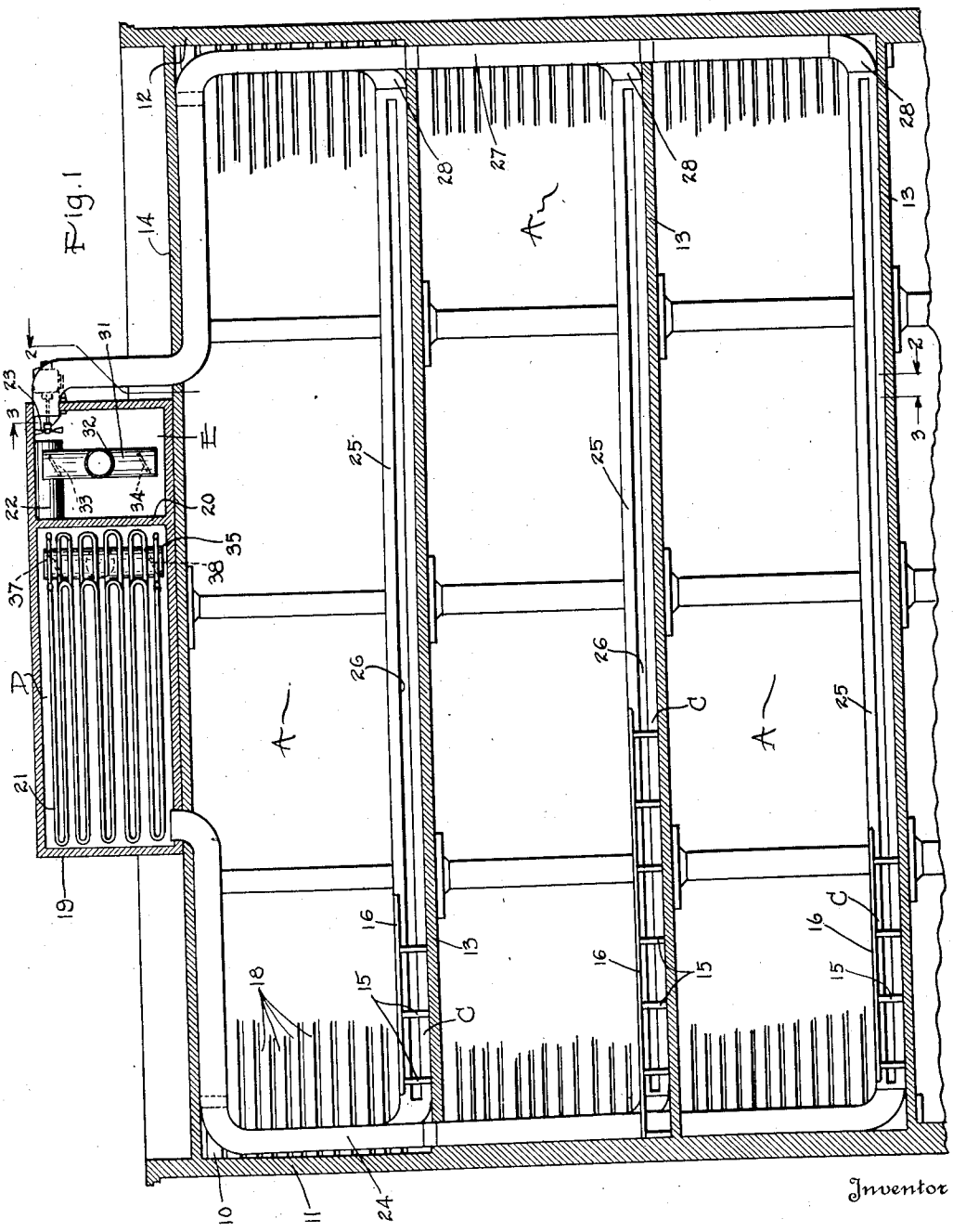
Dec. 4, 1928. 1,693,855

C. A. MOORE

AIR CONDITIONING SYSTEM

Filed May 1, 1926 3 Sheets-Sheet 1

Fig. 1



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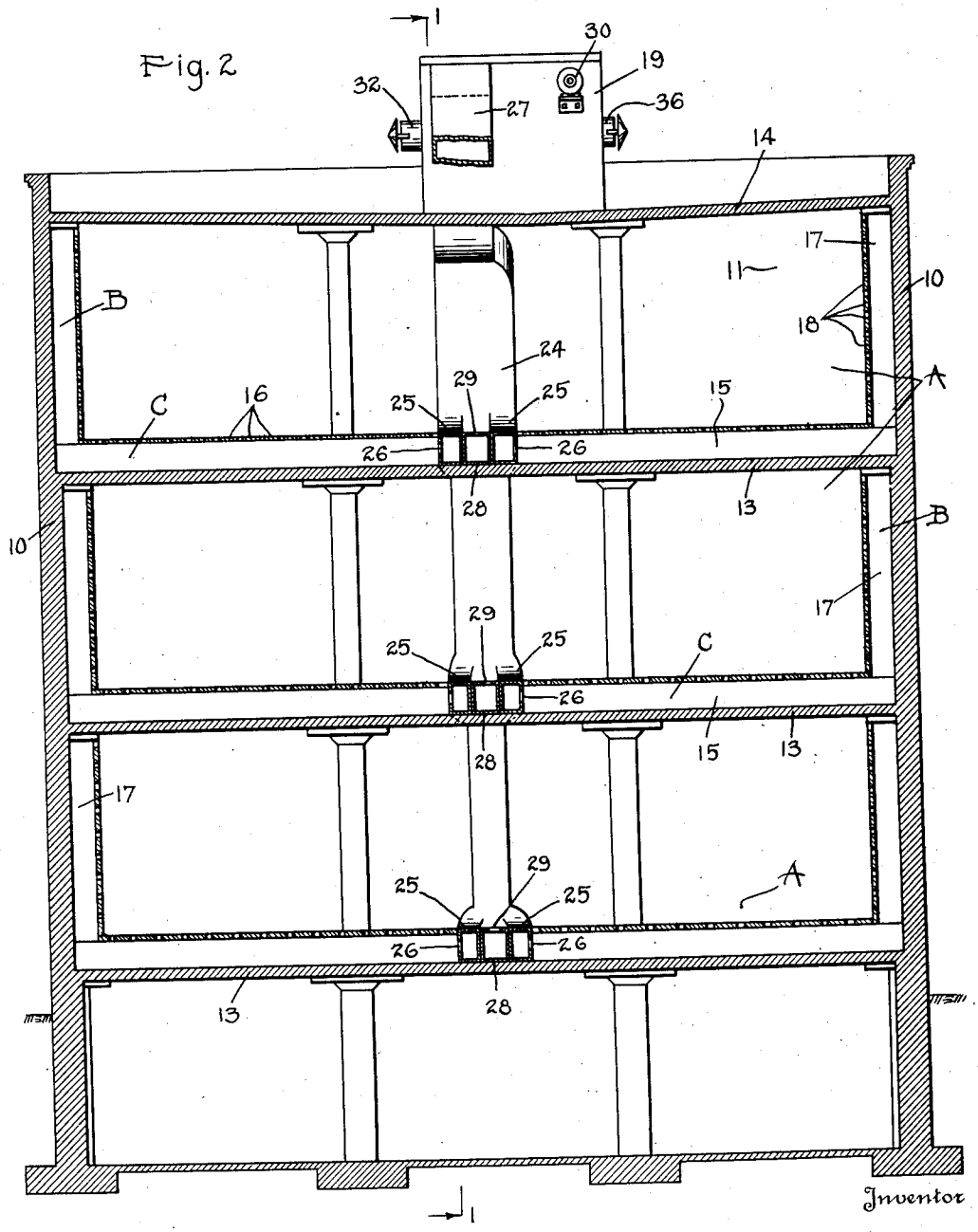
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Fig. 2



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AIR CONDITIONING SYSTEM

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Fig. 4

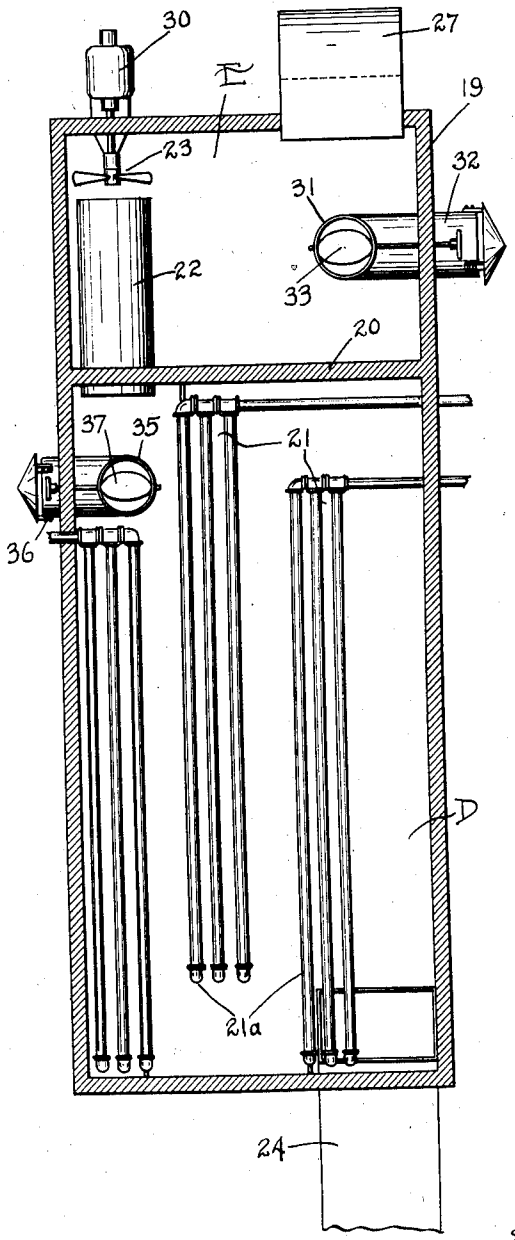
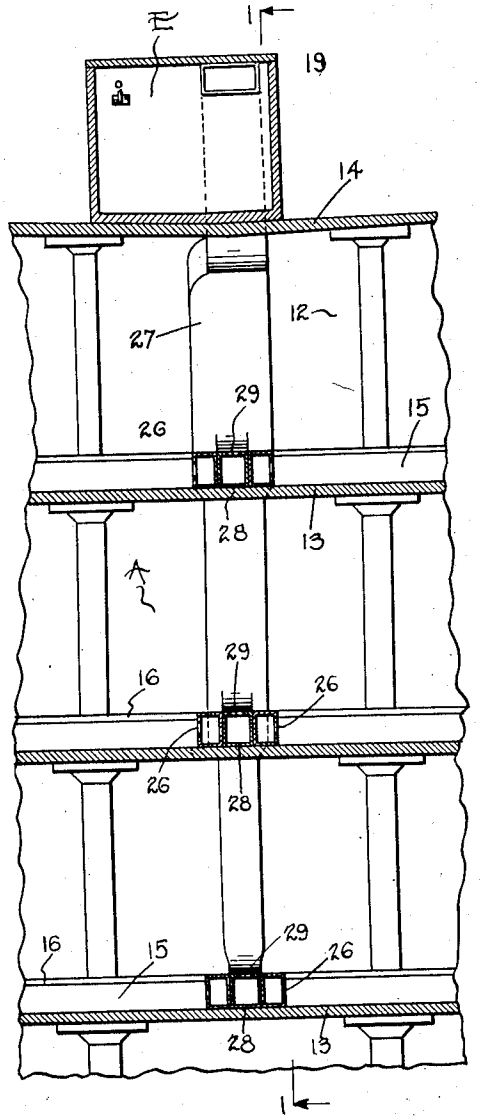


Fig. 3



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Patented Dec. 4, 1928. 1,693,855

UNITED STATES PATENT OFFICE.

CHARLES A. MOORE, OF EDINA, MINNESOTA.

AIR-CONDITIONING SYSTEM.

Application filed May 1, 1926. Serial No. 106,145.

My invention relates to improvements in air conditioning systems for houses, ships and like structures, wherein perishable commodities are stored for greater and less periods of time.

An object of the invention is to provide a system for effectively refrigerating and ventilating the chambers of structures of the character above noted, said system embodying elements constructed and arranged, not only to set up a thorough convective and diffused ventilated circulation of air within a chamber or chambers to which the system is applied, but also to provide for the maximum space for storage and for maximum facility in the handling of commodities within said space.

Another object of the invention is to supply a system, as above described, which is adapted to provide for the heating of a structure and as under refrigeration, to ventilate the structure as well.

More specifically, it is an object of the invention to employ a space along the floor of a chamber supplied, in part, to accommodate air conduits, also to use similar spaces along the sidewalls of the chamber, in conjunction with said space along the floor, for passageways serving to distribute air to the interior of the chamber, and further to provide means apart from the chamber proper for circulating air in the chamber through said conduits and passageways, and for changing the temperature of said air and freshening the same.

With the foregoing and other objects in view, which will appear in the following description, the invention resides in the novel combination and arrangement of parts and in the details of construction hereinafter described and claimed.

In the drawings, Fig. 1 is a vertical, longitudinal, sectional view of a building shown as equipped with an air conditioning system embodying my invention, said view being taken as on the lines 1—1 of Figs. 2 and 3, parts of the sleepers, floor and side slats being broken away; Fig. 2 is a vertical sectional view taken transversely of the building as on the line 2—2 of Fig. 1; Fig. 3 is a fragmentary view similar to Fig. 2, the same being taken on the line 3—3 of Fig. 1, and Fig. 4 is a detail plan view of the coil chamber and fan room structure surmounting the building, the roof of said structure being removed.

Reference being had to the accompanying drawings, it will be observed that the building shown includes the usual sidewalls 10, end walls 11 and 12, main floors 13, and roof 14, wherein provision chambers are provided. Extending transversely of each main floor 13 are two series of sleepers 15, one series at one side of a medial longitudinal area of the floor and the other series at the opposite side thereof. Nailed across these sleepers 15 of each chamber and extending longitudinally of the building are spaced floor slats 16 constituting a false floor. In each chamber riser timbers 17 rest at their lower ends upon the outer extremities of the sleepers 15, said riser timbers extending upward along the main sidewalls 10 to the ceiling of the chamber. Across these timbers 17, wall slats 18 are secured, the same comprising false sidewalls forming air passageways B, at the sides of the chamber, which passageways communicate with the air passageway C formed between the floor slats 16 and the main floor 13.

At the center of the roof 14 of this building is a structure comprising an elongated housing 19, the same being provided with a transverse partition 20, dividing the interior of the housing into a compartment D and a room E. In the compartment D are staggered tiers of coils 21, through which any suitable temperature affecting medium may be conducted. A horizontal pipe 22 passing through the partition 20 brings the compartment D and room E into communication one with the other, a fan 23 within the room being placed adjacent to the open end of said pipe in said room.

Passing downward through the roof 14 of the building from the lower portion of the compartment D, at the outer end thereof, is a duct or main 24, which extends along the middle of the ceiling of the uppermost chamber A to the inside of the end wall 11 of the building. This main 24 thence extends downward through intervening floors 13 to the floor 13 of the lowermost chamber included in the system. Upon the floor 13 of each of such chambers A and extending through the medial space left between the inner ends of the sleepers 15 are a pair of spaced conduits 25, each conduit of the pair communicating at one end with said main 24 and being closed at the other end thereof. The outer side of each conduit 25 is slotted longitudinally thereof as at 26, which provision brings one conduit 25 into communi-

cation, throughout its length, with the floor passageway C at one side of the middle of the chamber and likewise brings the other conduit 25 into communication with said passageway at the other side of the middle of said chamber.

A second upright main 27 is employed along the inside of the endwall 12 medially thereof, said main extending upward from the floor 13 of the lowermost chamber A, through intermediate floors 13 to the ceiling of the uppermost chamber, thence along said ceiling toward the center thereof, thence upward through the roof 14 of the building and thence into the upper portion of the fan room E of the housing 19.

On the floor 13 of each chamber A and between the spaced conduits 25 therein, is a conduit 28 formed at its upper side with a slot 29 extending longitudinally thereof. Each of these conduits 28 communicates at one end thereof with the main 27, the other end being closed.

Produce for storage within a given chamber A is readily trucked over the false floor formed by the floor slats 16, and over the conduits 25 and 28, foot plates (not shown) or other conduit protecting means being employed in the event that the conduits themselves are so constructed as to be unable to withstand an appreciable weight. The produce is stacked in tiers stopping short of the ceiling of the chamber and spaced apart from the wall slats 18 and above the slot 29 in the conduit 28.

When it is desired to refrigerate the stored produce, a refrigerating medium is conveyed through the coils 21 in the compartment D of the housing 19 and to augment the chilling effect of such medium in said coils, tiers thereof, indicated at 21^a (Fig. 4) are permitted to frost over to form baffle walls for directing air in a circuitous path in its passage through said compartment. The fan 23 is driven by a fan motor 30 in direction blowing into the pipe 22. Thus driven, said fan withdraws air, through the fan room E, from the main 27 and the conduits 28 connected therewith and forces such air into the coil compartment D, through the main 24 and into the conduits 25 connected therewith. In passing through the coil compartment D, the air is chilled and in this condition is forced outwardly through the slots 26 in the conduits 25. Entering the passageways C under the false floor slats 16, a part of the chilled air filters upward between the slats 16 about the lading on the false floor, the remainder thereof being urged into the side passageway B, where it is aided in its ascent along the relatively warm sidewalls 10 and from which side passageways said air filters through the side slats 18 into the lading space. In opposition to the pressure built up toward the sidewalls of the building through the egress of air from the conduits 25 is the suction caused by the fan 23 at the slots 29 in the conduits 28. This suction draws air downwardly, at the middle of the room, into said conduits 28. Thus, it will be understood that a convective and diffused circulation of chilled air is set up within the chambers A, such circulation being augmented under the natural laws at the sides of said chambers.

When it is desired to heat the produce stored within the chambers A, steam or other heating medium is conducted through the coils 21 in the coil compartment D and the rotation of the fan 23 reversed so that it will draw air through the pipe 22. Thus rotating the fan draws air from the coil compartment D wherein said air is heated, thence it forces said heated air from the fan room E through the main 27 to the conduits 28 and upwardly out of the slots 29 therein. Said fan 23 also draws air from the floor passageways C into the conduits 25, through the main 24, thence back into said coil compartment D. The heated air rising naturally from the conduits 28 and augmented by the force of the fan 23 ascends through the space left between the stacked produce. Thence spreading along the ceilings of the chambers A and descending by gravity between the produce containers said air, now more or less cooled, is urged downward through the false floors and drawn along the floor passageways C into the conduits 25 by the sucking action of the fan 23.

In this connection, attention is invited to the fact that the air in the side passageways B along the relatively cold side walls 10 has the natural tendency to fall by gravity taking air into the descending streams between the side slats 18. These descending streams of air upon entering into the floor passageways C are forcefully affected by the suction at the slots 26 in the conduits 25 in said passageways C. Thus, it will be understood that, under heating as well as under refrigeration, a thorough connective and diffused circulation of air is set up within the chambers A.

In the fan room E is an upright pipe 31 extending from a point near the floor to a point near the ceiling, said pipe being fitted with a horizontal branch 32 opening through one side of the housing 19 and further fitted with a damper 33 near its upper end and with a damper 34 near the lower end thereof. Within the coil compartment D is a similar upright pipe 35, similarly fitted with a branch 36 and dampers 37 and 38. When employing the system for refrigerating purposes, the circulating air may be freshened to ventilate the chambers A by admitting air, under the suction of fan 23, into the fan room E, through pipe 31 and permitting of the escape of air, under pressure from the fan, from the coil compartment D through the pipe 35. When the system is employed for the purpose of heating, air may be ad-

mitted to the coil chamber D, through pipe 35 on the suction side of the fan 23 and air permitted to escape from the fan room E, through pipe 31 on the pressure side of said fan. The opening more or less of either of the two dampers in the pipes 31 and 35 results in freshening the air in the system, the election of said dampers depending upon the percentage of humidity desired. If under refrigeration, the air in the system is too low in percentage of humidity with the dampers 33 and 37 open, the condition may be corrected by closing said dampers and opening the dampers 34 and 38. Under this adjustment of dampers warm air from the outside is admitted into the lower part of the fan room E under the inflowing colder air with the result that the humidity is increased. Further, the direct air in the lower part of the coil compartment D is removed therefrom. Accordingly, to meet other circumstances the dampers 34, 35, 37 and 38 are appropriately adjusted.

Changes in the specific form of my invention, as herein disclosed, may be made within the scope of what is claimed without departing from the spirit of my invention.

Having described my invention, what I claim as new and desire to protect by Letters Patent is:

1. In combination with a structure forming a provision chamber, a false perforate floor and false perforate sidewalls for said chamber, the same forming intercommunicating passageways at the bottom and sides of the chamber, a housing surmounting said structure, an air feed main depending from said housing into said chamber, a pair of spaced feed conduits branching off from said feed main and extending in parallelism along the main floor of the chamber medially thereof and parallel with said false sidewalls, each conduit being formed at its outer side with a slot extending longitudinally thereof and opening beneath the level of said false floor, an upright air return main leading from said chamber to said housing, a return conduit communicating with said return main and disposed between said feed conduits, said return conduit being formed at its upper side with an entry slot extending longitudinally thereof, a fan within the housing for drawing air thereinto from the return main and for forcing air into said feed main, means within the housing for reducing the temperature of air passing therethrough, said housing having means for admitting outer air thereto on the suction side of the fan and means to permit the escape of air to the outside from the pressure side of the fan.

2. In combination with a structure forming a provision chamber, a false perforate floor and false perforate sidewalls for said chamber, the same forming intercommunicating passageways at the bottom and sides of the chamber, a housing segregated from said chamber, an air feed main leading from said housing to said chamber, a pair of spaced feed conduits branching off from said feed main and extending in parallelism along the main floor of the chamber medially thereof and parallel with said false sidewalls, each of said conduits opening at its outer side beneath the level of said false floor, a return main leading from said chamber to said housing, a return conduit communicating with said return main and disposed between said feed conduits, said return conduit opening at its upper side for the entry of air thereto from said chamber, a fan within the housing for drawing air thereinto from the return main and for forcing it into said feed main, and means within the housing for reducing the temperature of the air passing therethrough.

3. In combination with a structure forming a provision chamber, a false floor in said chamber stopping short of the sidewalls of the chamber, a pair of spaced parallel feed conduits extending longitudinally of the chamber medially thereof along the main floor, each of said feed conduits opening at its outer side beneath the false floor, a return conduit disposed between said feed conduits and opening at the top thereof for the entry thereto of air from the chamber, said false floor providing an air passageway at the bottom of the chamber extending from the medially disposed feed conduits to the sides of the chamber, a fan interposed between the terminals of said feed and return conduits for setting up a circulation of air through said conduits and within said chamber, and means to which the circulating air is exposed for the purpose of refrigerating the same.

4. In combination with a structure forming a provision chamber, a false perforate floor in said chamber, a pair of spaced parallel conduits extending longitudinally of the chamber medially thereof along the main floor, each of said conduits opening at its outer side beneath the false floor, another conduit disposed between said pair of conduits and opening at the top thereof into said chamber, a fan interposed between the terminals of said first conduits and said second conduit to set up a circulation of air therethrough and cause a convective and diffused movement of air within said chamber, and temperature affecting means segregated from said chamber and associated with said conduits, the air circulating in said conduits being subjected to said means.

5. In combination with a structure forming a provision chamber, a false perforate floor in said chamber, a pair of spaced parallel conduits extending longitudinally of the chamber medially thereof along the main floor, each of said conduits opening at its outer side beneath the false floor, another

conduit disposed between said pair of conduits and opening at the top thereof into said chamber, a fan interposed between the terminals of said first conduits and said second conduit to set up a circulation of air therethrough and cause a convective and diffused movement of air within said chamber, temperature affecting means segregated from said chamber and associated with said conduits, the air circulating in said conduits being subjected to said means, and additional means associated with said conduits for admitting air from without on the suction side of the fan to the air circulating in said conduits and further means for permitting the escape of air to the outside from said conduits on the pressure side of said fan.

6. The combination with a storage chamber having a false perforate floor, of adjacent air conduits extending along the main floor of said chamber, one having communication at the side thereof with the chamber beneath the false floor and the other having communication through the top thereof with said chamber above said false floor, one conduit providing for the ingress of air to the chamber and the other conduit providing for the egress of air from said chamber, the terminals of said conduits being remote from the storage chamber, a fan interposed between the terminals of said conduits for setting up a flow of air through said conduits and circulating the same in the chamber, and means also interposed between the terminals of said conduits for affecting the temperature of the air in its flow to said chamber.

In testimony whereof, I have signed my name to this specification.

CHARLES A. MOORE