To all whom it may concern:

Be it known that I, Wesley Linford Smith, a resident of Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Apparatus for Preserving Organic Substances, of which the following is a specification.

This invention relates to an apparatus for preserving, storing and transporting meats, fruits, vegetables and other organic matter.

The purpose of the invention is to provide an improved apparatus for the purposes stated, which entails much less expense in the first installation and in subsequent operating cost as compared with existing apparatus for preserving, storing and transporting meats, fruits, vegetables, etc.; such as ice boxes, refrigerating plants, refrigerating cars, and the like.

The invention comprises the construction and arrangement of parts hereinafter described and claimed.

In the accompanying drawings, the invention has been shown applied to a railway car of the refrigerator type.

In said drawings Figure 1 is a side view, partly in vertical longitudinal section, of a car adapted for carrying out the method; Fig. 2 is a section on the line 2—2, Fig. 1; Fig. 3 is an enlarged vertical sectional view through exhaust apparatus, taken longitudinally to the axis thereof; Fig. 4 is a similar view taken transversely to the axis thereof; and Figs. 5 and 6 are detail views showing the mechanism for producing the power for operating the exhaust apparatus, and Fig. 7 is a detail view of the means for controlling the exhaust apparatus by the vacuum in the chamber.

The essential features of the apparatus are a suitable chamber or receptacle capable of being sealed substantially air tight, which can be done in various ways well known to plate metal workers, such as car builders and boiler makers. The car is provided with one or more door openings 13 for loading and unloading, adapted to be closed by door 14. Suitable means, such as a gasket or packing 15 is provided at the door opening so that when the door is closed the opening will be substantially sealed. Either screws or cams, preferably the latter, shown at 16 on swinging links 17, are provided for tightly pressing the door against the gasket.

The interior of the car will be arranged to receive the desired commodity transported therein, the drawing showing a rack 20 provided with hooks 21 for suspending therefrom quarters of beef 22, or the like. The interior arrangement, obviously, will depend upon the character of the commodity to be transported.

At some suitable place the car is provided with an opening through which the air is exhausted therefrom. In the drawings this is shown at one end at the top, the opening being indicated at 24, 25 is a rotary exhaust pump which is arranged to take in air from the interior of the car and exhaust to the opening 24. It may be driven by any suitable means or mechanism. This exhaust pump may be of any suitable design, and is shown as comprising a casing 26, in which is mounted a rotor 27 carrying a plurality of blades or vanes 28 adapted to draw in the air through inlet 29 and discharge the same through outlet 30. This is a well known type of rotary pump. In order to increase the efficiency of the pump, it is preferable to circulate through the same glycerin or other suitable liquid in order to seal the spaces between the blades or vanes and the casing of the pump. This is accomplished by providing a tank 32 for the glycerin, and connecting the exhaust outlet 20 of the pump to said tank by means of pipe 34, and providing connection, such as pipe 35, from the tank below the level of the glycerin with induction side of the pump, a regulating valve 36 preferably being placed in the last named connection.
The effect is to draw the glycerin through pipe 33 into the pump and discharge the same through pipe 34 into tank 32. The exit opening 24 for the air drawn out of the car is connected to the tank 32 above the level of the glycerin in the latter.

The pump illustrated and the one which it is preferred to use, is described and claimed in an application of James B. Vernon, filed June 29, 1891, Serial No. 635,917, but any other suitable exhaust apparatus may be employed. The pump described has a very high efficiency with minimum power and will produce a vacuum as high as 24 or 25 inches of mercury, thereby maintaining a very considerable degree of vacuum in the car.

The pump may be driven from any suitable source of power. As shown, the rotor 27 is directly connected to the armature shaft of a small electric motor 40 mounted upon the same support as the pump in the end of the car directly underneath the roof. This motor can be supplied with current from any suitable source, such as a generator or batteries in the caboose or other suitable car of the train, but is shown as supplied with current from a generator 41 mounted on the truck 42 and receiving power directly from the axle of the car, the generator being connected by wires 43 to the motor 40.

In order that the generator may be active irrespective of the direction in which the car is traveling, there is provided between the axle 44 and said generator, a suitable train of gearing which drives the generator in the same direction irrespective of the direction of travel of the car.

As shown in the drawings the axle 44 has loose thereon a pair of gears 45 and 46, one of which meshes directly with a gear 47 on the armature shaft 48 of the generator 41 while the other thereof connects with a gear 49 on said armature shaft through an intermediate gear 50. The gears 45 and 46 are provided respectively with oppositely arranged clutch members 51 and 52 arranged to respectively engage cooperating clutch members 53 and 54 non-rotatable on the axle by means of keys 55, but slidable thereon and pressed against the cooperating clutch gears by springs 56 abutting against collars 57 on the axle. When the car runs in one direction the clutch 53, 51 is in engagement, driving the generator through gears 45, 47, and when the car runs in the opposite direction the clutch 54, 52 is in engagement, driving the generator through gears 46, 50 and 59. In this way the generator is always actuated to produce current no matter in which direction the car may travel, and this current is transmitted to the motor 40 for operating the exhaust pump.

Various other mechanism for constantly actuating the generator irrespective of the direction of the travel of the car will readily suggest themselves to the skilled mechanic.

In lieu of the electrical connections for operating the pump, I may use suitable mechanical driving means.

The circuit from the generator to the motor, or the driving connection for the generator to the exhauster may be so arranged that it can be controlled by the degree of vacuum within the car. This may be accomplished in various ways, such for instance as providing a suitable clutch on the gear trams to the generator, or providing in the circuit a suitable switch, which can be actuated from a diaphragm or piston exposed to the vacuum within the car. As shown, there is provided a diaphragm 60 exposed to the interior of the car on one side and the atmosphere on the other, and arranged normally to be moved outwardly, i.e. away from the interior of the car, by means of spring 61 and having connected thereto a stem 62 which is suitably connected with a switch 63 in the circuit 43, the parts being so arranged that when the vacuum in the car reaches a certain desired degree of rarefaction, the diaphragm is pulled inwardly against the tension of spring 61 to open the circuit and stop the motor, and when the vacuum is decreased beyond a certain critical point, the spring 61 shifts the parts in the opposite direction and causes the circuit to again start the motor.

In the use of the apparatus described, the desired product is placed within the receptacle (which is the car in the embodiment illustrated,) the door 14 is closed and sealed, and the pump put into operation to exhaust the air from the receptacle. It is preferable to produce as high a degree of vacuum, or as low a rarefaction in the receptacle as possible and one which approaches fairly close to an ultimate vacuum. This prevents all decay or deterioration of the products and without the necessity of a refrigerating plant or of icing as has heretofore been necessary. Should any slight amount of air leak in the pump immediately withdraws it, and by running the pump either continuously, or at least intermittently at frequent intervals, a sufficient degree of rarefaction is maintained to prevent decay or deterioration of the products.

Should it be found that the vacuum reduces the moisture in certain commodities to such a degree as to affect the quality thereof, this can be readily overcome by coating the commodity with some moisture proof coating, such as dipping the same into melted paraffin, or by inclosing it in a suitable envelop.

The apparatus described is adapted for the preservation of any organic matter while being stored or transported, and while it...
has been shown applied to a car of the type of refrigerator cars, it will be understood that this is illustrative only, as it can be applied without change to any stationary receptacle or chamber.

What I claim is:—

1. Apparatus for preserving organic products comprising in combination, a sealed chamber or receptacle, an exhauster within said chamber or receptacle arranged to exhaust air therefrom, power means outside of said chamber or receptacle, and connections between said means and said exhauster for actuating the latter.

2. Apparatus for preserving organic products comprising in combination, a sealed chamber or receptacle, an exhauster arranged to withdraw air from said chamber or receptacle, an electric motor for actuating said exhauster, and means controlled by the pressure in said chamber or receptacle for controlling said exhauster actuating means, said means comprising a diaphragm in the wall of the chamber, and a contact connected to said diaphragm and arranged to open and close the motor driving circuit.

3. Apparatus for preserving organic products comprising in combination, a sealed car, axles and wheels therefor, a pump arranged to exhaust air from the interior of said car, a motor, for driving said pump, a generator connected to said motor and connections between one of said axles and said generator for driving the latter, said connections being so arranged that the generator will be driven in the same direction by rotation of the wheels in either direction.

4. Apparatus for preserving organic products comprising in combination, a sealed car, axles and wheels therefor, a pump within said car arranged to exhaust air therefrom, means for driving said pump, and connections between one of said axles and said means for driving the latter, said connections being arranged so that said driving means will be driven in the same direction by travel of the car in either direction.

5. Apparatus for preserving organic products comprising in combination, a sealed car, axles and wheels therefor, a pump arranged to exhaust air from the interior of said car, a motor for driving said pump, a generator connected to said motor, and connections between one of said axles and said generator for driving the latter, said connections comprising a constantly driven shaft coupled to said generator, and a gearing between one of said axles and said shaft, said gearing including a slip connection.

6. In a preserving apparatus, a closed chamber, a suction pump for exhausting the air from said chamber, means for driving said pump, and automatically operating means for throwing said pump into and out of operation as the vacuum within the chamber reaches certain predetermined minimum and maximum values.

7. In a preserving apparatus, a chamber provided with a door opening, a door adapted to close said opening, means for locking the door in the closed position, a suction pump for exhausting the air from said chamber, an electric motor for operating said pump, an electric circuit connected to said motor, and a switch in said circuit adapted to be automatically opened when the vacuum within the chamber reaches a certain predetermined value.

In testimony whereof, I have hereunto set my hand.

WESLEY LINFORD SMITH.

Witnesses:
F. W. WINTER,
M. E. CAHOON.