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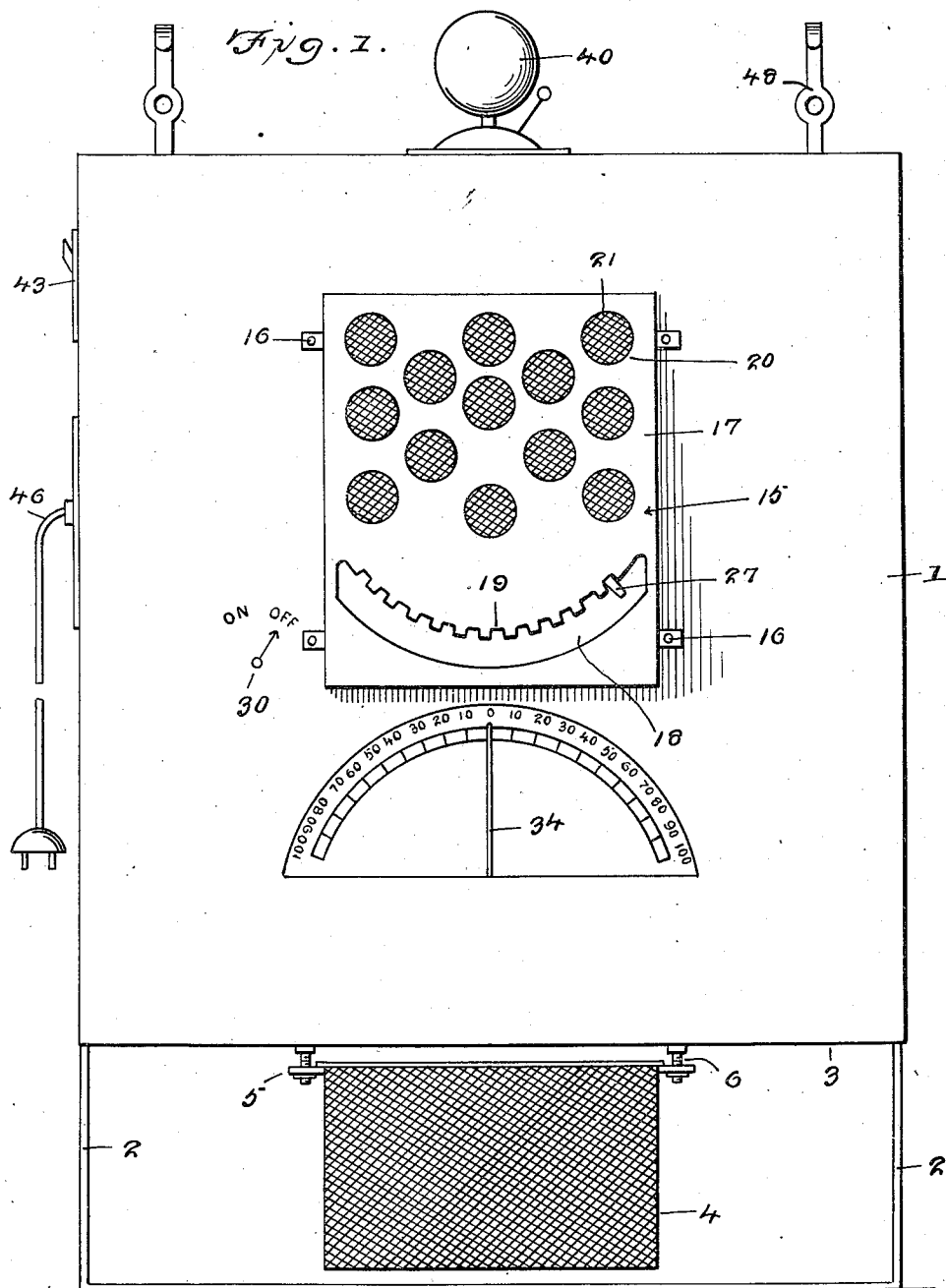
J. J. GUARAGNA

2,254,480

ADJUSTABLE CARBON MONOXIDE ALARM

Filed March 9, 1939

3 Sheets-Sheet 1



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WITNESS

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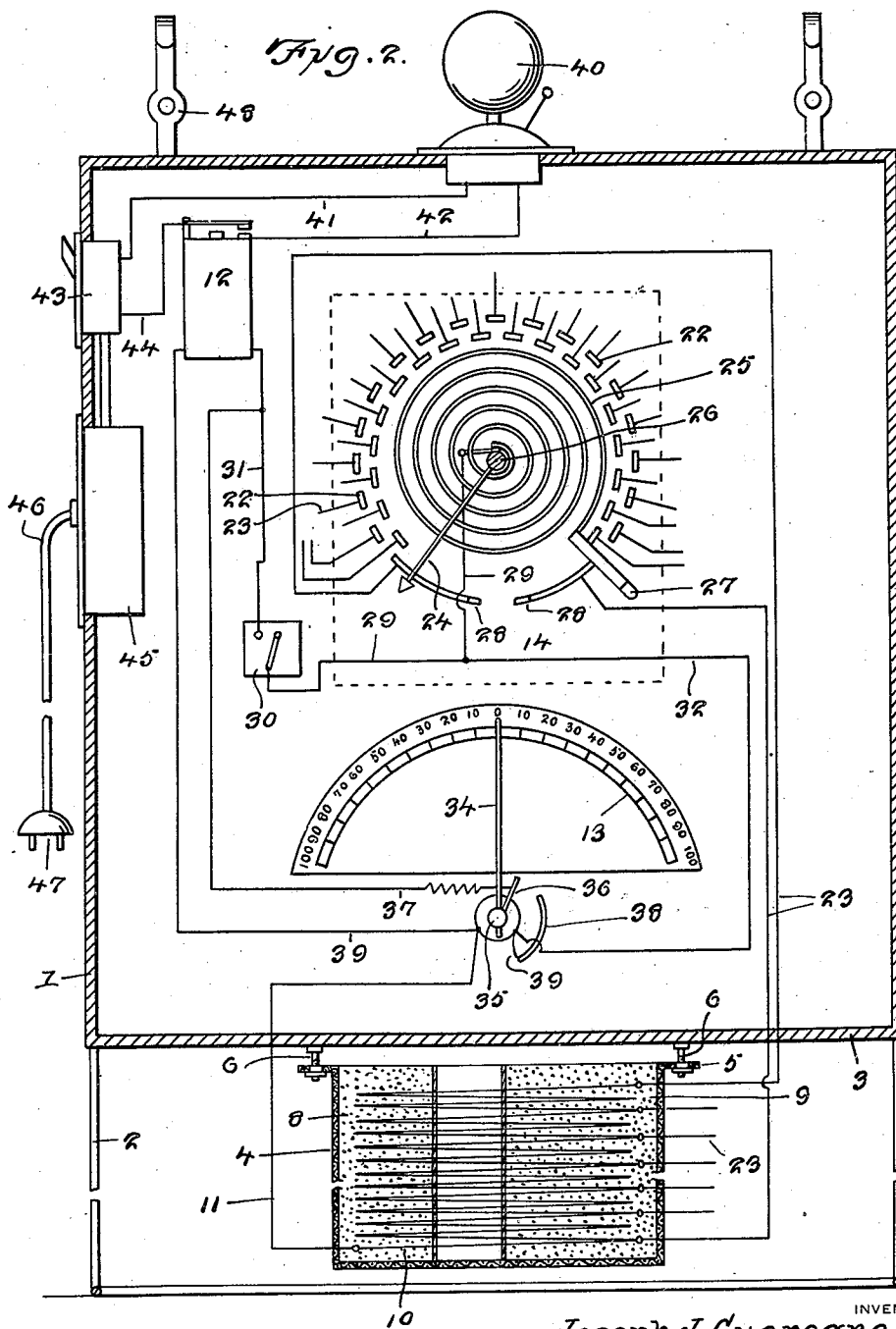
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ADJUSTABLE CARBON MONOXIDE ALARM

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3 Sheets-Sheet 2



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3 Sheets-Sheet 3

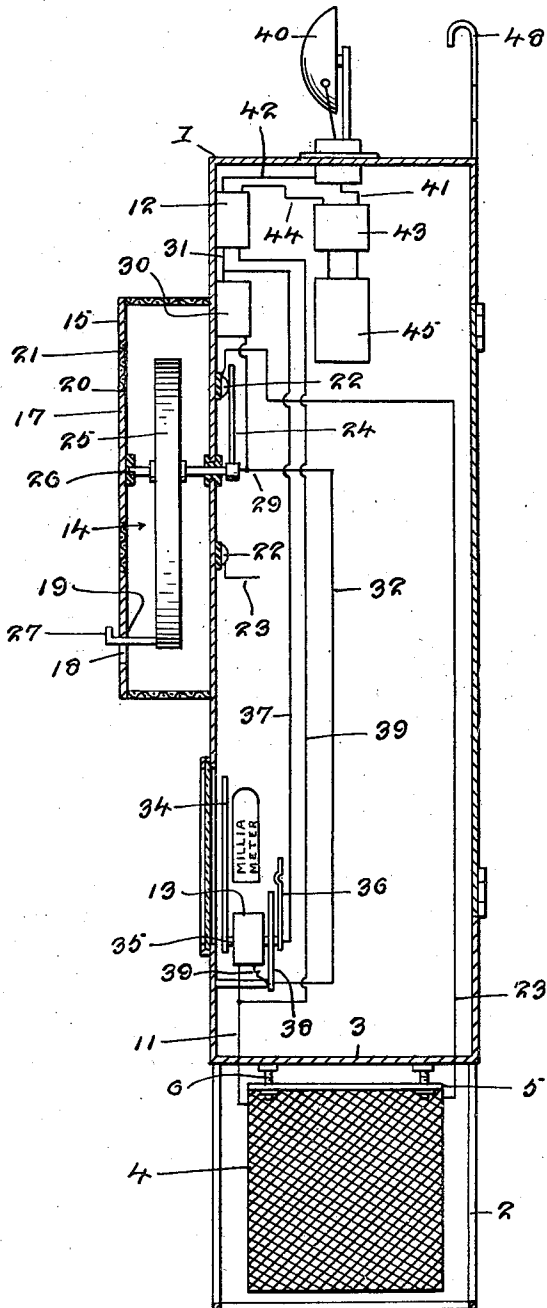


Fig. 3.

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ADJUSTABLE CARBON MONOXIDE ALARM

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Application March 9, 1939, Serial No. 260,829

2 Claims. (Cl. 177-311)

The invention relates to a combined detector and indicator device, designed primarily for use for detecting and indicating to a person, within an enclosed space the presence of carbon monoxide gas, but it is to be understood that the device, in accordance with this invention is for use in any connection for which it may be found applicable.

The primary object of the invention is the provision, in a manner as hereinafter set forth, of a device for the purpose aforesaid, wherein on the presence of a poisonous gas such as carbon monoxide within an enclosure an alarm either audible or visible will be given so as to prevent the possibility of death to persons within such enclosure, as the alarm is given before the gas becomes effective upon the person.

A further object of the invention is the provision, in a manner as hereinafter set forth, in a device of the character referred to wherein the presence of dangerous vapors or gases within an enclosure will be instantly detected and an alarm sounded or a signal given, and in this manner relieving liability of fatalities resulting from contamination of the atmosphere from the deleterious gases present.

A further object of the invention is the provision of a device for the purpose set forth and in a manner wherein its construction is novel in its entirety and is capable of being placed within an enclosure, such as a garage, room, automobile of the closed body type or in any other places where poisonous gases could accumulate and become effective for jeopardizing life both in human beings and animals.

Further objects of the invention are to provide, in a manner as hereinafter set forth a device for the purpose referred to which is simple in its construction and arrangement, strong, durable, compact, readily assembled, thoroughly efficient in its use and comparatively inexpensive to set up.

With the foregoing and other objects in view, the invention consists of a novel construction, combination and arrangement of parts as will be more specifically described and illustrated in the accompanying drawings, wherein is shown an embodiment of the invention, but it is to be understood that changes, variations, and modifications may be resorted to which fall within the scope of the invention as claimed.

In the accompanying drawings wherein like reference characters denote corresponding parts throughout the several views:

Figure 1 is a front elevation of a combined de-

tor and indicator device in accordance with this invention.

Figure 2 is a vertical sectional view thereof.

Figure 3 is a vertical sectional view of the device.

The device includes a housing 1 mounted on a hollow base 2. Suspended from the bottom 3 of housing 1 and arranged within the base 2 is a receptacle 4 formed from closely woven reticulated material possessing heat resisting characteristics. The receptacle 4 preferably is open at its top, but if desired it may be closed by a screen-like cover. The receptacle 4 at its top is provided with laterally extending flanges 5, and it is detachably connected or suspended from the said bottom 3 by the means 6, which coacts with the flanges 5. Arranged within the receptacle 4 is a pair of foraminous spaced parallel partitions 7 which divide receptacle 4 into the compartments 8, 9 and air circulates through all sides of the said compartments. The compartment 9 is filled with the catalyst Hopcalite, while the compartment 8 is filled with an inert substance such as sand. Arranged within the receptacle 4 are thermocouples 10. A circuit conductor 11 extends from a terminal of the thermocouples, passes through the bottom 3 of housing 1 into the latter. The conductor 11 will be further referred to. The number of thermocouples 10 may be as desired, but the number will be such, so that, about a millionth part of carbon monoxide per volume will actuate a relay 12 in any atmospheric temperature, due, of course to the automatic adjustment of a sensitivity switch, to be referred to by variations of temperature.

The relay 12 is arranged within the upper portion of housing 1. The device also includes a milliammeter 13 which is positioned in the lower portion of housing 1 below the sensitivity switch 14 and visible from the front of the housing. The switch 14 is arranged within a protective casing 15 which is suspended from the housing and connected as at 16 to the housing front wall. The front wall 17 of casing 15 has its lower portion formed of a horizontally disposed segmental shaped slot 18 having its top edge notched as at 19. The upper portion of the wall 17 of the casing 15 is formed throughout with spaced relatively large openings 20 which are screened as at 21. The top, bottom, side and end walls of casing 15 may be formed with screened openings in the same manner as the upper portion of casing wall 17.

The switch as shown includes spaced concentric rows of spaced contacts 22. The contacts

22 of the inner row are staggered with respect to the contacts 22 of the outer row. The number of contacts 22 will be as desired, but each contact 22 will be electrically connected to a thermocouples 10, at the right of the latter by a circuit connection or wire 23. Preferably the number of contacts 22 will be fifty-one, to correspond from zero to one hundred degrees F. Every contact piece of the switch 14 will have a difference of two degrees F., therefore associated as zero to one hundred degrees F., fifty-one contacts are required. It will be pointed out that each of the conductors 23 from the contacts, will be connected to the thermocouples so that, according to whatever number of thermocouples required, the conductors 23 will be distributed and connected to the thermocouples so that about one millionth part per volume of carbon monoxide will actuate relay 12 regardless of which contact 22 the needle or circuit closer 24 of the switch may rest on, thus making a uniform reaction with the same concentration of carbon monoxide from zero F., to one hundred degrees F.

The switch 14 includes an actuating means for the needle or circuit closer 24 and the said means includes a thermostatic controlled element 25 and a rotatably mounted insulated shaft 26. The element 25 is in the form of a coiled thermostatically controlled metallic strip connected at its inner end to the shaft 26. The outer end of element 25 is fixed to an adjustable support 27. The inner end of the needle or circuit closer 24 is fixed to the shaft 26. The needle 10 which, when atmospheric temperature is zero F., it will rest in the position as shown on left. As the normal temperature increases, the needle will move towards the right thus severing the thermocouples connections which it leaves on the left. When the needle 24 is on the extreme left all thermocouples are affected. As the needle moves toward the right, each notch that is separated, on the left will sever a number of thermocouples. The thermostatic coil 25 will be calibrated so that at zero F. the needle rests at the extreme left as shown; and with every two degrees F. rise at normal temperature, the needle will move on to another contact, thus severing more thermocouples of each contact. The contacts will be so arranged that the needle will always be in contact. If normal temperature is high and later becomes lower the needle 24 will move toward the left, so that each contact it touches will put into effect a number of thermocouples according to the demand placed upon it by the variations of temperature, thus making it uniform regardless of temperature variations and assuring a reaction, when carbon monoxide is in the air as quickly at zero F. as at one hundred degrees F.

Both outer extremes of the outer contacts 22 of the outer row of contacts of switch 14 are provided with stops 28 to prevent the passing off therefrom of the needle or circuit closer 24. The shaft 26 will be insulated from the element 25 in casing 15. To shaft 26 is attached a circuit conductor 29 which leads from a thermostatic switch 30 and extending from the latter to a contact of the relay 12 is a circuit conductor 31. From the conductor 29 leads a circuit conductor 32 to a terminal of the milliammeter 13. The needle or indicator 34 of the milliammeter has its inner end attached to a carrier or centerpiece 35, and to the latter is secured an angle-shaped extension piece 36 connected with a circuit conductor 37 leading from the relay 12. To the

right of and associated with the extension 36 is a metallic curved contact piece 38 connected at one end to an extension 39 of the conductor 32. Leading from a terminal of the milliammeter 13 to the relay 12 is a circuit conductor 39.

A signal which may be of the visible or the audible type forms an element of the device and is shown by way of example in the form of an alarm, as indicated at 40 and which preferably will be supported at the top of housing 1. Leading from the alarm 40 are circuit conductors 41, 42. The conductor 41 is connected to the main switch 43 of the device. The conductor 42 is connected to the relay 12 and leading from the latter to the switch 43 is a circuit conductor 44. Enclosed with the switch 43 is a transformer 45 to which is attached a coupling cord 46 provided with a connection plug 47 for connecting the device to a source of electrical supply. The housing 1 may be provided at its top with spaced suspension means 48.

The thermostatic coil or element 25 will be calibrated so that at zero F., the needle rests at the extreme left as shown; and with every two degrees F. rise of normal temperature, the needle will move onto another contact thus severing another number of thermocouples at each contact. There will be fifty-one contacts arranged as shown, so that the needle will always be in contact. More or less contacts and thermocouples may be used as desired for quicker reaction at lowest temperatures. If normal temperature is high and later becomes lower the needle will be moving toward the left, so that the contact it touches will put into effect a number of thermocouples, etc., according to the demand put upon it by the variations of temperatures thus making it uniform regardless of temperature variations and assuring a reaction when carbon monoxide is in the air as quickly at zero F., as at one hundred degrees F.

The extension and contact 38 provide when in coacting relation what may be termed the effecting of an extra contact or circuit closing independently of the conductors 29, 31. The contact piece 38 is placed at such a position that when the needle of the milliammeter approximates a given number, the point of dangerous concentration, the extension 36 will engage with the contact 38 thereby closing the signalling circuit and providing an alarm. This what is termed an extra contact or adjustment is suitable for garages or other places where there is always a certain amount of monoxide gas in the air so that the thermostatic switch 30 may be turned off, but owing to the coaction of the extension 36 and contact 38 it provides for the sounding of the alarm and will indicate to a person that a dangerous concentration is in the air. For places where no carbon monoxide is in evidence, by way of example, homes, offices, etc., the switch 30 will be kept on "on position."

The support 27, as it is adjustable may adjust the sensitivity of the element 25, so the latter will have its full effect. As element 25 is set from right to left, it becomes less sensitive.

It is readily obvious that regardless of normal temperature variations, about the same concentration of carbon monoxide will effect the milliammeter needle to move to a given number, so that, a danger point line may be drawn on the milliammeter and the extra contact due to the coaction of extension 36 and contact 38 is placed at a point approximating this line, so that, at any temperature when a dangerous concentration

of carbon monoxide is in the air this extra contact will provide always for giving an alarm.

The switch 30, which, when the device is used in places where no evidence of carbon monoxide is in the air, the switch will always be kept "on," but if used in any places, as explained previously, where a certain amount of carbon monoxide is constantly in the air, the switch 30 will be turned off and the coaction of the extension 36 and 38 will be effected to close the alarm circuit when the milliammeter needle has approximated the danger line.

It is readily apparent that when the carbon monoxide gas contacts the receptacle 4, heat is evolved through the coaction of the gas with Hopcalite. The heat evolved will produce a current corresponding to the concentration of carbon monoxide in the atmosphere in the thermocouples. There will be enough thermocouples so that one millionth part per volume of carbon monoxide at any temperature will actuate the relay 12 at ten milliamperes thus sounding an alarm and affecting other devices or objects which may be connected to it.

As set forth the switch 14 is of the thermostatic coil controlled type. The switch 14 will operate on the same principle as a thermostatic coil dial room thermometer, excepting that in this instance the dial is replaced by a very light weight needle of any suitable light metallic material, this needle is the circuit closer 24 which instead of reading the room temperature it will be in constant engagement with contacts 22 of the switch 14, moving one way or the other, according to the atmospheric temperature, thus either severing or adding more thermocouples and giving a uniform reaction of monoxide with the catalyst regardless of the atmospheric temperature. The circuit closer 24 will rotate on a very thin central axis, thus assuring smooth movements thereof without impediment. The contacts 22 will be insulated from and be positioned against the inner face of the front wall of housing 1. The circuit closer 24 operates within said housing.

The needle 34 is arranged within the housing 1, and is visible from the exterior and enables for the reading of the milliammeter when the latter is activated.

The switch 14 compensates for the ambient temperature, in that, each contact the needle

rests on (according to room temperature at that moment) will have enough thermocouples connected to it to actuate the relay at about one millionth part of carbon monoxide per volume of air; this will compensate for the variations of temperature.

Nothing will affect the thermocouples except when monoxide gas in the air contacts the chamber with the catalyst; that is why the catalyst is in one chamber with the ends of the thermocouples, and an inert substance is in the other chamber with the other ends of the thermocouples, thus making both sides equal in normal conditions.

When monoxide permeates the atmosphere, it will then react with the catalyst, producing more or less heat in the chamber containing the catalyst, and the ends of the thermocouples.

At all times, the only reaction is in the chamber which contains the catalyst, thereby generating electricity through the wires.

What is claimed is:

1. A combined detector and indicator device for the purpose set forth, comprising an electric circuit, a thermoelectric generator for energizing said circuit and including means for generating heat on the presence of deleterious gas, thermocouples connected with said means for receiving said heat generated thereby, said generator being adapted for greater sensitivity at higher temperatures than at low temperatures, and a sensitivity switch associated with the thermocouples for compensating the change from high and low sensitivity of the generator by an opposite change in the number of thermocouple connections therewith.

2. A combined detector and indicator device for the purpose set forth, comprising an electric circuit, a thermoelectric generator for energizing said circuit and including means for generating heat on the presence of deleterious gas, thermocouples connected with said means for receiving said heat generated thereby, said generator being adapted for greater sensitivity at higher temperatures than at low temperatures, a sensitivity switch associated with the thermocouples for compensating the change from high and low sensitivity of the generator by an opposite change in the number of thermocouple connections therewith, and means for adjusting said switch.

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