

June 23, 1931.

W. BARSTOW ET AL

1,811,529

PORTABLE APPARATUS FOR CONDITIONING PERISHABLE PRODUCTS

Filed June 13, 1928

3 Sheets-Sheet 1

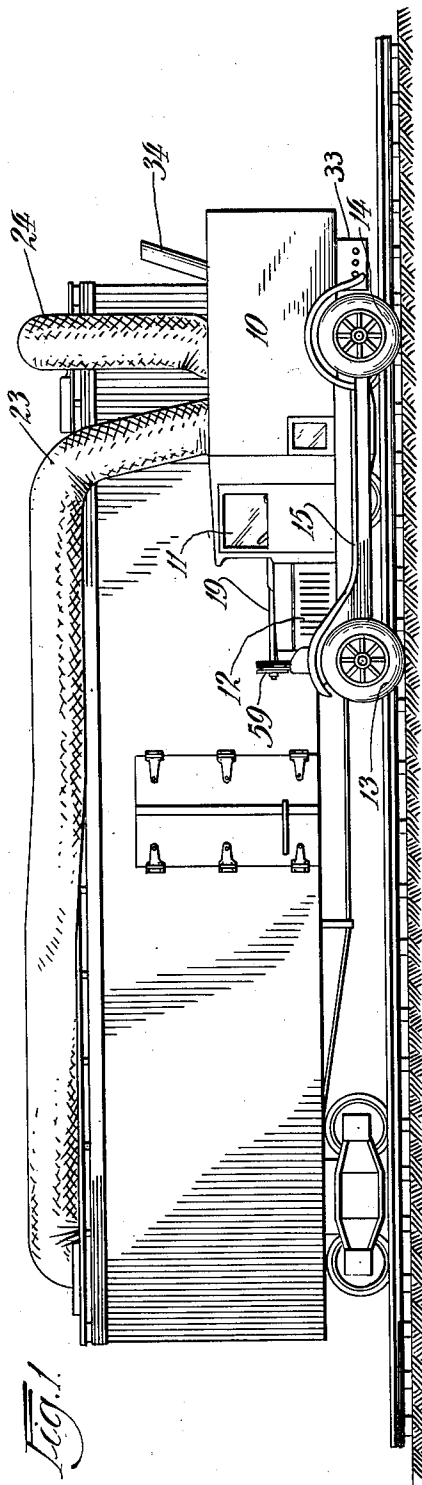


Fig. 1.

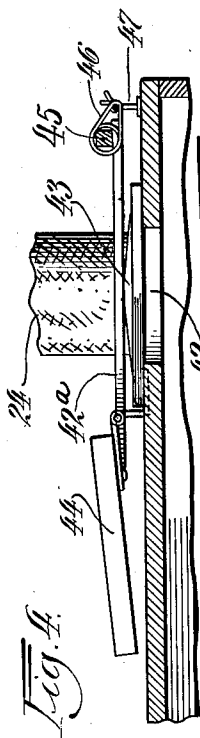


Fig. 4.

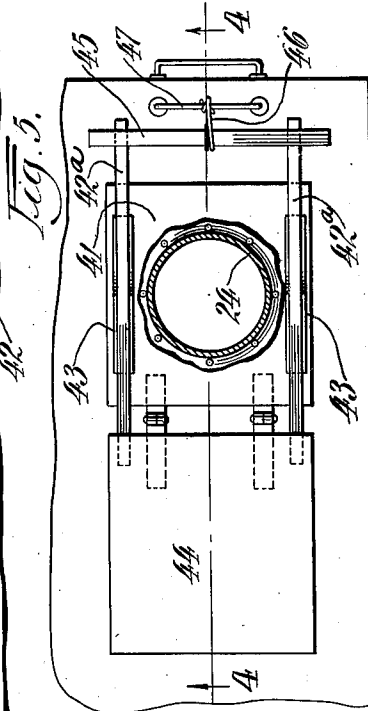


Fig. 5.

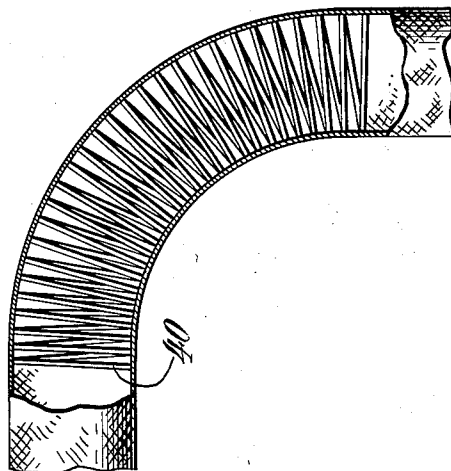


Fig. 6.

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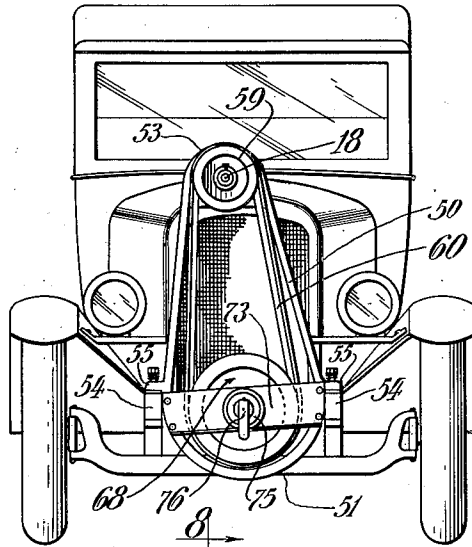
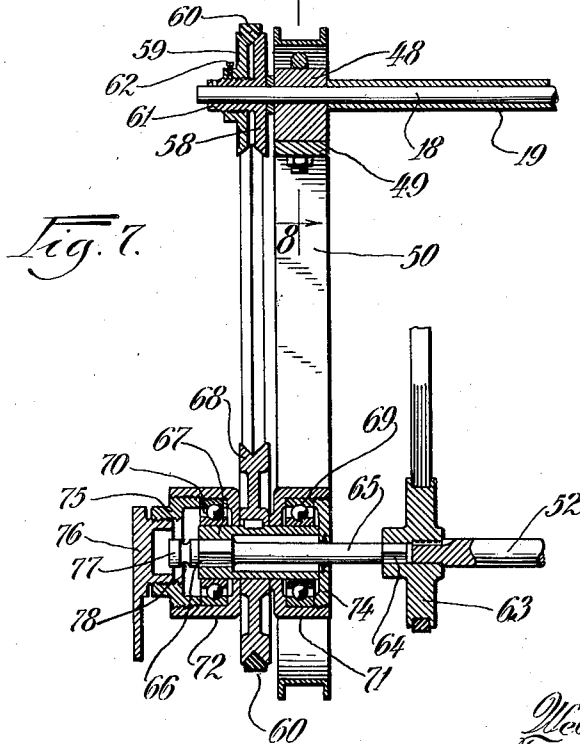
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3 Sheets-Sheet 2

Fig. 2.



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3 Sheets-Sheet 3

Fig. 3.

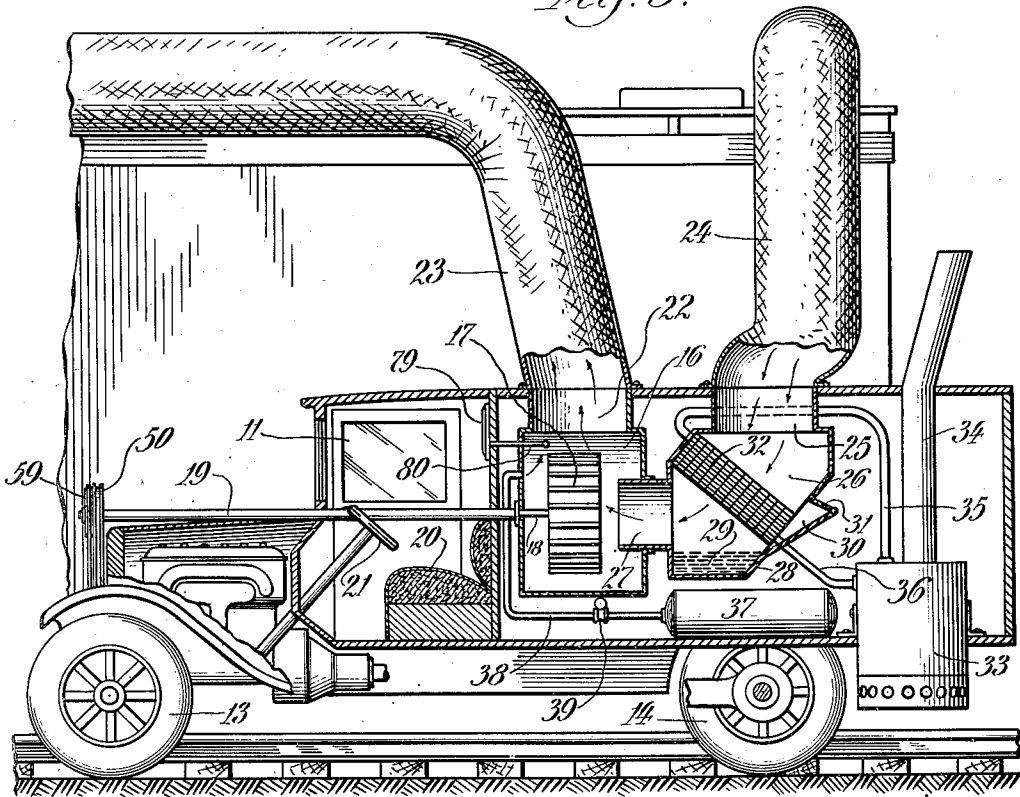


Fig. 8.

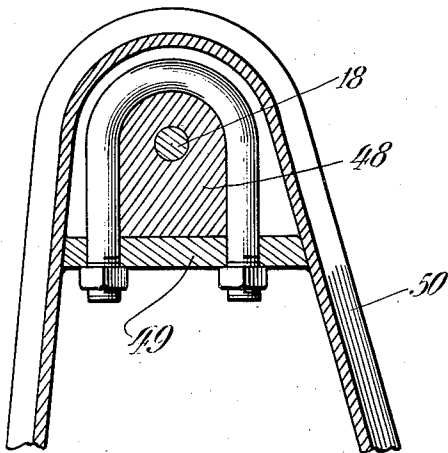
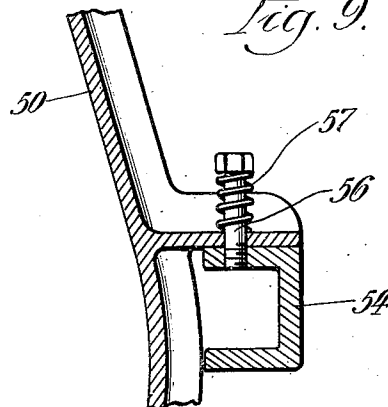


Fig. 9.



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UNITED STATES PATENT OFFICE

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PORTABLE APPARATUS FOR CONDITIONING PERISHABLE PRODUCTS

Application filed June 13, 1928. Serial No. 285,134.

This invention relates to improvements in portable apparatus for conditioning perishable products.

The apparatus of the present invention is designed particularly and primarily for use in the pre-ripening or otherwise conditioning of vegetables and fruits stored in refrigerator cars, in preparation for the unloading of the cars and the transporting of the products to market for sale. It is also designed for use in pre-conditioning the contents of a car in preparation for its transports to distant points.

The preparation of pre-conditioning the contents may consist in the introduction into the car of suitable gas or gases such as ethylene, which are required in the artificially accelerated ripening of such products, or it may consist in the maintenance of air currents through the interior of the car in order to induce the circulation required in precooling or otherwise conditioning the car in regard to thermal requirements.

Moreover, in the introduction of gases for pre-ripening purposes, it is highly desirable to establish and maintain proper thermal conditions and proper conditions of humidity, and the present apparatus is designed as a self-contained unit which is adapted to meet all requirements which may have to do with the establishment and maintenance of the intended atmospheric conditions within a car.

In these circumstances, it is highly important that the apparatus be quickly and easily transportable from place to place, since it is designed to condition the individual cars or groups of cars variously located on railway tracks or sidings. For this reason, all appliances required in the treatment must be capable of transport from place to place, and must be so constructed and arranged as to admit of quick and easy attachment to the car or group of cars requiring the services provided.

The present apparatus, therefore, is designed in the form of a motor vehicle properly provided for the development both of the power required in rapid transport and of that required for the continuous and uniform

maintenance of the air currents required in conditioning the atmosphere of the car.

The apparatus also makes provision for the introduction in measured amounts of the gas or gases required in the conditioning operation, and also provides the necessary means for the proper maintenance of the desired conditions of temperature and humidity.

The apparatus also is designed to provide for the carriage of the necessary piping required for connection at opposite ends of the refrigerator car, and the means for quickly and effectively joining such apparatus to the car in order to provide for the maintenance of air currents therethrough.

Further objects and details of the invention will appear from a description thereof in conjunction with the accompanying drawings, wherein—

Figure 1 is a side elevation of a refrigerator car showing the present apparatus in service;

Fig. 2 is a front elevation of the apparatus;

Fig. 3 is a longitudinal section through the center thereof;

Figs. 4 and 5 are details showing the means provided for connecting the piping to the top of the car;

Fig. 6 is a detail partially in section showing the means for reinforcing the bends in the piping;

Fig. 7 is a sectional detail of the driving connections at the forward end of the vehicle;

Fig. 8 is a detail of the upper end of the frame for such driving connections; and

Fig. 9 is a detail showing the spring connection between said frame and the side sills of the vehicle.

The apparatus is carried by and housed within a motor vehicle of the closed-in type ordinarily employed for delivery purposes, which comprises a body portion 10, a driving-cab portion 11, a hood 12, front steering wheels 13, and rear driving wheels 14, with the usual running board 15, all as ordinarily employed in delivery vehicles of the type common in use.

Within the body of the vehicle is located a fan housing 16 which surrounds a fan 17

driven by a fan shaft 18 (Fig. 7), which preferably extends through a tubing 19 lying immediately above the hood 12 of the engine, and extending rearwardly through the cab 11 of the vehicle. The arrangement is such that the shaft and tubing will clear the driver's seat 20 without interference with the steering wheel 21.

The fan housing discharges upwardly through a port 22 which registers with the inward end of a flexible pipe 23 which may be termed an outgoing pipe as contra-distinguished from a similar pipe 24 which may be termed the return pipe.

The return pipe registers with an inlet 25 on the upper side of what may be termed the air conditioning box or casing 26, which is located immediately to the rear of the fan housing and communicates with the interior thereof through a port 27 disposed in alignment with the eye of the fan.

The air conditioning housing is provided with an obliquely disposed rear wall 28 which affords a reservoir 29 at the bottom of the housing for the reception of a pool of water which is admitted through a chute 30 closed by a flap door 31, said chute being located on the rear side of the housing.

The air conditioning housing has located therein a condenser in the form of a radiator 32, similar in all respects to the radiator of an automobile, which radiator is obliquely disposed across the air conditioning housing so that the air discharged from the return pipe and returned to the fan will be sucked through the radiator, which may be heated to the desired temperature to properly heat the air ultimately delivered to the car.

The heating of the radiator is effected by means of a boiler 33 located in the rear portion of the box body of the vehicle and extending below the floor thereof, which boiler is provided with a stack 34 for the discharge of products of combustion, liquid fuel being preferably used in the boiler for generation of heat. The heating medium from the boiler—steam or hot water—will be delivered to the radiator through a pipe 35 leading from the top of the boiler to the top of the radiator. The return from the radiator is through a pipe 36 leading back to the boiler.

In order to admit treating gases into the air circuit, a gas tank 37 is provided from which leads a supply pipe 38 communicating with the interior of the fan housing. The pipe is provided with a reducing valve 39 which is of a type and style adapted to pass the gas at a definite volumetric rate per unit of time, so that measured quantities of the gas may be admitted in the amount necessary to afford the desired mixture of gas and air for pre-ripening or other treating purposes.

The pipes 23 and 24 are preferably in the form of large canvas ducts, circular in cross section, and provided at the bends or elbows

where the pipes are turned over the roof of the car with a spiral reinforcing spring 40, which may be of spring wire or the like and serves to distend the pipe at the bends or elbows so that it will not flatten or collapse when in use. Save for the spring reinforcements at the bends or corners, the remainder of each of the pipes will be held distended when in use by the passage of the air stream through the pipe.

Each pipe section, at its outer end, is secured to a covering board 41 which, as shown, is of rectangular shape, and of a size to bridge the bunker hole 42 which will be encountered in refrigerator cars of standard construction. Refrigerator cars are ordinarily provided with a bunker hole at each end of the car in the roof thereof for the purpose of permitting the deposit of ice into the ice bunkers at the edge of the car and immediately below the bunker holes.

The covering board 41 is clamped down in place over the bunker hole by the employment of bars 42^a, one on each side, each of which bars rests upon the apex of a shoe 43 secured to the edge of the covering board. The bars are so located as to permit the inner end of each of the bars to be thrust beneath the edge of the bunker door 44 when swung back into open position, as indicated in Figs. 4 and 5.

The opposite ends of the bars are held down by the provision of a cross bar 45, which is secured by a latching 46 to the proximate grab iron 47 on the top of the car. This arrangement holds the parts in tightly clamped relation and permits the pipes to be adjusted over bunker holes of varying sizes to establish communication with the interior of the car at each end thereof and in line with the ice bunkers, so that where it is desired to pre-cool the car during summer transportation the current of air will be directed through the bunkers, which serves to greatly accelerate the cooling action of the ice stored within the bunkers.

Of course, where pre-cooling is not required, the bunkers will be empty of ice, and the air current can be directed through the car for heating or otherwise reconditioning the atmosphere within the interior of the car.

The means for driving the fan shaft 18 are best illustrated in Figs. 2 and 7. The fan shaft is carried forwardly beyond the radiator and its forward end is journaled through a journal box 48, which is supported upon a bridge plate 49 carried between the sides of a frame 50 of vertically elongated oval shape, which occupies a position directly in front of the radiator of the car.

The frame 50 is preferably formed of channel iron and is of upwardly converging configuration, the lower curved end 51 being concentric with the axis of the engine shaft 52, and the upper end 53 of the frame being concentric with the shaft 18.

The lower portion of the frame 50 occupies a space between the side sills 54 of the car frame, being provided with lugs 55 which rest upon the sills. As best shown in Fig. 9, each of the lugs has freely entered therethrough a headed bolt 56 which is screw threaded into the underlying sill and is surrounded by a coil spring 57 bearing upon the lug, so that the frame 50 will be supported under spring tension between the side sills in such a way as to permit a slight freedom of movement between the parts, which is desirable in order to prevent any independent movement of one of the car sills with respect to the other from bending or distorting the frame.

The fan shaft 18 at its forward end carries a sheave consisting of an inner section 58 and an outer section 59, each section being baffled inwardly so that the two sections afford between them a groove or channel for the reception of a driving belt 60 which is V-shaped in cross section. The inner sheave section is provided with an exteriorly threaded hub 61 upon which the outer section is adjustably threaded and held in place by a set screw 62, which arrangement permits the inner and outer sheave sections to be adjusted to vary the width of the groove or channel which mounts the belt, and in this way the tension of the belt may be adjusted.

The power for driving the belt is derived from the engine shaft 52, the forward end of which is entered into the hub of the fan pulley 63, which hub is recessed to receive the squared inner end 64 of a stub shaft 65, the forward end 66 of which is squared and socketed within a tubular hub member 67 upon which is keyed a driving sheave 68 having a V groove in its periphery for the reception of the belt 60.

The hub member 67 is journaled within inner and outer ball bearings 69 and 70 respectively, the inner set of ball bearings being carried within a journal housing 71 suitably supported by the frame 50, and the outer journal bearings 70 are also located within an outer journal housing 72, which is likewise supported from the frame 50. In the present instance, the inner and outer journal housings are secured to bridge plates 73, the ends of which are suitably secured to the frame 50.

The inner journal housing is closed by a threaded disk 74 which affords space within the housing for the retention of a lubricant, and the outer journal housing is similarly closed by means of a threaded bushing 75 and a threaded cap member 76, which is removable to permit access to be had to the forward end of the stub shaft 65 which terminates in a head 77 behind which is a groove 78 which permits of the engagement of a suitable tool wherewith to remove the stub shaft by endwise withdrawal. It will be noted that the inner squared portion 64 of the shaft is

of less exterior dimensions than the outer squared portion 66 which permits a ready disassembling of the parts in the manner indicated.

In order to enable the thermal conditions within the fan housing to be readily observed, a thermometer 79 is provided in the cab of the vehicle, the tube 80 of which is extended inwardly into the interior of the fan housing so as to be directly influenced by the temperature at that point.

In operation, when it is desired to employ the engine solely for purpose of transportation, the stub shaft may be disconnected and withdrawn from the engine shaft, which permits the vehicle to be rapidly driven to any point where its service may be required, and after being located along the side of the car, as in Fig. 1, the stub shaft may be clutched up with the engine shaft, and the engine thereafter used solely as a source of power for the driving of the fan. This sets in motion a current of air through the car from end to end thereof. Where the apparatus is employed for pre-heating purposes, and where a heating of the air is required, such heat will be supplied from the boiler to the condenser within the rear housing, so that the air, at the temperature best suited to the ends in view, will be driven through the car.

Where gases, such as ethylene, propylene, etc., are required for pre-ripening purposes, such gas or gases are admitted to the interior of the fan housing, to be there commingled with the current of air circulated through the car. The air, in passing over the pool of water adjacent the fan housing, will be properly humidified, and the quantity of gas can be definitely regulated by the use of a suitable reducing valve, so that all of the constituent factors can be provided for in the proper conditioning of the air and may be taken care of in the operation of the present apparatus.

Although the apparatus is shown as in service in connection with a single car, it is obvious that a group of two or more cars may be connected in series with one another, and the pipes 23 and 24 may be made of a proper length to connect with the outermost bunkers of the car group so that a continuous current of air may be maintained through several cars instead of through only one, as shown in the present instance.

After the temperature in a car or group of cars has been properly conditioned as to gaseous content and humidity, or in one or more of these factors, the apparatus may be disconnected and rapidly driven to a more or less distant point, for use in connection with other cars variously located in the railroad or shipping yards, and in transporting the apparatus from place to place the piping will be collapsed and laid upon the roof of the box body of the vehicle, so that no time will

be lost in setting up the apparatus for service, wheresoever required.

The entire apparatus is self-contained and so arranged that its presence will not interfere in the slightest degree with the mobility of the vehicle, which is a matter of primary importance in the ready and convenient conditioning of cars either before or after transportation.

Although the apparatus has been described with particularity as to detail, it is not the intention to limit the invention strictly to the precise mechanism shown and described, since the same may be variously modified without departing from the spirit of the invention.

We claim:

1. In an apparatus of the class described, the combination of a vehicle including a roofed over box body, running gear and an engine for propelling the vehicle, two flexible and collapsible pipes secured to the roof of the box body and adapted to extend to opposite ends of the enclosure to be treated and adapted to be collapsed and folded into small compass on the roof, means for clamping the ends of the pipes to the enclosure to provide for the passage of air into and out of the enclosure, a fan casing located within the box body and communicating with the end of one of the pipes, a fan within the fan casing, and power connections from the engine for driving the fan, an air conditioning box located adjacent the fan casing and in communication therewith and in communication with the other pipe, a radiator extending across the air conditioning box and in interposed relation to the passage of air therethrough, and a boiler carried by the box body and provided with pipes for supplying a heating medium to the radiator, the lower portion of the air conditioning box being configured to afford a reservoir for the maintenance of a pool of water for humidifying the air.

2. In an apparatus of the class described, the combination of a vehicle including a roofed over box body, running gear and an engine for propelling the vehicle, two pipes secured to the roof of the box body and adapted to extend to opposite ends of the enclosure to be treated, means for clamping the ends of the pipes to the enclosure to provide for the passage of air into and out of the enclosure, a fan casing located within the box body and communicating with the end of one of the pipes, a fan within the fan casing, and power connections from the engine for driving the fan, an air conditioning box located adjacent the fan casing and in communication therewith and in communication with the other pipe, a radiator extending across the air conditioning box and in interposed relation to the passage of air therethrough, means for supplying a heating medium to the radiator, a gas tank located within the

box body, and a gas pipe leading therefrom to a suitable position to admit gas into the air circuit.

3. In an apparatus of the class described, the combination of a vehicle including a closed box body having a roof, running gear and an engine for propelling the vehicle, two collapsible pipes secured to the roof of the box body and adapted to extend to opposite ends of the enclosure to be treated and adapted to be collapsed and folded into small compass on the roof, means for clamping the ends of the pipes to the enclosure to provide for the passage of air into and out of the enclosure, a fan casing located within the box body and communicating with the end of one of the pipes, a fan within the casing, and power connections from the engine for driving the fan, an air conditioning box located adjacent the fan casing and in communication therewith and in communication with the other pipe, a radiator extending across the air conditioning box and in interposed relation to the passage of air therethrough, a boiler carried by the box body and provided with pipes for supplying a heating medium to the radiator, the lower portion of the air conditioning box being configured to afford a reservoir for the maintenance of a pool of water for humidifying the air, a gas tank located within the box body, and a gas pipe leading therefrom to a suitable position to admit gas into the air circuit.

4. In an apparatus of the class described, the combination of a vehicle comprising a body, running gear and an engine for propelling the running gear, a fan casing and outgoing and return pipes in communication therewith, a fan within the casing, a fan shaft extending to the front part of the vehicle above the engine, a stub shaft adapted to be removably connected with the engine shaft, a belt sheave on said removable shaft, a belt sheave at the forward end of the fan shaft, and a belt connected with said sheaves, journal bearings for said sheaves, and a vertically elongated frame carrying said bearings and secured to the frame of the vehicle in advance of the engine.

5. In an apparatus of the class described, the combination of a vehicle provided with a supporting frame, running gear, a roofed over box body carried by the rear portion of the supporting frame, a driver's seat in advance of the box body, and an engine located in the forward part of the vehicle for propelling the same, a fan housing within the box body and collapsible flexible pipes leading through the roof of the box body and adapted to be carried therefrom to the opposite ends of a freight car, said pipes being reinforced and distended at their bends by the provision of coil spring members, a fan within the housing, and a fan shaft leading for-

wardly from the fan and over the driver's seat and above the engine and terminating in advance of the engine, a removable stub shaft adapted to be engaged with the engine shaft, and power transmission elements leading from the stub shaft to the fan shaft in advance of the engine.

6. In an apparatus of the class described, the combination of a vehicle provided with a supporting frame, running gear, a roofed over box body carried by the rear portion of the supporting frame, a driver's seat in advance of the box body, and an engine located in the forward part of the vehicle for propelling the same, a fan housing within the box body and collapsible flexible pipes leading through the roof of the box body and adapted to be carried therefrom to the opposite ends of a freight car, a fan within the housing, and a fan shaft leading forwardly from the fan and over the driver's seat and above the engine and terminating in advance of the engine, a removable stub shaft adapted to be engaged with the engine shaft, and power transmission elements leading from the stub shaft to the fan shaft in advance of the engine.

In witness that we claim the foregoing we have hereunto subscribed our names this 2nd day of June, 1928.

WELCH BARSTOW.
FRED JOHN DAY.