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SMOKE AND FIRE ALARM SYSTEM

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3 Sheets-Sheet 2

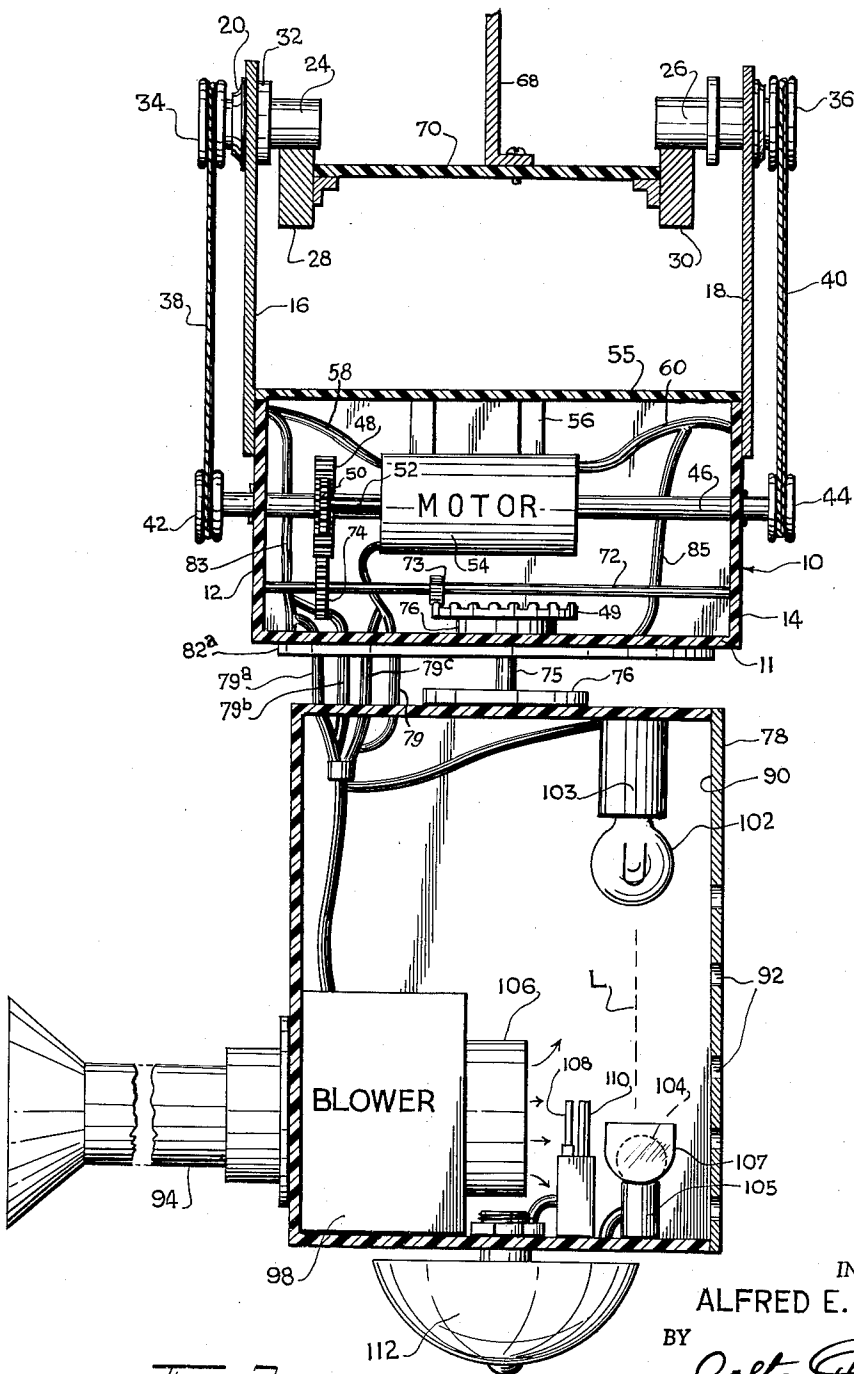


Fig. 3.

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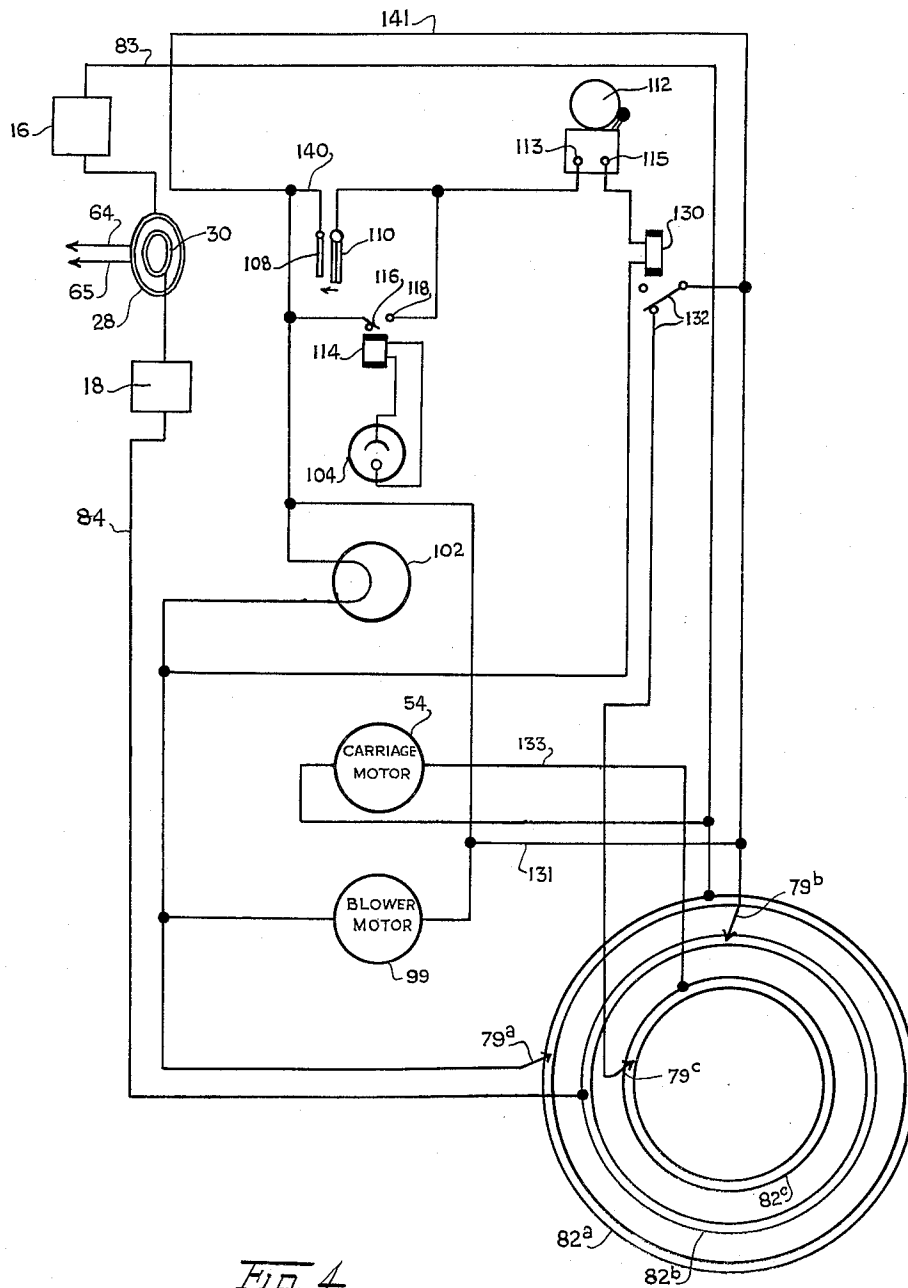


Fig. 4.

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SMOKE AND FIRE ALARM SYSTEM

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9 Claims. (Cl. 340—228)

This invention concerns a smoke and fire alarm system. A principal object of the invention is the provision of a smoke and fire alarm detector which travels around a track in a store, warehouse, factory or the like, continually testing the ambient air for the presence of smoke or fire.

Another object is the provision of a detecting device for smoke and fire which scans an entire area over which the device travels, the device including scanning means which is driven in a planetary orbit around a track.

For further comprehension of the invention, and of the objects and advantages thereof, reference will be had to the following description and accompanying drawings, and to the appended claims in which the various novel features of the invention are more particularly set forth.

In the accompanying drawings forming a material part of this disclosure:

Fig. 1 is a top plan view of the device showing the path of travel of the scanning means.

Fig. 2 is an elevational view of the device.

Fig. 3 is a sectional view on an enlarged scale taken on line 3—3 of Fig. 2.

Fig. 4 is a schematic diagram of the electric circuit of the device.

Referring to Figs. 1—3, there is shown a carriage 10 in the form of a rectangular box made of insulation material. At the opposite sides 12 and 14 of the box are secured two metal plates 16 and 18. The plates have bearings 20, 22 in which are journaled roller shafts 24, 26. The inner ends of the shafts ride on elliptical tracks 28 and 30 disposed concentrically one within the other. Flanges 32 on the shafts limit inward movement of the shafts.

On the outer ends of the shafts are secured pulleys 34, 36 around which are engaged endless belts 38, 40. The pulleys are preferably made of insulation material. The belts engage with pulleys 42, 44 carried on opposite ends of a shaft 46 passing through the sides 12 and 14 of the carriage. On shaft 46 is mounted a gear 48 which meshes with a smaller gear 50 carried on the end of the shaft 52 of a motor 54. The motor is supported on the top 55 of the carriage by brackets 56. The motor is energized via wires 58, 60 connected to the respective plates 16 and 18. The plates are energized via the shafts 24, 26 which ride on the endless tracks or rails 28, 30. The rails are electrified by the connection thereto of wires 64, 65 contained in cable 66. The wires terminate at a suitable source of electric power. Further roller shafts 25, 27 journaled in plates 16, 18 also ride the rails. These shafts have flanges 29. The shafts are journaled in bearings 31.

Cable 66 is supported by one of a plurality of brackets 68 secured to insulator plates 70 which hold the tracks in fixed spaced disposition. The brackets are intended to be secured to an overhead support such as the ceiling or roof of a store, warehouse or other facility having an expansive area to be repeatedly and continuously scanned for fire and smoke. By provision of this overhead support,

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areas that are piled high with stores of various kinds can be effectively scanned regularly and continuously far more efficiently than can be done by watchmen or by conventional stationary alarm systems.

5 Journaled in the sides of the carriage is another shaft 72 which carries a gear 74 in mesh with gear 48. A flanged gear 49 is meshed with another gear 73 on shaft 72 and is rotated thereby. Gear 49 is carried at the upper end of a shaft 75 which rotates in a bearing 76 at the bottom 11 of the carriage. The shaft 75 passes through the bottom 11 and has a flange plate 76' attached to a rectangular rotatable housing or casing 78. This casing carries three flexible spring wiper contacts 79^a—79^c which make continuous contact with circular rings 82^a—82^c (see Fig. 4) mounted concentrically at the underside of carriage 10. Wires 83, 84 are connected to the rings 82^a, 82^b to electrify them. Conductors in cable 79 supply power to the electrical components in casing 78. Ring 82^c and contact 79^c operate in a relay circuit for controlling motor 54.

Casing 78 is a closed rectangular box having a removable rear wall 90 provided with a plurality of holes 92. At the front wall 93 of the casing is a tube 94 terminating at its outer end in a conical funnel 96. The tube opens into the casing at the entrance to a blower 98. The blower has a motor 99 as indicated in Fig. 4.

In the casing is an incandescent lamp 102 supported in socket 103 at the top of the casing in line with a photoelectric cell 104 mounted in socket 105 and having a reflector 107. The cell is normally illuminated by the lamp 102 except when the box fills with smoke drawn in by the blower, to reduce the intensity of light impinging on the cell 104. Disposed adjacent to the outlet 106 of the blower is a fixed electrical contact 108 and a bi-metallic electric contact 110. These contacts are normally separated except when hot air or hot smoke such as might be caused by a fire is drawn into the casing by the blower. When contact 110 is heated the bimetallic element bends and makes contact with element 108 to close an alarm circuit as will be described. A bell 112 is mounted on the outside of the casing for sounding an alarm.

Fig. 4 shows the endless metal rails 28, 30 connected to wires 64, 65 which supply power from an external source of power (not shown). In circuit with rail 28 is plate 16, wire 83, ring 82^a, contact 79^a, motor 99, lamp 102, and motor 54. The return circuit to rail 30 includes plate 18, wire 84, ring 82^b, contact 79^b, and wire 131 which terminates at the motor 99 and lamp 102. The return circuit for motor 54 is through wire 133, ring 82^c, contact 79^c, contacts 132 of relay 130, contact 79^b, ring 82^b and wire 84. Photoelectric cell 104 has its terminals connected to relay 114. The contacts 116 and 118 of this relay are held open when the photoelectric cell is illuminated by the light of lamp 102. Bell 112 has one terminal 113 connected to bimetallic contact 110 and to contact 108. The other terminal 115 is connected electrically to relay 130. Fixed contact 108 is connected to contact 79^b via wires 140, 141. Relay contacts 132 are normally closed but are opened when the relay 130 in series with bell 112 is energized.

In operation of the device, the carriage motor drives the carriage around the endless rails, via gear train 48, 50, belts 38, 40, pulleys 34, 36 and shafts 24, 26. Simultaneously with movement of the carriage, the casing 78 is rotated continuously via gear train 49, 73, 74, 48 and 50. Air is continuously drawn into the casing through tube 94 by blower 98. If a fire occurs in the area which is scanned in a planetary path P as shown by dotted lines in Fig. 1, the heated air drawn into the casing will cause the bimetallic element 110 to contact element 108. This will cause the bell 112 to be energized and sound the

alarm. If a smoky condition should arise, the smoke drawn into the casing by the blower will interrupt the light path L indicated by a dotted line in Fig. 3, so that the photoelectric cell 104 will be deenergized. This will cause relay 114 to be deenergized and contacts 116, 118 will close causing the bell circuit to be closed to sound the alarm. When the bell is energized, relay 130 is energized to open relay contacts 132 which breaks the circuit of motor 54 and stopping the carriage at the place where the alarm is sounding.

It is to be understood that this device may also be made stationary at any desired location in a building.

While I have illustrated and described the preferred embodiment of my invention, it is to be understood that I do not limit myself to the precise construction herein disclosed and that various changes and modifications may be made within the scope of the invention as defined in the appended claims.

Having thus described my invention, what I claim as new, and desire to secure by United States Letters Patent is:

1. A smoke and fire alarm device, comprising an endless track, means for electrifying the track, a carriage having a motor electrified via the track and driving the carriage continuously around the track, and smoke and fire sensing means carried rotatably by the carriage and traversing a planetary path while the carriage moves around the track, there being gear means operatively connecting the motor and sensing means, whereby the sensing means is rotated in said planetary path.

2. A smoke and fire alarm device, comprising an endless track, means for electrifying the track, a carriage having electric power pickup means for drawing energy from the track, a motor mounted on said carriage and energized via said pickup means, said motor driving the carriage continuously along the track, a housing for fire and smoke sensing means, gear means operatively connecting the housing and motor and rotating the housing continuously while the carriage moves along the track, an elongated tube extending outwardly from the housing for collecting air while the housing rotates, and a blower in the housing directing air collected by said tube over said sensing means.

3. A smoke and fire alarm device, comprising an endless track, means for electrifying the track, a carriage having electric power pickup means for drawing energy from the track, a motor mounted on said carriage and energized via said pickup means, said motor driving the carriage continuously along the track, a housing for fire and smoke sensing means, gear means operatively connecting the housing and motor and rotating the housing continuously while the carriage moves along the track, an elongated tube extending outwardly from the housing for collecting air while the housing rotates, and a blower in the housing directing air collected by said tube over said sensing means, said sensing means being in electric circuit with an alarm, whereby the alarm is actuated when said sensing means detects smoke or fire in the collected air in the housing.

4. A smoke and fire alarm device, comprising an endless track, means for electrifying the track, a carriage having electric power pickup means for drawing energy from the track, a motor mounted on said carriage and energized via said pickup means, said motor driving the carriage continuously along the track, a housing for fire and smoke sensing means, gear means operatively connecting the housing and motor and rotating the housing continuously while the carriage moves along the track, an elongated tube extending outwardly from the housing for collecting air while the housing rotates, and a blower in the housing directing air collected by said tube over said sensing means, said sensing means being in electric circuit with an alarm, whereby the alarm is actuated when said sensing means detects smoke or fire in the collected air in the housing, there being a relay in circuit

with said alarm and motor for stopping the motor when the alarm is actuated.

5. A smoke and fire alarm device, comprising an endless track, means for electrifying the track, a carriage having electric power pickup means for drawing energy from the track, a motor mounted on said carriage and energized via said pickup means, said motor driving the carriage continuously along the track, a housing for fire and smoke sensing means, gear means operatively connecting the housing and motor and rotating the housing continuously while the carriage moves along the track, an elongated tube extending outwardly from the housing for collecting air while the housing rotates, and a blower in the housing directing air collected by said tube over said sensing means, said sensing means being in electric circuit with an alarm, whereby the alarm is actuated when said sensing means detects smoke or fire in the collected air in the housing, said carriage carrying a plurality of concentric electrically conductive rings, said housing carrying a plurality of wiper contacts respectively in circuit with said rings, said pickup means being in circuit with certain of said rings, contacts and alarm.

6. A smoke and fire alarm device, comprising an endless track, means for electrifying the track, a carriage having electric power pickup means for drawing energy from the track, a motor mounted on said carriage and energized via said pickup means, said motor driving the carriage continuously along the track, a housing for fire and smoke sensing means, gear means operatively connecting the housing and motor and rotating the housing continuously while the carriage moves along the track, an elongated tube extending outwardly from the housing for collecting air while the housing rotates, and a blower in the housing directing air collected by said tube over said sensing means, said sensing means being in electric circuit with an alarm, whereby the alarm is actuated when said sensing means detects smoke or fire in the collected air in the housing, said carriage carrying a plurality of concentric electrically conductive rings, said housing carrying a plurality of wiper contacts respectively in circuit with said rings, said pickup means being in circuit with certain of said rings, contacts and alarm, there being a relay in circuit with said alarm and motor for stopping the motor when the alarm is actuated, another of said rings and another of said contacts being in circuit with said relay.

7. A smoke and fire alarm device, comprising an endless track, means for electrifying the track, a carriage having electric power pickup means for drawing energy from the track, a motor mounted on said carriage and energized via said pickup means, said motor driving the carriage continuously along the track, a housing for fire and smoke sensing means, gear means operatively connecting the housing and motor and rotating the housing continuously while the carriage moves along the track, an elongated tube extending outwardly from the housing for collecting air while the housing rotates, and a blower in the housing directing air collected by said tube over said sensing means, said sensing means being in electric circuit with an alarm, whereby the alarm is actuated when said sensing means detects smoke or fire in the collected air in the housing, said carriage carrying a plurality of concentric electrically conductive rings, said housing carrying a plurality of wiper contacts respectively in circuit with said rings, said pickup means being in circuit with certain of said rings, contacts and alarm, there being a relay in circuit with said alarm and motor for stopping the motor when the alarm is actuated, another of said rings and another of said contacts being in circuit with said relay, said gear means including a flanged gear in mesh with a spur gear, said carriage having rotatable rollers riding the track and operatively driven by said spur gear.

8. A smoke and fire alarm device, comprising an endless track, means for electrifying the track, a carriage

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having electric power pickup means for drawing energy from the track, a motor mounted on said carriage and energized via said pickup means, said motor driving the carriage continuously along the track, a housing for fire and smoke sensing means, gear means operatively connecting the housing and motor and rotating the housing continuously while the carriage moves along the track, an elongated tube extending outwardly from the housing for collecting air while the housing rotates, and a blower in the housing directing air collected by said tube over said sensing means, said sensing means being in electric circuit with an alarm, whereby the alarm is actuated when said sensing means detects smoke or fire in the collected air in the housing, said carriage carrying a plurality of concentric electrically conductive rings, said housing carrying a plurality of wiper contacts respectively in circuit with said rings, said pickup means being in circuit with certain of said rings, contacts and alarm, there being a relay in circuit with said alarm and motor for stopping the motor when the alarm is actuated, another of said rings and another of said contacts being in circuit with said relay, said gear means including a flanged gear in mesh with a spur gear, said carriage having rotatable rollers riding the track and operatively driven by said spur gear, said sensing means including cooperating fixed and bimetallic elements for detecting the presence of fire, said elements being in circuit with said alarm.

9. A smoke and fire alarm device, comprising an endless track, means for electrifying the track, a carriage having electric power pickup means for drawing energy from the track, a motor mounted on said carriage and energized via said pickup means, said motor driving the carriage continuously along the track, a housing for fire and smoke sensing means, gear means operatively connecting the housing and motor and rotating the housing continuously while the carriage moves along the track, an elongated tube extending outwardly from the housing for collecting air while the housing rotates, and a blower in the housing directing air collected by said tube over said sensing means, said sensing means being in electric circuit with an alarm, whereby the alarm is actuated when said sensing means detects smoke or fire in the collected air in the housing, said carriage carrying a plurality of concentric electrically conductive rings, said housing carrying a plurality of wiper contacts respectively in circuit with said rings, said pickup means being in circuit with certain of said rings, contacts and alarm, there being a relay in circuit with said alarm and motor for stopping the motor when the alarm is actuated, another of said rings and another of said contacts being in circuit with said relay, said gear means including a flanged gear in mesh with a spur gear, said carriage having rotatable rollers riding the track and operatively driven by said spur gear, said sensing means including cooperating fixed and bimetallic elements for detecting the presence of fire, said elements being in circuit with said alarm.

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necting the housing and motor and rotating the housing continuously while the carriage moves along the track, an elongated tube extending outwardly from the housing for collecting air while the housing rotates, and a blower in the housing directing air collected by said tube over said sensing means, said sensing means being in electric circuit with an alarm, whereby the alarm is actuated when said sensing means detects smoke or fire in the collected air in the housing, said carriage carrying a plurality of concentric electrically conductive rings, said housing carrying a plurality of wiper contacts respectively in circuit with said rings, said pickup means being in circuit with certain of said rings, contacts and alarm, there being a relay in circuit with said alarm and motor for stopping the motor when the alarm is actuated, another of said rings and another of said contacts being in circuit with said relay, said gear means including a flanged gear in mesh with a spur gear, said carriage having rotatable rollers riding the track and operatively driven by said spur gear, said sensing means including cooperating fixed and bimetallic elements for detecting the presence of fire, said elements being in circuit with said alarm, said sensing means further including a lamp and photoelectric cell for detecting the presence of smoke, said cell being in circuit with relay means and said alarm for actuating the alarm.

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