Nov. 12, 1968 T. E. GREENWOOD ETAL 3,409,995

VEHICLE DRYING APPARATUS

Filed Sept. 16, 1966 4 Sheets-Sheet 1

Fig. 1.

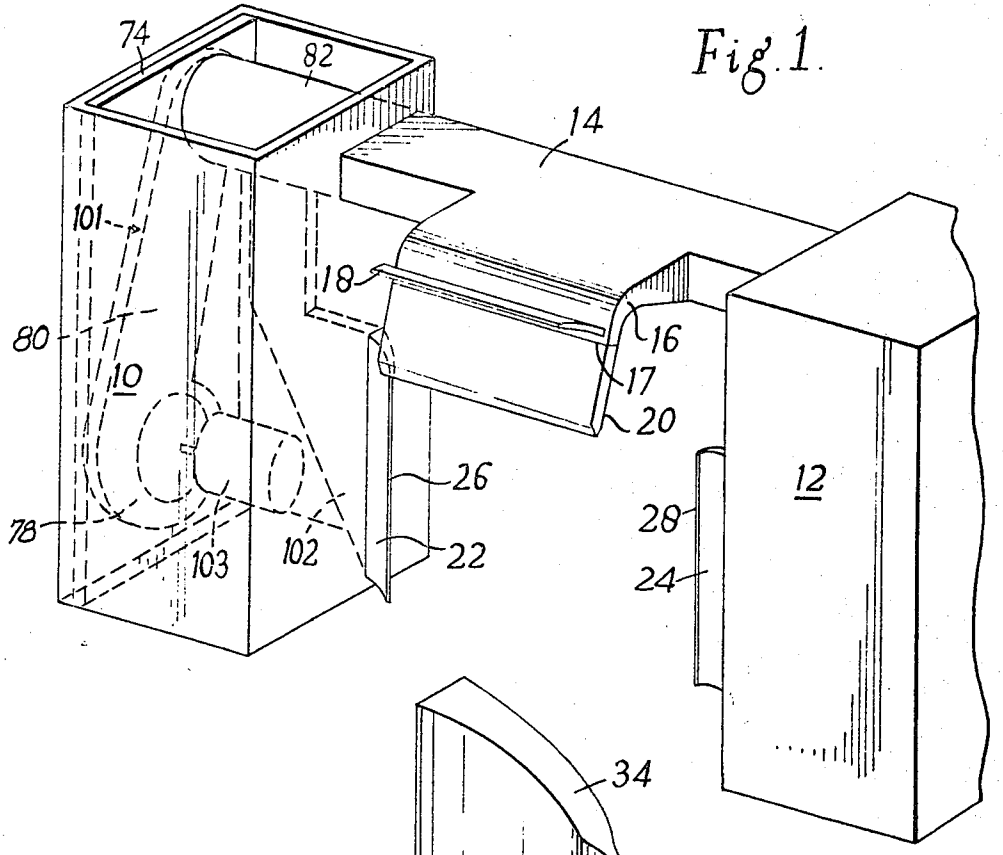
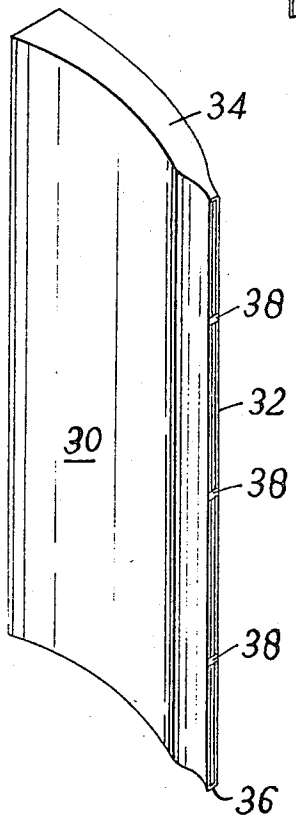


Fig. 3.



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VEHICLE DRYING APPARATUS

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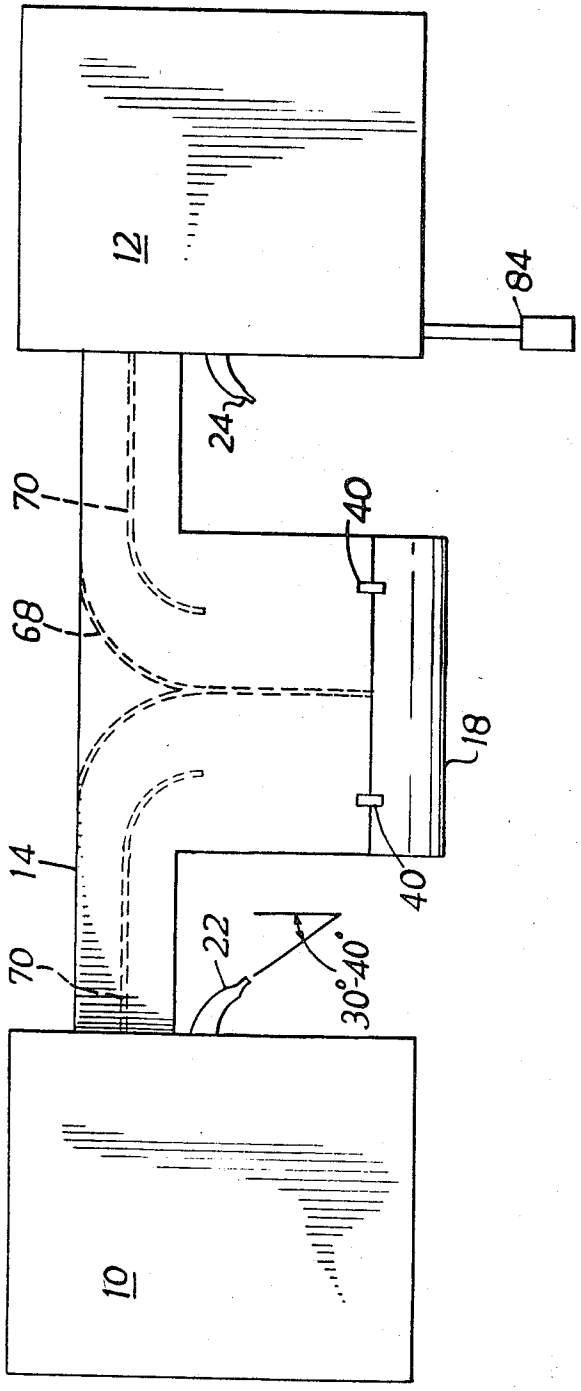
Fig. 2.



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VEHICLE DRYING APPARATUS

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Fig. 4.

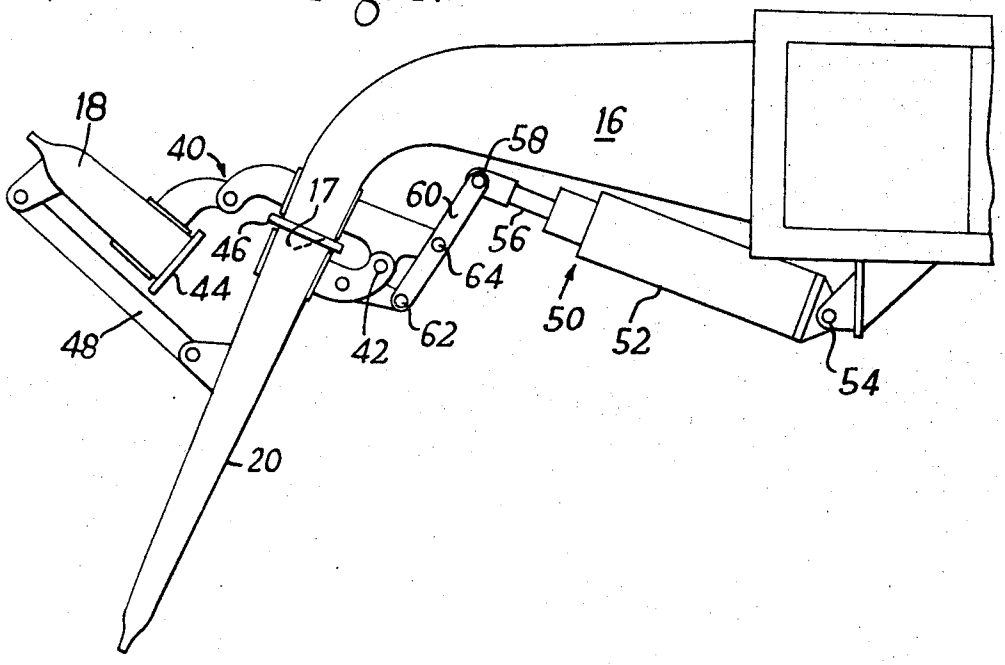
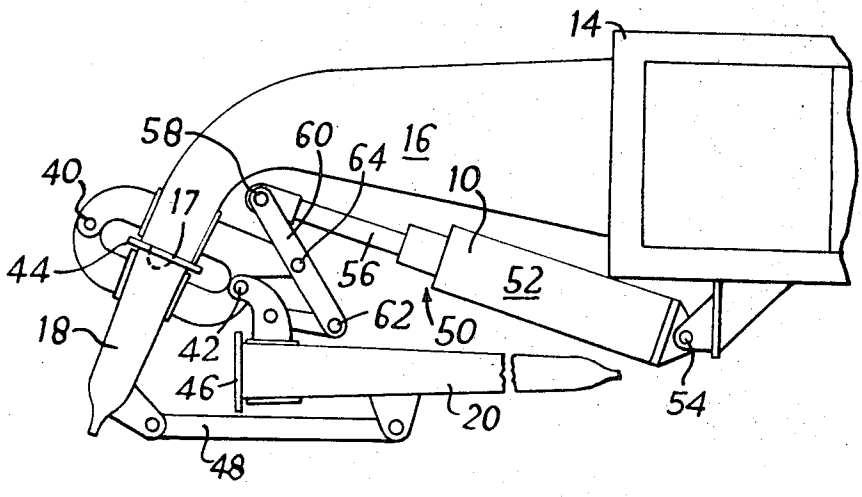


Fig. 5.



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VEHICLE DRYING APPARATUS

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Fig. 6.

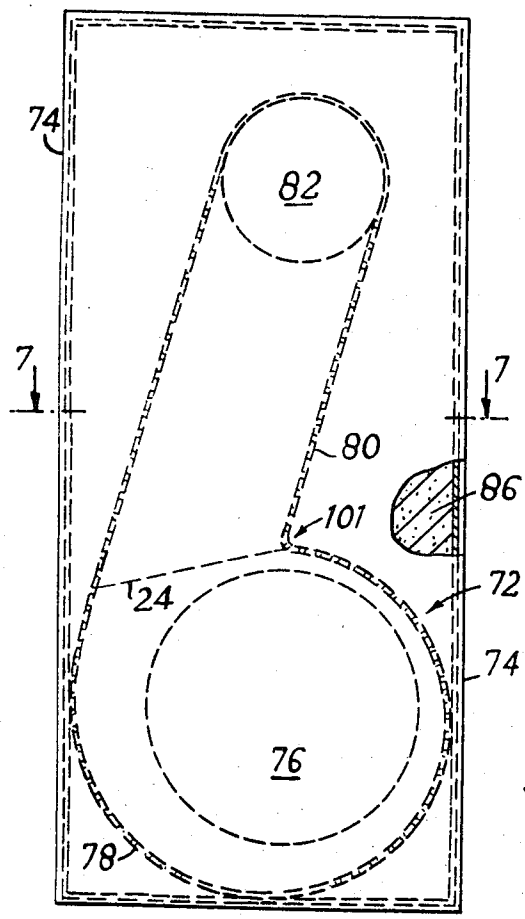


Fig. 8.

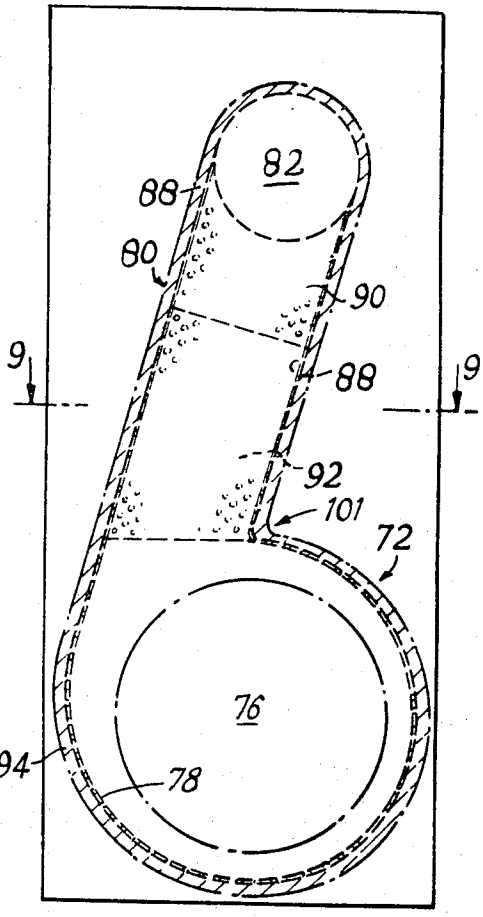


Fig. 7.

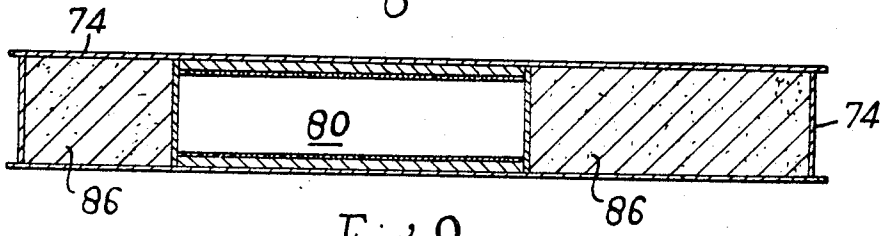
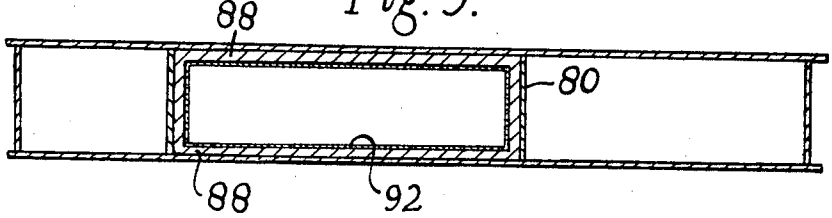


Fig. 9.



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3,409,995

VEHICLE DRYING APPARATUS

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11 Claims. (Cl. 34—87)

ABSTRACT OF THE DISCLOSURE

An apparatus for drying vehicles, including a pair of upright side nozzles having vertically elongated outlets directing their vertical streams of air in a horizontal direction and obliquely of a line of vehicle travel passing between the nozzles, a tubular nozzle base above the side nozzles including an elongated outlet extending transversely across said travel line, a first tubular top nozzle and a second tubular top nozzle, each top nozzle having an inlet adapted for selected detachable engagement with the outlet of said nozzle base in a substantially airtight connection and an elongated outlet transversely of said travel line, both of said top nozzles being pivotally movable into and out of a position wherein the nozzle inlet is cooperatively engaged with the outlet of the nozzle base, and the outlet is directed obliquely downward in the same sense as the side nozzles, and means for delivering air to the side nozzles and the nozzle base for discharge through a selected cooperating one of said top nozzles.

The present invention relates to driers, more particularly driers such as are used for removing water from a vehicle which has just been washed.

Conventional driers used for this purpose comprise two towers each of which contains a blowing mechanism, such as a centrifugal fan, for delivering a high velocity stream of air through ducting to nozzles by which the air is directed on to a wet vehicle to remove the water. Each of the towers is provided with a vertical, elongated side nozzle, and between the towers extends a hollow bridge to which is attached an elongated top nozzle which extends transversely between the towers and is directed obliquely downwards. The vertical side nozzles are each directed inwardly towards the other side nozzle and obliquely in the same sense as the top nozzle. Each tower also contains ducting which leads from the blower to a plenum chamber and thence to the corresponding side nozzle and to the top nozzle via the bridge.

A vehicle is dried by being passed beneath the top nozzle and between the side nozzles while high velocity air is directed on to it from the nozzles. In order to accommodate vehicles of different heights, the top nozzle is hingedly attached to the bridge so as to be retractable, and when retracted a gap is usually formed between the nozzle and the bridge, from which air can escape at low velocity, causing overloading of the blower driving motor. This escaping air is therefore not used efficiently for drying the vehicle. In addition, the nozzles have not hitherto been constructed in a manner which makes efficient use of the air, for removing water from the vehicle.

A further disadvantage of known driers of this kind is that the blower mechanism produces high frequency sound waves which constitute a noise which can be detrimental to the health of people in the vicinity of the drier.

It is an object of the present invention to provide a drier which embodies improvements which overcome, or at least, mitigate the disadvantages of known driers.

It is a further object of the invention to provide a vehicle drying apparatus of the type referred to in which there is provided an improved arrangement of the nozzles whereby more efficient use is made of air delivered by the blowers.

It is yet another object of the invention to provide a vehicle drying apparatus in which noise generated by the blowers is reduced or absorbed.

According to the present invention there is provided apparatus for drying vehicles, comprising a pair of side nozzles having vertically elongated outlet slots for directing streams of air in a horizontal direction, the side nozzles being directed obliquely towards a line passing between them, a tubular nozzle base disposed above the side nozzles and having an elongated outlet extending transversely across the line passing between the side nozzles, a first tubular top nozzle, a second tubular top nozzle shorter than the first top nozzle, each of the top nozzles having an inlet adapted to engage the outlet of the nozzle base in substantially airtight manner and a transversely elongated outlet slot, each top nozzle being mounted for pivotal movement into and out of a position in which its inlet co-operatively engages the outlet of the nozzle base and in which it is directed obliquely downwards in the same sense as the side nozzles, and means for delivering air to the side nozzles and to the nozzle base for discharge through a co-operating one of the top nozzles.

A preferred form of the invention will now be described with reference to the accompanying diagrammatic drawings, in which:

FIGURE 1 is a general undetailed view of a drying unit showing the disposition of the towers and nozzles;

FIGURE 2 is a plan view of the drying unit of FIGURE 1 showing the relationships of the side nozzles to the line of travel of a vehicle to be dried, and the internal configuration of the bridge;

FIGURE 3 is a perspective view of a side nozzle;

FIGURE 4 is a side elevation of part of the unit of FIGURE 1 showing the arrangement for operating the top nozzles in accordance with the invention;

FIGURE 5 is a similar view to FIGURE 4 showing the nozzles in another of their positions;

FIGURE 6 is an elevation of one form of blower;

FIGURE 7 is a sectional view on the line **7—7** of FIGURE 6;

FIGURE 8 is an elevation of an alternative construction of a blower and,

FIGURE 9 is a sectional view on the line **9—9** of FIGURE 8.

Referring particularly to FIGURES 1 to 3, a drier comprises two towers **10, 12** in each of which is housed a blower mechanism **101** for delivering a large volume of air at high pressure. A hollow bridge **14** extends between the upper parts of the two towers and has an obliquely and downwardly directed tubular nozzle base **16** to which is pivotally attached a pair of top nozzles **18, 20.** The nozzle base **16** has an elongated air outlet **17** which extends transversely between the towers and is connected through the bridge to the blowers **101.** The top nozzles are of elongated flattened shape and are pivotally attached to the nozzle base so that either one of the nozzles can be moved into a position in which it registers with the air outlet so that air which is conducted from the blowers through the bridge and nozzle base passes through the air outlet and through the nozzle, which it leaves in the form of an obliquely downwardly directed high velocity jet which is elongated in a transverse direction between the towers.

The top nozzle **20** is longer than the top nozzle **18** in the direction of air flow and, by appropriately positioning the top nozzles in relation to the nozzle base, the stream of air can be directed through either the long nozzle **20** or the short nozzle **18,** the long nozzle being used when a

low-topped vehicle is being dried and the short nozzle being used when the vehicle to be dried is of too great a height to pass beneath the long nozzle when this is in registration with the nozzle base.

Each of the towers **10, 12** is provided with a vertically disposed, elongated side nozzle **22, 24** respectively, which is directed inwardly towards the opposite tower and obliquely in the same general direction as the top nozzle which is in the position of use.

The side nozzles **22, 24** are of generally flattened shape, tapering towards their free, inner ends, at which they each terminate in a narrow vertically extending, elongated slot **26, 28** respectively. Each side nozzle is formed of a pair of plates **30, 32** which are held in spaced relation and are inclined together towards the slot. Upper and lower walls **34, 36** respectively, extend between the two plates of each nozzle to form a flattened tubular nozzle. Spacers **38** are provided between the two plates **30, 32** along the length of the slot, to hold the plates in fixed spaced relation so that the pressure of air passing through the nozzle does not force the plates apart. The construction of the top nozzles is generally similar to that of the side nozzles.

Ducting **82, 102** is provided within the towers for conducting air from the blowers to the wide nozzles and to the bridge **14**, whence the air is conducted through the nozzle base **16** to one of the top nozzles which is in registration with the nozzle base air outlet **17**. The air leaves the nozzles at their restricted ends in the form of high velocity jets. The arrangement of the present invention whereby the top nozzles are rendered movable in order that one or the other may be brought into registration with the nozzle base will now be described with reference to FIGURES 4 and 5.

The elongated transverse air outlet **17** of the nozzle base **16** is directed in an obliquely downward direction and above it is a pair of pivots **40** for the short nozzle and below it is a pair of pivots **42** for the long nozzle, the pivots of each pair being spaced along the nozzle base. The short nozzle is attached near its broad upper end **44** to the upper pair of pivots **40**, and the long nozzle is attached near its broad upper end **46** to the lower pair of pivots **42**. The upper and lower pairs of pivots constitute transverse pivotal axes for each of the top nozzles. The long nozzle moves about its pivotal axis between a position in which its broad upper end is in communication with the air outlet of the nozzle base, as shown in FIGURE 4, and a position in which it is disposed away from the air outlet and beneath the nozzle base, as shown in FIGURE 5. In a similar manner the short nozzle is movable about its pivotal axis between a position in which its broad upper end is in communication with the air outlet of the nozzle base (FIG. 5) and a raised position in which it is disposed away from the air outlet (FIGURE 4).

The long and short nozzles are interconnected by means of a pair of connecting bars **48**. Each connecting bar is pivotally connected at one end to the long nozzle, at a position spaced from its broad upper end **46**, and at the other end to the short nozzle, at a position spaced from the broad upper end **44** thereof. The arrangement is such that, when one of the top nozzles is moved about its pivotal axis, out of engagement with the air outlet of the nozzle base, the other nozzle is automatically moved about its pivotal axis into registration with the air outlet **17**.

Movement of the top nozzles is controlled by means of a pair of pneumatic jacks **50**, or the like, each having a cylinder **52**, which is pivotally connected to the bridge by a hinge **54**, and a piston of which the piston rod **56** is pivotally connected at **58** to one end of one of a pair of levers **60**. The other end **62** of each lever **60** is pivotally connected to the long nozzle, and the levers **60** themselves are pivoted about fixed points **64**, intermediate their ends. Movement of the piston rods **56** causes the levers **60** to pivot about the fixed points **64** so that movement of the long nozzle into or out of engagement with the nozzle base is produced and simultaneously the short nozzle is moved correspondingly out of or into engagement with the nozzle base.

The top nozzles and nozzle base are arranged so that the top nozzle in use directs a transversely extending flattened jet of air downwardly at an angle of about 60 to 70 degrees to the horizontal. The side nozzles **22, 24** are arranged at fixed angles to the towers so as to direct vertically elongated and flattened jets of air inwardly, which may be done, for example, at angles of about 30 to 40 degrees to a line extending between the towers and along which a vehicle to be dried is to pass. The air jets from the side nozzles can therefore be made to impinge on the sides of a vehicle being dried at the optimum angle for removal of water.

The tips of all the nozzles adjacent to the outlet slots are of streamlined shape, so as to direct streams of air in such a manner that the streams do not rapidly disperse; the widths of the outlet slots are such as to permit a volume of air to pass which is in accordance with the optimum rate of air delivery of the blowers.

Within the bridge and nozzle base, deflectors **68** and baffles **70** (FIGURE 2) are provided which serve to distribute the air-flow evenly across the width of the top nozzles.

Referring now to FIGURES 1 and 6, the blower in each tower comprises a centrifugal air pump **72** adapted to be driven by, for example, an electric motor **103** in FIGURE 1 and it is housed in an airtight casing **74** within the tower. The pump has an impeller **76** (FIGURE 6) mounted for rotation in an impeller chamber **78**. A passage **80** leads from each impeller chamber to the duct or plenum chamber **82** which has one or more outlets controlled by valves (not shown) leading to the side nozzle of the associated tower and to the bridge, whereby air is conducted from the blowers to the side and top nozzles.

The air pump may be operated continuously to feed air into the plenum chambers **82** in which the air is stored under pressure until required for drying. The valves controlling the outlets of the plenum chambers are opened by operation of a trip switch **84** (FIGURE 2). This trip switch is so positioned that, as a vehicle to be dried approaches the drier, it operates the switch to open the valves, thus permitting air to flow from the plenum chamber to the nozzles, from which it emerges as high velocity jets which are directed on to the vehicle as it passes between the towers.

In order to overcome the nuisance of noise caused by high frequency vibration generated by rotation of the impellers, sound insulating material, such as glass fibres, is employed to absorb the sound waves. The walls of the passage **80** leading from the impeller chambers **72** are constructed of perforated metallic sheet. The space within the casing **74** surrounding the passage **80** and the impeller chamber **78** of each blower is filled with sound absorbing material **86**. The walls of the casing are airtight so as to prevent loss of air from the passage.

In an alternative arrangement, as shown in FIGURES 8 and 9, the passage **80** may be lined with sound absorbing material **88** which in this case is retained in position by liners **90, 92** constructed of perforated metallic sheet, which line the bore of the passage **80** and sound absorbing material **94** is also fitted around the exterior of the impeller chamber and retained in position by means of perforated metallic strip. The liners and retaining strip may be welded to the inside of the casing in order to retain them in position.

We claim:

1. Apparatus for drying vehicles, comprising a pair of side nozzles having vertically elongated outlet slots for directing streams of air in a horizontal direction, the side nozzles being directed obliquely towards a line passing between them, a tubular nozzle base disposed above the side nozzles and having an elongated outlet extending

transversely across the line passing between the side nozzles, a first tubular top nozzle a second tubular top nozzle shorter than the first top nozzle, each of the top nozzles having an inlet adapted to engage the outlet of the nozzle base in substantially airtight manner and a transversely elongated outlet slot, each top nozzle being mounted for pivoted movement into and out of a position in which its inlet co-operatively engages the outlet of the nozzle base and in which it is directed obliquely downwards in the same sense as the side nozzles, and means for delivering air to the side nozzles and to the nozzle base for discharge through a co-operating one of the top nozzles.

2. Apparatus according to claim 1, wherein the top nozzles are pivotally attached to the nozzle base.

3. Apparatus according to claim 1 wherein the top nozzles are pivotally connected to each other, whereby movement of one of the top nozzles out of engagement with the outlet of the nozzle base produces movement of the other top nozzle into engagement with the outlet of the nozzle base.

4. Apparatus according to claim 1, including actuating means for moving each of the top nozzles into and out of co-operative engagement with the nozzle base.

5. Apparatus according to claim 4, wherein the actuating means comprises a pneumatic jack.

6. Apparatus according to claim 1, including a pair of spaced towers which support the nozzle base between them and each of which supports one of the side nozzles.

7. Apparatus according to claim 6, wherein the means for delivering air to the nozzles is housed in the towers.

8. Apparatus according to claim 1, wherein the means for delivering air to the nozzles comprises a pair of centrifugal pumps and passages, said passages leading from the pumps to the nozzles.

9. Apparatus according to claim 8 including an airtight casing for each pump, and sound absorbing material enclosing the pump and passage within each casing.

10. Apparatus for drying vehicles, comprising a pair of spaced supporting towers, a side nozzle supported by each

tower and having a vertically elongated outlet slot for directing a vertically elongated stream of air in a horizontal direction and obliquely towards a line passing between the towers, a tubular nozzle base supported between the towers and above the side nozzles, the nozzle base having an elongated outlet extending transversely across the line passing between the towers, a first tubular top nozzle, a second tubular top nozzle shorter than the first top nozzle, each top nozzle having a transversely elongated outlet slot and an inlet which is adapted to engage the outlet of the nozzle base in substantially airtight manner, means supporting each top nozzle for pivotal movement into and out of a position in which the nozzle inlet co-operatively engages the outlet of the nozzle base and in which the top nozzle is directed obliquely downwards and in the same sense as the side nozzles, means pivotally connecting the top nozzles together whereby movement of one of the top nozzles out of engagement with the outlet of the nozzle base produces movement of the other top nozzle into engagement with the outlet of the nozzle base, actuating means for moving each of the top nozzles into and out of cooperative engagement with the nozzle base, air passages for conducting air to the side nozzles and to the nozzle base and at least one pump for delivering air through the air passages.

11. Apparatus as claimed in claim 10, including an airtight casing for the said pump and the said passages, and sound absorbing material in the said casing.

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