



SCIENTIFIC VENTILATION IN PULLMANS

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*This certifies that a Diploma of Merit
has been awarded to
The Pullman Company
for an exhibit on the ventilation of sleeping cars*

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PULLMAN VENTILATION: A TESTIMONIAL

More GOOD Air, Less BAD Air—

Is provided, by scientific ventilation, to Pullman patrons than to indoors people almost anywhere else. Here are the average figures from a long series of tests and determinations:

PLACES	Parts of carbon dioxide in 10,000 parts of air	Cubic feet of fresh air per hour per person
Body of sleeping cars .	6.20	2,727
Berths	6.96	2,027
Stores	8.80	1,250
Elevated cars	13.90	674
Offices	13.91	670
Street cars.	15.10	541

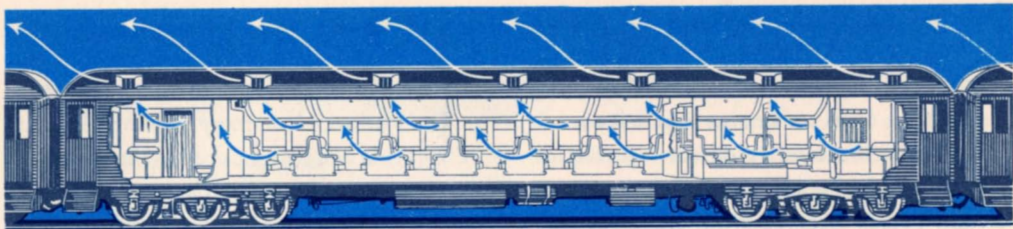
Scientific Ventilation in Pullmans

THE PULLMAN COMPANY has been from its beginnings a leader in scientific studies of car ventilation and in practical application of their results. Grand Prizes received from the American Museum of Safety for work in safety and sanitation give official recognition of this accomplishment. The Pullman Company's Director of Sanitation and Surgery, "In Acknowledgment of Long Services of Special Merit," was made an honorary life member of the Conference of State and Provin-

cial Health Authorities of North America.

The Pullman Company found by long investigation and costly experiments that early car ventilation had been utterly wrong, as indeed had ventilating methods generally. Even yet, the old and unscientific methods are all too common; but not in Pullmans, wherein ventilation is based on the same sound practice that is followed in the most modern schools, hotels, office buildings and homes.

The earliest ventilation—when there was



MOVEMENTS OF AIR CURRENT IN AND FROM A PULLMAN

any at all—was based on the idea of introducing fresh air intermittently, through large openings, in big doses; when it caused draughts or unduly low temperatures, the supply was simply shut off a while. Then, the air having become vitiated again, the

doors and windows were opened and the process repeated. It was bad, unscientific, dangerous; but it was the best known.

That rude procedure was particularly disastrous in rapidly moving cars. Currents that were moderate elsewhere, here became

boisterous. Both discomforts and dangers were increased. But what to do about it?

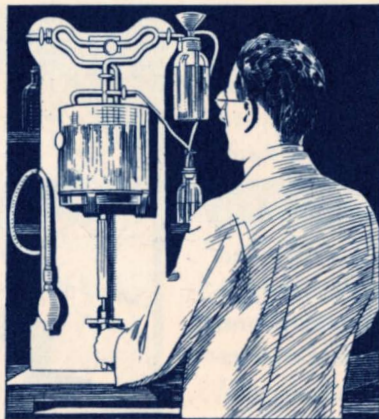
The Pullman sanitation authorities set out to find an answer. The air from all parts of cars, under all circumstances, was tested by analyzing samples. The results were compared with one another and with air from homes, schools, public places, shops, etc. Drafts in cars were traced, charted, measured. Thousands of analyses and measurements were made, studied, compared; and after exhaustive examination it was concluded that all the old practice had been exactly 100 per cent wrong—inverted, upside down. It was



TAKING SAMPLES OF AIR

decided that correct ventilating procedure was to pump the used air *out of the car*, and allow the fresh air to filter in through the crevices and small openings, to fill its place.

The mechanics are simple: an arrangement of intakes and ducts on top of the car. As the train speeds along, the intake gathers in the air, which rushes through the duct and out



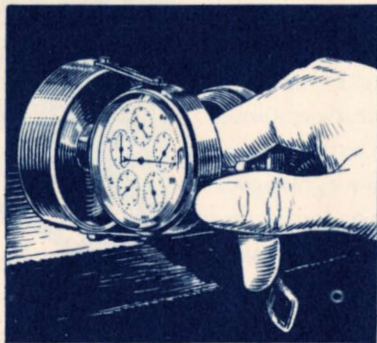
ANALYZING AIR SAMPLES
FROM A CAR

again. This is simply a stream of good, fresh, outside air. The exit through which it passes out of the duct is right alongside of another opening, from which another duct leads into the car. The rush of wind through the first duct simply sucks out through the second a stream of air from inside the car. There are fourteen of these exhausts on a standard Pull-

man and each one on a car moving forty miles per hour is geared to draw out 14,000 to 15,000 cubic feet of air per hour. That is equivalent to a complete change of air every four or five minutes.

With certain types of cars an electric fan is used to draw air out when the train is standing and the suction process is suspended. These electric fan exhausts are especially useful

in ventilating rooms and smoking compartments.

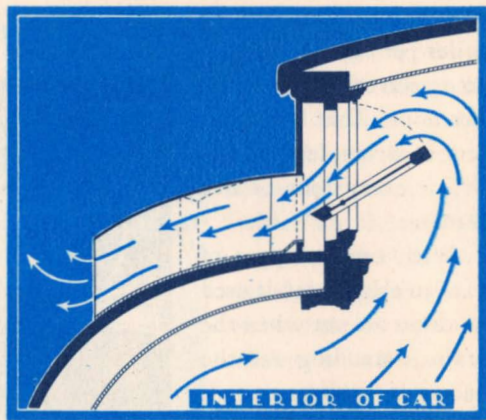


ANEMOMETER MEASURES AIR
CURRENTS

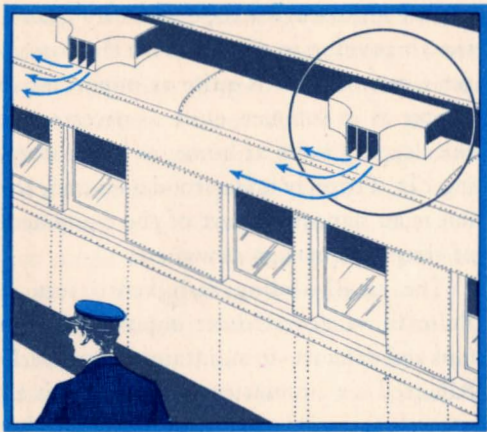
Ventilating and heating are intimately related. Place a man in a tight compartment and he will soon suffer from bad air. Now, introduce a tube through which he can breathe fresh air, and what happens? Quite surprisingly, he gets almost no relief; for the body discharges its waste heat through the skin and

if the air next to the skin is not changed constantly, but is allowed to get stale and hot, it can no longer perform its function. Moreover, as much body heat is carried away by evaporation, the surrounding air must be dry enough to induce evaporation. Good ventilation requires not only constant change of air, but also that the fresh air, however pure, must not be too moist or too warm.

The skin needs fresh air, constantly changing, even more than do the lungs; and that, whether one is sleeping in a berth, or in one's bed at home, or tramping around in the open. Everybody knows the discomfort of



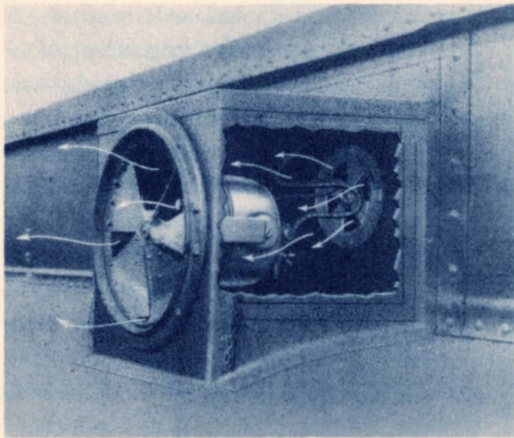
A CHART OF AIR MOVEMENTS



USED AIR STREAMS FROM VENTILATOR

wearing a tightly buttoned raincoat. It holds next to the skin a thin envelop of air which changes little, becomes warm, and cannot carry away the body heat. Similarly, the feeling of stuffiness after sleeping in a close room is less due to lack of fresh air for the lungs than to the need of constantly changing the air in contact with the skin. So it is, that the ounces of fluffy fabric in a woman's costume are more healthful than the pounds of clothing that, on a man, prevent continuous easy change of air next to the skin.

The electric fans in Pullman cars, keeping



ELECTRIC EXHAUST ON CAR ROOF

the air mildly agitated, constantly change the air envelop in contact with the passenger's person. This is quite as important in winter as in summer, quite as necessary in the sleeping room at home, as in the sleeping car. Properly understood and used, the fan is an important part of the equipment of sleeping quarters anywhere.

The small sliding sash ventilators in Pullman windows render important aid to fans and exhausts in maintaining a properly balanced air circulation; and balance is essential. It would seem that a fast moving railroad car should always have plenty of

fresh air. As a matter of fact it is perfectly easy to have not only enough but *too much* air circulation, if you are not finicky about the quality of your air. But to get just *enough*, of proper quality and temperature, is a problem that presents more difficulties, perhaps, in a Pullman, than in any other structure save a submarine. The American *penchant* for good air and plenty of it adds to the difficulties of the car builder in this country, because as everybody knows who has traveled much abroad, Americans are the foremost consumers of fresh air. A Pullman may be operating at one end of its run

under a semi-tropic sun; two or three days later it may be making its way through the rigors of a near-arctic winter. No difference; the passenger wants plenty of air, sweet and fresh, at his own preferred temperature. One is cold at 70 degrees, another swelters above 68; but both must be satisfied. In order that they may be satisfied, the heating and ventilating systems are most carefully coordinated; scientific apparatus and multiple controls enable the individual passenger to indulge his own preference; and the result is a triumph in practical sanitation.

PULLMAN TICKETS *are on sale at 4,200 railroad ticket offices in the United States.*

It is advisable to secure your Pullman accommodations at the earliest moment.

All ticket agents and Pullman employes will help you in arranging this detail of your journey.

THIS IS ONE OF A SERIES OF TWELVE BOOKLETS,
THE TITLES BEING AS FOLLOWS:

1. Service You Get With Your Pullman Ticket
2. The Evolution of the Pullman Car
3. The World's Greatest Housekeeper
4. Building a Pullman Car
5. Safety First, Last and All the Time
6. Scientific Ventilation in a Pullman
7. How a Pullman Car Is Lighted
8. Hidden Mechanisms of a Pullman Car
9. The Pullman Bureau of Tests
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