

Aug. 1, 1939.

S. V. SWANSON

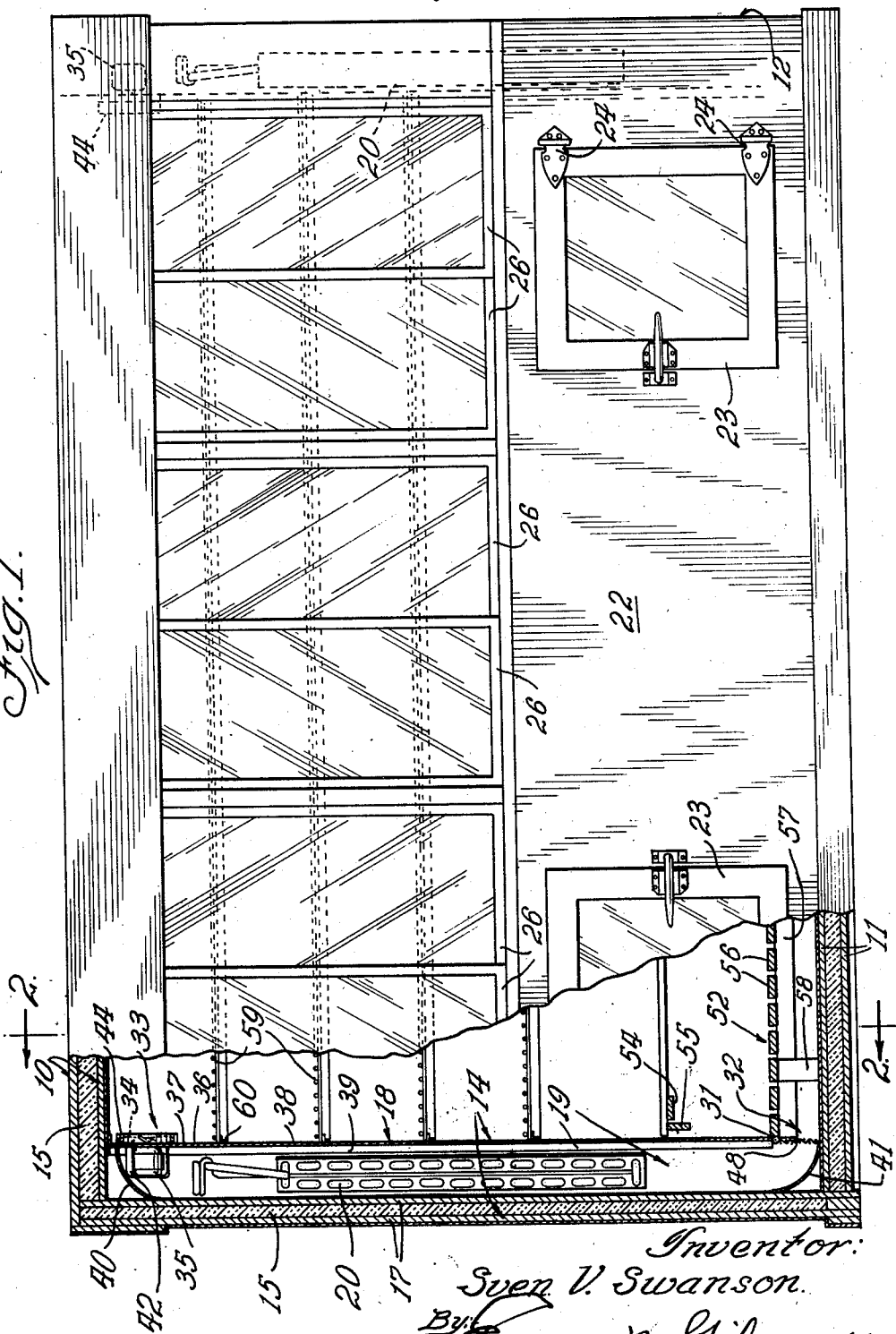
2,168,007

REFRIGERATED CABINET

Filed July 15, 1938

4 Sheets-Sheet 1

Fig. 1.



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4 Sheets-Sheet 2

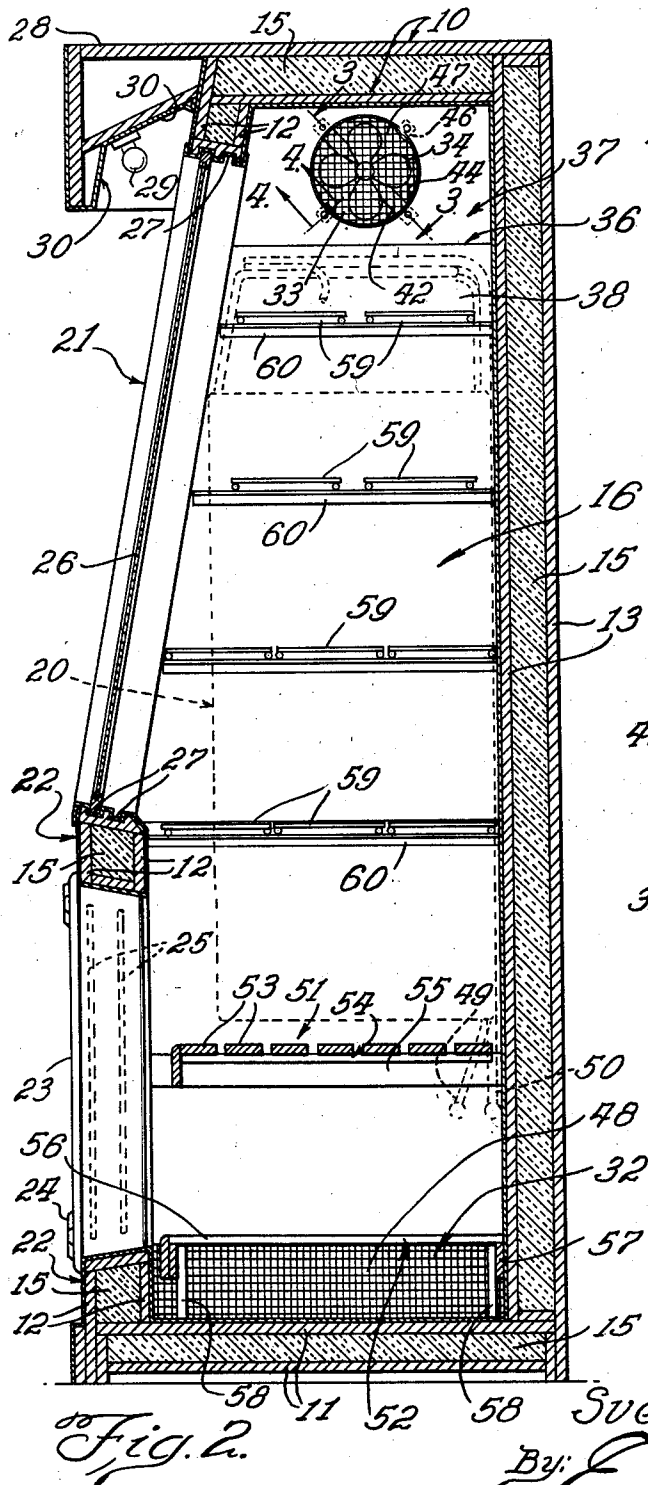


Fig. 4.

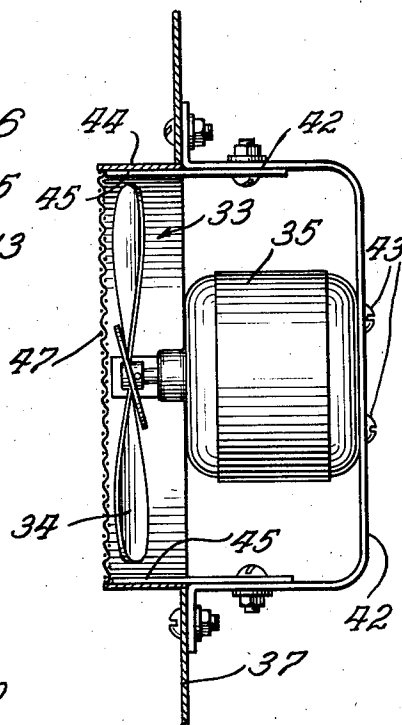
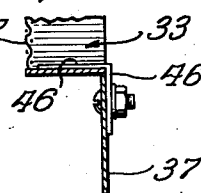


Fig. 3.

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4 Sheets-Sheet 3

Fig. 5.

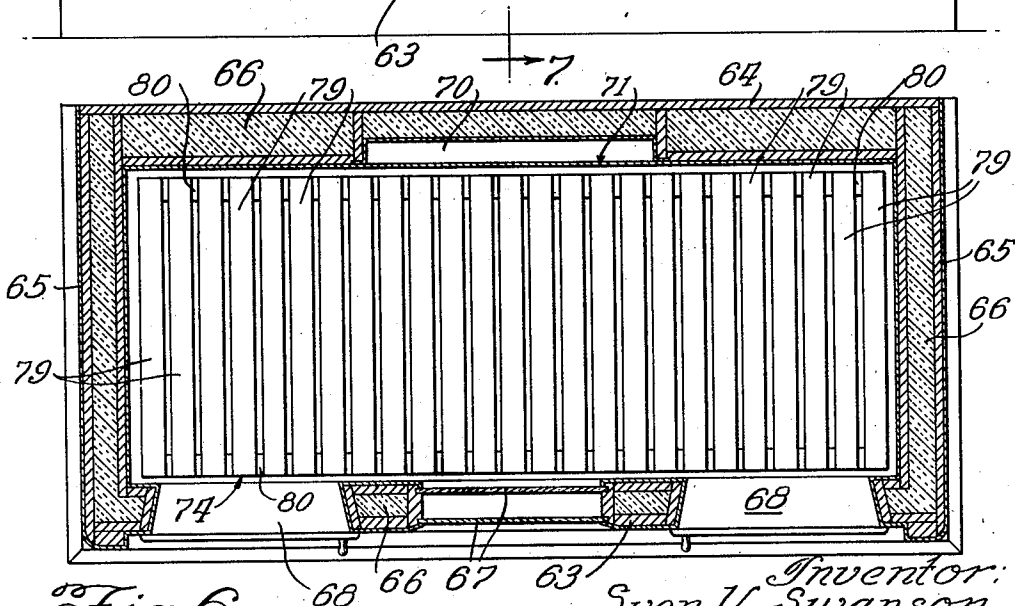
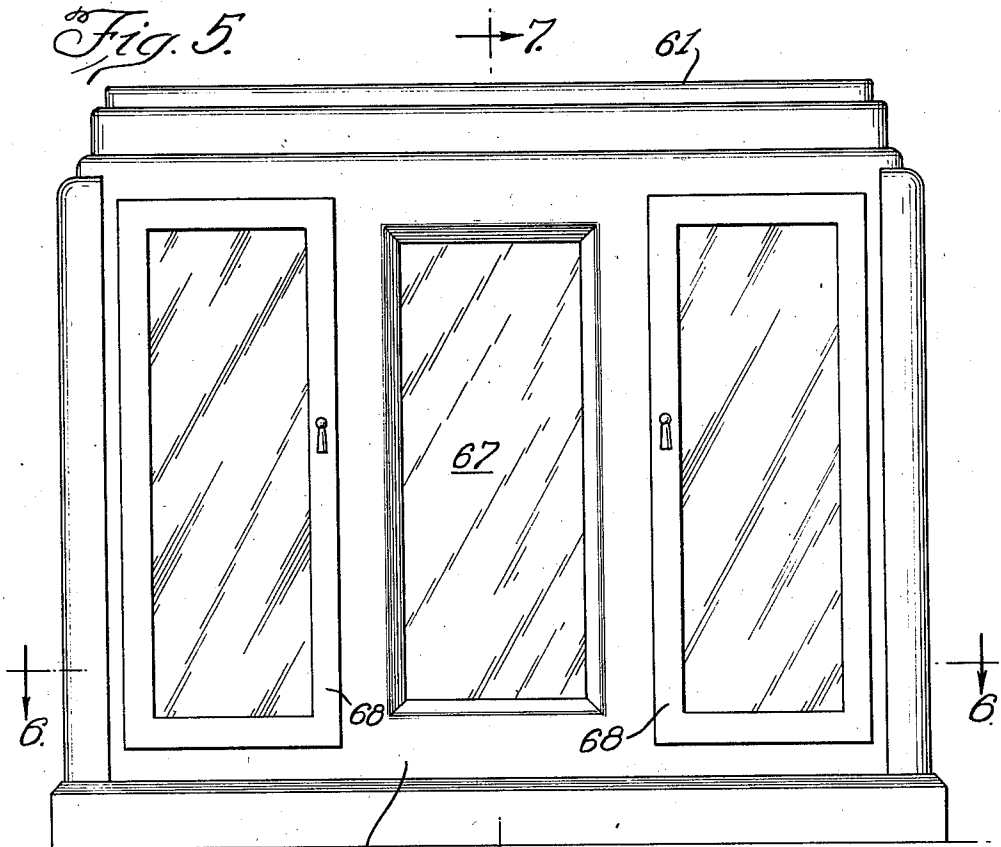


Fig. 6.

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4 Sheets-Sheet 4

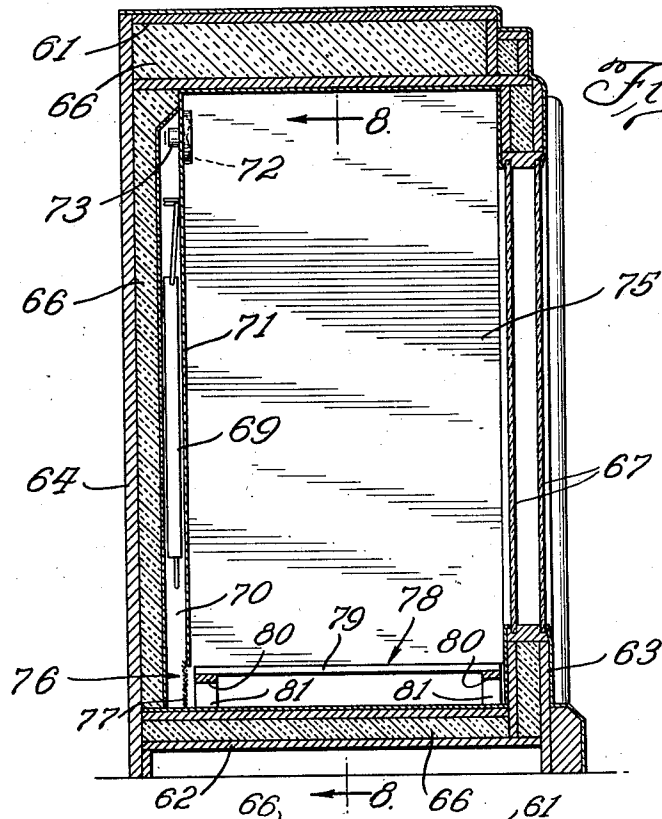


Fig. 7.

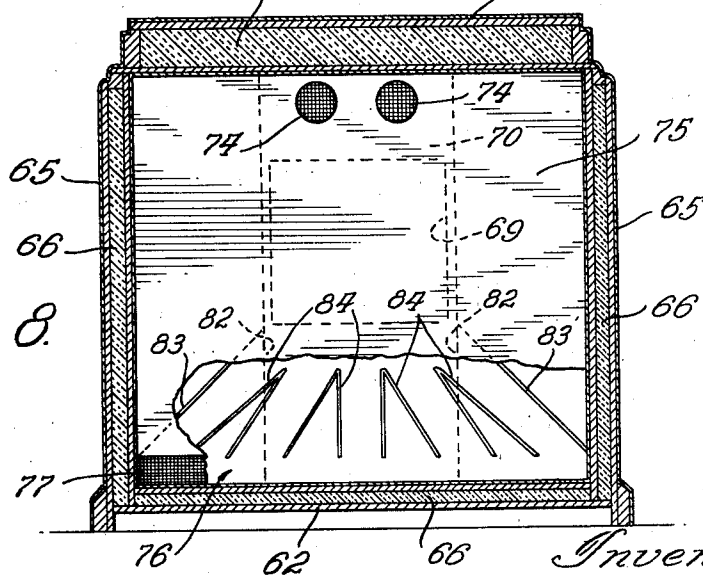


Fig. 8.

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UNITED STATES PATENT OFFICE

2,168,007

REFRIGERATED CABINET

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Application July 15, 1938, Serial No. 219,347

10 Claims. (Cl. 62—89.5)

This invention relates to cabinets of the refrigerated type, refrigerators or similar refrigerated equipment which are provided with cooling units through which air is circulated for cooling the compartment of the cabinet, refrigerator or similar equipment and has reference more particularly to the incorporation of the cooling units in the cabinet or refrigerator or compartment walls. The invention also includes facilities for uniform distribution of the cooled air throughout the space to be cooled and for prevention of moisture particles being carried by the circulated air into the space to be cooled.

The principal objects of this invention are to provide an improved refrigerated cabinet or the like which is particularly adaptable for display of its contents; to incorporate the cooling units in the walls of the space to be cooled in a compact manner so as to economize space, simplify the construction and improve the appearance of the cabinet or the like; to insure uniform distribution of the cooled air throughout the compartment; and to avoid circulation of moisture particles into the compartment, these and other objects being accomplished as hereinafter pointed out and as disclosed in the illustrative embodiments of the accompanying drawings in which;

Fig. 1 is a front view of a display cabinet constructed in accordance with this invention, a portion at one end being broken away to show in section details of the construction;

Fig. 2 is a vertical sectional view on the line 2—2 of Fig. 1;

Figs. 3 and 4 are detail sectional views on the lines 3—3 and 4—4 respectively of Fig. 2;

Fig. 5 is a front view of another form of cabinet constructed in accordance with this invention;

Fig. 6 is a horizontal sectional view thereof on the line 6—6 of Fig. 5;

Fig. 7 is a vertical sectional view on the line 7—7 of Fig. 5; and

Fig. 8 is a vertical sectional view on the line 8—8 of Fig. 7 with a portion of the rear wall broken away to disclose details.

Referring to the cabinet of Figs. 1 and 2, said cabinet has a top wall 10, a bottom wall 11, front and rear walls 12 and 13 respectively and hollow end walls 14, all of which said walls are insulated in any suitable manner as indicated at 15 and form a cooling compartment 16 throughout which cooled air is circulated and in which articles are placed for preservation and display. Each hollow end wall 14 is composed of an outer wall portion 17, which contains the insulation 15, and an inner

ner wall portion 18 between which said wall portions is a space 19 through which the compartment air is circulated in contact with a cooling unit 20 by which the compartment air is cooled.

The front wall 12 is composed of upper and lower sections 21 and 22 respectively, the latter of which is preferably vertical and has a pair of doors 23 hinged at 24 to provide access to the lower portion of the compartment, these doors being of double glass construction as indicated at 25. The other front wall section 21 slopes rearwardly as shown in Fig. 2 and has glass doors 26 for display of the cabinet contents and which are slidable in channels 27 to permit access to the interior at any place along the length of the compartment.

The top wall 10 overhangs the sloping front section 21 as shown at 28 in Fig. 2 and this overhanging portion has an illumination recess in the under side containing lamps 29, the light from which is directed by a reflector 30 downwardly through the glass front 26 into the interior of the cabinet.

The inner portion 18 of each hollow end wall 14 terminates at a distance above the compartment floor 11 as indicated at 31 to provide an opening 32 between said wall portion 18 and the floor 11 for air circulation, and each wall portion 18 also has an opening 33 at the top in which is mounted a fan 34 operated by an electric motor 35 to withdraw air from the compartment and circulate same downwardly through the space 19 and return same to the compartment 16 through the respective opening 32. The wall portion 18 is preferably divided at 36 into upper and lower sections 37 and 38 respectively, each consisting of a metal plate which is detachably secured in place in any convenient manner, as for example to flanges of angle irons 39 on the front and rear walls of the cabinet, to permit convenient access to the end wall space 19 and curved deflectors 40 and 41 are provided at the upper and lower ends respectively of each air space 19 to direct the air downwardly into the air space 19 at the upper end and outwardly through the opening 32 at the bottom.

For mounting the fan 34 and motor 35 a strap 42 is secured at its opposite ends to the respective plate 37 so as to extend diametrically across the opening 33 and at the opening is offset as shown in Fig. 3 for attachment to the rear end of the motor 35 as at 43, and the fan 34, which projects into the compartment 16, preferably is enclosed by an annular band 44 which is secured

in place by brackets 45 attached to the motor mounting strap 42 and other brackets 46 which are secured directly to the plate 37. The inner end of the fan enclosure 44 and the opening 32 at the bottom of the wall portion 18 are preferably covered by screens 47 and 48 respectively and the lower screen 48 is preferably of a suitable mesh to afford sufficiently intimate contact with the air passing therethrough to prevent moisture particles from being carried by the circulating air into compartment 16.

The cooling unit 20 is of conventional type, consisting of a series of tubes with fins thereon, such as commonly employed for refrigerating purposes to which compressed and liquefied refrigerant is supplied through an inlet pipe 49 and an expansion valve (not shown), a return pipe 50 being provided from the cooling unit to the compressor of the refrigerating system.

In the lower portion of the compartment 16 upper and lower slatted decks 51 and 52 respectively are provided which extend from end to end of the compartment 16 and substantially across same and serve not only as shelves on which to support articles in the compartment but also to spread the incoming cooled air from the openings 32 throughout the bottom of the compartment and insure uniform circulation thereof upwardly at all places in the compartment.

The upper deck 51 is located above the openings 32 as shown and has slats 53 which are secured to cleats 54 and extend from end to end of the compartment, and the ends of the slats 53 rest on supporting strips 55 which are secured at their ends to the front and rear walls of the compartment. The lower deck 52 is located near the bottom 11 of the compartment and preferably has the slats 56 thereof extending from front to rear and secured at their ends to strips 57 which have legs 58 at suitable intervals which rest on the compartment bottom and support the deck 52 at the desired elevation.

The portion of the compartment above the deck 51 is provided with any desired number of shelves 59 preferably of wire type for free circulation of air and these shelves may be supported at their ends on angle irons 60 secured to the end wall plates 38 or in any other convenient manner.

In operation compressed refrigerant is supplied through the inlet pipes 49 from a suitable source to the coils of the cooling units 20, each under the control of the usual expansion valve and the fans 34 at the opposite ends of the compartment by their operation remove air from the top of the compartment 16 and circulate the withdrawn air downwardly through the end wall spaces 19 in contact with the respective cooling unit 20 and return the cooled air through the screened openings 32 to the bottom of the compartment 16, the screens 48 serving as the air passes therethrough to remove moisture particles therefrom. This returned air is directed from each opening 32 toward the opposite end of the compartment and this incoming direction of supply tends to distribute the cooled air throughout the length of the compartment at the bottom.

Moreover, such distribution is further insured by the slotted decks 51 and 52 which provide zones thereunder in which the incoming air is sufficiently confined to insure spreading thereof throughout the lower portion of the compartment 16 with the openings between the slats of these decks and along the sides thereof serving to insure such distribution of cooled air from these zones that

uniform cooling of the compartment space above these decks is assured.

In the cabinet of Figs. 5 to 8 inclusive, which may be of large walk-in type suitable for preservation, display or storage of merchandise, for example flowers, the top, bottom, front, back and end walls 61, 62, 63, 64 and 65 respectively are insulated in a customary manner as at 66, and the front wall 63 has a double glass window 67 and two doors 68 with double glass panels.

The cooling unit 69 is located in the back wall of the cabinet, said wall having a vertical recess 70 therein containing the cooling unit and this recess is closed at the front by the back wall lining plate 71. A pair of annularly enclosed fans 72 operated by motors 73 are provided in screened openings 74 at the upper end of the recess or air space 70 to withdraw air from the top of the cabinet compartment 75 and an opening 76 is provided from the air space 70 at the floor of the compartment through which said opening the withdrawn air is returned to the compartment 75 after passing in contact with the cooling unit 69, this opening 76 preferably being covered with a screen 77 to remove moisture particles from the air passing therethrough.

A slatted floor 78 is provided in the compartment 75 composed of laterally spaced slats 79 extending from front to back and secured at their ends to strips 80 with legs or supports 81 at suitable intervals along these strips 80 to hold the slatted floor at an elevation above the compartment bottom, and the opening 76 from the air space 70 is arranged to discharge under this slatted floor. Thus a zone is provided between the slatted floor and the bottom of the compartment in which the incoming air from the opening 76 is spread out at the bottom of the compartment and the openings between the slats and around the margin of the slatted floor are suitably proportioned to insure a uniform distribution of the cooled air from this zone throughout the compartment space thereabove.

The air space 70 may be of uniform width from top to bottom as indicated by dotted lines at 82 in Fig. 8 in which case the opening 76 therefrom may be of the same width but I prefer to flare the air space 70 below the cooling unit 69 as indicated at 83 to the full length of the compartment and in such case the opening 76 preferably extends the full length of the compartment. Moreover, I prefer to provide spreaders 84 as shown in Fig. 8 in the flared portion of the air space 70 to distribute the outflow of air from the cooling unit along the opening 76 and thus insure substantially equalized introduction of cooled air at low velocity along the length of the spreader zone under the slatted floor 78.

While I have shown and described my invention in a preferred form I am aware that various changes and modifications may be made therein without departing from the principles of my invention, the scope of which is to be determined by the appended claims.

I claim as my invention:

1. An enclosure of the class described having top, bottom and upright walls forming a cooling compartment, one of said upright walls having therein an air space separated from the compartment and with upper and lower openings thereto from the top and bottom respectively of the compartment, a blower operable to circulate air from the compartment downwardly through said air space from the upper opening to the lower opening thereof, and a cooling unit within

the air space in the path of air circulation therein, said compartment being divided at the bottom to provide an air space with which said lower opening communicates and said air space being of substantially the same area as the compartment and having openings at the top substantially uniformly distributed throughout the area thereof and leading from said air space into the compartment space thereabove.

2. An enclosure of the class described having top, bottom and upright walls forming a cooling compartment, one of said upright walls having therein an air space separated from the compartment and with upper and lower openings thereto from the top and bottom respectively of the compartment, a blower operable to circulate air from the compartment downwardly through said air space from the upper opening to the lower opening thereof, a cooling unit within the air space in the path of air circulation therein and spreading means through which the air from the cooling unit passes and by which it is distributed over the bottom of the compartment, said compartment being divided at the bottom to provide an air space with which said lower opening communicates and said air space being of substantially the same area as the compartment and having openings at the top substantially uniformly distributed throughout the area thereof and leading from said air space into the compartment space thereabove.

3. An enclosure of the class described having top, bottom and upright walls forming a cooling compartment, one of said upright walls having therein an air space separated from the compartment and with upper and lower openings thereto from the top and bottom respectively of the compartment, a blower operable to circulate air from the compartment downwardly through said air space from the upper opening to the lower opening thereof, a cooling unit within the air space in the path of air circulation therein, and means in the compartment forming at the bottom thereof a free unobstructed entrance zone with which the lower opening of said air space communicates, and said zone being of substantially the same area as the compartment and having openings at the top uniformly distributed throughout the area thereof and leading from said zone into the compartment space thereabove.

4. An enclosure of the class described having top, bottom and upright walls forming a cooling compartment, one of said upright walls having therein an air space separated from the compartment and with upper and lower openings thereto from the top and bottom respectively of the compartment, a blower operable to circulate air from the compartment downwardly through said air space from the upper opening to the lower opening thereof, a cooling unit within the air space in the path of air circulation therein and a deck in the compartment and spaced above the bottom to provide between the deck and bottom a free unobstructed zone with which the lower opening of said air space communicates, said zone being of substantially the same area as the compartment and having openings at the top uniformly distributed throughout the area thereof and leading from said zone into the compartment space thereabove.

5. An enclosure of the class described having top, bottom and upright walls forming a cooling compartment, one of said upright walls having therein an air space separated from the compartment and with upper and lower openings

thereto from the top and bottom respectively of the compartment, a blower operable to circulate air from the compartment downwardly through said air space from the upper opening to the lower opening thereof, a cooling unit within the air space in the path of air circulation therein and means in the compartment forming at the bottom thereof an entrance zone with which the lower opening of said air space communicates, said zone being of substantially the same area as the compartment and having openings at the top uniformly distributed throughout the area thereof and leading from said zone into the compartment space thereabove, said cabinet having a wall thereof provided with doors through which the compartment spaces above and below said means are separately accessible.

6. An elongated enclosure of the class described with top, bottom, front and back and two end walls, said end walls each having therein an air space separated from the compartment and with upper and lower openings thereto from the top and bottom respectively of the compartment, and blower means operable to circulate air from the compartment downwardly through each air space from the upper opening thereof to the lower opening thereof, each said air space having a cooling unit therein in the path of air circulation therethrough and the front wall of the cabinet having portions through which the compartment contents are visible and doors through which the compartment contents are accessible.

7. An enclosure of the class described with top and bottom walls and surrounding upright walls forming a cooling compartment, one of said upright walls having therein a by-pass leading from the upper portion of the compartment to the lower portion thereof, a blower operable to circulate air downwardly through the by-pass and a cooling unit in the by-pass in the path of air circulation therein, said by-pass having a flared outlet at the bottom substantially coextensive with the width of the wall in which the by-pass is located, said compartment being divided at the bottom to provide an air space with which said lower opening communicates and said air space being of substantially the same area as the compartment and having openings at the top substantially uniformly distributed throughout the area thereof and leading from said air space into the compartment space thereabove.

8. An enclosure of the class described with top and bottom walls and surrounding upright walls forming a cooling compartment, one of said upright walls having therein a by-pass leading from the upper portion of the compartment to the lower portion thereof, a blower operable to circulate air downwardly through the by-pass and a cooling unit in the by-pass in the path of air circulation therein, said compartment having therein a deck with openings therethrough and spaced from the bottom wall, said by-pass having a flared outlet at the bottom substantially coextensive with the width of the wall in which the by-pass is located and opening into the space under the said deck, said space being substantially the same area as the compartment and said deck having openings therethrough substantially uniformly distributed throughout the area thereof which lead from said space into the compartment space thereabove.

9. An enclosure of the class described with top and bottom walls and surrounding upright walls forming a cooling compartment, one of said

upright walls having therein a by-pass leading from the upper portion of the compartment to the lower portion thereof, a blower operable to circulate air downwardly through the by-pass and a cooling unit in the by-pass in the path of air circulation therein, said compartment having a slatted deck therein spaced from the bottom wall and said by-pass having a flared outlet at the bottom substantially coextensive with the width of the wall in which the by-pass is located and opening into the compartment under the said slatted deck, and said flared outlet having spreading means therein arranged to distribute the air from the cooling unit throughout the width of said wall in which the by-pass is located, said deck being of substantially the same area as the compartment and having openings therethrough substantially uniformly distributed throughout the area thereof through which the space below said deck communicates with the compartment space thereabove.

10. An enclosure of the class described with top and bottom walls and surrounding upright

walls forming a cooling compartment, one of said upright walls having therein a by-pass leading from the upper portion of the compartment to the lower portion thereof, a blower operable to circulate air downwardly through the by-pass and a cooling unit in the by-pass in the path of air circulation therein, said compartment having a slatted deck therein spaced from the bottom wall and said by-pass having a flared outlet at the bottom substantially coextensive with the width of the wall in which the by-pass is located and opening into the compartment under the said slatted deck, and said flared outlet having spreading means therein arranged to distribute the air from the cooling unit throughout the width of said wall in which the by-pass is located, said cabinet having the wall thereof opposite the wall which contains the by-pass provided with transparent portions through which the compartment contents are visible and provided with doors through which the compartment contents are accessible.

SVEN V. SWANSON.