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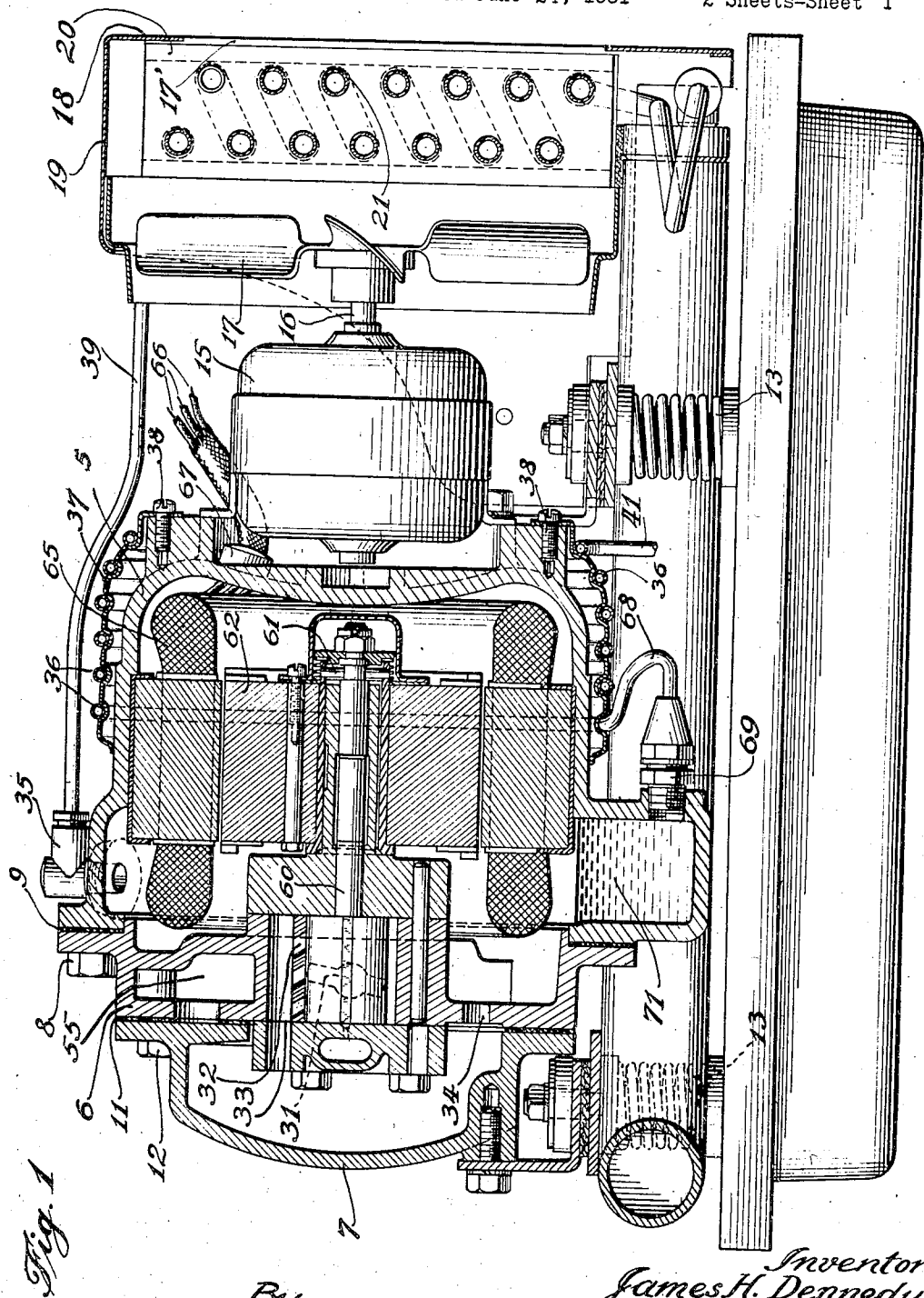
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1,970,033

FLUID COMPRESSOR

Filed June 24, 1931

2 Sheets-Sheet 1



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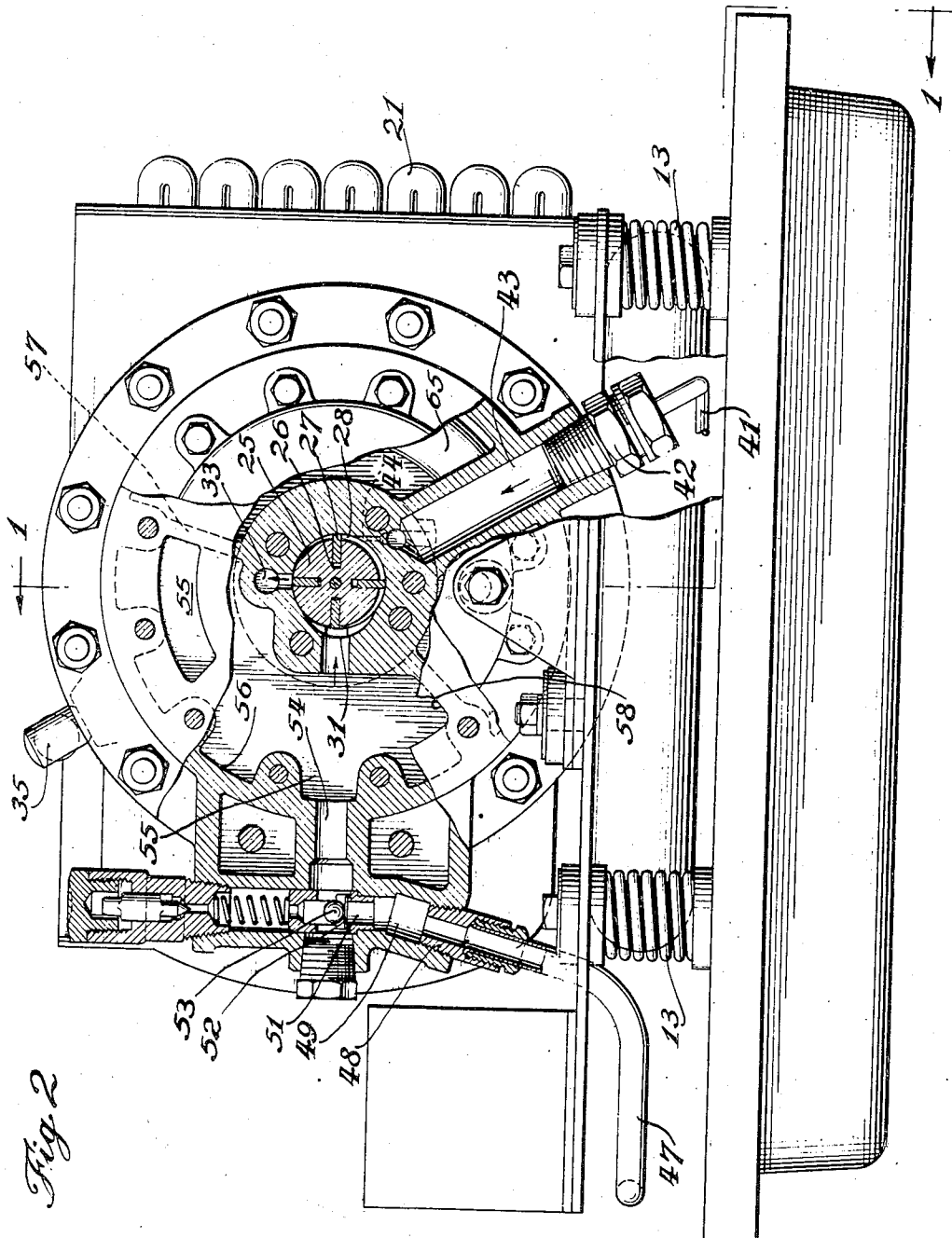


Fig. 2

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UNITED STATES PATENT OFFICE

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FLUID COMPRESSOR

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3 Claims. (Cl. 230—139)

This invention relates to fluid compressors and will be described as embodied in a compressor unit employing a rotary type compressor and an induction motor sealed within a casing.

In compressor units of the type in which the motor and rotary compressor are sealed within a casing, the interior of which is filled with refrigerant, gas and oil, it has been found very desirable to employ an induction motor. In order that an induction motor of satisfactory operating characteristics could readily start a compressor it is desirable that the load or starting resistance should be as small as possible to permit it being started with the least possible applied torque.

An object of my invention is the provision of means whereby the starting resistance including the load of the rotary compressor is greatly minimized to facilitate starting.

A further object is the provision of a compressor unit including means for causing equalization of pressures on both sides of the compressor when the compressor is at rest and providing means whereby the differential of pressures is caused to increase slowly for a sufficient period of time to permit the driving motor to attain substantially normal speed.

Other objects and advantages of my invention will become apparent from the following description.

In the accompanying drawings,

Fig. 1 is a longitudinal section through a compressor unit incorporating my invention and showing portions thereof in elevation; and

Fig. 2 is an end elevation of that shown in Fig. 1 with portions of the cover plate and the stator broken away and showing the compressor and some of the associated parts in section.

The compressor unit, as best illustrated in Fig. 1, includes a motor housing 5, a stator element 6 and a compressor cover plate 7. The housing 5 is secured to the stator 6 by bolts 8 and a seal is effected between the housing 5 and stator 6 by means of a gasket 9 extending around the circumference of the stator. Similarly a gasket 11 forms a seal between the stator 6 and the cover member 7 and is secured in position by bolts or cap screws 12. The compressor unit is resiliently supported by coil springs 13 which are secured to the housing 5 and the cover member 7 in the manner illustrated. On the forward end of the motor housing is mounted a fan motor 15 having a shaft 16 on which is mounted a cooling fan 17 adapted to draw air through the opening 17' in the condenser 18 consisting of a shell 19, fin members 20 and tubes 21 through which

refrigerant normally passes for being condensed after it has been compressed.

The compressor comprises a rotor 25 having slots 26 therein and compressor vanes 27 slidably mounted in the slots 26 and adapted to be forced outwardly against the inner surface of the cylindrical opening 28, in the stator 6, by centrifugal force for sweeping the surface and compressing gas which may be within the compressor. Gas is admitted to the compressor through the intake port 31 and is forced outwardly through the inclined exhaust ports 32 and the exhaust passageway 33 leading to the interior of the sealed casing. From the point of discharge into the cover member 7, the gas is adapted to pass through the port 34 through the lower portion of the stator 6 and thence through the motor housing and outwardly through the fitting 35, then forwardly through the conduit 39 and thence into the tubes 21 of the condenser.

For the purpose of lubricating the compressor, oil is forced through a conduit 41 through the fitting 42 into the passageway 43 and through the oil duct 44 into the cylindrical bore 28 of the stator where it is picked up by the compressor vanes and swept around the compressor, being discharged with the compressed refrigerant at 33. A portion of the oil, however, adheres to the compressor vanes 27 and passes completely around the compressor, lubricating the entire inner surface thereof.

Low pressure gas passes from the evaporator (not shown) through the conduit 47 through the fitting 48 and the passageway 49 and through the valve seat 51 upon which is supported a check valve element 52 normally held in place by the ball 53, which ball, however, is adapted to yield upwardly by the pressure of gas on the lower side of the valve element 52 to permit the gas to pass through the passageway 54 into the reservoir 55, which reservoir is formed entirely within a portion of the compressor stator and is defined by the outer wall 56 and the radially extending partitions 57 and 58. This reservoir has direct communication with the interior of the compressor only through the intake port 31 and is of such a capacity that when the compressor is started gas from the reservoir 55 will first pass through the compressor without the necessity of drawing gas from the conduit 47 until the pressure in the reservoir is considerably reduced, whereupon the check valve 52 will open and permit low pressure gas from the conduit 47 to enter the reservoir and thus to the compressor.

While the compressor is in normal operation

the pressure in the reservoir 55 is substantially the same as the pressure in the conduit 47. However, when the compressor ceases to rotate, the vanes 27 are no longer urged outwardly by centrifugal force against the interior of the compressor stator and high pressure gas will leak by the rotor gradually filling the reservoir 55 so that the pressure in the reservoir 55 becomes substantially equal to the pressure beyond the exhaust port 33. When the pressures become equalized the starting of the compressor is facilitated by reason of the fact that the only resistance to be overcome to start is friction, there being no difference of pressure between the suction and discharge side of the compressor. The reservoir 55 having a relatively large volume as compared with the suction volume of the pump, the pressure in this reservoir decreases very slowly permitting the prime mover, which in this case is an induction motor, to attain normal speed before an appreciable difference in pressure is established between the intake and discharge ports of the compressor.

The rotor 25 has formed integral therewith a shaft 60 extending into the motor housing and having a pin 61 extending therethrough and engaging a portion of the rotor 62 of the driving motor. For the purpose of causing rotation of the rotor 62 I have provided the usual motor winding 65 into which electricity may be conducted by conductors 66 which pass through a sealed bushing 67 leading into the motor housing.

The complete circuit of the lubricant is as follows: From the oil supply 71 in the bottom of the motor housing the oil passes through a coupling 69 and tubing 68 to a coil 36 comprising several convolutions wrapped about the motor housing on bracket strips 37 mounted at circumferential spaced intervals on the exterior of the motor housing by means of cap screws 38. From the last convolution of the coil 36 the tubing extends as at 41 (Fig. 1) to the coupling 42 (Fig. 2) where the oil enters the passage 43 leading to the duct 44 through which it passes into the bore of the compressor. The oil together with the refrigerant passes out through the discharge ports 32 and 33 into the expansion chamber formed by the housing 7. From the expansion chamber it passes through the opening 34 into the motor housing. The oil drops to the supply in the bottom of the motor housing, while the refrigerant passes out through the line 39.

The lubricant is caused to flow through this circuit because the discharge or high side pressure to which the supply 71 is subjected is greater than the pressure prevailing in the compressor chamber into which the duct 44 leads. The coils 36 are in line with the air stream induced by the fan 17, and the oil is thus cooled to keep it from building up to too high a temperature.

From the foregoing description of the mechanism which I employ and the manner of operation it will be understood that various modifications may be devised without departing from the principle of this invention as more specifically set forth in the accompanying claims.

I claim as my invention:

1. A refrigerant compressor unit for a refrigerating system, comprising a low starting torque motor, a rotary refrigerant gas compressor driven thereby and having an inlet and outlet, a housing enclosing and sealing the motor and compressor and means forming inlet passage from an expansion chamber of the system to the compressor inlet and including a check valve, and wall means in the casing forming a refrigerant reservoir in communication with the inlet passage between the check valve and the compressor inlet, the reservoir being of a volume which is greatly in excess of operating passage requirements and which will store sufficient refrigerant leaking back from the discharge side of the compressor during additional idle periods to permit the motor to assume substantially its operating speed before the compressor builds up a normal pressure differential, said wall means for the reservoir being in heat exchange relation between the compressor and the refrigerant within the reservoir.

erating system, comprising a low starting torque motor, a rotary refrigerant gas compressor driven thereby and having an inlet and outlet, a housing enclosing and sealing the motor and compressor and means forming inlet passage from an expansion chamber of the system to the compressor inlet and including a check valve, and wall means in the casing forming a refrigerant reservoir in communication with the inlet passage between the check valve and the compressor inlet, the reservoir being of a volume which is greatly in excess of operating passage requirements and which will store sufficient refrigerant leaking back from the discharge side of the compressor during additional idle periods to permit the motor to assume substantially its operating speed before the compressor builds up a normal pressure differential, said wall means for the reservoir being in heat exchange relation between the compressor and the refrigerant within the reservoir.

2. A refrigerant compressor unit for a refrigerating system, comprising a low starting torque motor, a rotary refrigerant gas compressor driven thereby and having an inlet and outlet, a housing enclosing and sealing the motor and compressor and means forming inlet passage from an expansion chamber of the system to the compressor inlet and including a check valve, and wall means in the casing forming a refrigerant reservoir in communication with the inlet passage between the check valve and the compressor inlet, the reservoir being of a volume which is greatly in excess of operating passage requirements and which will store sufficient refrigerant leaking back from the discharge side of the compressor during idle periods to permit the motor to assume substantially its operating speed before the compressor builds up a normal pressure differential, said wall means for the reservoir being in heat exchange relation between the compressor and the refrigerant within the reservoir, the reservoir being disposed arcuately about the compressor.

3. A refrigerant compressor for a refrigerating circuit comprising a compressor body having a cylindrical bore, a rotor journaled therein, a plate extending from the body at a normal to the axis of the bore, a cupped casing member secured at its outer edges to one side of said plate and constituting a compressor chamber in communication with the discharge side of the compressor, a second cup-shaped casing member secured at its edges to the other side of the plate and disposed with its open side facing the open side of the first mentioned cup-shaped member, a motor within the second member and drivingly connected to the rotor, said plate being hollow to provide a reservoir, and means forming a check valved inlet passage to the rotor, said reservoir being in communication with the passage and the reservoir being of such capacity as to store sufficient refrigerant leaking back from the discharge side of the compressor during idle period to permit the motor to build up to substantially its operating speed before the compressor builds up a normal pressure differential.

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