Dec. 24, 1968 L. A. GILBERTSON 3,418,068

CONTROL APPARATUS FOR AIR TREATING SYSTEMS

Filed May 19, 1965 2 Sheets-Sheet 1

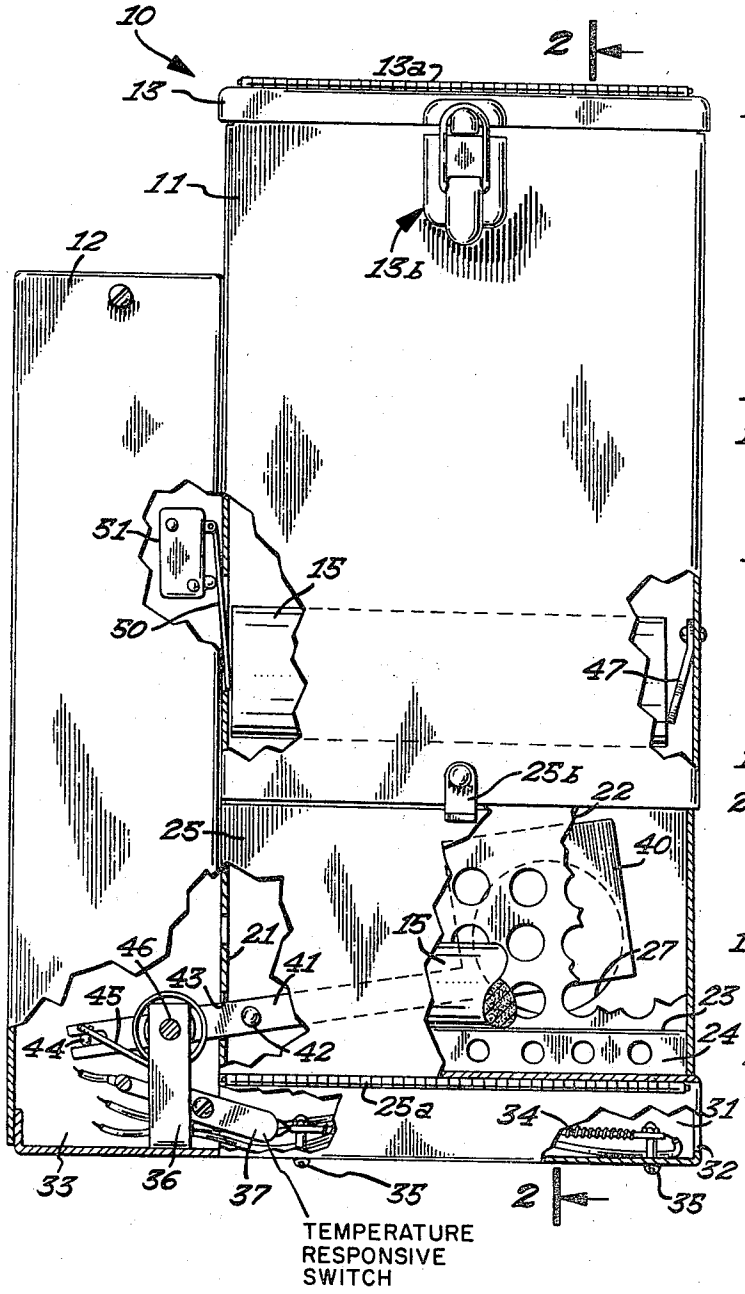


FIG 1

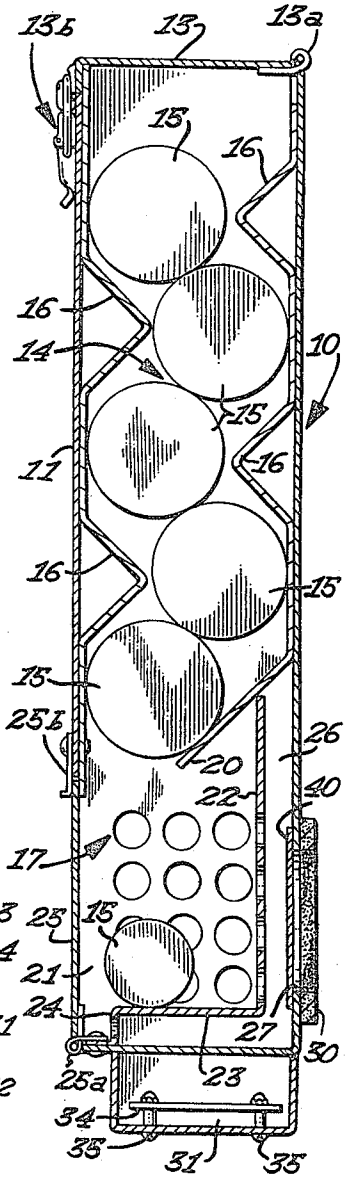


FIG 2

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CONTROL APPARATUS FOR AIR TREATING SYSTEMS

Filed May 19, 1965 2 Sheets-Sheet 2

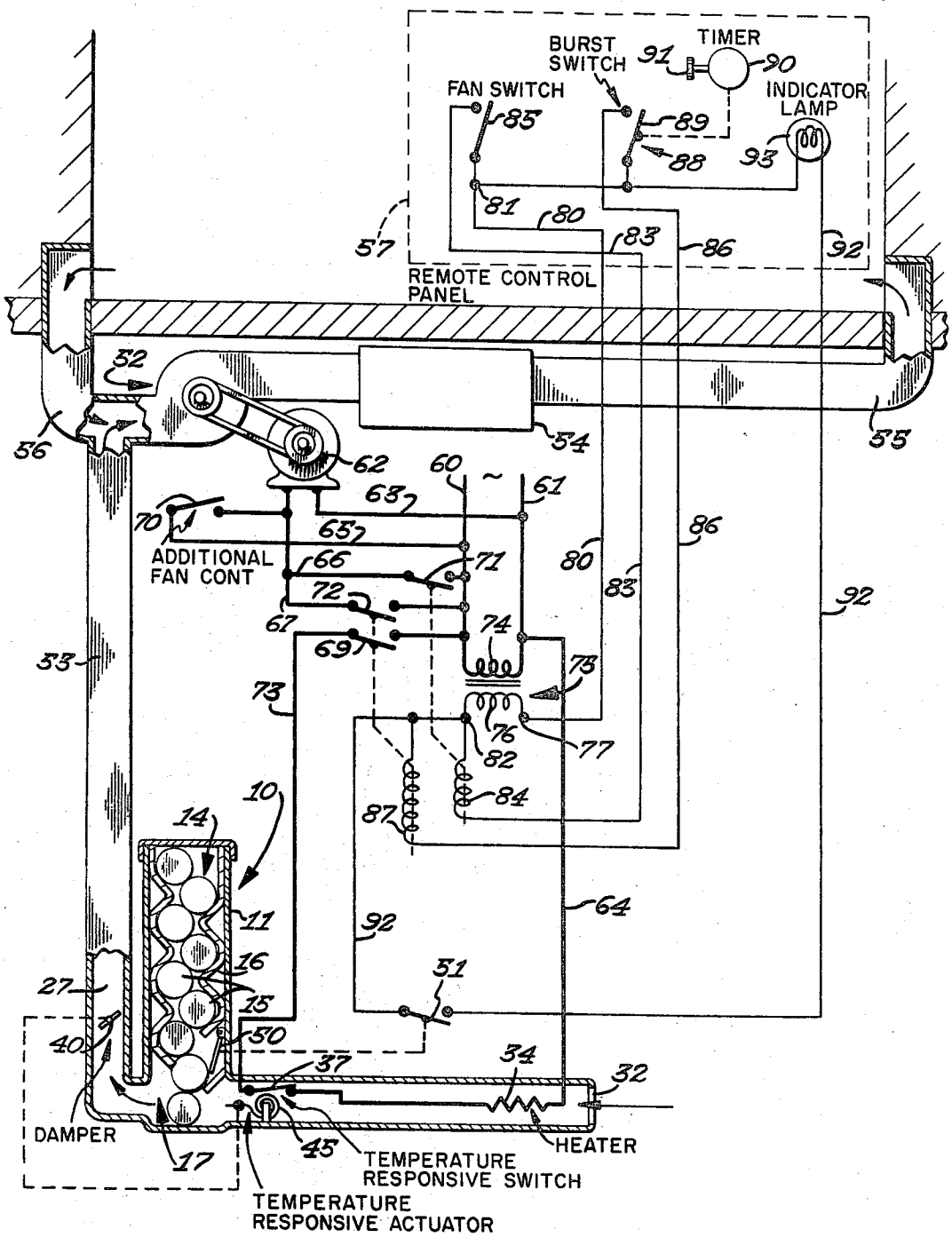


FIG 3

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CONTROL APPARATUS FOR AIR TREATING SYSTEMS

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Filed May 19, 1965, Ser. No. 457,133
14 Claims. (Cl. 21—74)

ABSTRACT OF THE DISCLOSURE

An air treating apparatus and control system; the apparatus having an air inlet, a vaporizing area, and an air outlet; with a heater disposed in the air inlet to heat the air before it reaches the vaporizing area, with a thermostat controlled damper controlled by the air temperature in the inlet and arranged to allow increased air flow when the heater is energized, and with a manually operated and timer controlled switch to energize the heater; the air treating apparatus being associated with a forced air heating or cooling system; and with electrical circuitry to allow selective remote control of the heater and the blower of the forced air system.

This invention relates to control apparatus and more specifically to an improved air treating apparatus and control system therefor. In particular, the invention relates to dispensing apparatus for adding a vaporizable air treating material to air, means for varying the rate of evaporation of the material, and a control system for selectively controlling the rate of evaporation of the air treating material and thereby the effectiveness of the dispensing apparatus.

Various methods of counteracting undesirable odors in residences, commercial buildings, and the like have been proposed in the past and several are used widely today. These include the various deodorants marketed in aerosol cans and also deodorants dispensed by means of a wick which can be exposed to the air and thereby convey the deodorant from the container to the air which is to be treated. Also, some types of deodorants or odor cunteractants are dispensed by bringing a stream of air into contact with them so as to evaporate a portion of the counteractant into the air which is then in turn mixed with the air in the enclosure to be treated. This type of counteractant may take the form of either a liquid, a solid or a gel. Various attempts to control the effectiveness of dispensers for the latter type of counteractant materials have been proposed, generally attempting to vary the amount of air coming into contact with the counteractant and to thereby control the amount of evaporation which takes place. These systems have not been altogether satisfactory since they did not provide accurate control which could be easily operated from a remote point.

My invention provides a dispensing or treating apparatus and a control system therefor which permits selective operation of the apparatus at levels of vaporization which vary greatly and which could not be obtained by simply operating a damper to control the amount of air coming into contact with the counteractant in the manner used in the past. Also, my invention provides a control which is particularly adaptable to be located remotely from the dispensing apparatus. Therefore, the invention is particularly useful where the dispensing apparatus is to be used in connection with the air treating system in a building with the controls located in a position remote from the dispenser and other air treating apparatus so that they will be more convenient to the occupants of the building.

In its broadest sense, my invention lies in the provision,

in combination with a dispensing apparatus of the type wherein a vaporizable air treating material is vaporized by bringing a stream of air into contact with it, of a heater selectively operable to increase the temperature of the stream of air prior to its coming into contact with the air treating material so as to increase the rate of vaporization of the material and thereby increase the effectiveness of the air treating apparatus. My invention also contemplates the use, in combination with the aforementioned heater, of a thermal actuator responsive to the temperature of the air heated by the heater, to operate a damper which in turn controls the rate of air flow which comes into contact with the air treating material. Thus, the heater is effective to increase the effectiveness of the air treating apparatus in two ways, first by raising the temperature of the air so as to increase the rate of evaporization of the material, and secondly, to cause operation of the damper so as to permit a greater volume of air to come into contact with the air treating material. My invention further lies in structure for adding these controls to an air treating apparatus and to a remote control system which is selectively operable to bring the heater into operation and to thereby vary the effectiveness of the dispensing apparatus.

My invention will become apparent upon reading the following detailed description of a preferred embodiment of my invention with reference to the drawing wherein:

FIGURE 1 is a front view, with portions broken away, of an air treating apparatus constructed according to my invention.

FIGURE 2 is a transverse cross-sectional view of the air treating apparatus, taken generally along line 2—2 of FIGURE 1.

FIGURE 3 is a schematic representation of the air treating apparatus disclosed in FIGURES 1 and 2 utilized in connection with a home heating and/or cooling system and including an electrical control system for the air treating apparatus.

Referring first to FIGURES 1 and 2, reference numeral **10** generally designates a dispenser for air treating material. The dispenser **10** takes the form of a box **11**, which is generally rectangular in cross-section and which may be formed of any desired material, for example from metal or plastic. Box **11** makes up the main portion of the dispenser but has attached to the side of it an auxiliary box **12** which is also rectangular in cross-section. Box **11** has an opening at the top which is closed by a cover **13** attached to the box by an appropriate hinge **13***a* and secured by a releasable hasp **13***b*. Cover **13** provides access to the upper portion of box **11**, which upper portion will be referred to as the storage portion **14** of box **11**. This portion of the disclosed apparatus is conventional and is adapted to house a plurality of slugs or bars **15** of a vaporizable odor counteractant material. The walls of box **11** have a plurality of alternately spaced, inwardly extending baffles **16** which support the bars or slugs of air treating material and define a passageway through which they art fed by gravity into an intermediate portion of box **11** which will be referred to as a vaporizing chamber **17**. The baffles are desirable in the storage area of the dispenser since the slugs are made of a gel-like material and it is not desirable to have the weight of several of these slugs exerted upon a single one of them.

Vaporizing chamber **17** is separated from the storage portion **14** of the box by an extended baffle member **20** which, with the forward wall of the box, defines an opening which has a width less than the diameter of the slugs of counteractant material. The purpose of this construction will be discussed below. Chamber **17** is provided with an air inlet which takes the form of a perforated portion of an end wall **21** which forms the left-hand end of the box **11**, as viewed in FIGURE 1. The chamber also has

a perforated back wall **22** which is spaced forward from the rear wall of the box **11** and which forms a part of the air outlet from chamber **17**. The chamber has a horizontal step or pedestal **23** upon which the slugs of counteractant material may lie to be vaporized. The riser portion **24** of this step, spaced backward slightly from the front of box **11**, is also perforated and acts as an additional air outlet from the vaporizing chamber. A door **25** provides access to the vaporizing chamber and is hinged by hinge **25***a* and secured by an appropriate latch **25***b*.

The areas behind perforated wall **22** and under the step or pedestal **23**, together, define an outlet passage **26** through which air passes to an outlet opening **27** in the back wall of box **12**. This opening **27** may be provided with an appropriate gasket or seal **30** and may be connected so as to supply treated air to an enclosure. For example, outlet opening **27** may be connected to the inlet of the blower for the air conditioning system of a building.

At the bottom of box **12** is an additional chamber **31** which has a grilled air inlet opening **32** at the right-hand end (as seen in FIGURE 1). This chamber, along with a chamber **33** at the lower end of the auxiliary box **12**, forms an air inlet passage for the treating apparatus. This inlet passage, the vaporizing chamber, and the outlet passage, considered together, define an air flow circuit through the dispenser. Disposed in the inlet passage, in chamber **31**, is an elongated electric heater **34** which is supported by appropriate means such as screws **35** so that the heater is disposed generally along the center of the chamber **31** and extends almost the entire length. The heater is disposed so as to be in heat transfer relationship with air passing through chamber **31**. Supported by an upstanding member **36** located in chamber **33**, and disposed in the air inlet passage, approximately at the point of intersection between chambers **31** and **33**, is a temperature responsive switch **37** which is connected in controlling relationship with heater **34**. As will be seen hereinafter, this switch **37** acts as a high limit safety switch for heater **34** to prevent overheating.

Positioned in air outlet passage **26**, intermediate back wall **22** of the vaporizing chamber and the rear wall of box **12**, is a damper or air valve **40** which cooperates with outlet opening **27** to control the amount of air passing through the outlet passage and thereby controlling the amount of air which can pass through the vaporizing chamber. Damper **40** is carried by a lever **41** which is pivoted at **42** on the rear wall of box **12**. The end of lever **41**, opposite to the end which carries the damper **40**, extends through an opening **43** in wall **21** and into chamber **33** in box **12**. There a pin **44** extends transversely from the end of the lever and is engaged by the free end of a bimetal temperature responsive actuator **45**. The other end of bimetal actuator **45** is connected to a shaft **46** which is rotatably mounted on support **36**. A manual adjustment (not shown) may be provided for selecting the normal position of damper **40**, that is the position occupied by the damper when heater **34** is de-energized. These details are not disclosed since they are considered to form no part of the invention and any appropriate adjustment apparatus may be used. Suffice it to say that when the heater is de-energized, the bimetal will normally position damper **40** so that it blocks off at least a portion of outlet opening **27**. When heater **34** is energized, the heated air comes into contact with bimetal **45** and the bimetal tends to unwind as its temperature rises and hence lever **42** is pivoted in a counterclockwise direction to open damper **40**.

As noted in FIGURE 2, storage portion **14** of box **11** may contain several bars of the air treating gel. In FIGURE 1 a portion of the box has been broken away to disclose one of these bars in this storage portion. As seen there, a leaf spring **47** engages the right-hand end of the bar so as to urge the bar towards the left as seen in FIGURE 1. At the left-hand side of box **11**, there is an opening through end wall **21** through which a switch actuating arm **50** extends so as to be engaged by the lefthand end of the bar. This switch operating lever operates a conventional miniature switch **51** and, when the lever **50** is depressed by the presence of a bar of gel, switch **51** is opened. The function of this switch will be seen in connection with FIGURE 3. Switch **51** is mounted in the upper portion of box **12** which may also be used to house a number of other components such as relays and transformers and the like. Since the specific manner in which these components are mounted is of no significance to the present invention, they have not been disclosed in FIGURE 1. However, these components will be discussed in connection with the control system disclosed in FIGURE 3.

In FIGURE 3, dispensing apparatus **10** is shown schematically in combination with the forced air system of a building. While the dispensing apparatus may be used as a free standing unit with its own means for drawing air through the device, it has particular application when used in connection with the central system in the home or other building. For illustrative purposes, outlet **27** has been shown connected to the inlet side of a system blower **52** by means of a duct **53**. Actually, dispensing apparatus **10** may be mounted directly on the side of a furnace with outlet opening **27** aligned with a corresponding opening through the wall of the furnace and leading into the inlet area for the blower. FIGURE 3 illustrates the central forced air system schematically and shows an air conditioning apparatus **54** which may include cooling, heating, air cleaning or other equipment and shows the air being delivered to a room through a supply duct **55** with the return air coming through a duct **56** into which the duct **53** connects. As illustrated in FIGURE 3, the air treating apparatus may be located in the basement along with the various other air conditioning equipment where it would not be particularly convenient should the occupants of the area being conditioned wish to change the adjustment of the apparatus or otherwise supervise the system. FIGURE 3 discloses a control system for the dispensing apparatus which is particularly applicable to installations where it is desired to have a remote control panel located in the occupied area.

The system includes a remote control panel **57**, the details of which will be discussed hereinafter. Power for the system is supplied by a pair of AC power conductors **60** and **61**. Conductor **61** is connected to one terminal of a motor **62** for driving the system fan, by a conductor **63**. A conductor **64** connects conductor **61** to one side of the electric heater **34**. Conductor **60** is connected to the other terminal of motor **62** by means of parallel conductors **65**, **66** and **67** through switches **70**, **71** and **72** respectively. Conductor **60** is also connected to the opposite side of heater **34** by a conductor **73** through a switch **69** and the thermal switch **37**, previously discussed. Conductors **60** and **61** are also connected across the primary winding **74** of a transformer **75**. Transformer **75** has a secondary winding **76** which has one terminal **77** connected by a conductor **80** to a common terminal **81** in the remote control panel **57**.

Another terminal **82** of the transformer secondary is connected, by a conductor **83**, through an electromagnetic relay coil **84** to one terminal of a manual fan switch **85** located at the remote control panel **57**. The other terminal of this switch is connected to the common terminal **81** in the remote control panel. Terminal **82** is also connected by a conductor **86**, through an electromagnetic relay coil **87** to one terminal of a switch **89** which is located at the remote control panel **57** and forms part of a burst switch **88**. The switch **89** is controlled by a timer **90** having a manual actuator **91**. Timer **90** may take the form of any mechanical or electrical timer which may be manually operated to close the switch and to select a time for which the switch is to remain closed and which will, after the expiration of that preselected period, open the switch. The other side of switch **89** is connected to the common terminal **81** in the remote control panel. Terminal **82** of transformer **75** is also connected, by a conductor **92**, through the switch **51** located in box **12** of the dispensing

apparatus to an indicator lamp **93** located in the remote control panel. The other side of the lamp **93** is also connected to the common terminal **81**.

The operation of the air treating apparatus and the control system therefor will now be described. The system is shown in the drawing in its de-energized position, that is with all of the switches open so that the system fan is de-energized as is heater **34** and all of the other controls. It it is desired to place the system in operation, this may be accomplished in any one of three different ways. First of all, the system may be placed in operation by the closing of the additional fan control switch **70** which, while shown as a simple switch, may be the condition responsive control apparatus for the air conditioning system. If this switch is closed, a circuit is completed from conductor **60**, through conductor **65** and the switch **70** to the fan motor **62** and through conductor **63** back to conductor **61**. This energizes motor **62** and causes operation of the system fan **52** which in turn causes the air to be drawn in through opening **32** in box **11**. Thus air is caused to pass through vaporizing chamber **17** of box **11** and to come into contact with a slug of gel disposed in chamber **17** as well as with the lower portion of a slug resting upon the lower baffle **20** of storage area **14**. Since damper **40** is closed, or substantially closed, the amount of air passing through the air treating apparatus will be relatively small and a "normal" rate of vaporization of slug **15** will occur and a "normal" effectiveness of the air treating apparatus will be obtained. As noted, the air passing through chamber **17** contacts a portion of the lowermost slug of gel in storage area **14**. The remaining portion of that slug tends to seal off the storage portion from the vaporizing chamber. As air continues to pass through the vaporizing chamber, the slug laying in the vaporizing chamber tends to become smaller and smaller due to evaporation. In the same manner the slug resting upon baffle **20** also gradually reduces in size due to evaporation and finally drops through the space between the end of baffle **20** and the forward wall of box **11**. This will occur when the slug in chamber **17** has been substantially all evaporated away. When this happens the next higher slug rolls down and closes off the space between baffle **20** and the front wall. As the slugs **15** evaporate into the air passing through the air treating apparatus, the odor counteractant material is evaporated into the air and this air is added to the air conditioning system to be dispersed throughout the area controlled by the air conditioning system.

Whenever a supply of gel is present in storage chamber **14**, the slugs act upon switch actuating lever **50** (see FIGURE 1) causing switch **51** to be held open. Referring to FIGURE 3, it can be seen that when this switch is closed a circuit is completed from terminal **82** of transformer **75**, through conductor **92** and the switch **51** to indicator lamp **93** and back through common terminal **81** and conductor **80** to the secondary of the transformer. Switch **51** and actuating lever **50** are located so that when the last slug in the storage chamber drops onto baffle **20**, switch **51** is closed and light **93** comes on at the remote control panel to indicate a need for replenishing the supply of counteractant material.

The system can also be placed in operation by closing fan switch **85** at the remote control panel. When this is done a circuit is completed from terminal **82** of the transformer secondary, through relay coil **84** and conductor **83**, fan switch **85**, common terminal **81** and conductor **80** back to terminal **77** of the transformer. Thus, relay coil **84** is energized and this is effective to close switch **71** so that a circuit is completed from conductor **60**, through switch **71**, conductor **66**, fan motor **62** and conductor **63** to conductor **61**. Under this condition the system operates exactly as it was described in connection with the closing of additional fan switch **70**.

Closure of either of the switches **70** or **85** results in "normal" operation of the air treating apparatus. However, should it be desired to increase the effectiveness of the air treating system, for example upon the occurrence of an extremely objectionable odor, a "burst" can be obtained by utilization of the burst switch **88** at the remote control panel. This is accomplished by operating actuator **91** to set timer **90** and close switch **89**. When switch **89** is closed, a circuit is completed from terminal **82** of transformer **75**, through relay coil **87**, conductor **86**, switch **89**, common terminal **81** and conductor **80**, to terminal **77** of the transformer. Energization of relay coil **87** results in closure of switches **69** and **72**. This completes a circuit from conductor **60**, through switch **72** and conductor **67**, motor **62** and conductor **63** to conductor **61** so that motor **62** is energized and the system fan is placed in operation. At the same time, the closure of switch **69** completes a circuit from conductor **60**, through switch **69**, conductor **73**, normally closed temperature responsive switch **37**, heater **34** and conductor **64** to conductor **61**. This causes energization of heater **34** and hence the air drawn in through the opening **32** and passing through the air inlet passage is heated as it passes along heater **34**. This alone causes the evaporation rate of the air treating material to increase so that the effectiveness of the air treating apparatus increases substantially. However, at the same time, the increased temperature of the air passing through the air inlet passage causes the temperature responsive actuator **45** to operate and to open damper **40**. This causes the amount of air passing through the air treating apparatus to increase. Thus, not only is the temperature of the air passing over the air treating material increased, but also the volume of air passing over it is increased. Operation of the burst switch thus results in a two-fold increase in the effectiveness of the air treating apparatus. Should the operation of heater **34**, for some reason or other, unduly raise the temperature of the air passing over switch **37**, and hence coming into contact with the air treating material, switch **37** opens and breaks the circuit to the heater. Thus switch **37** acts as a high limit safety switch for the system. A safety switch of this type is particularly important to the system since care must be taken not to overheat the odor counteractant material in vaporizing chamber **17**.

If the system is already operating due to the closure of switch **70** or switch **85** when the burst switch is operated, the operation of the system fan will not be interrupted and the only effect of the burst switch will be to cause energization of heater **34** which in turn will increase the effectiveness of the system. When the selected time has elapsed, timer **91** will open switch **90** and heater **34** will be de-energized as will fan motor **62** unless one of the other switches for the fan motor is closed at this time.

From the foregoing it can be seen that my invention provides a relatively simple air treating apparatus and control system which is readily adaptable for use either by itself or in connection with a forced air central system. It is particularly adaptable for use with a remote control panel which is located some distance from the air treating apparatus itself. The system provides a simple and effective means for controlling the rate of evaporation and thereby the effectiveness of the air treating apparatus. It renders this selection so simple that it can be readily accomplished by the homeowner or other user of the device to change the level of effectiveness by simply operating a switch.

It should be noted that my invention is not limited to the preferred embodiment which I have shown and described. While I have shown a dispenser and apparatus for using slugs or bars of material in a gel form, it is to be understood that similar principles could be applied where a liquid is used, for example. Also, while I find it preferable to use the bimetal operator for the damper in conjunction with heater **34**, the heater may be used alone to provide a substantial increase in the effectiveness of the device if this is desired. Also, the device has been described as used in connection with a central forced air

system and indication has been made herein that the device may be used alone as a free standing unit. The apparatus which I have described may be used in connection with other portable devices such as portable air filters, humidifiers and the like. My disclosure may suggest various modifications to those skilled in the art without departing from the scope of my invention. Therefore, it is to be understood that my invention is to be limited solely by the scope of the appended claims.

I claim:

1. Dispensing apparatus for a vaporizable air treating material of the type which is evaporated in air at a rate which increases as the temperature of air passing thereover is increased, the apparatus comprising: a structure having an air flow circuit therethrough including an air inlet opening and an air outlet opening and a vaporizing area adapted to have a quantity of vaporizable air treating material retained therein, said structure being constructed and arranged so that air passing through said air flow circuit passes over and makes surface contact with treating material in said vaporizing area; electrically energizable heater means mounted in said inlet opening and adapted to heat air passing therethrough; control switch means; timer means; electrical circuit means including said switch means and said timer means connected in controlling relation with said heater means and adapted to be connected to a source of electrical energy; and manual means selectively operable to close said switch means and to render said timer means operable, said timer means being effective a predetermined time thereafter to automatically open said switch means to de-energize said heater means.

2. In combination with apparatus for dispensing a vaporizable air treating material of the type which is evaporated in air at a rate which increases as the temperature of air passing thereover is increased and wherein the apparatus includes a dispenser structure with an air passage therein defining an air flow circuit having air inlet and air outlet openings, means adapted to connect the air passage to a means for moving air therethrough, and a vaporizing area of the air passage intermediate the inlet and outlet openings and adapted to have a quantity of vaporizable air treating material retained therein to be evaporated into air moving thereover, control apparatus for selectively increasing the vaporizing rate of the dispensing apparatus comprising: electrically energizable heater means disposed intermediate the inlet opening and the vaporizing area and adapted, when energized, to heat air moving through said air circuit; electrical circuit means adapted to connect said heater means to a source of electrical power; and timer controlled switch means connected in said electrical circuit means in controlling relationship with said heater means, said switch means including manually operable means for selecting the operating time of said timer and completing an electrical circuit to said heater means to cause energization thereof, said timer thereafter automatically operating said switch means to de-energize said heater means after expiration of the selected operating time.

3. Apparatus for adding to the air in an enclosed area a vaporizable air treating material of the type which is evaporated in air at a rate which increases as the volume and temperature of air passing thereover is increased, the apparatus comprising: a dispenser having an air flow circuit including air inlet means for admitting air, air outlet means for dispelling air to the enclosed area, and a vaporizing chamber intermediate said inlet and outlet means, said chamber being adapted ot have a quantity of vaporizable air treating material retained therein and exposed to air passing therethrough; electrically energizable heater means disposed in said air inlet means and adapted, when energized, to heat air passing through said inlet means; electrical circuit means adapted to connect said heater means to a source of electrical power; air valve means associated with said air flow circuit and operable to control the flow of air therethrough, said valve means normally permitting a predetermined amount of air flow; thermally responsive actuator means mounted in operative association with said heater means and operably connected to said valve means so that upon heating of said heater means said actuator means operates said valve means to permit a flow of air which is greater than said predetermined amount; and manual control means including switch means connected in said electrical circuit means in controlling relationship with said heater means and operable to selectively energize said heater means to increase the evaporation rate of the treating material.

4. Apparatus for adding to the air of an enclosed space a vaporizable air treating material of the type which is evaporated in air at a rate which increases as the volume and temperature of air passing thereover is increased, the apparatus comprising: a dispenser structure having an air flow passage therethrough adapted to have contained therein a quantity of vaporizable air treating material which is vaporized and carried away by such air; means for connecting said passage to apparatus for moving air therethrough; electrically energizable heater means mounted in said passage in a position to heat air passing therethrough before such air reaches the air treating material; control switch means; limit switch means responsive to the temperature of air heated by said heater means; circuit means electrically connecting said control switch means and said limit switch means in controlling relation with said heater means and adapted to be connected to a source of electrical power, said limit switch means being operable to open the circuit to said heater means when the temperature of the air heated thereby reaches a predetermined maximum; air flow control means associated with said passage and operable to control the amount of air flowing therethrough and permitting a predetermined flow through said passage when said heater means is de-energized; thermally responsive actuator means operably connected to said air flow control means and responding to heat from said heater, when energized, to operate said air flow control means to increase the amount of air flow through said passage.

5. In an air treating apparatus of the type wherein a stream of air is brought into contact with a quantity of vaporizable air treating material so that the material is evaporated into the air, the improvement comprising: heater means in said apparatus, disposed in heat transfer relation with the stream of air and selectively operable to heat the air prior to its coming into contact with the treating material to increase the vaporization rate of the material and thereby increase the effectiveness of the air treating apparatus.

6. Apparatus for adding to air a vaporizable air treating material of the type wherein the vaporization rate of the material increases with increasing volume and temperature of the air passing thereover, the apparatus comprising: an enclosure having a passage therethrough through which air is to be conveyed, the passage including a vaporization area which is adapted to house a vaporizable material over which air conveyed through the passage must pass; heater means associated with said passage and operable to heat air traveling through said passage prior to its entry into said evaporization area; air valve means associated with said passage and operable to control the amount of air conveyed through said passage; thermally responsive actuator means operably connected to said valve means and disposed in heat transfer relation with the air heated by said heater means, said actuator means maintaining said valve means in a position to permit a predetermined amount of air to be conveyed through the passage when said heater means is not operated and responsive to the operation of said heater means to open said valve means to permit a greater amount of air to be conveyed through said passage; and control means operably associated with said heater means and selectively operable to render said heater means op-

erative and to thereby increase the vaporization of the air treating material due to the combined effect of raising the temperature of air entering said vaporization area and increasing the volume of air conveyed threthrough by operation of said valve means.

7. Air treating apparatus for use in combination with a forced air heating or cooling system of the type having a blower to move air therethrough, the apparatus comprising: an enclosure having an air passage therethrough with an inlet and an outlet and adapted to be connected to the forced air system so that the system blower effects movement of air through said passage and so that said outlet connects into the system to supply treated air thereto, said passage including a vaporization chamber adapted to be partially filled with a vaporizable air treating material of the type wherein the vaporization rate increases with increasing temperature of the air passing thereover; heater means associated with said enclosure and operable to heat air passing through said passage prior to its entry into said vaporizing chamber to increase the vaporization of the air treating material; and control means associated with said heater means and selectively operable to render said heater means operative to heat air in said passage.

8. Air treating apparatus for use in combination with a forced air heating or cooling system of the type having a blower to move air therethrough, the apparatus comprising: an enclosure having an air passage therethrough with an inlet and an outlet and adapted to be connected to the forced air system so that the system blower effects movement of air through said passage and so that said outlet connects into the system to supply treated air thereto, said passage including a vaporization chamber adapted to be partially filled with a vaporization air treating material of the type wherein the vaporization rate increases with increasing temperature and volume of air passing thereover; heater means associated with said enclosure and operable to heat air passing through said passage prior to its entry into said vaporizing chamber to increase the effectiveness of the air treating apparatus; damper means operable to control the amount of air flow through said passage upon operation of the system blower; thermally responsive actuator means operably connected to said damper means, said actuator means normally maintaining said damper means in a position to permit a predetermined amount of air flow through the passage when said heater means is not operated and responsive to operation of said heater means to operate said damper means to permit a greater air flow through said passage to further increase the vaporization of the air treating material; and control means associated with said heater means and selectively operable to render said heater means operative to heat air in said passage.

9. Air treating apparatus for use with a temperature conditioning system of the type having a blower to move air therethrough, the apparatus comprising: an enclosure having an air passage therethrough with an air inlet and an outlet and adapted to be connected to an air duct of the temperature conditioning system so that the system blower is effective to move air through said passage from said inlet to said outlet, said enclosure including a vaporization chamber adapted to contain a quantity of vaporizable air treating material of the type wherein the amount of vaporization increases with increasing temperature of air passing thereover, said enclosure being constructed and arranged so that a portion of the air treating material contained therein is exposed to air passing through said vaporization chamber; electrically energizable heater means associated with said enclosure and effective, when energized, to heat air passing through said passage prior to its entry into said vaporization chamber to increase the vaporization of the air treating material therein; first electrical circuit means connected to said heater means and adapted to be connected to a source of electrical power; second electrical circuit means adapted to be connected to the system blower and to a source of electrical power; and control apparatus including switch means adapted to be located remotely from said enclosure, connected in controlling relationship with said first and second circuit means, and selectively operable to effect energization of said heater means and the system blower.

10. The air treating apparatus of claim 9 wherein said switch means includes an electrical switch connected in controlling relationship with said first and second circuit means, timer means operatively connected to said electrical switch, and manual means operably connected to said timer means and said electric switch and selectively operable to effect operation of said timer means and to close said switch means to effect energization of the system blower and said heater means, said timer means being effective for a pre-selected time and thereafter to automatically open said electric switch to de-energize said heater means and the system blower.

11. The air treating apparatus of claim 9 wherein the enclosure further has a damper associated with said passage and operable to control the amount of air moved therethrough, and thermally responsive operating means responsive to the temperature of air in said passage and operably connected to said damper so that said damper is maintained in a first operative position to permit a first predetermined amount of air to be moved through said passage when said heater is de-energized and so that said actuator means responds to heating of air by said heater means, when energized, to operate said damper to permit a greater amount of air to be moved through said passage to further increase the effectiveness of the air treating apparatus.

12. The air treating apparatus of claim 9 wherein said first circuit means includes a temperature responsive switch connected in series circuit with said heater means and responsive to the temperature of air heated by said heater means, said last named switch being normally closed but effective to open the circuit and thereby de-energize said heater means when the temperature of the air heated thereby reaches a predetermined maximum.

13. The air treating apparatus of claim 9 wherein said control apparatus further includes indicator switch means responsive to the amount of air treating material contained in said enclosure and operable thereby upon the amount of treating material reaching a predetermined minimum amount, indicator circuit means connected to said indicator switch means and adapted to be connected to a source of electrical power, and electrically operated indicator means connected in said indicator circuit means and adapted to be located remotely from said enclosure and in proximity with said remote switch means, said indicator means being operated in response to operation of said indicator switch means to call attention to the need for replenishing the air treating material.

14. An air freshening system comprising: a dispenser enclosure having an air passage therethrough and including a vaporizing chamber forming a part of said passage, said enclosure further including a space above the vaporizing chamber for storing a plurality of bars of vaporizable air freshening material in gel form, said enclosure including a wall separating said storage space and said vaporizing chamber with an elongated opening therethrough so that individual bars of material are fed by gravity from said storage space into said vaporizing chamber, said passage being adapted to be connected to a means for moving air therethrough and through the vaporization chamber so as to pass over the air freshening material therein; electrically energizable heater means mounted in said passage in a position to heat air passing therethrough before such air reaches said vaporizing chamber and thereby increases the vaporization of the air freshening material therein; circuit means electrically connected to said heater means and adapted to connect said heater means to a source of electrical energy; first manually

operable switch means electrically connected in said circuit means and selectively operable to control the energization of said heater means; second switch means electrically connected in said circuit means in controlling relationship with said heater means, and responsive to the temperature of air heated by said heater means, said second switch means being operable in response thereto to open the circuit to said heater means when the temperature of the air heated thereby reaches a predetermined maximum temperature; air flow control means associated with said passage and operable to control the amount of air flowing therethrough and permitting a predetermined flow through said passage when said heater means is de-energized; thermally responsive actuator means operably connected to said air flow control means and disposed in heat transfer relationship with the air heated by said heater means and responsive thereto when said heater means is energized, to operate said air flow control means to increase the amount of air flow through said passage and thereby further increase the vaporization of said air freshening material; electrically operable indicator means; circuit means connected to said indicator means and adapted to be connected to a source of power; third switch means connected in said last named circuit means in controlling relationship with said indicator means and responsive to the presence of at least one bar of freshening material in said storage space to maintain said indicating means inoperative, said switch means responding to the passing of the last bar from said storage space to operate said indicator means.

References Cited

UNITED STATES PATENTS

2,733,956	2/1956	Wenner	239—58 XR
2,923,479	2/1960	Wenner et al.	239—55 XR
2,942,786	6/1960	Wenner et al.	239—58 XR
2,021,521	11/1935	Sargent.	
2,047,973	7/1936	Lawton et al.	
2,497,068	2/1950	Canney.	
2,537,761	1/1951	Howard	21—121
2,614,820	10/1952	Boydjieff	21—126 XR
2,686,944	8/1954	Gubelin	21—126
2,737,572	6/1956	Wernst	21—119 X
2,937,419	5/1960	Vaughn	21—119 XR
3,042,383	7/1962	Pennington.	
3,044,276	7/1962	Kauten	21—121 XR
3,158,194	11/1964	Rawlins.	

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