Aug. 26, 1958 H. A. PFEIFFER 2,849,577

TEMPERATURE PRESSURE CONTROL

Filed June 6, 1957

Fig. 1

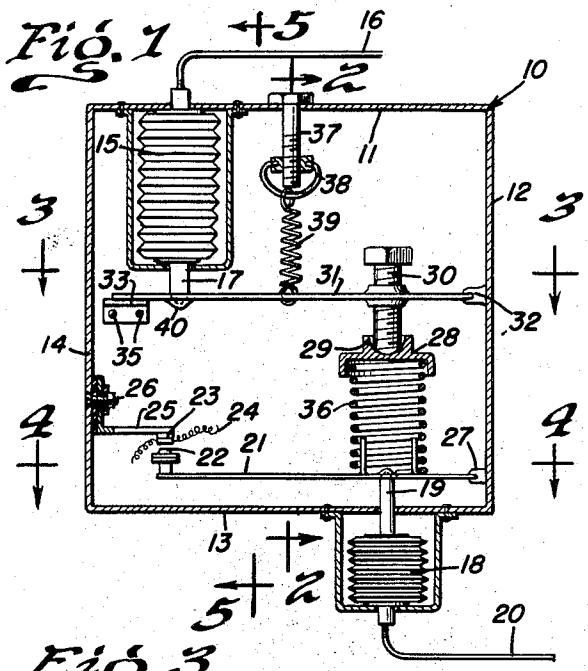


Fig. 2

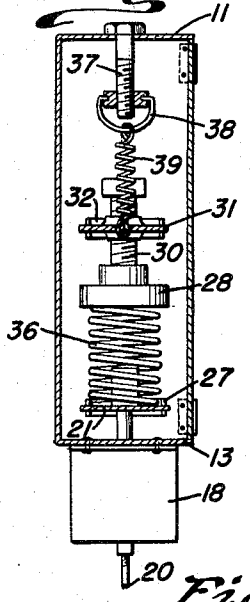


Fig. 3

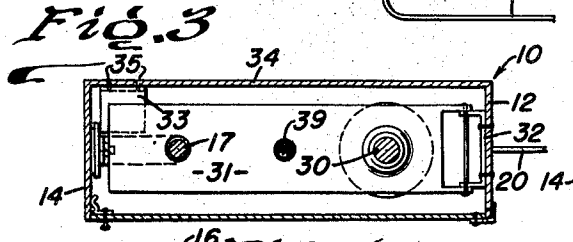


Fig. 4

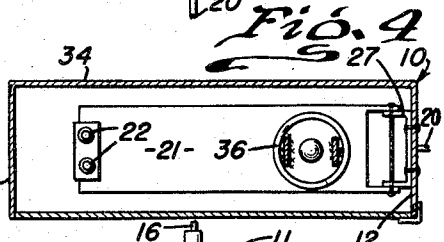


Fig. 6

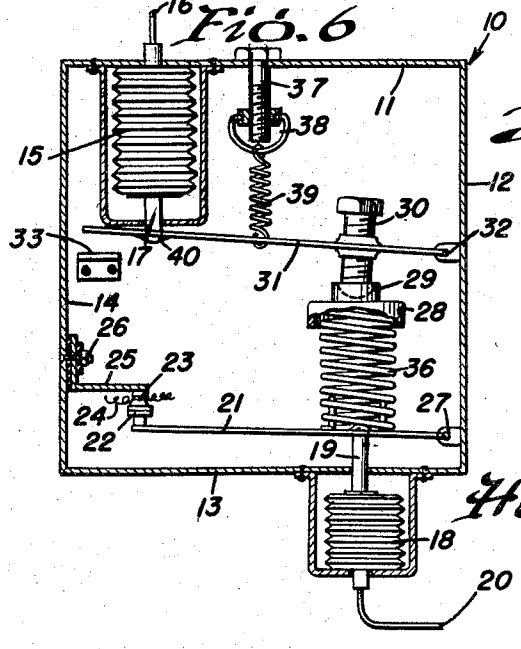
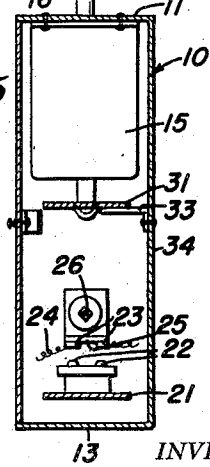


Fig. 5



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TEMPERATURE PRESSURE CONTROL

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3 Claims. (Cl. 200—140)

This invention relates to a control mechanism, and more particularly to a control mechanism for a refrigeration system.

The object of the invention is to provide a control unit for use with refrigeration systems that include units that are separated from each other so as to prevent the refrigeration units from becoming inoperative when the refrigerated fixture and refrigeration units are at different temperatures.

A still further object of the invention is to provide a temperature pressure control which will compensate for different weather conditions which may exist in an area surrounding a refrigeration unit and in the area surrounding a remote refrigerated fixture, so that damage or malfunctioning of the units will be prevented.

A further object of the invention is to provide a temperature pressure control for a refrigeration system which is extremely simple and inexpensive to manufacture.

Other objects and advantages will be apparent during the course of the following description.

In the accompanying drawings, forming a part of this application and in which like numerals are used to designate like parts throughout the same

Figure 1 is a longitudinal sectional view taken through the control unit of the present invention.

Figure 2 is a sectional view taken on the line 2—2 of Figure 1.

Figure 3 is a sectional view taken on the line 3—3 of Figure 1.

Figure 4 is a sectional view taken on the line 4—4 of Figure 1.

Figure 5 is a sectional view taken on the line 5—5 of Figure 1.

Figure 6 is a view similar to Figure 1, but showing the parts in adjusted or shifted position.

Referring in detail to the drawings, the numeral 10 indicates a hollow housing which is provided with walls 11, 12, 13 and 14. Arranged within the housing 10 is a first bellows 15 which has a conduit or tube 16 extending therefrom, and connected to the first bellows 15 is a first pin or finger 17.

Arranged externally of the housing 10 is a second bellows 18 which has a finger or pin 19 extending therefrom. The pin or finger 19 is connected to a movable bar 21. A tube or conduit 20 extends from the second bellows 18. The bar 21 is pivotally connected to the wall 12 of the housing 10 as at 27.

Carried by the free end of the bar 21 is a pair of contacts 22 which are mounted for movement into and out of engagement with a pair of stationary contacts 23, and the contacts 23 have electric wires 24 connected thereto. The contacts 23 are supported by a lug 25 which is secured to the wall 14 of the housing 10 through the medium of a securing element 26.

Arranged in engagement with the movable bar 21 is a coil spring 36, and a cap 28 is connected to an end of the coil spring 36. The cap 28 is provided with a socket 29, and a bolt or securing element 30 extends through a

movable lever 31 and into engagement with the socket 29 of the cap 28. The lever 31 is pivotally connected to the wall 12 as at 32, and a stop member 33 is provided for limiting pivotal movement of the lever 31. The stop member 33 is adapted to be secured to a wall 34 of the housing 10 by suitable securing elements 35.

As shown in Figures 1 and 6, a suitable securing element such as a bolt 37 extends through the wall 11 of the housing 10, and a bracket 38 serves to connect a coil spring 39 between the bolt 37 and the movable lever 31.

The tension on the spring 39 can be adjusted by rotating the element 38 on the bolt 37, and the small spring 39 serves to make the control more sensitive.

The control unit of the present invention is especially suitable for use with commercial refrigeration of the type that includes remote installations. In a refrigeration system wherein the refrigerated compartment or fixture is in a store building or warm room, and wherein the refrigeration unit is on the outside of the building in a cold temperature, the pressure of the refrigerant is at a lower pressure in the unit than in the fixture but the pressure will equalize in the system and if it is lower than the temperature control setting, the refrigeration unit will not start and the temperature in the fixture gets too warm. The control of the present invention corrects this condition.

Furthermore, the temperature control of the present invention will eliminate service calls for persons using the refrigeration units as when in the past it has been necessary to have service calls in order to adjust the control when the weather gets cold and then when the weather warms up it was necessary to readjust the device. In the past some people have covered the units up and then forgot to uncover the unit as the weather gets warmer which caused the unit to overheat and often cause damage thereto.

It is known that refrigeration units become inoperative when the unit is a remote installation and when the unit is at a colder temperature than the refrigerated fixture which is being cooled, with the low pressure controls now in use, but the control of the present invention will eliminate or rectify this condition.

The numeral 10 indicates the box or housing while pivotally mounted in the housing 10 are the bar 21 and lever 31. The stop member 33 is adapted to be used for limiting pivotal movement of the lever 31 and the numeral 15 indicates the high pressure bellows which has the small tubing 16 leading therefrom and connected to the high side of the unit. There is further provided the movable lever 31 through which is extended the bolt 30, and the bolt 30 is adjustable. An indentation 40 in the lever 31 is provided for maintaining the needle or pin 17 of the bellows 15 in its proper position. The numeral 18 indicates the low pressure power bellows which has a needle 19 that operates the bar 21 on the pivot 27, and the adjusting screw 30 can be used for setting the desired temperature through the spring 36. The contacts 23 and 22 form part of an electric switch for starting and stopping the motor.

The operation of the control unit is as follows. When the temperature is high, high pressure in the power bellows 15 will keep the lever 31 firmly on the stop member 33 and proper tension on the spring 36, and the low side pressure bellows 18 will control the fixture temperature. However, during a freezing temperature, the pressure equalizes between the low side and the high side with the high side being in a lower temperature than the low side at this time and there will not be enough pressure in the low side or power bellows 18 to operate the switch contacts 22 and 23. However, when there is a low pressure on the power bellows 15, during a freezing temperature, the bellows 15 will contract and the lever 31 will move

off of the stop member **33** so as to reduce tension on the spring **36** in order to permit the power bellows **18** to close the switch contacts **22** and **23** at a lower pressure and this starts the refrigeration unit which will then build up a pressure and push the lever **31** onto the stop **33** again and this places the proper tension on the spring **36** for the correct cutoff temperature for the fixture. When using Freon 12, is will be at a pressure of 34 to 36 pounds per square inch for defrosting temperature and the switch set to cut in at this pressure, but with the units being in a 25° temperature, then the pressure of the unit will be 24 pounds per square inch and this will permit high pressure power bellows **15** to reduce tension on the spring **36**.

In Figure 6 there is illustrated the position of the power bellows and associated part on cold days when the unit is on the off cycle. Certain switches have a high pressure power bellows to cut the unit off in case of a dangerous high pressure, but the present invention also connects to the high side of the unit.

It will be seen that there has been provided a temperature pressure control for use with a refrigeration system wherein the control will adjust itself to the weather conditions on remote installation where the refrigerating unit is in the changing weather condition. In actual practice, a valve plate and an expansion valve may be used on a refrigeration system to divide the high and low side of the piston and these are also known as the condensing side and suction side. The power bellows **18** connects to the low side through the small copper tubing **20** and this leads to the usual compressor body. The pressure in the refrigeration cooling coil acts on the bellows **18** to control the bar **21**, according to the spring **36** and setting of the screw **30**, which for Freon 12 is 34 to 36 pounds per square inch gauge reading. At this pressure, the temperature of Freon 12 is 35 and the coil is defrosted and the unit is to start refrigerating.

In winter, with the refrigeration unit in atmospheric temperature on the outside, in a freezing temperature of 25° or lower, the refrigerant in the receiver will be 24.6 pounds per square inch which is lower than the switch setting. The pressure in the cooling coil which may be arranged in a cold storage vault as for example, in a retail store or other building, will balance with the pressure in the receiver and will remain at 24.6 pounds per square inch and the unit will not start. However, the temperature in the vault will go up to spoiling temperature because it is in room temperature of 75° which temperature is kept at this range by a conventional heating system. However, with the control of the present invention, with the pressure in the unit and receiver at 24.6 pounds per square inch, the pressure in the bellows **15** connected to the high side of the unit through the small tubing **16** is also 24.6 pounds per square inch. The bellows **15** will contract, the bar **31** will lift up off of stop **33** and tension on the spring **36** will be reduced to 24.6 pounds per square inch and the unit will start. After compression is started, the pressure in the unit for the high side will increase because compression causes the refrigerant to be compressed which causes the bellows **15** to expand and this pushes the bar **31** down on to the stop **33** which puts the spring **36** on adjusted cutoff tension again. On warm days, when the outside temperature is over freezing, the bellows **15** and bar **31** will not be in operation but will remain so that the bar **31** is on the stop **33**. The pressure required to keep the bar **31** down to keep the spring **36** at the proper tension is about 40 pounds per square inch.

The advantage of the pressure control of the present invention is that the device will adjust itself to the outside weather conditions so that it is suitable for remote installations.

The above description of the invention is for illustrative purposes only and it is understood that modifications may be made in the construction within the scope and spirit of the following claims.

I claim:

1. In a control unit, a hollow housing, a first bellows arranged within said housing, a first tube connected to said first bellows, a first pin extending from said first bellows, a second bellows arranged externally of said housing, a second tube connected to said second bellows, a second pin extending from said second bellows, a bar having one end pivotally connected to a wall of said housing and said second pin being connected to said bar, a pair of first spaced apart contacts carried by said bar, a lug secured within said housing, a pair of second contacts connected to said lug for selective engagement by said first contacts, a coil spring positioned within said housing and arranged in engagement with said bar, a cap connected to said coil spring, a lever pivotally connected to a wall of said housing, a securing element extending through said lever and arranged in engagement with said cap, and a stop member secured within said housing for engagement by said lever.

2. In a control unit, a hollow housing, a first bellows arranged within said housing, a first tube connected to said first bellows, a first pin extending from said first bellows, a second bellows arranged externally of said housing, a second tube connected to said second bellows, a second pin extending from said second bellows, a bar having one end pivotally connected to a wall of said housing and said second pin being connected to said bar, a pair of first spaced apart contacts carried by said bar, a lug secured within said housing, a pair of second contacts connected to said lug for selective engagement by said first contacts, a coil spring positioned within said housing and arranged in engagement with said bar, a cap connected to said coil spring, a lever pivotally connected to a wall of said housing, a securing element extending through said lever and arranged in engagement with said cap, and a stop member secured within said housing for engagement by said lever, a securing element extending into said housing, and a coil spring extending between said last named securing element and said lever.

3. A control unit embodying a hollow housing, a first bellows arranged within said housing, a first tube connected to said first bellows, a first pin extending from said first bellows, a second bellows arranged externally of said housing, a second tube connected to said second bellows, a second pin extending from said second bellows, a bar having one end pivotally connected to a wall of said housing and said second pin being connected to said bar, a pair of first spaced apart contacts carried by the free end of said bar, a lug secured within said housing, a pair of second contacts connected to said lug for selective engagement by said first contacts, a coil spring positioned within said housing and arranged in engagement with said bar, a cap connected to said coil spring and said cap being provided with a socket, a lever pivotally connected to a wall of said housing, a securing element extending through said lever and arranged in engagement with the socket in said cap, a stop member secured within said housing for engagement by said lever to limit pivotal movement of the lever, a securing element extending into said housing, a bracket connected to said last named securing element, and a coil spring extending between said bracket and said lever, the tension on the last named spring adapted to be adjusted by rotating the bracket on the last named securing element, there being an indentation in said lever for receiving an end of said first pin to maintain the first pin of the first bellows in its proper position.

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