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PROCESS FOR RESTORATION OF BURNED OUT  
HERMETIC REFRIGERATION SYSTEM  
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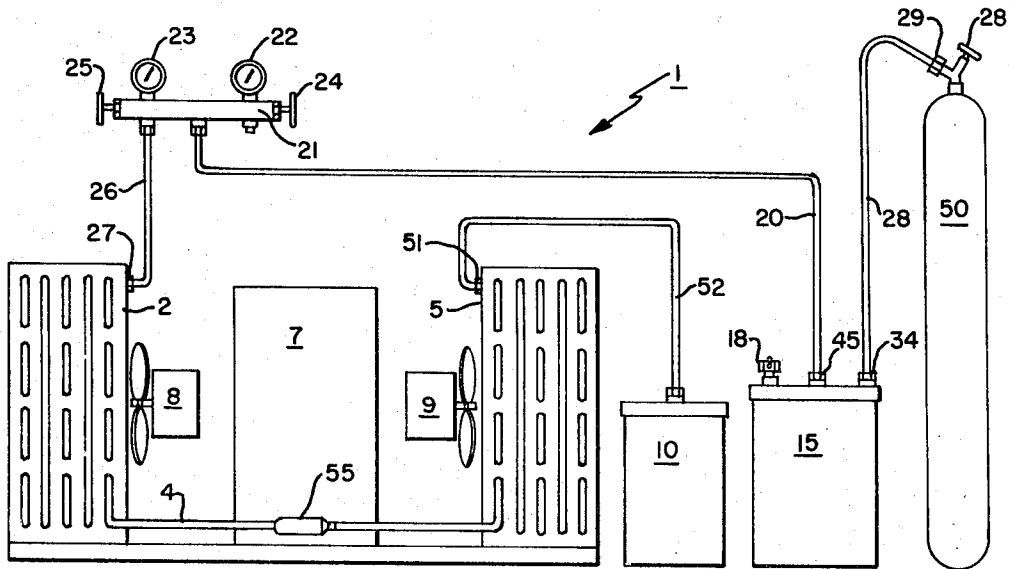


FIG. 1

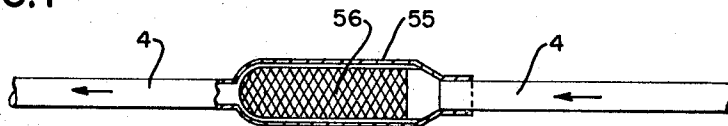


FIG. 2

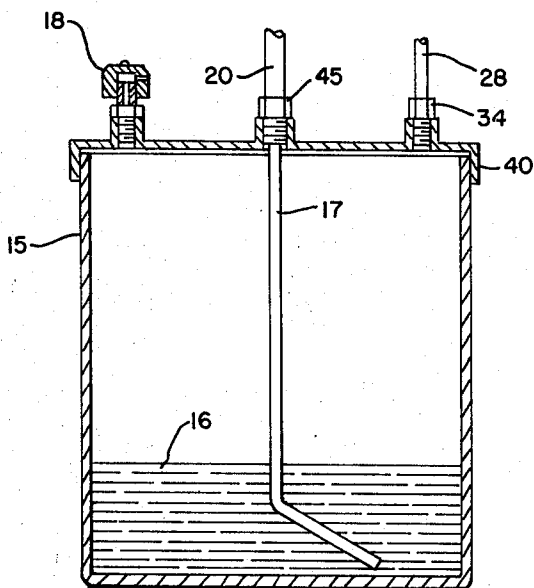


FIG. 3

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**PROCESS FOR RESTORATION OF BURNED OUT  
HERMETIC REFRIGERATION SYSTEM**William O. Alexander, 7018 Panama Drive,  
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3 Claims

**ABSTRACT OF THE DISCLOSURE**

Discloses a process whereby a burned out hermetic refrigeration system may be restored to use quickly and economically through the use of a counter current flow of cleaning refrigerant.

**FIELD OF THE INVENTION**

This invention relates to the field of refrigeration systems and more specifically to the cleaning and restoration of refrigeration systems after a motor compressor burnout. More specifically, this invention relates to the cleaning and restoration of a hermetic or sealed type refrigeration system in which a hermetic or sealed motor compressor is utilized.

**DESCRIPTION OF THE PRIOR ART**

Generally speaking, refrigeration systems are of two types, i.e., the accessible motor compressor type system and the hermetic or sealed system. In the accessible motor compressor system, such as that disclosed in my previous Patent 3,225,554, the motor compressor is accessible for service to the service man so that the motor compressor may be charged with more refrigerant, charged with more oil or completely cleaned periodically.

However, with the hermetic or sealed type system, the entire motor compressor unit is sealed from access at the factory and it is difficult to service such systems.

Accordingly, when there is a motor compressor burnout, there results a considerable amount of debris which passes throughout the system clogging up the straining devices and valves within the system, depositing acids and other materials onto the various tubes and valves in the system thus making the entire system completely inoperative. Installation of a new motor compressor into such a system would result in a burnout, since the debris in the system would cause overheating and failure of the motor compressor.

As a consequence, it has been extremely difficult to restore such systems to use after a motor compressor burnout due to the widespread contamination of acid, motor winding insulation and contaminated oil in the evaporator and condenser coils.

**SUMMARY**

According to the present invention, in the event of a motor compressor burnout, the motor compressor is removed, and a new motor compressor is installed into the system. However, prior to the installation of the new motor compressor, the system is completely cleaned by first evacuating the contaminated oil and refrigerant from the system, and thereafter charging from the suction side, a cleaning refrigerant which is forced countercurrently relative to the normal flow of refrigerant throughout the system and is recovered from the open tubing on the pressure side of the system. Thus, the cleaning refrigerant is forced through the strainers and capillary tubes countercurrent to the normal flow thus ridding the straining devices from particulate debris. The cleaning refrigerant is then strained and recycled throughout the system in each case countercurrent to the normal flow of refriger-

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ant until the system is completely cleaned. Normally, a fresh batch of cleaning refrigerant is then forced countercurrently through the system to complete the cleaning job prior to installation of the new motor compressor. At that time, i.e., the installation of a new motor compressor, the entire system is again charged with refrigerant and oil and placed back into operation.

**BRIEF DESCRIPTION OF THE INVENTION**

FIG. 1 is a side elevation of the apparatus of my invention in use with a stripped down air conditioning unit;

FIG. 2 is an enlarged view of a typical tube and strainer with the arrow indicating the normal flow of refrigerant;

FIG. 3 is a sectional view of my pressure injector, illustrating the various fittings.

**DESCRIPTION OF THE PREFERRED EMBODIMENT**

Referring now specifically to the drawings, a stripped down refrigeration unit 1 is shown as comprising an evaporator or expanding coil 2, which has been severed from the suction valve of the motor compressor unit (diagrammatically shown as 7). A connecting tube 4 extends between the evaporator coil 2 and the condenser coil 5. The condenser coil 5 has been severed from the pressure side of the motor compressor. The evaporator and condenser coils are both equipped with fans 8 and 9 in conventional manner.

The pressure injector 15, described in detail in my Patent 3,225,554, is connected via line 28 to pressure cylinder 50. The pressure injector consists of cleaning refrigerant canister 15, cleaning refrigerant 16, stem 17 and exhaust and pressure regulating valve 18. A pressure opening 34 is connected to conduit 28 which leads to a pressure tank of nitrogen or refrigerant 50. The top 40 of the canister also contains a liquid discharge fitting connected to conduit 20 by coupling 45 to convey cleaning refrigerant from stem 17 to the fluid manifold 21. Fluid manifold 21 contains pressure gauges 22 and 23 which are connected to manually controlled valves 24 and 25, respectively. In use of the standard fluid manifold in this application, valve 24 is always closed. Running from manifold 21 to the end of the evaporator coil 2 is line 26. Coupling 27 connects line 26 to the end of evaporator coil 2. As previously stated, the evaporator coil 2 is normally connected by connecting tube 4 to the condenser coil 5. The end of condenser coil 5 is connected by means of coupling 51 to line 52 which discharges into recovery receptacle 10.

As is shown in somewhat exaggerated detail, the coils contain a series of strainers 56, one of which is illustrated inside of the enlargement 55 of connecting tube 4. As is shown more specifically in FIG. 2, the strainer 56 consists of a fine mesh dead end tube, in which the open end is in the normal direction of travel (as indicated by the arrow) of refrigerant and oil throughout the system. In some instances, the expansion valve is a small cylinder capillary tube located between the connecting tube 4 and evaporator coil 2. Further, in some instances, small diameter straining tubes are used as substitutes for strainers or in conjunction with the strainers in various refrigeration units.

At any rate, during a motor burnout, pieces of insulation, motor winding, acids and other contaminants, both particulate and liquid, are dispersed throughout the system and tend to clog up the various straining devices, valves and tubes.

Therefore, by use of the apparatus of my invention, the cleaning refrigerant is added to the end of the evaporator coil 2 and is forced countercurrently to the normal flow of refrigerant so as to unclog and clear out the

lines and the material passing through the system, i.e. through the evaporator coil tube 2, through the connecting tubing 4 to the condenser coil 5, exits at the end of the condenser coil 5 into line 52 to be recovered in the receptacle 10. This cleaning refrigerant, containing some particulate solids, is then strained in order to be added to the pressure injector 15. Thereafter, pressure is added to the pressure injector 15 by manipulation of valve 28 so that refrigerant or nitrogen is forced through line 28 into the pressure injector 15 and thus the cleaning refrigerant 16 is forced through stem 17 into line 20 and into the manifold 21. By manipulation of valve 25, the refrigerant cleaner is then forced through line 26 into the end of the evaporator coil 2, and via connecting tubing 4 countercurrent to the normal flow of refrigerant through the strainer 56 to the condenser coil 5 and from the end of the condenser coil into line 52 to be recovered in receptacle 10.

This recovered material is then strained. Valve 28 is turned off and the pressure regulating valve 18 is opened to relieve the pressure in the pressure injector prior to removing the top 40. The strained cleaning refrigerant is then poured into the pressure injector canister 15, the top 40 is replaced and valve 18 is closed. Valve 28 is opened to again pressurize the pressure injector 15 and the process is again repeated. The process is repeated until the recovered material appears clean.

I have found it good practice to then load the pressure injector 15 with a clean new volume of cleaning refrigerant and to again repeat the procedure prior to the installation of a motor compressor. After the final cleaning, a new motor compressor is installed and connected by conventional methods to the end of the evaporation coil 2 on the suction side of the compressor and to the end of condenser coil 5 on the pressure side of the motor compressor. A suction is then drawn on the system and the system is evacuated of non-condensable gases according to conventional practice and the entire unit and system is recharged with oil and refrigerant and the unit is placed back in operation.

While it may appear that the procedure is somewhat complicated, I have found that a burned out system may be thoroughly cleaned in a matter of a few minutes so that the new motor compressor may be installed to place the entire system back into operation in a comparatively short time.

As many embodiments will occur to those skilled in the art from the detailed description hereinabove given, I do not wish to limit my invention to the specific details herein contained, except as to be in commensurate scope with the appended claims.

#### I claim:

1. A method of restoring burned out hermetic refrigeration systems comprising:

- (A) a burned out motor compressor, having a suction side and a pressure side;
- (B) a first coil connected to the suction side of said compressor, including an evaporator coil;
- (C) a second coil, including a condenser coil operatively connected at one end to said evaporator coil

and at the other end to the pressure side of said motor compressor;  
the improvement which comprises:

- (A) removing said burned out motor compressor;
- (B) pressurizing a closed container containing a cleaning refrigerant;
- (C) connecting said container to said first coil;
- (D) forcing said refrigerant cleaner through said evaporator coil and condenser coil in reverse direction to the normal flow of refrigerant in said system to clean said system;
- (E) recovering said refrigerant cleaner from said system on the pressure side;
- (F) installing a new motor compressor to said system and connecting said suction side of said motor compressor to said first coil and said pressure side of said motor compressor to said second coil;
- (G) purging non-condensable gases from said system and charging the system with new refrigerant.

2. A method of restoring a burned out hermetic refrigeration system, as defined in claim 1 which, prior to installing a new motor compressor, comprises the further steps of:

- (A) recovering said refrigerant cleaner from each pass through the system and straining said refrigerant cleaner;
- (B) depressurizing said container and returning said strained refrigerant cleaner to said container;
- (C) pressurizing said closed container;
- (D) connecting said container to said first coil, forcing said refrigerant cleaner through said evaporator coil and condenser coil in reverse direction to the normal flow of refrigerant in said system to clean said system;
- (E) removing said refrigerant cleaner from said system on the pressure side.

3. A method of restoring a burned out hermetic refrigeration system as defined in claim 1, which prior to installing a new motor compressor, comprises the further steps of:

- (A) pressurizing said closed container;
- (B) adding new refrigerant cleaner to said container and pressurizing said container;
- (C) connecting said container to said first coil;
- (D) forcing said new refrigerant cleaner through said evaporator coil and condenser coil in reverse direction to the normal flow of refrigerant in said system, and
- (E) removing said refrigerant cleaner from said system on said pressure side.

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