

(No Model.)

H. C. JOHNSON.

REFRIGERATING AND DEHYDRATING APPARATUS FOR MEAT, &c.

No. 328,784.

Patented Oct. 20, 1885.

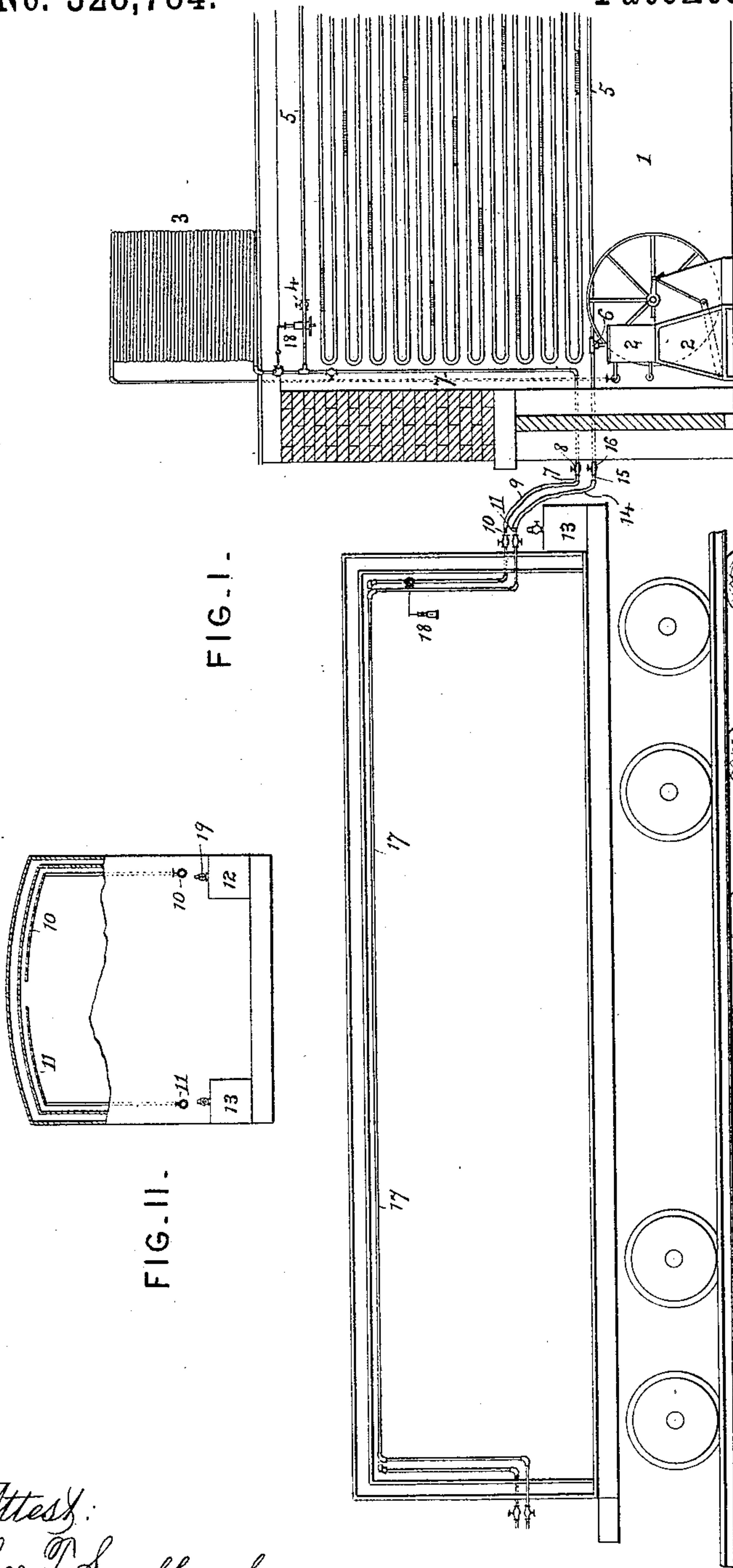


FIG. I.

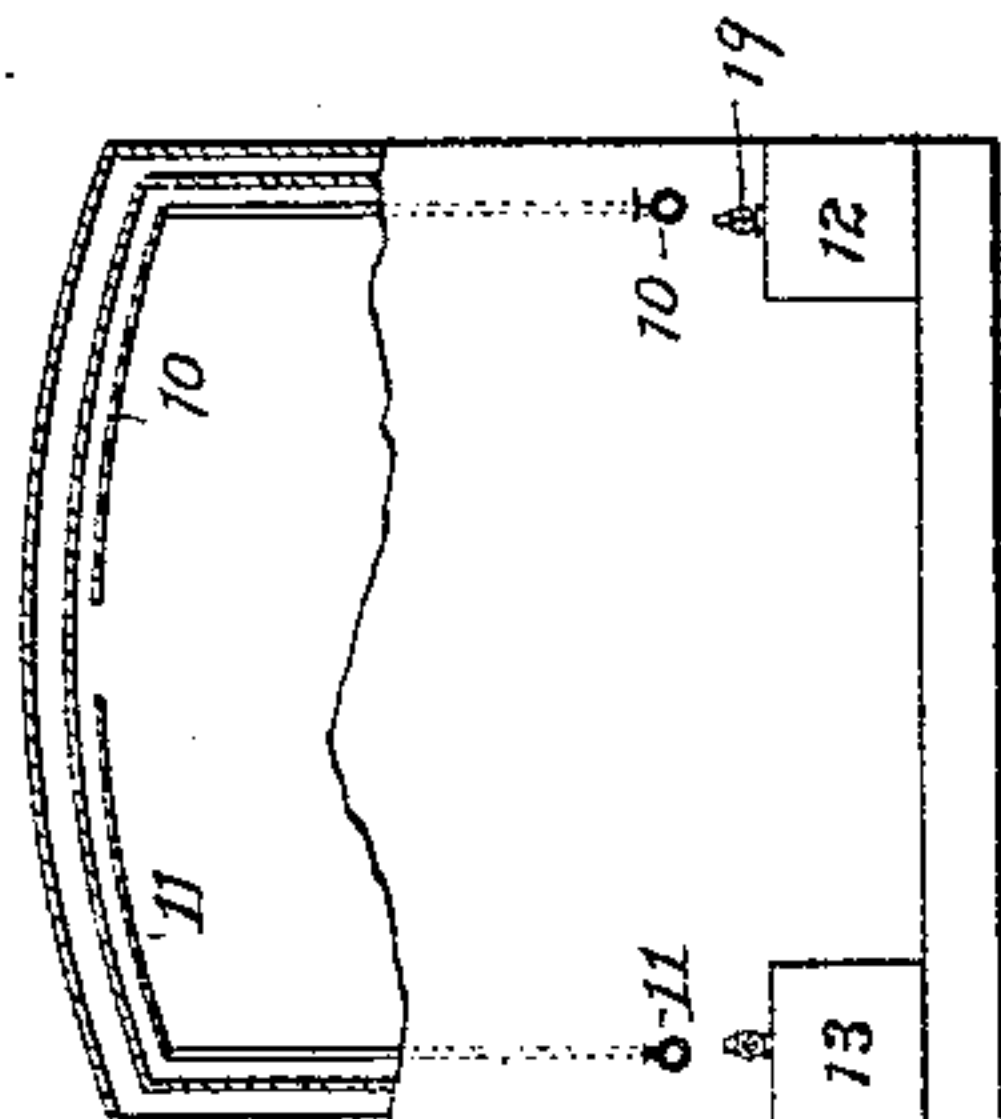


FIG. II.

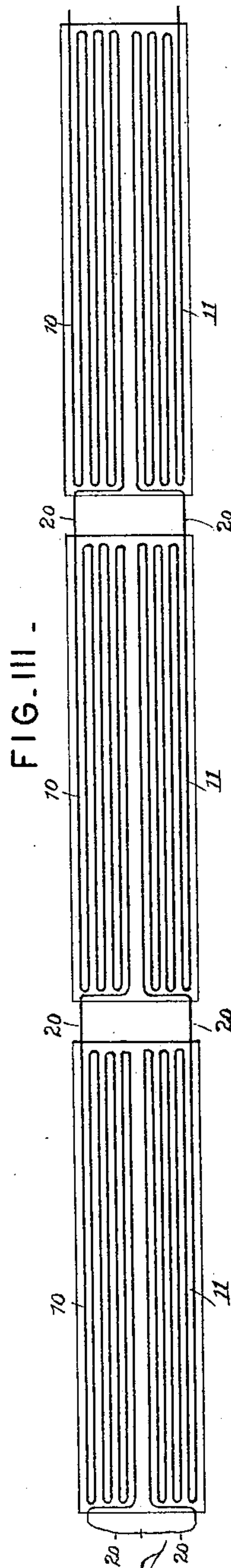


FIG. III.

Attest:
Geo. P. Smallwood.
[Signature]

Inventor
Henry C. Johnson
By *[Signature]* attys

UNITED STATES PATENT OFFICE.

HENRY CLAY JOHNSON, OF MEADVILLE, PENNSYLVANIA.

REFRIGERATING AND DEHYDRATING APPARATUS FOR MEAT, &c.

SPECIFICATION forming part of Letters Patent No. 328,784, dated October 20, 1885.

Application filed August 22, 1885. Serial No. 175,092. (No model.)

To all whom it may concern:

Be it known that I, HENRY CLAY JOHNSON, a citizen of the United States, residing at Meadville, in the county of Crawford and State of Pennsylvania, have invented a new and useful Improvement in Refrigerating and Dehydrating Apparatus for Storing and Transporting Meat, Fruit, &c., of which the following is a specification.

In Letters Patent No. 316,975, granted to me the 5th day of May, 1885, I have described a refrigerating apparatus for the transportation of meat and other perishable articles, in which a refrigerating or cooling coil is employed within a car, boat, or other means of conveyance, compressed ammonia or carbonic acid gas being supplied to the said refrigerating-coil through a regulating-valve, and the spent gas being taken up by the water-tank for reuse, under control of a check-valve to prevent the influx of water to the cooling-coil.

My present invention relates to means for more economically and effectively utilizing this mode of transportation. To this end I employ a cold-storage warehouse at the shipping-point and at an intermediate station, where it is desirable, in which refrigeration is carried on by compressing ammonia-gas into a receiver and radiator by means of power appliances, and allowing it to expand when cooled in the manner commonly practiced in manufacturing ice.

To effect the refrigeration of the meat or other perishable merchandise and the interior of cars or boats in which it is contained and which are furnished with my refrigerating-coils and detachable gas-holders and water-tanks, I detach such gas-holders and tanks from the refrigerating-coil in the car or boat and connect the ends of the coil from which they are removed with the expansion-pipe and air-pump inlet, respectively, of the power refrigerating apparatus, so as to make the coil in the car or boat or the connected coils of a whole train of cars a part of the coil of the power refrigerating apparatus, and when the refrigeration of the interior of the cars or boat is completed and the meat completely frozen, if desired, the portable gas-holder (suitably charged) and the water-tank are replaced to maintain this refrigerated condition in transit, which can thus be effected with a small expenditure of

compressed gas, a single gas-holder at one end and water-tank at the other serving for the connected and continuous refrigerating-coil of a whole train of cars. The freight-compartments of the cars or boats are of course properly and sufficiently insulated or protected from heat-conduction to adapt them for transportation of this character.

My system combines in a novel and very effective and economical manner the power apparatus as adapted by me to the refrigeration of boats or cars or trains of cars and the mode I have heretofore devised for refrigerating trains or boats en route, the refrigeration en route being maintained more economically and successfully by the aid of the preliminary refrigeration effected by the power apparatus.

The same power apparatus which is used for the preliminary refrigeration of the cars and cargo is of course available for extracting the gas from the water-tank in which it is taken up in transit and packing the same for reuse. I also employ, in connection with the refrigerating-coils, dehydrating appliances by which the air is dried as well as cooled.

The power of refrigeration in this way is so great that a dry atmosphere can be established, and a temperature so much lower than the possibilities of ice maintained, and with an economy so much greater than the cost of ice, that the cars themselves can be loaded and closed and used successfully for cold storage within themselves, thus saving the packing into and repacking from cold-storage warehouses. This system of cooling the freight-compartments and cargo makes entirely practicable the shipping of meats from the most distant feeding-grounds to the most remote markets with a cheapness and effectiveness hitherto unknown by any process.

In order that the invention may be fully understood, I will proceed to describe it with reference to the accompanying drawings, in which—

Figure I represents a sectional elevation of a cold-storage warehouse and one car with my improvement applied. Fig. II is an end view of the car. Fig. III is a plan view, on a smaller scale, illustrating the application of the system to a train of cars.

1 represents a cold-storage warehouse. 2 represents an air-pump driven by steam, wa-

ter, or any suitable power, so as to compress the ammoniacal gas into a radiator, 3, which may be of any usual form—for example, a coil of the requisite length of radiating-surface to cause the compressed gas to be cooled to atmospheric temperature with sufficient expedition. Fans and water evaporation or other means may be applied to the external surface of this radiating-coil to assist the cooling of the compressed gas. From the radiator or compressed-gas receiver 3 the gas is delivered under control of a stop-cock, 4, to a pipe, 5, of any length, which may take the form of a refrigerating-coil in the warehouse. The pipe or refrigerating coil 5 communicates with the induction 6 of the air-pump 2, by which the gas is repacked or compressed for reuse.

To any convenient part of the pipe or coil 5 a branch pipe or nozzle, 7, is connected, provided with a stop-cock, 8, and flexible hose 9, adapted to be placed in communication with the end 10 of the refrigerating-coil in the car or boat, from which the portable gas-holder 12 has been removed for the purpose. The water-tank 13 is in like manner removed from the other end, 11, of the coil, and this is connected by a similar hose, 14, with a branch pipe or nozzle, 15, having a cock, 16, and connected with the induction 6 of the air-pump.

A sufficient number of detachable dehydrating-jackets, 17, constructed as described and claimed in my application No. 173,985, filed August 10, 1885, are filled with deliquescent salt and applied to the refrigerating-coil 10 11, to thoroughly dry the air in the freight-compartments in the cars in which the meat or other freight is contained. Similar dehydrating-jackets, 17, may also be used on the refrigerating-coil 5 in the cold-storage house.

The cargo being thus effectually refrigerated before starting and inclosed in a dry cold atmosphere, the same condition may be maintained en route by a slight flow of ammonia when required, and this is supplied from the portable gas-holder 12 and taken up by the detachable water-tank 13, which are connected with the respective ends 10 11 of the refrigerating-coil of the car or train.

The flow of gas to maintain the required low temperature may be regulated automatically by a thermostat, 18, in each car, as described in Letters Patent No. 316,976, granted to me May 5, 1885; or it may be regulated or turned on or off, as required, by means of a dial-cock, 19, on the gas-holder 12.

The coils 10 11 are preferably arranged in top of the cars underneath the roof, and connected through pipes down the ends, with hose 20 for coupling the pipes from car to car in one continuous coil throughout the train, as described, and at that end of the train where the gas-holder and tank are not located the hose are connected together to complete the circuit.

The pipes for cold compressed gas from the cold-storage house may be run underground

or in any convenient manner, and may be provided with branch pipes or nozzles in different places for connection with the cars.

It is evident that parts of my invention may be carried into effect by forcing brine or other non-freezing liquid through the cooling-coil instead of gas.

I am aware that refrigerating-cars have been cooled by forcing in cold air from an ice-house, refrigerator, or other cold-storage house, so as to change the air within the car. This, therefore, I do not claim.

Having thus described my invention, the following is what I claim as new therein and desire to secure by Letters Patent:

1. A cold-storage warehouse provided with power appliances for compressing gas, and detachable connections for conveying the cooling medium to cars, boats, or other conveyances by which perishable articles are to be transported.

2. The combination of power apparatus for condensing or packing gas for cooling purposes, and a car, boat, or other vehicle for transporting perishable articles, provided with cooling-pipes and means of connection with the aforesaid power cooling apparatus.

3. A cold-storage warehouse provided with gas-compressing apparatus, a holder for the compressed gas, and a conduit leading therefrom, in combination with a car or boat for transporting perishable merchandise, provided with a cooling-coil and dehydrating appliances and a coupling for connecting and disconnecting the said cooling-coil with the compressed gas-holder in the storage-warehouse, as explained.

4. A cold-storage warehouse provided with means for compressing gas for refrigerating purposes, cooling-conduits for the utilization of such compressed gas, and detachable couplings for connecting and disconnecting such conduits with cooling-conduits on cars or boats for the transportation of perishable articles.

5. The combination of a gas-compressing apparatus, a holder for compressed gas, a conduit leading therefrom, a cooling-conduit in a car or boat for the transportation of meat or other perishable merchandise, and detachable couplings for connecting or disconnecting the said gas-holder and the cooling-conduit in the car or boat, substantially as and for the purposes set forth.

6. The apparatus for the cooling and transportation of perishable substances, consisting of a cold-storage house, gas-compressing appliances, cars or boats having non-conducting walls and circulating-pipes and couplings for connecting said pipes with the stationary gas-condensing appliances, and receivers for the compressed and spent gas on said cars or boats also having couplings for connecting with said gas-compressing apparatus.

7. The mode or process herein described of refrigerating meat and other perishable merchandise for and during transportation, the

same consisting in the production or storage of compressed refrigerated gas in a suitable receiver or coil by power appliances in a cold-storage house, connecting such receiver or coil
5 with refrigerating coils in the freight-compartments of the car or boat, and subsequently applying a portable gas-holder to maintain the refrigerated condition during transit, as explained.

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Witnesses:

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NORMAN M. JOHNSON.