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W. HOELLE

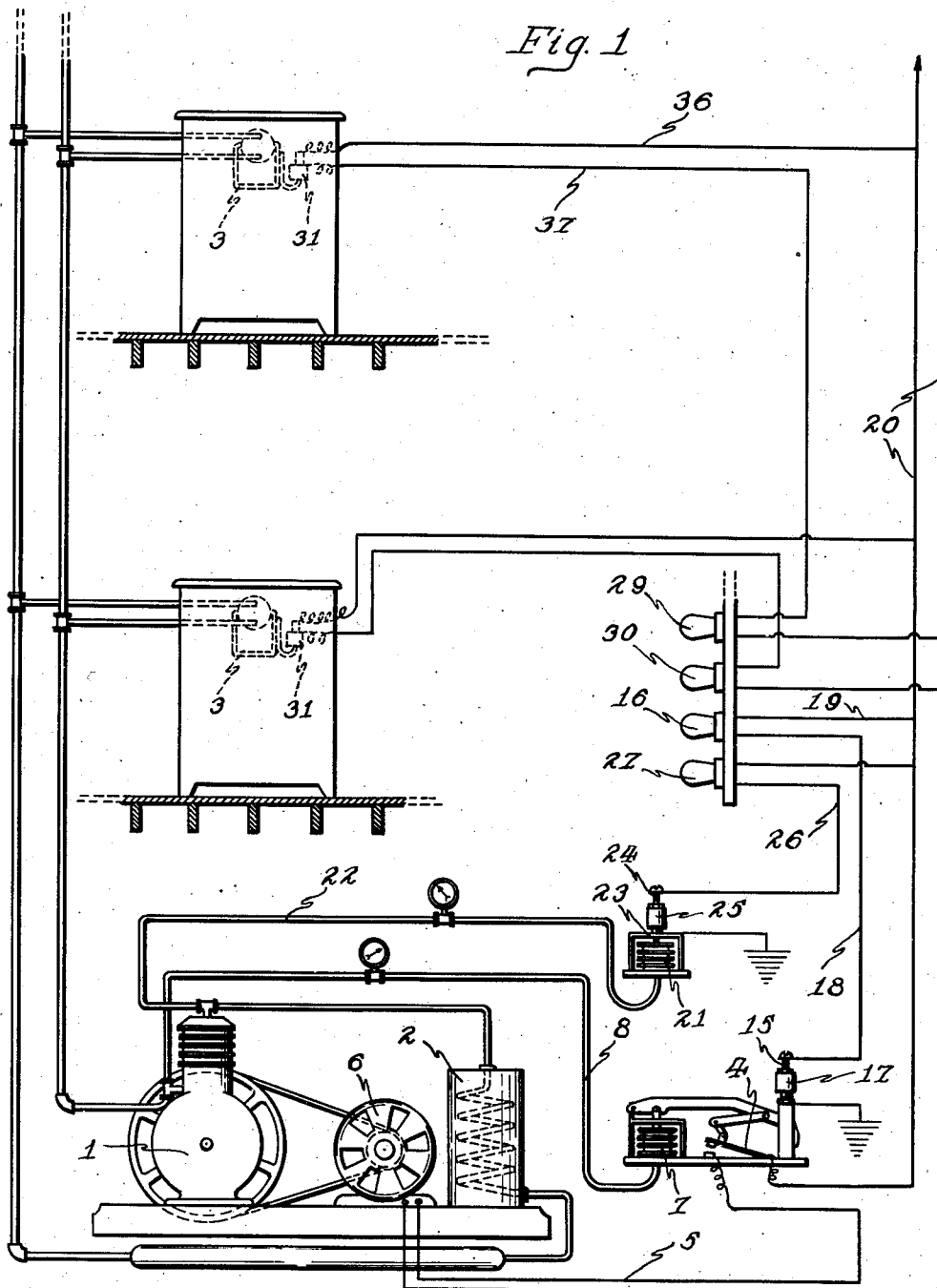
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REFRIGERATING MACHINE INDICATOR

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2 Sheets-Sheet 1

Fig. 1



Inventor
William Hoelle,
Summer Summer Woodworth,
Attys.

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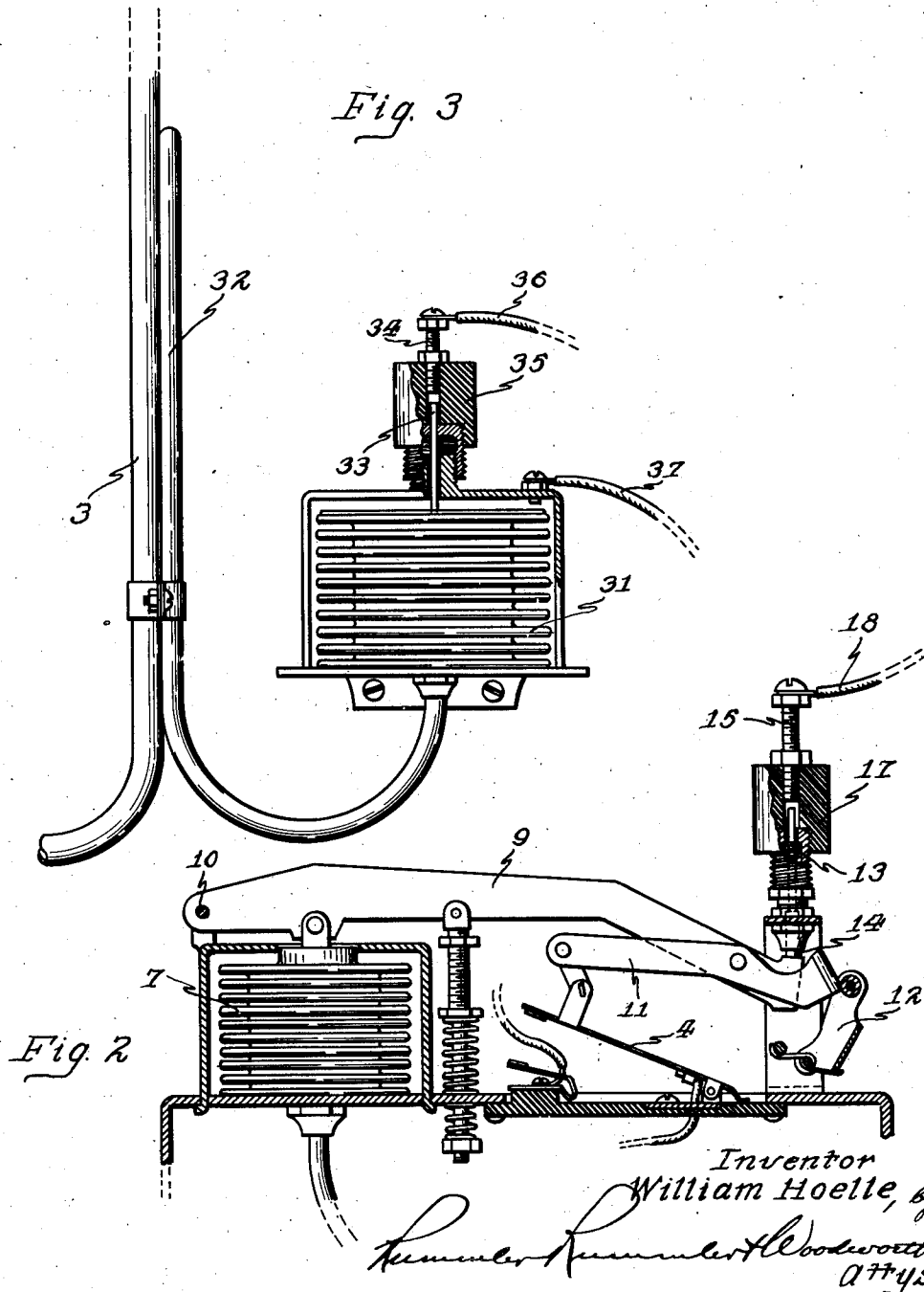
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2,054,542

REFRIGERATING MACHINE INDICATOR

William Hoelle, Chicago, Ill.

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3 Claims. (Cl. 62-4)

The purpose of this invention is to provide an improved arrangement of indicating devices responsive to abnormal conditions on the high and low pressure sides of a refrigerating machine for indicating the necessity of attention or repairing and to locate failures of individual cooling coils operated in multiple from a single compressor unit.

The purpose of the invention is accomplished by means of an arrangement as illustrated in the drawings in which:

Figure 1 is a diagrammatic view of a refrigerating machine shown, as having connections with distantly located cooling coils and arranged to operate indicating lights on a central panel according to the operative condition of the machine. The cooling coils also have separate connections to the indicating panel.

Fig. 2 is an enlarged detail partly in section, showing an expansion motor operated switch for the compressor motor and contact elements for the indicator which discloses normal or abnormal operation.

Fig. 3 is an enlarged detail partly in section of an expansion motor with indicator control contacts and for use in connection with cooling coils.

In the work of servicing refrigerator machines, it is found that much needless expense is occasioned the owners thereof due to delays in learning of failures of the machines. For instance, a compressing unit may be located in a basement while the cooling coils are on upper floors, and failure of a machine to operate correctly is only learned through observation of conditions in the refrigerators. Needless losses are occasioned due to the lack of a means for indicating at a convenient location normal or abnormal conditions in the system.

Dangerous conditions also result from use of refrigerating equipment, as at present manufactured, from many unforeseen possibilities having an immediate effect upon either the high or low pressure sides of the machine. Utilization of the pressure conditions is made in the improved arrangement for indicating normal or abnormal operation.

To accomplish the purposes of the invention, there is provided a central indicating panel having lights wired to pressure responsive devices on the high and low pressure sides of the refrigerating machine. Some of the lights are also connected with pressure responsive switches at the individual cooling coils. The contacting devices, for these lights indicating the condition

of the refrigerating machine, are arranged to send a momentary signal for each normal operation of the control switch for the compressor motor and to continuously signal a failure of the machine.

Figure 1 shows diagrammatically a refrigerating machine including a compressor 1 having the usual connections to a condenser 2 and individual refrigerating coils 3 arranged in multiple. Control switch 4 for the circuit 5 of the compressor motor 6 is subject for operation upon the action of an expansion motor 7 having conduit connections 8 with the low pressure side of the compressor.

The expansion device 7 operates a lever 9 pivoted at 10 and carries the lever 11 linked to the switch 4. The lever 11 coacts with a resilient quick-throw member 12.

The operation of the lever 9 is in accordance with pressure conditions on the low pressure side of the compressor and the throwing of switch 4 is nicely regulated to occur at some exact predetermined pressure by an adjustable spring 13 bearing down upon a plunger 14, resting upon the end of the lever. When the plunger 14 is pressed upwardly against the action of spring 13, it contacts with the lower end of a screw 15 when the switch is swung to closing position by action of member 12. This sets the compressor in operation and there is an immediate drop in the pressure within the expansion motor 7 and the lever 9 moves slightly downward, permitting spring actuated plunger 14 to move out of contact with screw 15.

The momentary engagement of plunger 14 with screw 15 serves to ground a circuit through lamp 16 and causes the illumination of the lamp for that short interval. Thus an indication is made of the normal operation of the switch.

Screw 15 is carried by an insulator 17 and the conductor 18 leads from the screw to lamp 16 and the circuit is from there completed through conductor 19 to one of the power lines 20.

In case the switch 4 is closed by a rising pressure in the expansion device 7 and the motor 6 fails or the compressor 1 fails to cause a drop in pressure on the low pressure side thereof, the lever 9 is held in its uppermost position and plunger 14 is held in contact with screw 15 and lamp 16 is continuously illuminated, thereby indicating failure of the refrigeration machine.

If an undue pressure occurs on the high pressure side for any reason, such as lack of circulation or failure of the cooling fluid, an expansion motor 21 connected by conduit 22 to the high

pressure side of the compressor lifts a plunger 23 carried by the motor into contact with screw 24. This screw is secured to the insulator guide 25 for plunger 23 and through the conductor 26 is connected with an indicating lamp 27. The circuit of the lamp is thus closed through grounding on the plunger 23.

The cooling coils 3 control the operation of signal lamps 29 and 30 and the lamps are lighted upon undue rise in temperature of these coils. For this purpose associated with each coil is an expansion motor 31 as illustrated in Figure 3. The motor contains an expansible fluid and communicates with a closed tube or bulb 32 filled with the fluid and clamped to the coil 3.

A rise in temperature of the coil 3 causes heat to be conducted to the expansible fluid and at a predetermined rise in temperature plunger 33 is lifted into engagement with contact screw 34. The screw is carried by the insulator 35 within which the plunger is slidable. Screw 34 is connected with a conductor 36 leading to one side of the power line and when contact is made the current may flow through the conductor 36, screw 34, plunger 33, the frame of the expansion device and by means of conductor 37 through an indicating lamp back to the opposite side of the line.

In the operation of the arrangement illustrated, the lamps 29, 30 and 27 are normally not illuminated. Also lamp 16 under normal conditions is only momentarily illuminated when the switch 4 is thrown to the "on" position. This is due to the periodical increase in pressure in the expansion device 7 at which time the lever 9 is lifted far enough to engage plunger 14 with contact screw 15; and as a consequence lamp 16 is illuminated but only until a drop in pressure on the low pressure side of the compressor, due to the operation of the compressor. The arm is thus drawn downwardly slightly and disengages plunger 14 from screw 15. But if the compressor fails to operate, the expansion device 7 remains expanded and illumination of lamp 16 continues.

In case of an undue rise in pressure in the high pressure side of the compressor, expansion device 25 moves plunger 23 into contact with screw 24 and lamp 27 is illuminated. In case of an undue rise in temperature of one of the cooling coils 3, the heat therein is communicated to the bulb 32 and the expansion of the fluid therein operates the thermostatic motor 31, causing a closing of one of the circuits for lamps 29 or 30, thus indicating what cooling coil is failing to function properly.

Although but one specific embodiment of this invention is herein shown and described, it is to be understood that details as set forth may be altered or omitted without departing from

the spirit of the invention as defined by the following claims.

I claim:

1. A refrigerating machine including a compressor and a condenser, a motor for driving said compressor, a switch mechanism for the motor including a switch, an operating lever and an expansion motor for oscillating said lever and thereby opening and closing the switch, said expansion motor having conduit connections with the low pressure side of the compressor, a separate contact device associated with said lever for operation thereby to make contact each time the lever comes in position for closing the switch, said lever being subject to decreased pressure upon the starting of the compressor to release said contact after the closing of the contact and to finally open the switch upon a continued decrease in pressure, said lever and expansion means also being arranged to hold said contact in contacting position during continued high pressure in the expansion device irrespective of the position of the switch operated thereby, an indicator, and circuit connections between said indicator and contact device.

2. In a system of the class described, a refrigerating machine comprising a compressor and an electric motor for driving the compressor, an expansion motor connected with the low pressure side of the compressor, a switch for the electric motor operated by said expansion motor, an expansion motor connected with the high pressure side of the compressor, contact devices operated by each of said expansion motors, and indicating means with circuit connections to said contact devices.

3. In a system of the class described, a refrigerating machine and a plurality of separate cooling units connected therewith, said refrigerating machine comprising a compressor and an electric motor for driving the compressor, a pressure operated switch for said motor, said switch being subject to the pressure on the low pressure side of the compressor, a contact device associated with said pressure-operated switch, said contact device being arranged to momentarily move to closing position each time the pressure operated switch is closed, an indicating circuit connected with said contact device and including a lamp; a circuit including an indicating lamp for each cooling unit, means for controlling each cooling unit circuit according to the temperature of the corresponding cooling unit; a circuit including a contact device and an indicating lamp for indicating the condition of the high pressure side of the refrigerating machine, and expansion means for operating said contact device, said expansion means being in communication with the high pressure side of said refrigerator.

WILLIAM HOELLE.