

- [54] **REFRIGERATED CABINET HAVING DETACHABLE FROST SHIELD**  
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 [73] Assignee: **Schaefer Corporation**, Minneapolis, Minn.  
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 [51] Int. Cl. .... **F25b 5/00**  
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[57] **ABSTRACT**

A refrigerated cabinet having a detachable frost shield which is easily removable for defrosting and quickly replaceable for further use. The frost shield has a panel which serves to cover a liner surface of a refrigerated wall in the cabinet. A mounting means is provided having one or more studs secured in a refrigerated wall so that the studs project from the liner surface thereof, and having a corresponding number of wedge-shaped embossments on the shield, the studs and embossments being placed in such a manner that they can be substantially aligned. As the frost shield is placed in a use position within the refrigerated cabinet, the embossments are engaged by the corresponding studs, thereby forcing the panel of the shield tightly against the liner surface. The studs and embossments can be quickly disengaged at a later desirable time to remove the frost shield for defrosting. The detachable frost shield can then once again be placed in the refrigerated cabinet for further use.

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6 Claims, 3 Drawing Figures

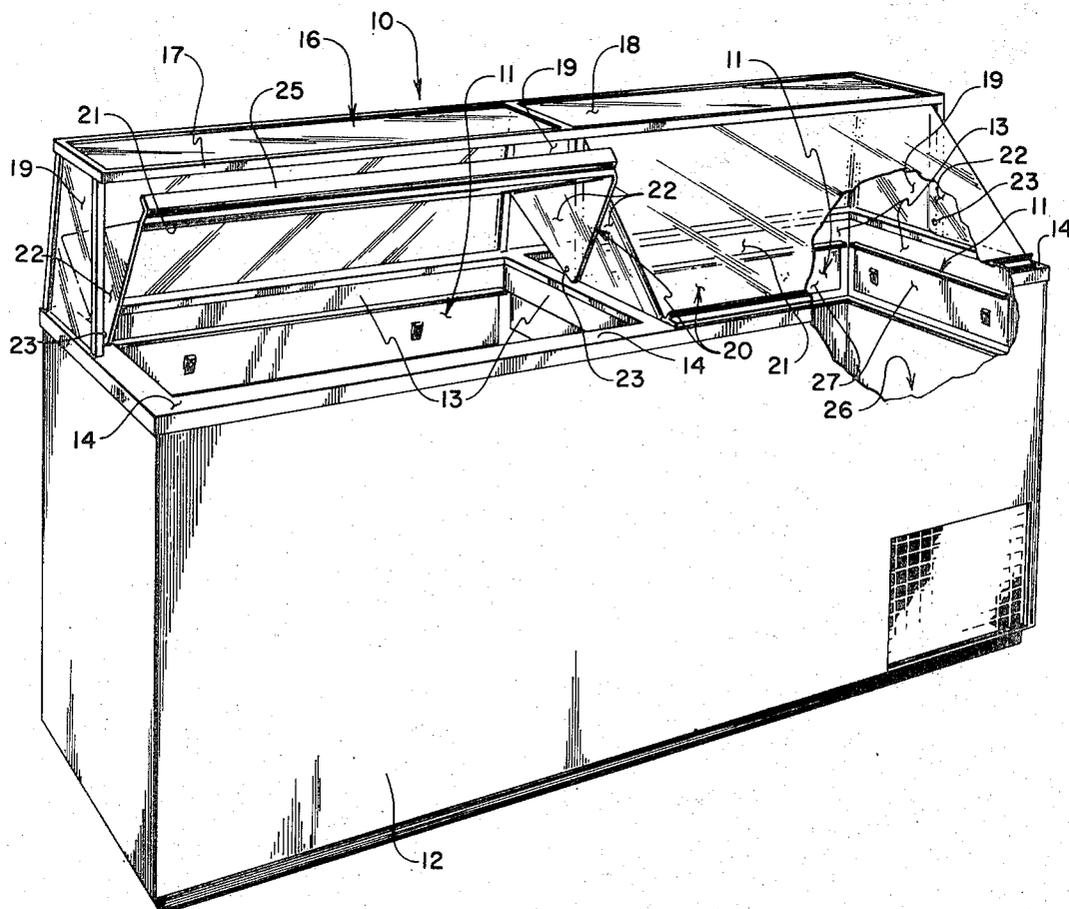


Fig. 1

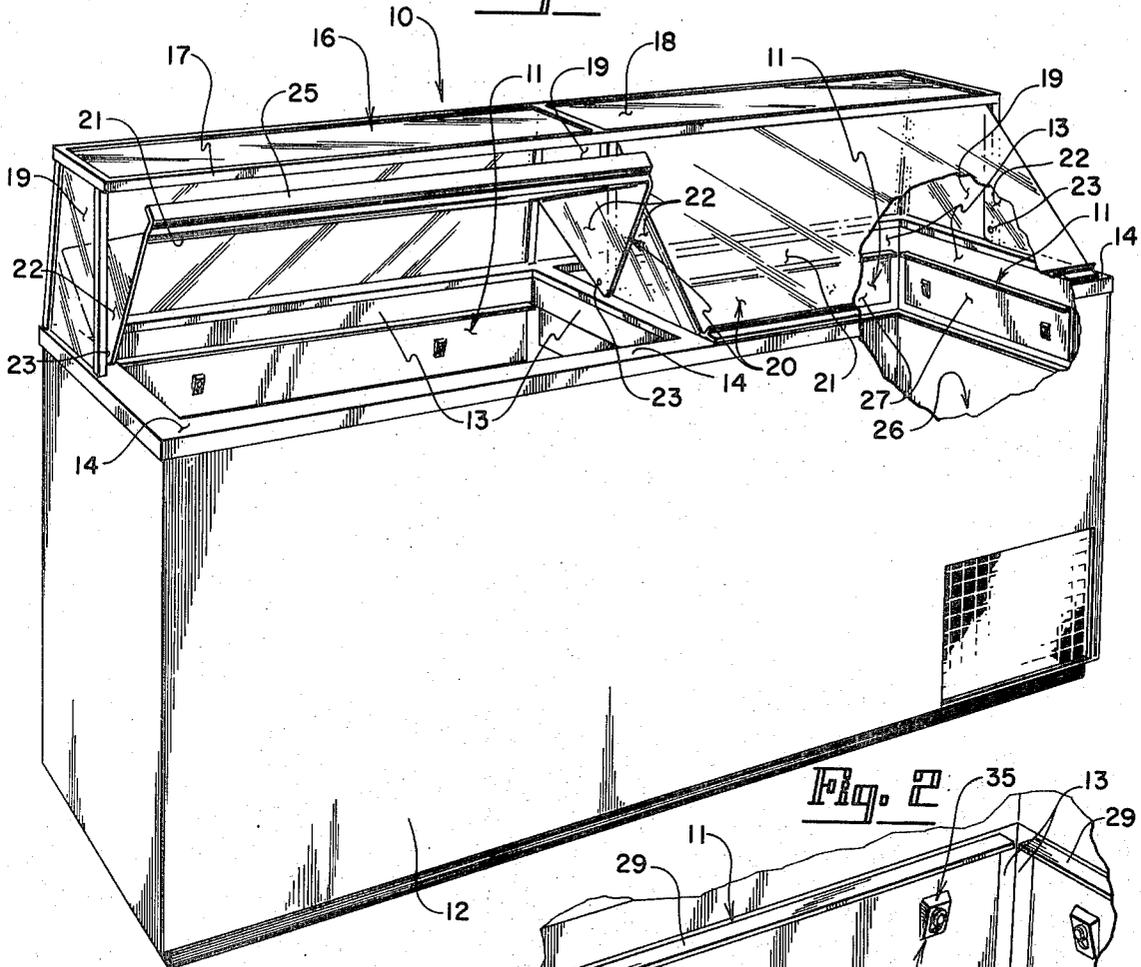


Fig. 2

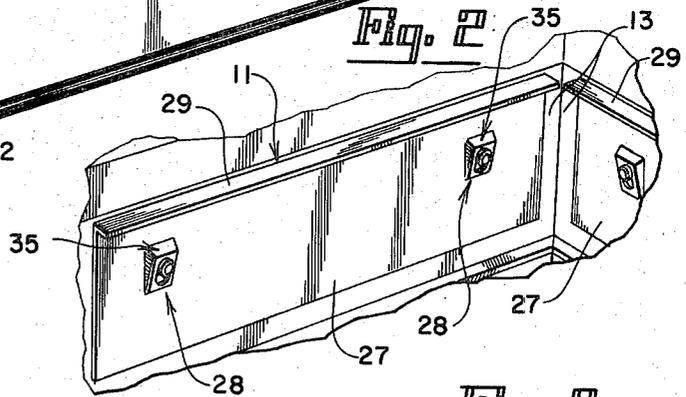


Fig. 4

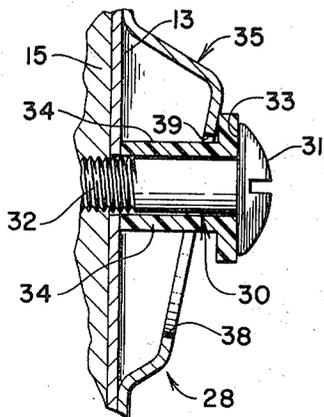
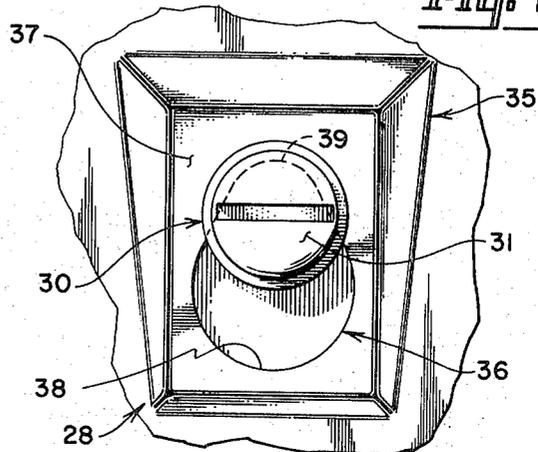


Fig. 3



## REFRIGERATED CABINET HAVING DETACHABLE FROST SHIELD

### BACKGROUND OF THE INVENTION

For many years, refrigerated cabinets were equipped with liner surfaces which were fixed against refrigerated walls. Large amounts of frost would collect on the liners during use, substantially reducing the operating efficiency of the cabinets. Since the liners were not removable, the only possible methods of removing the frost were either to temporarily suspend use of the refrigerated cabinet or to scrape the frost from the fixed liner surface, both of which proved to be quite unsatisfactory.

From a practical standpoint, it was often undesirable to suspend use of a refrigerated cabinet for the time necessary to melt the frost from the fixed liner surface by exposing it to the outside environment. This was especially true with regard to refrigerated cabinets used for commercial purposes, such as ice cream dipping cabinets, which are particularly susceptible to frost formation due to their frequent exposure during use to the saturated air of the warmer outside environment. It was usually necessary either to shift the contents of the cabinet to be defrosted to another refrigerated cabinet or to expose the contents of the cabinet to the outside environment. If the former course was chosen, a considerable amount of labor and inconvenience was involved. On the other hand, if the contents were exposed to the outside environment, the possibility that they would thaw and spoil was greatly increased. Also, removing the frost by this method posed the problem of disposing of the water deposited in the cabinet when the frost had finally melted.

The alternative of scraping the frost from the fixed liner surface was also undesirable, since it required considerable labor and inconvenience, and by its very nature the scraping proved to be a most difficult task. In addition, although the cabinet could be continued in use, the contents would often have to be shifted within the cabinet to make scraping of the frost from the liner surface and removal of the frost from the cabinet possible. However, an even more undesirable result was that the liner surface of the cabinet would often be damaged by use of the sharp instruments which were necessary to adequately perform the scraping operation.

In an effort to eliminate the disadvantage resulting from frost formation on the fixed liner surfaces of refrigerated cabinets, removable frost shields were developed. The purpose of the frost shields was to collect the frost on the surface of the removable shields rather than on the fixed liner surfaces.

Generally, frost shields have been mounted in cabinets by being hung loosely downward over the top edges of the fixed liner surfaces. A significant drawback to this type of arrangement has been the fact that the frost shields have not been firmly held against the liners. In practice, this has permitted frost to collect on the liner surfaces as well as on the frost shields.

As a result, use of this type of frost shield has reduced, but not eliminated, the adverse effects caused by the formation of frost on the fixed liner surface. Either a temporary suspension of use of the refrigerated cabinet, or scraping of the frost from the liner surface have remained periodically necessary to remove the frost buildup from the liner surface of the cabinet.

These undesirable methods of frost removal must still be followed on occasion to maintain the operating efficiency of the refrigerated cabinet.

### SUMMARY OF THE INVENTION

The present invention is concerned with a refrigerated cabinet having a detachable frost shield which is tightly held against a liner surface of a refrigerated wall in a cabinet while in use, and quickly removable for defrosting and replaceable for further use at times when defrosting is desired. The present invention is also concerned with a mounting means for a detachable frost shield to facilitate effective use thereof.

The detachable frost shield consists of a panel which serves to cover the liner surface of a refrigerated cabinet. Instead of being hung loosely downward over the top edge of the liner surface, as has been the practice in the past, when the frost shield of the present invention is placed in a use position in a refrigerated cabinet, the mounting means holds the shield tightly against the liner surface.

The mounting means of the present invention consists of one or more studs secured in a refrigerated wall so that the studs project from the liner surface thereof at appropriately chosen locations. Each stud has a head and a shank portion with the diameter of the heads being somewhat greater than the diameter of the shanks. The cooperating element of the mounting means is a corresponding number of embossments placed on the panel of the detachable frost shield at locations permitting substantial alignment of the embossments with the studs. The embossments are wedge-shaped with the wedges tapering outward from the liner surface toward the interior of the cabinet when the shield is in a use position. In the inclined surfaces of the embossments, and near the points where the outward tapers begin, there are openings somewhat larger than the diameter of the stud heads.

To place the panel of the frost shield in a use position within the cabinet, the detachable frost shield is placed so that the stud heads project through the openings in the inclined surfaces of the corresponding embossments. The openings narrow until near the point of maximum outward taper they are of a diameter approximately equal to the diameter of the stud shanks. By pushing downward on the panel of the frost shield, while having the stud heads projecting through the openings, the frost shield is wedged against the liner surface. This cooperation between the embossments and the studs serves to hold the frost shield tightly in place against the liner surface of the refrigerated cabinet during periods of use. Accordingly, substantially all of the frost formed within the refrigerated cabinet will be deposited, as desired, on the detachable frost shield rather than on the liner surface.

After a period of use, and a corresponding accumulation of frost on the panel of the frost shield, the detachable shield is easily removed from the cabinet for the purpose of defrosting. The process for removing the frost shield is exactly the reverse of that described above for placing it in a use position. The panel of the frost shield is simply pulled upward thereby reducing the wedging action caused by the engagement of the embossments and the stud heads. When the stud heads and the largest portions of the openings in the inclined surfaces of the embossments are in substantial alignment, the panel of the detachable frost shield is com-

pletely disengaged from the studs and removed from the refrigerated cabinet. The frost shield can then be washed in hot water to quickly remove the accumulated frost. When the frost shield is defrosted, it can once again be replaced in the refrigerated cabinet for further use.

It should be noted that the present invention permits uninterrupted use of the refrigerated cabinet during the brief period of time required for defrosting the detachable frost shield. In addition, removal of the frost from the refrigerated cabinet can be done at frequent intervals due to the ease with which defrosting can be performed. This permits the cabinet to always be used at, or near, peak operating efficiency. Also, it should be noted that the present invention substantially eliminates the problem of a frost buildup on the liner surface of the refrigerated walls in the cabinet. Thus, a refrigerated cabinet having a detachable frost shield of the present invention permits quick and simple defrosting with uninterrupted use. The frost shield prolongs the potential use of the refrigerated cabinet while at the same time making that use substantially more efficient.

Various other features and objects of the invention will be apparent from a consideration of the accompanying specification, claims and drawings.

#### BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of my refrigerated cabinet bearing the detachable frost shield with portions of the cabinet broken away to better show the placement of the shield on the liner surface;

FIG. 2 is a close-up perspective view of my detachable frost shield in a use position;

FIG. 3 is a frontal elevation of the mounting means showing both the wedge-shaped embossment and the stud in a use position; and

FIG. 4 is a transverse sectional view of the mounting means of FIG. 3.

#### DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIG. 1, the refrigerated cabinet 10 shown, except for the detachable frost shield 11 construction, is of a type commonly used commercially. The cabinet 10 is provided with an exterior body 12 and an interior liner surface 13, preferably of a metallic construction with an acrylic enamel finish. A handrail 14 of stainless steel is also provided. Finally, referring to FIG. 4, refrigerated walls 15 are provided behind the liner surface 13.

The body 12, refrigerated walls 15 and handrail 14 completely enclose the major components of the refrigeration system of the cabinet 10. The components include cooling coils disposed behind the refrigerated walls 15, a compressor, a condenser and an expansion device. Since the refrigeration components are of a type well-known in the art, they have not been shown.

The refrigerated cabinet 10, in the preferred embodiment shown in FIG. 1 for commercial use as an ice cream dipping cabinet, is provided with a glass canopy 16 having a front wall 17, a top wall 18 and a plurality of side walls 19. In addition, lids 20 having back walls 21 and triangular frames 22, preferably of a transparent plastic material such as Plexiglass, are provided. The triangular frames 22 have a manipulating member 25 secured thereto and extending therebetween and having pivotal mounting points 23.

The glass canopy 16 is permanently secured to the handrail 14 of the refrigerated cabinet 10 and is of a suitable size and design to permit easy customer viewing of the ice cream. The triangular frames 22 of the lids 20 are removably secured to the handrails 14 at the pivotal mounting points 23. The lids 20 are of suitable size and design so that the walls 21 and frames 22 engage both the canopy 16 and the handrail 14 when the lids 20 are in a closed position (right-hand lid in FIG. 1) in order to seal the interior 26 of the cabinet 10 from the outside environment. The pivotal mounting points 23 easily permit the lids 20 to be swung to an open position (left-hand lid in FIG. 1) when the operator must dip ice cream from the cabinet 10 by lifting manipulating member 25.

Within the cabinet 10, a plurality of detachable frost shields 11 can be seen. The frost shields 11 are attached to the liner surface 13 of the cabinet 10. The shields 11 are placed so as to cover locations susceptible to frost accumulation during use of the cabinet 10.

The reason for using a number of frost shields 11 rather than a single shield is to promote the ease and efficiency with which defrosting can be handled through use of the present invention. The size, number and location of the shields 11 can be varied to meet the needs of a particular refrigerated cabinet 10. The shape of the shields 11 shown in FIGS. 1 and 2 was chosen to facilitate easy removal, washing and replacement while at the same time maximizing the frost collection function of the shields. However, the representation of the detachable frost shields 11 is merely by way of example and not by way of limitation.

Referring to FIG. 2, the general design characteristics of the detachable frost shields 11 can more clearly be seen. They consist, generally, of a metallic construction covered with an acrylic enamel finish in the form of substantially planar panels 27. While many other finishes are acceptable, a material of the acrylic type is preferred because it is sanitary, durable and easy to clean. At intermittent points along the frost shields 11, mounting means 28 are provided. The spacing of the mounting means 28 is dependent upon the size and shape of the frost shields 11 which is, in turn, dependent upon the design of the particular refrigerated cabinet 10 being used. In any event, mounting means 28 are provided at appropriately selected points sufficient to hold the detachable frost shields 11 tightly in place against the liner surface 13.

In the preferred embodiment, as shown in FIG. 2, lips 29 are provided at the top edges of the panels 27. The lips 29 serve to stiffen the panels 27. In addition, the lips 29 provide a lifting surface which aids removal for defrosting and replacement for further use of the frost shields 11.

Looking more closely at the mounting means 28, reference should be made to FIGS. 3 and 4. In FIG. 4, the stud 30 and stud head 31 projecting from the liner surface 13 of the refrigerated cabinet can clearly be seen. The stud 30 has a threaded shank 32 which is threadedly engaged with the refrigerated wall 15 to hold the stud head 31 in the proper spaced relation with respect to the liner surface 13. Surrounding the stud 30 and the underside 33 of the stud head 31 is a flanged sleeve 34 of some soft material such as a suitable plastic. The flanged sleeve 34 is provided to prevent marring of the acrylic enamel finish on the frost shields 11 during engagement and disengagement of the stud therewith.

Referring back to FIG. 3, the wedge-shaped embossment 35 of the detachable frost shield 11 can be better understood. A tapered opening 36 is provided in the inclined surface 37 of the embossment 35. As FIG. 3 discloses, the lower extent 38 of the tapered opening 36 is slightly larger than the diameter of the stud head 31. Further up the inclined surface 37 the size of the opening 36 decreases. Finally, at the upper extent 39 of the tapered opening 36 in the inclined surface 37 of the embossment 35, the diameter of the tapered opening 36 roughly corresponds to the diameter of the stud shank 32 shown in FIG. 4.

When a detachable frost shield 11 is placed in the refrigerated cabinet 10, the largest portions of each of the tapered openings 36 in the inclined surfaces 37 of the embossments 35 are aligned with the corresponding stud heads 31. The stud heads 31 are then projected through the tapered openings 36. To place the frost shield 11 in a use position, the substantially planar panel 27 is then pushed downward by exerting a pressure on the lip 29 until the shank 32 portions of the studs 30 are engaged with the upper extents 39 of the tapered openings 36 in the embossments 35. When the shield 11 has been pushed into this position, the wedge-shaped embossments 35 acting against the stud heads 31 force the frost shield 11 into firm engagement with the liner surface 13 of the refrigerated cabinet 10. This same procedure is followed for each of the detachable frost shields 11 being used in a particular refrigerated cabinet 10.

After a period of use, with a corresponding buildup of frost on the frost shields, the shields 11 can be removed for defrosting. To do this, the process of placing the shields 11 in the refrigerated cabinet 10 is simply reversed. The shields 11 are pulled upward by using the lips 29. By this action, the embossments 35 are shifted to a position where the stud heads 31 are located at the lower extents 38 of the inclined surfaces 37 of the embossments 35. At this point, the tapered openings 36 in the inclined surfaces 37 are larger than the stud heads 31. The frost shields 11 can simply be lifted off the studs 30 and taken to a proper receptacle in order to remove the frost by washing with hot water. When the defrosting process is completed, the detachable frost shields 11 can once again be placed in the refrigerated cabinet 10.

Since there will be essentially no buildup of frost

under the detachable frost shields 11 to remove, during periods when defrosting is desirable the refrigerated cabinet 10 can be continued in use without the necessity of scraping frost from the liner surface 13. Therefore, the frost shields 11 can be taken out of the cabinet 10, defrosted, and replaced for further use in a minimum of time. Nothing else is necessary to completely defrost the cabinet 10. This dramatically cuts defrosting time and saves labor. As a result, frequent defrosting of the shields 11 is possible with a corresponding improvement of cabinet efficiency, decrease of operating cost, and longer life for the refrigerated cabinet 10.

While I have shown a specific embodiment of the cabinet for purposes of illustration only, it is to be understood that the invention is to be limited solely by the scope of the appended claims.

I claim as my invention:

1. A refrigerated cabinet having a refrigerated wall with a liner surface thereon on which frost would tend to collect, and a detachable frost shield having a substantially planar panel covering a frost susceptible portion of said liner surface, said frost shield having a mounting means detachably wedging said shield tightly in contact with said liner surface.

2. The refrigerated cabinet of claim 1 in which said frost shield has a mounting means having an embossment in said substantially planar panel of said shield in the form of a wedge, a tapered opening in the inclined surface of said embossment, and a stud threadedly engaged with said refrigerated wall of said cabinet and projecting from said liner surface in a manner enabling engagement of said stud with said tapered opening to detachably secure said frost shield tightly in contact with said liner surface.

3. The refrigerated cabinet of claim 2 in which said mounting means for said frost shield has a plurality of said embossments, tapered openings and studs.

4. The refrigerated cabinet of claim 1 in which there are a plurality of said frost shields disposed to cover frost susceptible portions of said liner surface.

5. The refrigerated cabinet of claim 1 in which said substantially planar panel has a lip positioned at the top edge of said panel.

6. The refrigerated cabinet of claim 1 in which said frost shield is metallic and has an acrylic enamel finish.

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