March 13, 1934. B. J. VANDOREN ET AL 1,951,223

REFRIGERATING APPARATUS

Filed July 31, 1930 4 Sheets-Sheet 1

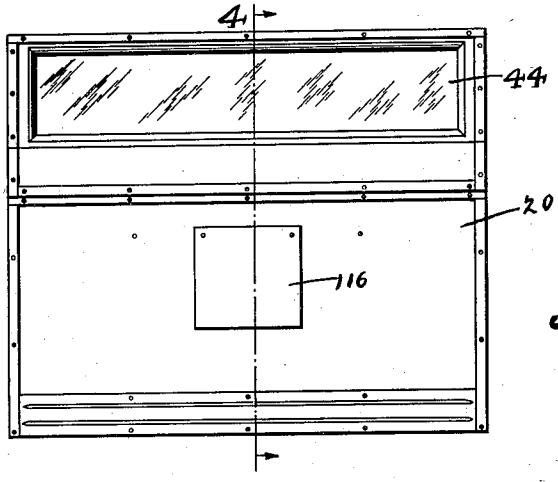


Fig. 1.

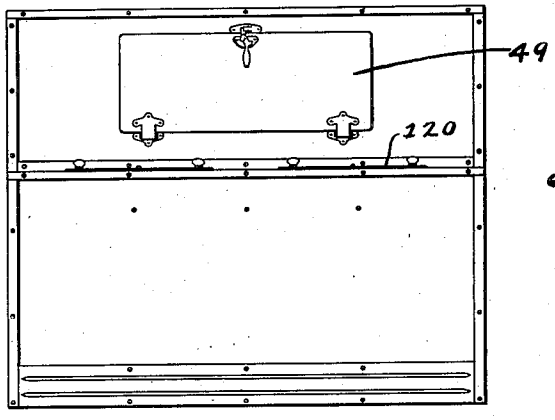


Fig. 2.

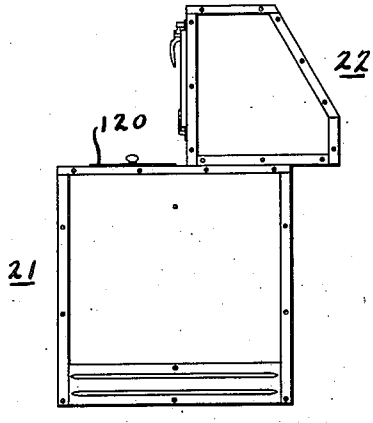


Fig. 3.

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REFRIGERATING APPARATUS

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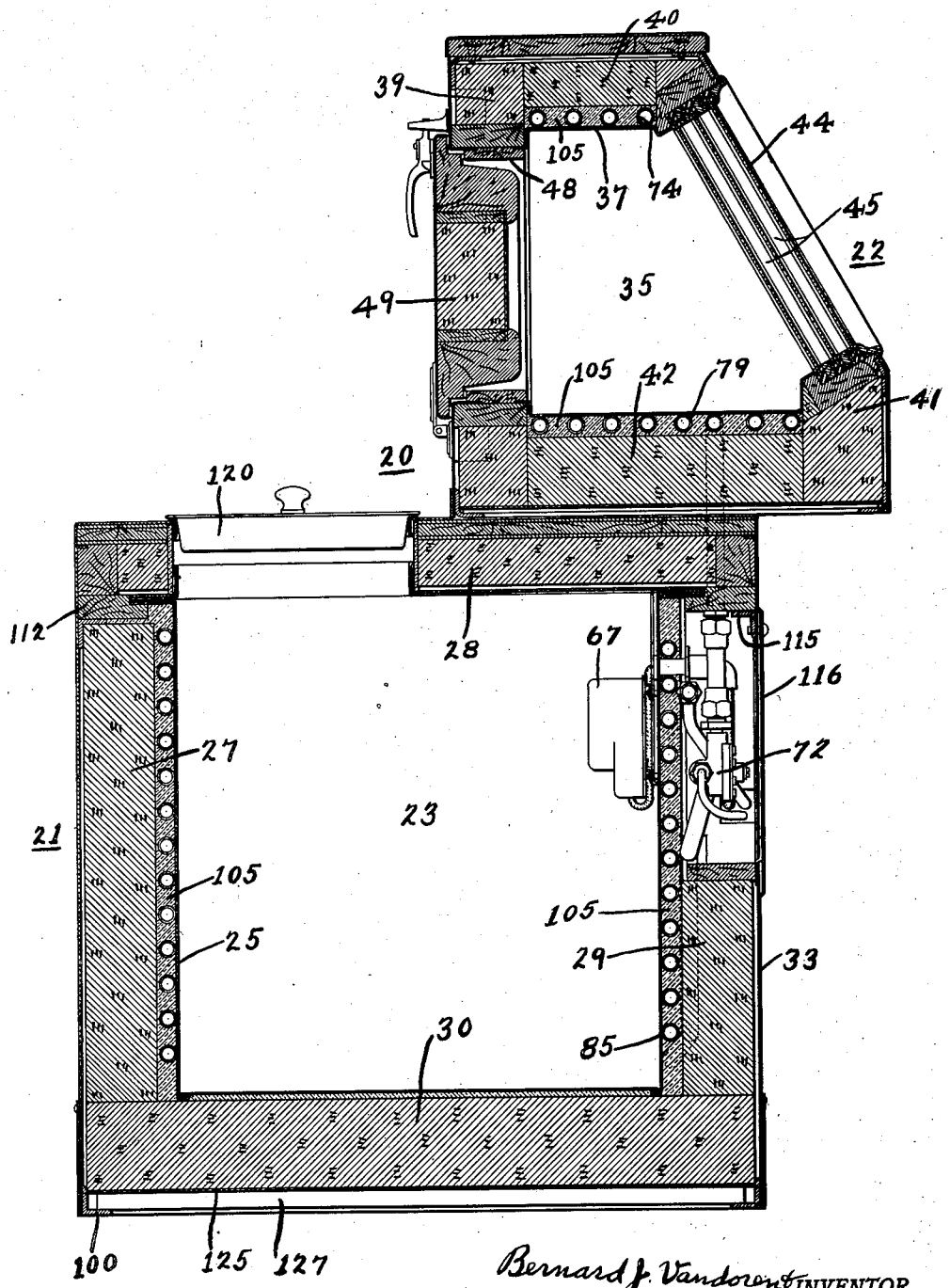


Fig. 4.

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REFRIGERATING APPARATUS

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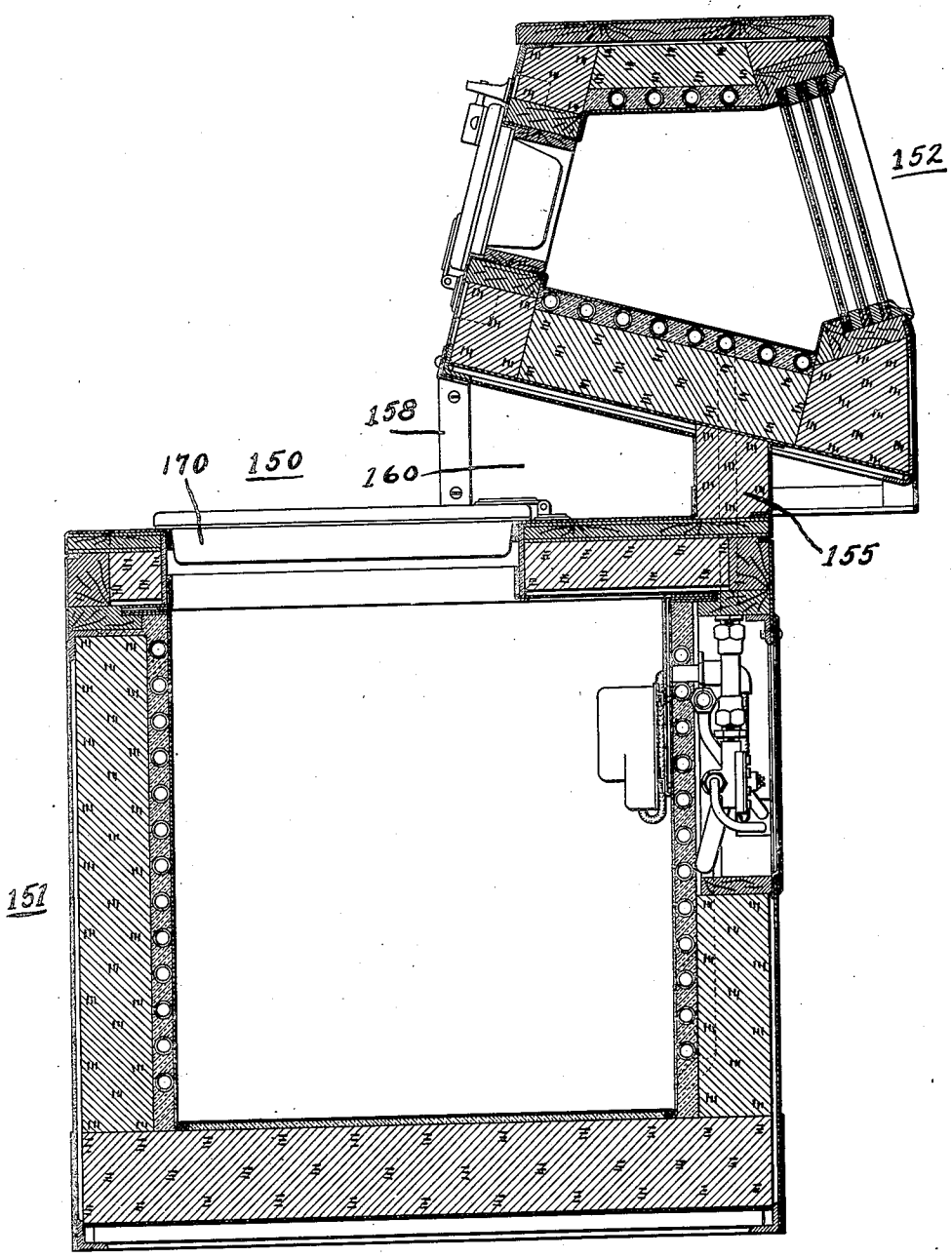


Fig. 5.

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REFRIGERATING APPARATUS

Filed July 31, 1930 4 Sheets-Sheet 4

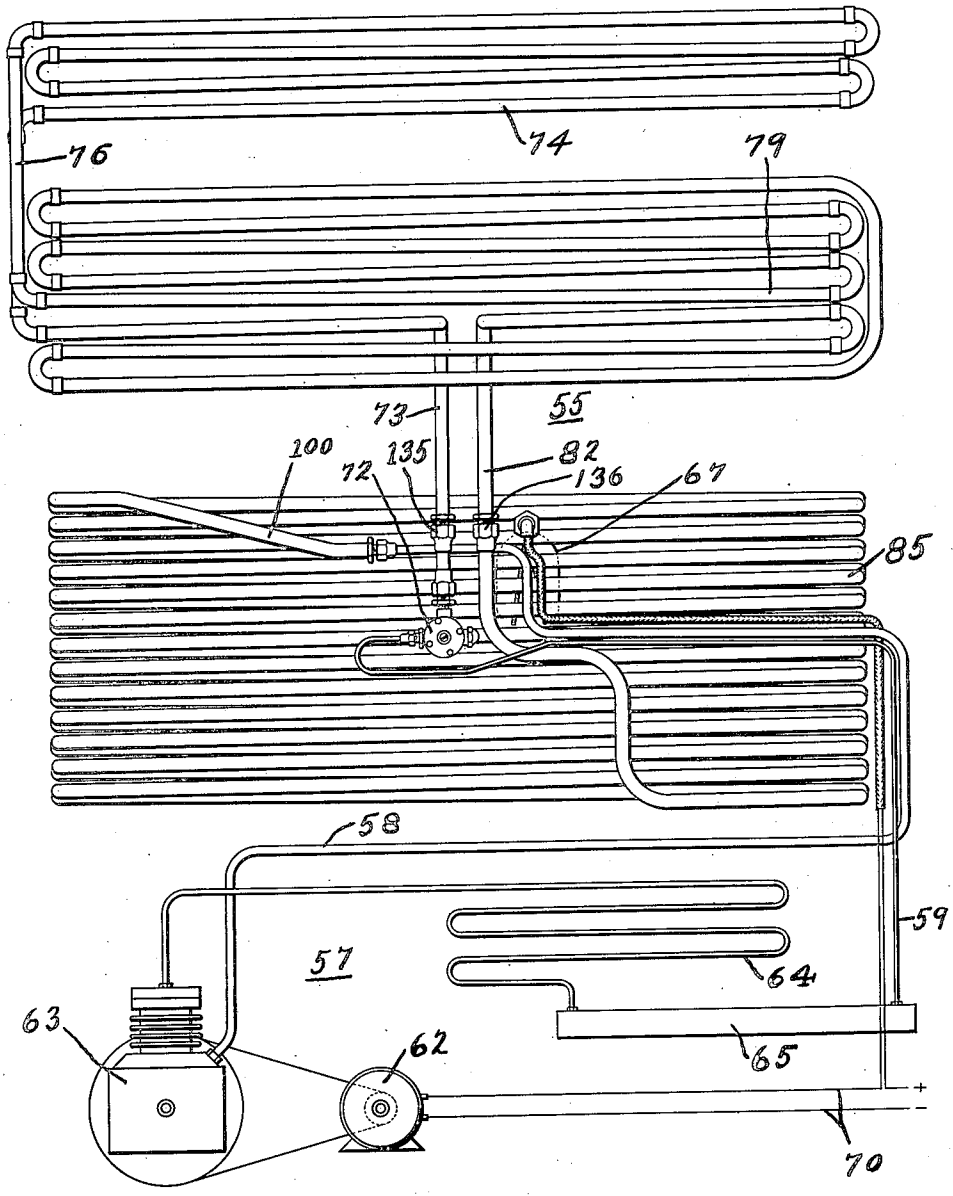


Fig. 6.

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UNITED STATES PATENT OFFICE

1,951,223

REFRIGERATING APPARATUS

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Application July 31, 1930, Serial No. 471,930

4 Claims. (Cl. 62—89.5)

This invention relates to refrigerating apparatus and more particularly to a refrigerator adapted for storing and displaying food articles for sale.

One of the objects of the present invention is to provide an improved refrigerator cabinet for storing and displaying food articles.

Another object is to provide a refrigerator cabinet which includes a storage compartment and a display compartment, and to provide improved refrigerating means for maintaining the temperature in said compartments below the freezing point of water.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings, wherein a preferred form of the present invention is clearly shown.

In the drawings:

Fig. 1 is a front plan view in elevation of the refrigerator cabinet embodying features of the invention;

Fig. 2 is a view in elevation taken from the rear of Fig. 1;

Fig. 3 is an end view in elevation of the cabinet shown in Fig. 1;

Fig. 4 is an enlarged view in cross section of the cabinet shown in Fig. 1, the view being taken on the line 4—4 of Fig. 1;

Fig. 5 is a vertical view in cross section similar to the view shown in Fig. 4, and showing a modified form of refrigerator cabinet; and

Fig. 6 is a diagrammatic illustration of a refrigerating apparatus employed for cooling the refrigerator cabinet.

In freezing food articles such as fish, poultry, meats and the like to an intense cold temperature it has been found that while a slow freezing of foods would tend to break down the cell structure of the articles that if the articles are frozen suddenly to a temperature of about —45° F. that the cell structure is not injured and when the article is thawed it will be in the same, if not better, condition than before it was frozen. While there may be adequate transportation facilities for shipping these frozen articles in packages yet the problem remains to provide an adequate refrigerator cabinet for storing and displaying these frozen articles.

This invention is concerned with a refrigerator cabinet for storing and displaying the frozen food articles in standard packages at temperatures below the freezing point of water to thus maintain the food articles in the frozen condition until sold. This invention further contemplates displaying the food articles in such a manner that they may be easily viewed by the customer and stored in a readily accessible storage compartment.

Referring to the drawings and particularly to Figs. 1 to 4 the numeral 20 designates in general a refrigerator cabinet embodying features of the invention. The cabinet 20 is constructed preferably of two major units, namely, a storage unit 21 for storing the frozen food articles and a display unit 22 for displaying the frozen food articles. The storage unit 21 is provided with a storage compartment 23 formed by a tank-like lining member 25. The storage unit 21 also includes insulated walls 27, 28, 29 and 30 and an outer casing 33. The display unit 22 is provided with a display compartment 35 formed by a lining member 37. The display unit 22 also includes insulated walls 39, 40, 41 and 42. The display unit is provided with a plurality of transparent glass panels 44 enclosing a plurality of dead air spaces 45. The display compartment is also provided with an opening 48 closed by hinged door 49.

In order to cool the compartments 23 and 35 to the desired temperature, for instance, a temperature below the freezing point of water we have provided a refrigerating apparatus of the type shown diagrammatically in Fig. 6. The refrigerating apparatus comprises in general a coiled evaporator 55 and a refrigerant liquefying unit 57. The refrigerant liquefying unit withdraws the gaseous refrigerant from the vapor conduit 58 and liquefies the refrigerant and delivers it to a liquid supply conduit 59. The condensing element may be of any desired type. For example, it may include the usual motor 62, compressor 63, condenser 64, and receiver 65. The motor is preferably controlled in response to the temperature in the storage compartment 23 by means of an automatic switch 67 located within the storage compartment 23 and which connects the motor 62 to the power mains 70. Automatic switches of this type are well-known to those skilled in the art and any switch having these characteristics may be used. The refrigerant liquefying unit 57 is adapted to supply refrigerant to the evaporator 55 under the control of an expansion valve 72 through pipe 73. The refrigerant is first expanded in coil 74 whence it passes through pipe 76 to coil 79 from whence it is directed to pipe 82 to coil 85. As shown in Fig. 4 the coil 74 is placed in engagement with the outer side of

the lining member 37 on its top side while the coil 79 is placed on the opposite wall of the lining member 37 and in engagement with the outer side of the bottom wall of said lining member. The coil 85 is wound around the tank-like lining member 25 for cooling the compartment 23. Refrigerant enters the coil 85 at the lowermost loop thereof and is directed upwardly through said coil whence it is withdrawn through pipe 100 which is connected to vapor conduit 58 for returning the gaseous refrigerant to the compressor 63. The coil 85 is in engagement with the tank-like lining member 25 and preferably the coil 85 as well as the coils 74 and 75 are soldered to the lining members 25 and 37 respectively.

In order to prevent condensation within the insulated walls of the refrigerator cabinet, the coils 74, 79 and 85 are hermetically sealed from the insulated walls by means of any suitable cement, preferably, bituminous cement such as hydrolene 105. Thus the hydrolene 105 by hermetically sealing the coils of the evaporator 55 will prevent the collection of moisture within the insulated walls of the refrigerator cabinet.

Referring more in detail to the drawings, the storage unit 21 includes an angle iron frame 110 which supports a wooden frame member 112 to which the tank-like lining member 25 is secured. The unit 21 is provided with an opening 115 closed by a removable panel 116. For the purpose of accessibility the expansion valve and evaporator fittings are located in the opening 115. If desired, suitable insulating material such as kapok (not shown) may be inserted around the valve and fittings in the opening 115. In order to arrange the storage unit in such a manner that the contents therein are readily accessible, a plurality of movable closure means 120 are provided in the top wall of the unit adjacent the rear of the display unit. A preferred method of manufacturing the storage unit is to secure the lining member 25 and frame 112 to the angle iron frame 100, insert the insulation 27 and 29 and then pour the hydrolene around the coil 85 which is secured to the lining 25. The insulation 30 is then placed in position and so held by the metal plate 125 which is supported by slats 127.

As shown in Fig. 4, the display unit 22 is mounted on the top of the storage unit and extends or overlaps said storage unit at the front part of the cabinet 20. This arrangement permits the customer to stand very close to the cabinet to view the articles displayed since the overlapping portion of the display unit provides ample foot room therebelow.

The display unit may be secured to the rest of the cabinet in any suitable removable manner preferably by screws (not shown) and may be separated from the coil 85 of the evaporator 55 by simply removing the evaporator fittings 135 and 136. Thus the display unit may be removed by removing said screws and turning the fittings 135 and 136 and then lifting the display unit upwardly until the pipes 73 and 82 clear the top of the storage unit.

Referring to Fig. 5 there is shown a modified form of refrigerator cabinet designated in general by the numeral 150. The cabinet 150 is provided with a storage unit 151 and a display unit 152. The display unit is mounted above the storage unit on a vertical wall 155 carried by the unit 151 and also supported by a metallic member 158. The metallic member 158, vertical wall 155 and top of the storage unit 151 provides a storage space 160 for articles between the two units. In this embodiment of the invention the lower wall of the display unit is obliquely disposed with reference to the plan of the storage unit. By this arrangement the bottom wall of the display unit provides a sloping shelf for the articles displayed to thus enable the customer to easily view said articles on display. As shown in Fig. 5, lids 170 are hinged to the storage unit and may be moved upwardly utilizing a portion of the space 160 thus enabling the use of larger lids than those used on the cabinet shown in Fig. 4.

In a refrigerator cabinet of the type herein described there are many advantages some of which are that the refrigerant may first be expanded in one compartment and then in the other to thus automatically maintain different temperatures in the separate compartments. Also the refrigerating apparatus is so arranged that the separate compartments will be cooled to the desired temperatures although the compartments are filled with standard packages containing the frozen food articles.

While the form of embodiment of the invention as herein disclosed, constitutes a preferred form, it is to be understod that other forms might be adopted, all coming within the scope of the claims which follow.

What is claimed is as follows:

1. A refrigerator cabinet comprising in combination a display unit and a storage unit, insulated walls for said units, lining members for said units, a coiled liquid refrigerant evaporator disposed between said insulated walls and said lining members and hermetically sealed from said insulation, said evaporator being in engagement with opposite sides of each of said lining members, and a refrigerant circulating element for supplying refrigerant to said evaporator, said refrigerant first being expanded on opposite sides of one of said lining members and then the other to thus maintain different temperatures in said units.

2. A refrigerator cabinet comprising in combination a display unit and a storage unit, insulated walls for said units, lining members for said units, a coiled liquid refrigerant evaporator disposed between said insulated walls and said lining members and hermetically sealed from said insulation, said evaporator being in engagement with opposite sides of each of said lining members, and a refrigerant circulating element for supplying refrigerant to said evaporator, said refrigerant first being expanded on the top side of one of the lining members, the bottom side of said member and then on opposite sides of the other lining member.

3. A combined display and storage refrigerator comprising in combination a lower storage compartment and an upper display compartment, said compartments being insulated from the atmosphere and from each other, said display compartment being located above and on the forward end of said storage compartment and having a transparent front wall and access openings in the rear wall, and means for cooling said display compartment comprising cooling coils embedded in the upper and lower walls of said display compartment, said lower storage compartment having access openings in its upper horizontal wall and cooling coils embedded in the walls of said storage compartment.

4. A display refrigerator comprising an insulated chamber having a transparent front wall and access openings in the rear wall, upper and lower linings of heat conducting material for said insulating chamber, and means for cooling said chamber, said means comprising cooling coils embedded in the upper and lower walls of said chamber, said coils being in thermal contact with the upper side of said upper lining and in thermal contact with the under side of said lower lining, substantially as described.

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