.

It has been found that the air in subterranean passages such as subways, tunnels and mines carries a very large amount of solid matter in the form of dust which is stirred up and kept in circulation by movements within the subway etc. For convenience in nomenclature I will use the word subway as applied to any form of subterranean passage. In subways provided with railway trains and the like it has been found that the solid particles contain very high percentages of steel dust derived largely from the rails, from the wheels and from the brakes. Ordinary dust particles and dirt existing on the street level also find their way into the subway and are there stirred up with the dirt which is created and exists in the subway itself. The condition of the air thus created is not only very uncomfortable but injurious to health. The dirt also soils the clothing and persons of those who are in the subway both by direct contact and through contact with the walls of vehicles, seats, etc. There are also frequently present germs which are dangerous to health and odors which are unpleasant.

The main object of my invention is to provide means for removing from the air such solid particles or materially reducing the quantity.

Another object is to generally purify and clarify the air.

To carry out the invention I provide a car or an attachment for a car having means for treating the air in the subway so as to remove the solid particles, neutralize or remove odors and remove or render inert microbes.

Fig. 1 is a plan view and partial section of a car showing more or less diagrammatically one form of apparatus embodying the improvements of my invention.

Fig. 2 is a side view and partial longitudinal section of the same.

Fig. 3 is a transverse vertical sectional view of the same on a somewhat larger scale.

Figs. 4 and 5 are fragmentary sectional views of details of construction.

In the drawing I have shown the invention as applied to a special car, but it should be understood that the invention might be installed as a part or compartment of the car, the remainder of which could be used for other purposes. The body of the car is

preferably provided with two reservoirs 10 and 11 for liquid, one at the bottom and the other at the top. Reservoir 10 may be deeper in the center than at the ends of the car. A pump 12 with proper conduit connections is provided for lifting water from the lower reservoir to the upper one. From the upper reservoir the liquid is distributed through sprays throughout the car. These sprays may be arranged in a number of different ways. For instance, I may provide a longitudinal conduit 14 and outwardly extending conduits 15. I also may provide other conduits or distributors 16 connected to up-rights 17 which have passages connecting with the upper reservoir 11. Preferably I provide a central partition 18 and baffles or deflectors 19 which extend inwardly from the posts 17. The distributors 16 and baffle plates 19 are preferably mounted so that they may be swung backward or forward depending upon the direction of movement of the car. When I speak of a car of course it should be understood that the car may travel on tracks or an ordinary road way.

The car is provided with a number of inlet and outlet passages for the air and each of these passages may be provided with a fan for stimulating circulation. Such fans may be placed at the sides as shown at 20 and 21 in Fig. 2 and/or at the ends as shown at 22. These fans may be driven in any suitable manner so as to draw the air into the car and cause it to circulate therein against the baffles or partitions 18 and 19 which are being moistened or sprayed by the liquid from the distributors 14, 15 and 16.

The inside of the car is preferably provided with inclined floors or bottom plates 23 which are arranged to drain toward the filter 24 which will remove the solid particles. Such a filter 24 may be made in any suitable manner and adapted to be inserted or removed for the purpose of cleaning in any suitable manner such as is commonly employed in filter constructions. Valves such as 25 and 26 may be provided in suitable locations for the purpose of controlling the flow of the liquid.

I also prefer to provide screens such as 27 at opposite ends of the car for the removal of large foreign particles. A door 28 may be provided for convenience in passage through the car.

It will also be understood that a compart-

ment 29 may be provided for the motorman or driver at one or both ends.

In addition to the means for spraying the air and the partition and baffle plates
 5 I may provide a high pressure atomizer for the purpose of cooling the air by adiabatic expansion. Such spray heads are shown at 30 supplied with water through channels 31 and with compressed air from an air
 10 compressor 32 through pipe 33. Any suitable form of atomizer may be used however. It will be understood of course that it would not be desirable to use a cooling device except where the temperature war-
 15 ranted it. It should also be understood that thermostat control apparatus may be employed in such a construction for the purpose of regulating, starting and stopping such a cooling atomizer or other device.
 20 In the operation of the apparatus the purifying car is driven through the subway from time to time at such speed as practice would indicate to be desirable under the cir-
 25 cumstances. The air is drawn through the car, charged with moisture so as to precipitate the solid particles and then allow to escape from the car. The air is drawn into the car by the fans 22 and 20 and by the move-
 30 ment of the car through the subway. As the dirt-laden air strikes the water flowing down the walls of the deflectors, the dirt is arrested and is washed down into the filter and tank at the bottom. The air passes by the deflectors 19 and the partition 18 which
 35 prevents interference of the air on one side with that on the other. As the air reaches the rear end of the car it passes out through the openings corresponding to the inlet open-
 40 ings at the front end, the car being reversible. This may appear to be an indirect method of purification but it should serve to remove injurious particles and odors in a practical manner at no great expense. It
 45 should be understood of course that the liquid used would be water or a solution containing such purifying, de-odorizing or de-oxidizing agent as may be necessary.

Preferably the car is of approximately the same height and width as an ordinary
 50 subway car and the inlets and outlets are provided at various positions so as to be able to treat as much of the air as possible without depending upon other circulating devices.

55 I claim:

1. Air purifying apparatus for subways comprising a reversible car having screens at both ends for removing foreign particles from air passing through said car, fans for forcing air into said car and out of said car, and liquid spraying and deflecting means for removing other particles from the air and collecting them in the car as the car moves.

2. Subway cleaning apparatus compris- 65 ing a car adapted to be run through the subway and having a screened inlet at one end and an outlet at the other, baffling deflector plates in the car, a water reservoir beneath said plates, a tank above said plates, 70 distributing pipes leading from said tank to said deflector plates for causing water to flow over the surface of said plates, and a pump for raising water from said reservoir to said tank. 75

3. Air purifying apparatus for subways, etc., comprising a car having a central partition and lateral deflectors, means for flow- 80 ing water over said partition and deflectors, and means for drawing air into and out of said car past said partition and said de- flectors.

4. Air purifying apparatus for subways etc., comprising a reversible car having a series of swinging deflectors and means for 85 flowing water over said deflectors.

5. Air purifying apparatus for subways, etc. comprising a reversible car having a series of swinging deflectors and means for 90 flowing water over said deflectors and means for forcing air through said car over the surface of said deflectors from either end of the car toward the other end.

6. Air purifying apparatus for subways and the like comprising a car having swing- 95 ing deflectors on opposite sides, means for spraying water within said car against said deflectors and a central partition between said deflectors for directing the passage of air through said car on opposite sides of the 100 center of the car.

7. Air purifying apparatus for subways and the like comprising a car having swing- 105 ing deflectors on opposite sides, means for spraying water within said car against said deflectors, filtering means arranged along the bottom of said car between said deflector and a collecting reservoir below the fall- ing water.

GEORGE A. ARKWRIGHT.