July 9, 1968 G. WILHELMSSON 3,391,630

SPRAY PAINTING TUNNEL

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FIG. 1.

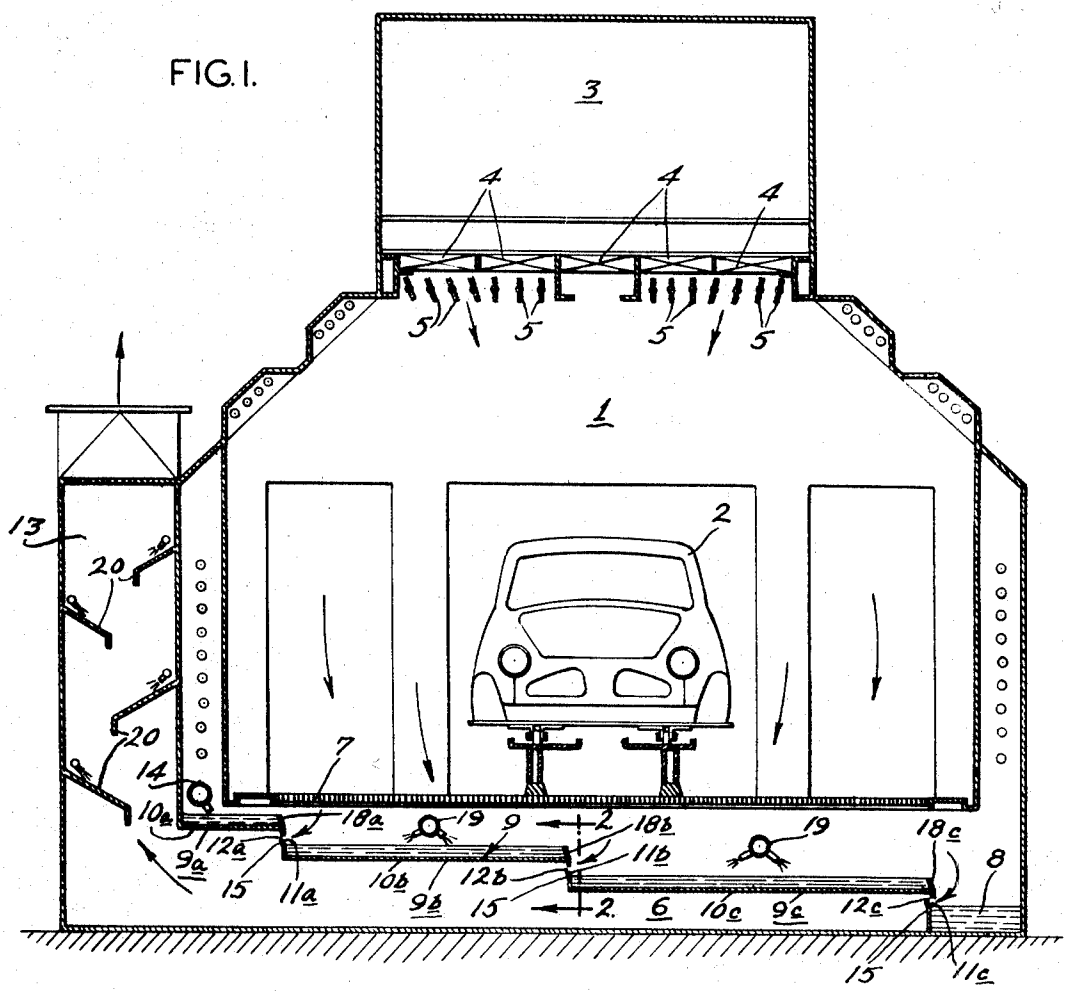
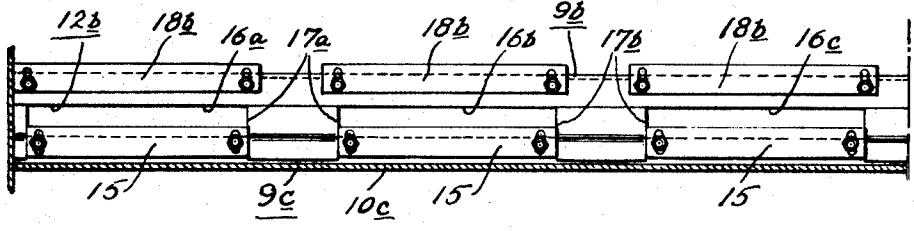


FIG. 2.



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SPRAY PAINTING TUNNEL

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ABSTRACT OF THE DISCLOSURE

A spray-painting tunnel having ventilating air injected along the roof and withdrawn at the floor, and having an intermediate bottom in the form of a sequence of steps with a like sequence of longitudinal air outlet slots in the vertical portions of the steps. The slots are individually adjustable to provide proper transverse distribution of exhausted air and each slot is also adjustable along its length to provide the desired longitudinal distribution of exhausted air.

The present invention relates to a tunnel for spray-painting intermittently or continuously advanced objects, which tunnel is ventilated by air supplied, for example, at the tunnel roof and removed by suction at the tunnel floor. The air is conducted away to a drop separator in the form of a chamber provided below the tunnel and having the same width as the tunnel and a vertical ventilation air outlet shaft located on at least one side of the tunnel. The tunnel is also equipped with means for the supply of washing liquid for entrainment in ventilating air.

The invention has as its object to improve conventional arrangements of spray-painting installations, particularly with respect to a more uniform air flow through the tunnel, and to eliminate "lee-turbulence" close to the side walls in the tunnel.

Another object of the invention is to render possible a simplification with respect to the supply of washing liquid and, finally, to eliminate the inconvenience of paint deposits, when the washing liquid pumps are switched off.

The spray-painting installation according to the invention is substantially characterized by an intermediate bottom between the tunnel and the underlying chamber, which bottom comprises a number of step elements arranged in sequence, the horizontal portions of said step elements providing a liquid plane by flushing with washing liquid or as a shallow basin of washing liquid, and the vertical portions being provided with longitudinal slots to form a sequence of longitudinally elongated outlet openings for conducting away the ventilation air to said drop separator. Means for supplying washing liquid is mounted to cooperate with at least the uppermost step element, and the outlet slots are provided with means for adjusting their width to such a value that the out-flowing ventilation air is imparted a speed, which is sufficient to entrain by ejector effect the supplied washing liquid into the air stream and to atomize said liquid therein.

The sequence of step elements may be arranged either to form a bottom declining from one side of the tunnel to the opposite side, or to form a bottom declining from both sides towards the center. In the preferred embodiment, the outlet opening in each step element is divided into a series of individually adjustable slots separate from one another. Due to the fact that the floor is formed by a number of step elements, the supply of washing liquid can be substantially simplified compared with conventional arrangements, in such a manner, that normally water must be supplied only onto the uppermost step element, from which it flows by gravity to the remaining elements. Since in this case the ventilation air is conducted away through a number of step elements, it is possible to discharge the air stream according to the demand across the transverse direction of the tunnel. The feature of dividing the outlet opening in each element into longitudinal series of individually adjustable slots separated from one another in addition creates the possibility of adjusting the amount of sucked-off ventilation air to the spraying intensity which may vary in the longitudinal direction of the tunnel. In this way, the total amount of ventilation air sucked off can be reduced without impairing the effective sucking capacity of the points of greater demand.

The invention will now be described in the following in a greater detail, with reference to the accompanying drawing, wherein:

FIG. 1 shows a cross-section through a spray-painting tunnel installation according to the invention; and

FIG. 2 showing the outlet openings is a section taken along the line 2—2 of FIG. 1.

Referring to the drawing, FIG. 1 designates a closed channel or tunnel, through which the objects **2** to be spray-painted are advanced. Heated ventilation air is supplied from means (not shown) through a duct **3** and is uniformly distributed across the entire horizontal cross-section of the tunnel by filters **4** and air guides **5** inserted in the roof. A chamber **6** provided below the tunnel communicates with the tunnel through a grating **7** having an extent which substantially corresponds to the total tunnel width. The chamber **6** is equipped with a liquid basin **8** below said grating.

According to the invention an intermediate bottom **9** is arranged between the tunnel and said chamber, which bottom comprises a number of step elements **9***a*, **9***b*, **9***c* arranged in sequence. The horizontal portions of the step elements **10***a*, **10***b*, **10***c* provide a liquid plane by being flushed with washing liquid or as a shallow liquid basin. The vertical portions of the step elements **11***a*, **11***b*, **11***c* are provided with longitudinal slots **12***a*, **12***b*, **12***c* to form a sequence of outlet openings for conducting away the ventilation air to a drop separator. The drop separator comprises the aforesaid chamber **6** and an outlet shaft **13** located on at least one side of the tunnel **1**. A washing liquid supply means **14** is mounted to cooperate with the uppermost element **9***a*. Means **15** is provided for adjusting the width of the outlet openings to such a value that the outflowing ventilation air is imparted a speed, which is sufficient to entrain by ejector effect the supplied washing liquid into the air stream and to atomize the liquid in said stream. In the illustrated embodiment, the elements are arranged to form a bottom declining from one side of the tunnel to the opposite side. The step elements, however, may also be arranged to form a bottom declining from both sides to the center.

The sequence of outlet openings **12***a*, **12***b*, **12***c* is distributed across the transverse dimension of the tunnel, and the openings are adjustable to provide the desired flow characteristics both transversely and longitudinally of the tunnel. As appears more clearly from FIG. 2, the outlet opening **12***b* in the element **9***b* is divided into a series of individually adjustable slots **16***a*, **16***b* and **16***c* disposed along the length of the tunnel and respectively separated from one another. In the spaces **17***a* and **17***b* between said slots, the washing liquid can flow down unimpeded to the element next below. For adjusting the water distribution in the longitudinal direction of the channel according to desire, adjustable overflow plates **18***a*, **18***b* and **18***c* are mounted above the slots. Due to this design, thus, it is possible to direct a greater amount of washing liquid to the points, where the spraying intensity is the highest. In certain cases

it may be desirable to provide the spray-painting installation with separate liquid supply means for every step element, as indicated at **19** in the drawing. The outlet openings in the sequence, as can be seen in the drawing, have been placed at such points in relation to the channel side walls and its center respectively, that a uniform distribution of the ventilation air across the cross-section of the tunnel and an ideal flow pattern is obtained.

The mixture of ventilation air, washing liquid and paint particles passing through the outlet openings is conducted away from the chamber **6** through the vertical shaft **13** to the atmosphere. The vertical outlet shaft is provided in known manner with oblique deflection plates **20** in order to bring about an effective separation of entrained liquid and paint particles. The deflection plates may be designed in known manner to be subjected to watering. Where appropriate, and particularly in the embodiment in which the elements are arranged to form a bottom declining from both sides to the center, it may be suitable to provide the spray-painting installation with vertical outlet shafts mounted on both sides.

I claim:

1. In a tunnel for spray-painting intermittently or continuously advanced objects, ventilated by air supplied at the roof and discharged at the floor, having means for supplying washing liquid, and a drop separator comprising a chamber underlying the tunnel and of the same width as the tunnel and a vertical ventilation air outlet shaft located on at least one side of the tunnel for conducting away the discharged ventilating air; an intermediate bottom between the tunnel and said chamber, which bottom comprises a number of step elements arranged in sequence across the width of the tunnel, the horizontal portions of said step elements providing a plane of washing liquid and the vertical step portions forming a sequence of longitudinal slots distributed across the transverse direction of the tunnel to form outlet openings for conducting away the ventilation air to said drop separator, and said means for supplying washing liquid supply being mounted to cooperate with at least the uppermost element, said outlet slots being provided with means for adjusting their width to such a value, that the outflowing ventilation air is imparted a speed, which is sufficient to entrain by ejector effect the supplied washing liquid into the air stream and to atomize said liquid therein.

2. A tunnel according to claim **1** wherein the sequence of the step elements are arranged to form said intermediate bottom declining from one side of the tunnel to the opposite side.

3. A tunnel according to claim **1**, wherein the outlet openings in said sequence are longitudinally divided into a series of individually adjustable slots separated from each other to control the distribution of air flow longitudinally of said tunnel.

4. A tunnel according to claim **1** wherein said outlet openings of said series are separately adjustable to control the distribution of air flow transversely of said tunnel.

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