Jan. 5, 1943. G. P. DAIGER 2,307,113

REFRIGERATION

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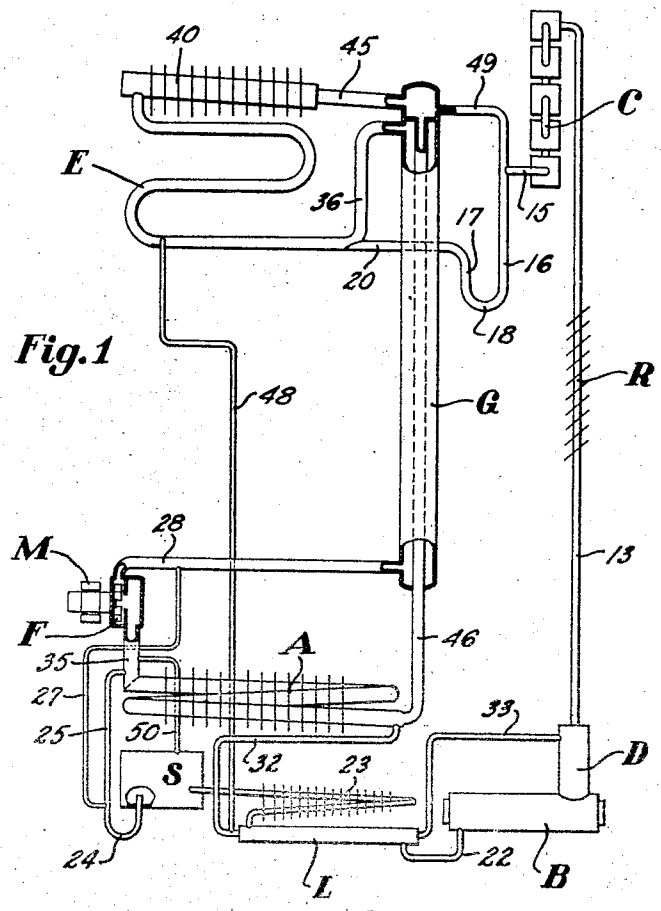


Fig. 1

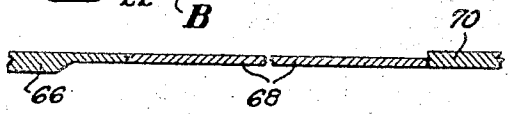


Fig. 3

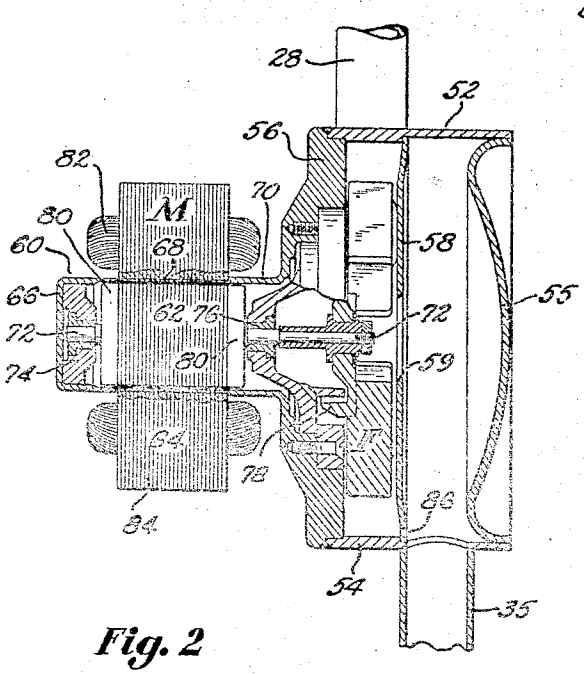


Fig. 2

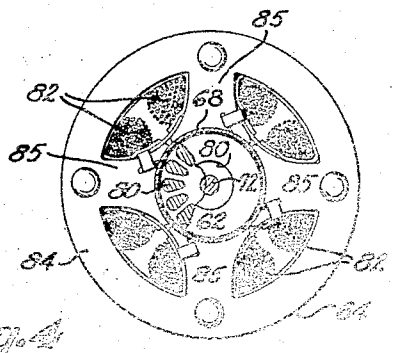


Fig. 4

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REFRIGERATION

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20 Claims. (Cl. 62—119.5)

This invention relates to refrigeration and more particularly to a three-fluid absorption refrigerating apparatus of the type using a power operated motor fan unit for circulating the mediums in the system.

In refrigerating apparati of this type using ammonia as the refrigerant and water as the absorbent the internal pressures within the apparatus are very high and may range from 250 pounds per square inch to over 400 pounds per square inch, depending upon the ambient temperatures involved and other operating conditions. It may also happen under certain abnormal conditions that the internal pressures may go to a much higher value.

The apparatus must therefore be sufficiently strong to withstand the high operating pressures involved under normal operation and also the higher abnormal pressures and at the same time be resistant to the corrosive action of the ammonia.

The use of a pressure equalizing medium renders it unnecessary to provide a large power unit for circulating the mediums, since there is only a small pressure head to overcome. It is therefore possible to circulate the mediums in such an apparatus with a motor fan unit developing only a few inches of water pressure difference between the inlet and outlet side and requiring only a few watts power input.

This small motor unit must be so related to the apparatus that it will withstand the high pressures involved and also be protected from the corrosive action of the ammonia. One way of doing this is to position the motor rotor and fan interiorly of the apparatus and the motor field structure exteriorly thereof. Due to the high pressures involved and the small size of the circulator unit required, this has been very difficult to accomplish in prior machines of this type.

It is therefore one object of this invention to provide an absorption refrigerating apparatus of the type using a pressure equalizing medium and a smoll motor fan unit for circulating the mediums in which the motor rotor and fan are positioned interiorly of the apparatus and the motor field is positioned exteriorly thereof which will withstand the high pressures involved while preserving the efficiency of the motor fan unit and in which the motor fan unit will be protected from the corrosive action of the mediums being circulated.

More particularly it is an object of this invention to provide an absorption refrigerating apparatus of the type above referred to in which the motor rotor and fan unit is positioned interiorly of the apparatus and its stator positioned exteriorly thereof, in which the rotor and stator are separated by a thin shell of high strength corrosive resistant magnetic material with end sections of high strength corrosive resistant nonmagnetic material joined to the shell and to the walls of the apparatus by welded joints and in which the stator structure is so positioned relative to the thin shell as to reinforce it against internal pressures.

In absorption refrigerating apparati of the type under consideration, some means such as a corrosion inhibitor is used to prevent the ammonia from attacking the metal of the boiler and the solution circuit. One such inhibitor is sodium chromate. This inhibitor has the property of reacting with iron to form a stainless steel surface which is resistant to further corrosion but has the disadvantage that it attacks other metals such as aluminum or other conductor bars and end rings for the induction rotor of the motor fan unit, some bearing materials and other parts of the motor fan unit.

It is therefore another object of this invention to provide an absorption refrigerating apparatus having a motor fan unit for circulating the mediums and using a corrosion inhibitor dissolved in the solution in which the motor fan unit is protected from coming into contact with the inhibitor.

Other objects and advantages of this invention will become apparent as the description proceeds when taken in connection with the accompanying drawing in which:

Figure 1 is a diagrammatic representation of a refrigerating system embodying the present invention;

Figure 2 is a longitudinal sectional view of the motor fan unit separated from the system;

Figure 3 shows the details of construction of the shell between the rotor and stator of the motor; and

Figure 4 is a transverse cross-sectional view through the motor rotor and stator.

Referring to Figure 1 of the drawing, there is disclosed a three-fluid absorption refrigerating system comprising a boiler B, an analyzer D, an air-cooled rectifier R, a tubular air-cooled vertically positioned condenser C, an evaporator E, a gas heat exchanger G, a tubular air-cooled absorber A, a solution reservoir S, a liquid heat exchanger L, and a circulating fan F which is driven by an electrical motor M.

The above described elements are intercon-

nected by various conduits to form a plurality of gas and liquid circuits constituting a complete refrigerating system to which reference will be made in more detail hereinafter.

The refrigerating system will be charged with a suitable refrigerant, such as ammonia, a suitable absorbent, such as water, a suitable inert pressure equalizing medium, such as nitrogen, and a corrosion inhibitor such as sodium chromate dissolved in the absorbent.

The boiler B will be heated in any suitable manner as by an electrical cartridge heater or by a gas burner as may be desired. The circulating motor M and the heater for the boiler B may be controlled in any suitable or desired manner.

The application of heat to the boiler B liberates refrigerant vapor from the strong solution contained therein. The vapor so liberated passes upwardly through the analyzer D passing backwardly and forwardly across staggered baffle plates (not shown) in counterflow relationship to strong solution flowing downwardly through the analyzer. Further refrigerant vapor is generated in the analyzer by the heat of condensation of absorption solution vapor generated in the boiler. The refrigerant vapor is conducted from the upper portion of the analyzer D to the upper portion of the condenser C through a conduit 13 which includes the air-cooled rectifier R wherein any vapor of absorption solution passing through the analyzer is condensed and returned to the analyzer through the conduit 13. The refrigerant vapor is liquefied in the condenser by heat exchange relation with atmospheric air and is discharged from the bottom portion thereof through a conduit 15 into a downwardly extending conduit 16. The bottom portion of the conduit 16 connects to the bottom portion of an upwardly extending conduit 17 through a U-bend 18. The conduit 16 is appreciably longer than the conduit 17 for a purpose to be described hereinafter. The conduit 17 opens at its upper end into a conduit 20 which discharges into the evaporator in a manner to be described more fully hereinafter.

The weak solution formed in the boiler by the generation of refrigerant vapor therefrom is conveyed from the boiler through a conduit 22, the outer pass of the liquid heat exchange L, and a conduit 23 into the solution reservoir S. The weak solution is conveyed from the solution reservoir S through a U-shaped conduit 24 opening into a vertically extending tube 25, of small diameter, forming a gas lift pump which discharges into the top of the absorber A. It is apparent that the top of the absorber is materially above the solution level normally prevailing in the boiler-analyzer reservoir system wherefore some means must be provided to elevate the absorption solution to the top of the absorber A. For this purpose a small bleed conduit 27 is connected to the discharge conduit 28 of the circulating fan F and leads to the junction of the conduits 24 and 25 which is below the solution level normally prevailing in the reservoir whereby the weak solution is elevated into the top of the absorber by gas lift action.

In the absorber the weak solution flows downwardly by gravity in counterflow to the rich pressure equalizing medium refrigerant vapor mixture flowing upwardly therethrough. The refrigerant vapor content of the mixture is absorbed in the absorption solution and the heat of absorption is rejected to the surrounding air by the air cooling fins which are mounted on the exterior walls of the absorber vessel. The strong solution formed in the absorber discharges into a conduit 32 which opens into the inner pass of the liquid heat exchanger L. From the inner pass of the liquid heat exchanger L the strong solution is conveyed to the upper portion of the analyzer D by conduit 33 whereby it flows downwardly through the analyzer in counterflow to upwardly rising vapor generated in the boiler.

The lean pressure equalizing medium refrigerant vapor mixture formed in the absorber A is taken from the upper portion thereof through the conduit 35 into the suction side of the circulating fan F in which it is placed under pressure and discharged through the conduit 28 into the outer pass of the gas heat exchanger G, through a downwardly extending conduit 36 into the bottom portion of the evaporator E.

The conduit 20 opens into the bottom portion of the conduit 36 whereby the liquid refrigerant supplied to the evaporator enters the same simultaneously with the pressure equalizing medium which is placed under pressure by the circulating fan F. The diameter of the conduits of the evaporator are relatively small whereby the pressure equalizing medium flows through them at a relatively high velocity. The rapidly flowing pressure equalizing medium sweeps or drags the liquid refrigerant with it through the evaporator into the box-cooling conduit 40 as the refrigerant is evaporating by diffusion into the pressure equalizing medium to produce refrigeration. In the conduit 40 the velocity of the inert gas stream is relatively slow by reason of the large diameter of that conduit and the liquid refrigerant flows therethrough by gravity. Any liquid refrigerant not evaporated in the evaporator will flow through conduit 45, the inner pass of the gas heat exchanger and pipe 46 to the bottom of the absorber so as not to interfere with the operation of the motor fan unit.

The rich pressure equalizing medium refrigerant vapor mixture formed in the evaporator is conducted therefrom into the inner pass of the gas heat exchanger G through a conduit 45. The opposite end of the gas heat exchanger G communicates with the bottom portion of the absorber A through a conduit 46. In the absorber A the rich pressure equalizing medium refrigerant vapor mixture flows upwardly in counterflow to absorption solution whereby the refrigerant vapor content of the mixture is absorbed by the weak solution.

The bottom coil of the evaporator E is provided with a drain conduit 48 which opens into the strong solution return conduit 32. The conduit 48 opens into the top portion of the bottom coil of the evaporator whereby it will not completely drain such conduit. The upper portion of the discharge conduit 15 of the condenser is vented through a vent conduit 49 into the inner pass of the gas heat exchanger G. The solution reservoir S is vented through a conduit 50 into the suction conduit 35 of the circulating fan.

The circulating fan F places the pressure equalizing medium discharged therefrom under a small pressure in the neighborhood of a pressure of 4½" of water. In order to prevent this pressure, which also prevails in the conduit 36, from being carried back through the condenser discharge conduit, the condenser and conduit 13 to the analyzer, the conduit 16 has been made appreciably longer than the conduit 17 whereby

a pressure balancing column of liquid is formed in the conduit 16 which extends above the point of connection between the conduits 17 and 20 a distance sufficient to overcome the pressure produced by the circulating fan F in the conduit 36.

Referring to Figures 2, 3 and 4 the motor fan unit comprises a fan casing 52 comprising an annular portion 54 with end plates 55 and 56 welded thereto. The interior of the fan casing is divided by a plate 58 into a suction chamber and a discharge chamber and has an opening 59 leading to the suction or eye side of the fan. Welded to the end plate 56 is a motor shell generally indicated at 60 which separates the motor rotor 62 and the motor field structure 64. The shell 60 is made up of three sections of annular form welded together in end to end relationship. The three sections comprise a cup-shaped end section 66, a central annular section 68 and an end annular section 70 which is welded to the end plate 56 of the fan casing.

The sections 66 and 70 are made of a chrome nickel alloy steel which has the approximate percentages of 18% chromium, 8% nickel and a low percentage of carbon. This steel has a very high tensile strength, is very resistant to corrosion by the ammonia in the system and is non-magnetic in that it has a high reluctance and low permeability.

The central section 68 is made of a chromium steel alloy having the approximate percentages of 16% to 18% chromium and a low percentage of carbon. This steel alloy has a very high tensile strength, is highly resistant to the corrosive action of ammonia and is magnetic in that it has a high permeability and low reluctance.

The motor rotor 62 is rigidly connected with the fan F by means of a shaft 72 supported at one end by a bearing assembly 74 in the cup-shaped section 66 and at the other end by a bearing assembly 76 suitably supported on the end plate 56 of the fan housing. The fan F may be made of aluminum or other metal not subject to attack by an ammonia atmosphere and includes a throwoff ring 78, the purpose of which will be described later. The rotor 62 is made of stainless steel laminations with cast aluminum conductor bars and end rings 80 for forming an induction rotor of a well known type. The motor field structure includes windings 82 and iron laminations 84 having a plurality of poles 85.

The central section 68 which lies between the rotor and stator of the motor is made extremely thin so as to reduce the effective air gap between the rotor and stator. This section is machined very accurately on the interior and exterior surfaces to provide a very small air gap between the rotor and shell and to provide a tight fit with the field structure 64.

Since the motor fan unit is located in that part of the inert gas circuit which leads from the top of the absorber to the bottom of the evaporator, it is evident that none of the liquid mediums in the system can reach the motor fan unit under normal operating conditions. Any liquid that might condense in the outer part of the gas heat exchanger G and tube 28 when the system is shut down will be immediately thrown off by the throw-off ring 78 and drain into the absorber through drain opening 86. None of the sodium chromate inhibitor in the solution circuit can ever reach the motor fan unit since this inhibitor is not vaporizable.

Hence, it will be clear that the inhibitor is restricted to the absorption solution circuit. Yet, by reason of the novel arrangement of parts, I am enabled to employ a motor driven pump to circulate absorption solution without any danger of the inhibitor or solution coming into contact with any part of the motor pump assembly.

Any liquid refrigerant which is not vaporized in the evaporator E will be led through the conduit 45, the inner pass of the gas heat exchanger G and the conduit 46 to the bottom of the absorber. It can therefore be seen that none of this liquid refrigerant can reach the motor fan unit which is in the other half of the pressure equalizing medium circuit.

Furthermore, any condensate which may collect in the outer passage of the gas heat exchanger or in conduit 28 is prevented from reaching the pump assembly since such condensate is drained off through bleed conduit 27.

Since the fan F only develops a pressure difference of a few inches of water, the motor M may be made very small with a power input of approximately 12 to 15 watts. It can therefore be seen that it is essential that the shell between the rotor and stator be made as thin as possible consistent with withstanding the pressures involved and at the same time have the best magnetic properties for the magnetic lines of force passing from the motor field structure to the rotor. In Figure 3, the section 68 which separates the rotor from the stator is shown enlarged but in actual practice its thickness is a few thousandths of an inch.

The making of the central section 68 of high strength stainless magnetic steel alloy is therefore very important since its high strength characteristics renders it suitable for withstanding the high pressures within the system, its corrosion resistant properties renders it suitable for resisting the corrosive atmosphere within the system and its magnetic properties renders it suitable for use as a part of the motor field structure itself. Since the field structure 64 is pressed tightly over the central section 68, it can be seen that the section 68 forms a part of the field structure itself as it forms a magnetic path for the magnetic lines of force from the field structure to the rotor in addition to performing its function as a part of the system walls.

In small fractional horse power induction motors of this type it has been found that if the adjacent tips of the poles are connected by a magnetic bridge that the motor has better running characteristics. As can be seen from Figure 4, the magnetic annulus 68, in addition to forming a part of the refrigerating system walls, forms a magnetic path for the lines of force from the field structure to the rotor and also forms a magnetic bridge between adjacent pole tips. This section therefore performs three separate and distinct functions in the complete system.

The non-magnetic sections 66 and 70 also perform two distinct functions in that in addition to forming part of the system walls they prevent magnetic flux leakage from adjacent poles of the field structure and also prevent magnetic flux leakage to other parts of the system itself.

The field structure 64 also performs a double function in that in addition to its magnetic function it supports the thin shell 68 against the high internal pressures within the system.

It can therefore be seen that this invention provides a refrigerating apparatus having a motor fan circulator unit for circulating the absorption solution, the inert medium and the refrig-

erant in various parts of the system without coming in contact with any of the liquid mediums within the system, which is inaccessible to the chromate inhibitor dissolved in the solution, in which the field structure is positioned exteriorly of the system whereby it cannot be attacked by the corrosive atmosphere, and which is separated from the motor rotor by a thin magnetic shell which performs magnetic functions as well as mechanical functions.

While I have shown but one embodiment of my invention, I do not wish to be limited to the particular structure shown and described but to include all equivalent variations thereof except as limited by the claims.

I claim:

1. An absorption refrigerating apparatus of the type using an inert pressure equalizing medium and subject to an internal pressure in excess of 250 pounds per square inch, in combination with a motor-fan unit for circulating the mediums in the apparatus, said motor-fan unit comprising a fan and motor rotor positioned interiorly of the apparatus and a motor field structure positioned exteriorly of the apparatus, a thin shell of high strength chrome-alloy steel having magnetic properties separating the motor rotor and field structure, an annular section positioned between the thin shell and other parts of the apparatus walls, and an end section positioned at the other end of the thin shell and closing the interior of the apparatus, said annular section and end section being of a high strength chrome-nickel alloy steel having non-magnetic properties and being joined to the thin shell and to the walls of the apparatus by welded joints, said field structure being so related to the thin shell as to reinforce it against the pressure within the apparatus.

2. An absorption refrigerating apparatus of the type using an inert pressure equalizing medium in combination with a motor-fan unit for circulating the mediums in the apparatus, said motor-fan unit comprising a fan and motor rotor positioned interiorly of the apparatus and a motor field structure positioned exteriorly of the apparatus, a thin shell of magnetic material separating the motor rotor and field structure, an annular section separating one end of the thin shell from other parts of the apparatus walls, and an end section positioned at the other end of the thin shell and closing the interior of the apparatus, said annular section and end section being of non-magnetic material and being joined to the thin shell and the apparatus walls by welded joints, said field structure being so related to the thin shell as to reinforce it against the pressure within the apparatus.

3. An absorption refrigerating apparatus, a boiler, an absorber and an evaporator, conduits connecting said boiler and absorber to form a closed circuit for circulating an absorption solution between the boiler and absorber, conduits connecting said evaporator and absorber to form a closed circuit for circulating a pressure equalizing medium between the evaporator and absorber, power driven means in the evaporator-absorber circuit for circulating the pressure equalizing medium in its circuit and utilizing a portion of said medium for circulating the absorption solution in its circuit, said power driven means comprising a motor-fan unit having a fan casing and a motor rotor casing communicating with and forming a part of said evaporator-absorber circuit and being positioned in that part of said circuit normally in accessible to the liquid mediums within the apparatus but subject to an accumulation of liquid mediums under certain conditions, said fan casing having means for draining any accumulated liquid away from the motor-fan unit and said motor rotor casing comprising three annular sections connected in end to end relation with each other and the fan casing by welded joints, the end sections being of non-magnetic material and the central section of magnetic material.

4. A shell for a fractional horse power induction motor for circulating a medium in an absorption refrigerating apparatus in which the rotor is subjected to the corrosive atmosphere and high pressure on the interior of the shell and in which the field structure is arranged externally of the shell, comprising, a cup-shaped member of non-magnetic strainless steel, a seamless annular section of annealed magnetic stainless steel integrally connected in end to end relationship to the open end of the cup-shaped member by a welded joint, and an annular member of non-magnetic stainless steel integrally connected in end to end relationship to the other end of the magnetic stainless steel section by a welded joint.

5. An induction motor for circulating a medium in an absorption refrigerating apparatus which is subjected to the corrosive atmosphere and high pressure on the interior of a casing and in which a multi-pole stator is positioned on the exterior of the casing, comprising, an integral shell for separating the rotor from the stator, said shell comprising two end annular sections of non-magnetic steel and a relatively thin central annular seamless section of magnetic steel joined to the end annular setcions by welded joints, a multi-pole field structure positioned over said thin central section so as to support it against internal pressure, and an induction rotor positioned for rotation on the interior of the shell with the rotor proper positioned at the central magnetic section, said magnetic section forming a bridge between the pole tips of the field structure to thereby improve the running characteristics of the motor as well as to form a portion of the enclosing casing for the rotor.

6. A hermeticaly sealed unit for operation under high pressures within the interior of an absorption refrigerating apparatus, comprising a casing of magnetic material, a closed end annular shell secured thereto by a welded joint, said shell comprising an end annular member and an inner annular member of non-magnetic steel connected by a thin annulus of seamless magnetic steel joined to the inner and end members by welded joints, a rotatable element in said casing, an induction rotor secured to said rotatable element for rotation therewith, the rotor proper being positioned in said shell at the thin annulus of magnetic steel, and a multi-pole stator positioned on the exterior of said thin annulus of magnetic steel so as to support it against internal pressure, said end annular member serving to form a part of the enclosing casing for the rotor and to prevent magnetic flux leakage across adjacent poles, said thin annulus of magnetic steel serving to connect adjacent pole tips by a magnetic path and also to form a part of the enclosing casing, and said inner annular section serving to prevent magnetic flux leakage from the field structure to the magnetic casing as well as to form a portion of the casing.

7. A hermetically sealed unit for operation un-

der high pressures within the interior of an absorption refrigerating apparatus comprising a casing of magnetic material, a closed end annular shell secured thereto by a welded joint, said shell comprising an end cup-shaped member and an inner annular member of non-magnetic steel connected by a thin annulus of seamless magnetic steel joined to the inner and end members by welded joints, a rotatable element in said casing, an induction rotor secured to said rotatable element for rotation therewith, the rotor proper being positioned in said shell at the thin annulus of magnetic steel, and a multiple pole stator positioned on the exterior of said thin annulus of magnetic stainless steel, so as to support it against internal pressure.

8. A closed end annular shell for separating the rotor and stator of an induction motor for circulating a medium in an absorption refrigerating apparatus comprising, a continuous annular wall in which the metal of the wall has molecular cohesion throughout, said wall being divided into an intermediate annular section of magnetic material and end annular sections of non-magnetic material.

9. An annular shell for separating the rotor from the stator of a dynamo electric machine for circulating a medium in an absorption refrigerating apparatus comprising, a continuous annular wall having an uninterrupted crystalline structure, said wall being divided into an intermediate annular section of magnetic material and end annular sections of non-magnetic material.

10. An absorption refrigerating apparatus, comprising a boiler, an absorber and an evaporator, conduits connecting said boiler and absorber to form a closed circuit for circulating an absorption solution between the boiler and absorber, conduits connecting said evaporator and absorber to form a closed circuit for circulating a pressure equalizing medium between the evaporator and absorber, power-driven means for circulating said pressure equalizing medium in its circuit and utilizing a portion of said medium for circulating the absorption solution between the boiler and absorber, said power-driven means comprising a motor fan unit having a rotor and a fan assembly hermetically sealed within the walls of the apparatus, a stator outside the walls of the apparatus and surrounding an annular section of the wall of the apparatus constructed to house said rotor, said annular section being made of stainless magnetic steel and being separated from and connected to other portions of the apparatus walls by an annular section of non-magnetic steel, said sections forming an integral part of the apparatus walls and having a continuous uninterrupted crystalline structure throughout.

11. An absorption refrigerating apparatus, comprising a boiler, a condenser, an evaporator and an absorber, the top of said evaporator being positioned above the bottom of the condenser, a conduit connecting the bottom of said condenser with the evaporator for leading liquid refrigerant thereto, conduits connecting said boiler and absorber to form a closed circuit to circulate solution between the boiler and absorber, conduits connecting the evaporator and absorber to form a closed circuit for circulating inert pressure equalizing medium between the evaporator and absorber, power-operated means for circulating mediums in their circuits, said power-operated means comprising a motor-fan unit having a motor rotor and fan assembly hermetically sealed with the walls of the apparatus, a motor stator outside the walls and surrounding said rotor, that part of the apparatus walls separating the motor rotor and stator being made of an annular section of magnetic steel and being separated from and joined to other parts of the apparatus walls by an annular section of non-magnetic steel, said sections forming an integral part of the apparatus walls and having a continuous uninterrupted crystalline structure throughout, and means for utilizing the pressure developed by the fan for circulating the absorption solution between the boiler and absorber and for moving liquid refrigerant along the evaporator.

12. In an absorption refrigerating apparatus, an evaporator and an absorber, conduits connecting the evaporator and absorber to form a circuit for circulating pressure equalizing medium between the evaporator and absorber and power-operated means for circulating said medium in its circuit, said power-operated means comprising a motor rotor separated from a motor field structure by a shell of stainless steel, said shell comprising a closed end section of non-magnetic steel, a thin annular section of magnetic steel between the rotor and stator and an annular section of non-magnetic steel separating the magnetic annular section from the remainder of the apparatus walls, the sections of said shell forming an integral portion of the refrigerating apparatus walls and having a continuous uninterrupted crystalline structure throughout, said field structure being positioned to assist said magnetic section in supporting the internal pressure of the apparatus, said magnetic annular section forming a part of the magnetic circuit of the field structure and rotor, and said non-magnetic section serving to prevent magnetic flux leakage between adjacent poles of the field structure and to other parts of the refrigerating apparatus.

13. In combination with a plurality of interconnected fluid circuits including a gaseous fluid circuit and liquid circuit having a part in common with said gas circuit, a motor-driven pumping means associated with said circuit operable to circulate both the gas and the liquid and having the internal moving elements located in a portion of the gas circuit inaccessible to liquid, said motor including an armature, a stator, an integral casing for said armature having a continuous uninterrupted crystalline structure throughout interposed between said armature and stator and including a magnetic section directly beneath the stator and non-magnetic sections on either side of the stator, said casing consisting of materials resistant to attack by the fluids being circulated.

14. In combination with a refrigerating system of the hermetically sealed type, said system including a casing having a continuous uninterrupted crystalline structure throughout subject on its interior to conditions within the system and forming an integral part of the walls thereof, a motor driven pumping mechanism housed by said casing and operable to circulate a medium within the system, said casing including an annular magnetic section interposed between two non-magnetic portions, a motor armature rotatably mounted within said annular section, a stator having a plurality of spaced poles mounted about said annular section exteriorly thereof and in such manner that portions of said section bridge the gap between adjacent poles with material of high permeability and low reluctance,

whereby portions of said casing are common to both said refrigerating system and to said motor.

15. In combination, an absorption refrigerating apparatus of the type subject to interior pressures in excess of 250 pounds per square inch and power means for circulating a medium in the apparatus, said power means including a multipole, fractional horse power induction motor having its field structure positioned exteriorly of the apparatus, its rotor interiorly of the apparatus and a casing having a continuous uninterrupted crystalline structure throughout separating the field structure and rotor and forming a part of the apparatus walls, said casing comprising a thin annular section of magnetic material separating the rotor and field structure and two end annular sections of non-magnetic material extending beyond the ends of the field structure and rotor, said field structure being pressed tightly over the thin annular magnetic section whereby the field structure supports the thin section against internal pressure as well as performs its electrical function, the thin annular section forms a part of the flux path of the motor and serves to form magnetic bridges between adjacent poles as well as serve as part of the apparatus walls and said end non-magnetic sections serve to prevent flux leakage between adjacent poles and other parts of the apparatus as well as serve as part of the apparatus walls.

16. An annular shell for separating the rotor and stator of an induction motor for circulating a medium in an absorption refrigerating apparatus comprising, a continuous annular wall having an uninterrupted crystalline structure throughout, said wall being divided into an intermediate annular section of magnetic material and end annular sections of non-magnetic material with a sharp line of demarcation between said sections, the metal between said sections being free of oxides.

17. A shell for separating the stator and rotor of a dynamoelectric machine for circulating a medium in an absorption refrigerating apparatus comprising, a unitary shell in which the iron of the end section is in an austenitic state and the iron of the central section in a ferretic state and in which the shell has a continuous uninterrupted crystalline structure throughout.

18. A unitary shell for separating the rotor and stator of a dynamoelectric machine for circulating a medium in an absorption refrigerating apparatus comprising, a steel shell in which the atoms of the iron in the end sections are so arranged that the end sections are non-magnetic and those of the central section so arranged that the central section is magnetic.

19. A motor for circulating a medium in an absorption refrigerating apparatus comprising, a casing, a rotor mounted for rotation in the interior of said casing and a stator pressed over the exterior of said casing, said casing comprising a closed end shell in which the metal of the shell has molecular cohesion throughout and said shell being divided into an intermediate annular section of magnetic material and end sections of non-magnetic material, said intermediate section being positioned immediately between said rotor and stator and said end sections being positioned outside the linear extent of said rotor and stator.

20. A motor for circulating a medium in an absorption refrigerating apparatus comprising, a casing, a rotor mounted for rotation in the interior of said casing and a stator pressed over the exterior of said casing, said casing comprising a shell having an uninterrupted crystalline structure throughout and being divided into an intermediate annular section of magnetic material and end sections of non-magnetic material with a sharp line of demarcation between the magnetic and non-magnetic material of said sections, said intermediate section being positioned immediately between said rotor and said stator and said end sections being positioned outside the linear extent of said rotor and stator.

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