V. K. BOYNTON.

FUME CONTROL DEVICE.

APPLICATION FILED OCT. 14, 1920.

1,414,722.

Patented May 2, 1922.

2 SHEETS—SHEET 1.

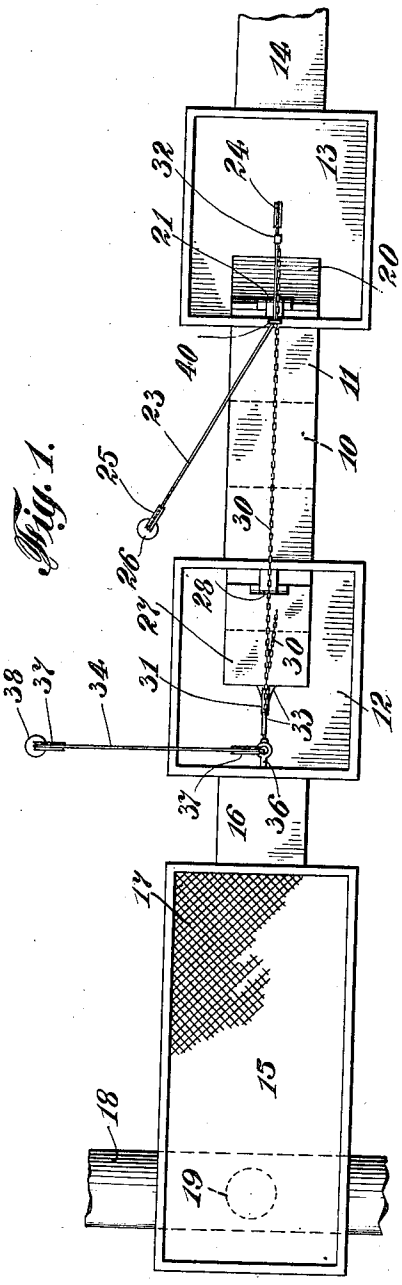


Fig. 1.

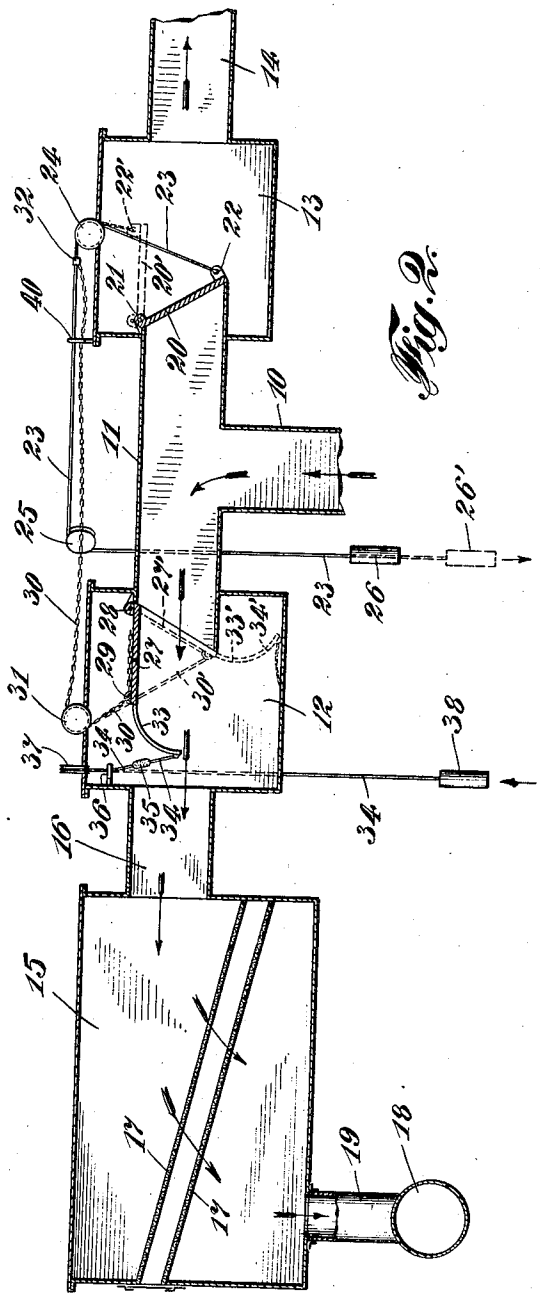


Fig. 2.

Inventor

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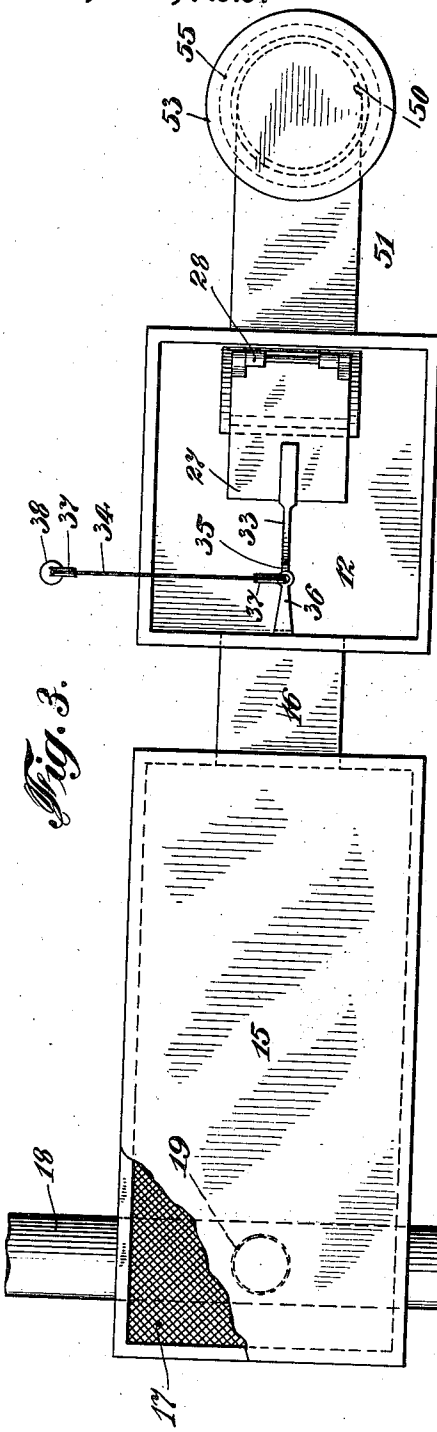


Fig. 3.

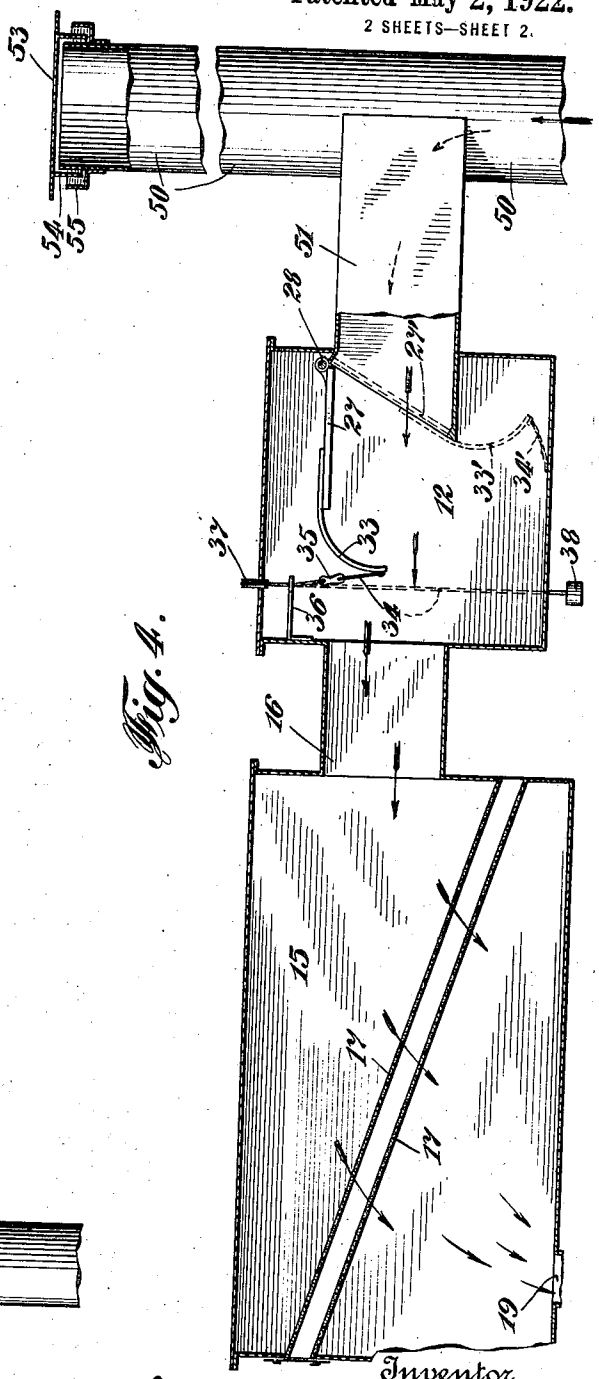


Fig. 4.

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UNITED STATES PATENT OFFICE.

VERN K. BOYNTON, OF NEW YORK, N. Y., ASSIGNOR TO PERRY & WEBSTER, INC., OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

FUME-CONTROL DEVICE.

1,414,722. Specification of Letters Patent. Patented May 2, 1922.

Application filed October 14, 1920. Serial No. 417,044.

To all whom it may concern:

Be it known that I, VERN K. BOYNTON, a citizen of the United States, residing in New York city, county of New York, borough of Manhattan, and State of New York, have invented certain new and useful Improvements in Fume-Control Devices, of which the following is a full, clear, and exact specification.

My invention relates to fume control devices and refers particularly to fume control conduit devices.

In the heating and treatment of industrial materials there is frequently a liability to fire and explosion due to the inflammability or explosiveness of the materials employed, or produced, during the treating operations.

In addition to the incident danger to the devices directly connected with the operations, there is frequently, the danger of transmission of the fire, or explosion effects, to other portions, or units, of the apparatus connected therewith.

This is particularly true in those treating, or chemical, operations resulting in the evolution of fumes possessing inflammable, or explosive, properties, which fumes are to be subjected to further treatments, and hence, are conducted through conduits into devices and apparatuses.

It is evident that if the fume flames, or explosive results, can be governed at, or near, the time and place of their inception, the danger of a large conflagration and extensive destruction of plant and property may be avoided.

It is further evident that great advantages may also be gained if the flames and disruptive forces can be immediately removed from confinement within the apparatus and diverted therefrom to some place where their destructive forces may be rendered practically ineffective.

A device of this character should be of such construction that it can be tested, as desired, irrespective of the fume operations with which it is employed, in order that its operativeness may be determined. This is particularly necessary in the treatment and control of fumes incident to the manufacture of varnish, which have a natural tendency to stick, or gum, the valves, closures and other movable portions of the mechanism.

It is further advantageous in many installations that the fume control device may be employed in one-story buildings, and without the necessity of tall chimneys.

In order that such a device may be effectively operated, it must be automatic, simple in construction, positive in operation and of such a character and construction that it will not interfere with the normal working of the apparatus with which it is employed.

The device of my invention possesses all of the above and many other valuable attributes which will be evident upon a consideration of my drawings and specification.

In the accompanying drawings, illustrating one form of a device of my invention, similar parts are designated by similar numerals.

Figure 1 is a diagrammatic top plan view of one form of my device.

Figure 2 is a vertical cross-section of Figure 1.

Figure 3 is a diagrammatic top plan view of a modified form of my device.

Figure 4 is a vertical cross-section of Figure 3.

In the accompanying drawings, illustrating diagrammatically one form of a device of my invention, a conduit 10 is connected with an apparatus (not shown) in which fumes are produced, or evolved, the fumes passing through the conduit 10 in the direction of the arrow. The conduit 10 opens into a transverse conduit 11, the normal exit of which opens into the practically air-tight control chamber 12 and the abnormal exit of which opens into the practically air-tight chamber 13. The chamber 13 opens into the conduit 14 which communicates with the atmosphere, or other safe fume disposal. The other extremity of the chamber 12 communicates with the practically air-tight screen chamber 15 by means of the conduit 16. The chamber 15 contains the two spaced screens 17, 17 and is connected to the fume manifold 18 by means of the conduit 19, whence the fumes are conducted for desired treatment during the normal operation of the device.

At the normal exit of the conduit 11 and within the chamber 13, a door, or closure, 20 is pivotally attached at 21. The closure 20,

in its normal position, closes the abnormal exit of the conduit 11 and practically prevents the escape of fumes therethrough. Attached to the free end 22 of the closure 20, is a chain, or cable, 23, passing over the sheave 24 and the idler 25, and has attached to the end thereof a weight 26 weighing slightly less than is necessary to open the closure 20, so that it will not prevent the closure 20 from closing the abnormal exit of the conduit 11.

At the other extremity, or normal exit, of the conduit 11, and within the chamber 12, a door, or closure, 27 is pivotally attached at 28. The closure 27, in its free position, is capable of closing the exit of the conduit 11 and practically preventing the escape of fumes therethrough. The closure 27 carries a hook 29, capable of linked engagement with the chain 30 which passes over the idler 31 and is connected to the cable 23 at 32. The cable 23 and the chain 30 pass through a guide 40, carried by the upper cover of the chamber 13. The closure 27 carries an extended arm 33, to the outer extremity of which is attached the cable, or chain, 34 having the fusable member, or link, 35. The cable 34 passes through the guide 36 and over the idlers 37, 37 and carries at its extremity a weight 38, weighing slightly more than is necessary to maintain the closure 27 in an open position, so that the closure 27 will be normally maintained in a position to allow the exit of fumes from the conduit 11.

The combined effective weight of the closure 27 and the weight 26 is considerably greater than the effective weight of the closure 20.

When the apparatus is in normal working condition, the closure 20 is closed, the closure 27 is open and fumes pass through the conduit 10, the conduit 11, the chamber 12, the conduit 16, the screens 17, 17, the chamber 15 and the conduit 19 into the manifold 18.

In the event of the ignition of the fumes passing through the conduits 10 and 11, the heat generated thereby will melt the fusible member 35, allowing the closure 27 to fall across the normal exit of the conduit 11, thus preventing the passage of the flames therethrough, and the combined effective weight of the closure 27 and the weight 26, acting through the chain 30 and the cable 23, will raise the closure 20, allowing the flames to pass through the conduit 14 and thence outwardly into the atmosphere. It will thus be seen that the heat of ignition of the fumes diverts the ignited fumes from the direction toward the further treating members, or units, of the apparatus and toward the atmosphere, thus preventing the extension of the conflagration.

The positions of the various elements of the device, following the fusing of the member 35, are indicated in dotted lines, similar parts being designated by prime numerals.

In the event of an explosion of the fumes within the device, or of the chemicals within the operating receptacle to which conduit 10 is connected, the reaction thereof will violently force the closure 20 upwardly, thus opening the device for a great portion of the explosive force to find an exit through the conduit 14 to the atmosphere; whereas, if the conduit 11, at the extremity 20, were permanently sealed, the full force of the explosion would pass through the conduits 11 and 16, with the liability of great destructiveness to those portions as well as to the chamber 15, the manifold 18 and all of the apparatus to which the manifold leads.

If it is desirable to have the normal exit area of the conduit 11 reduced during normal operations, without affecting the efficiency of the device as a control for fire, or explosion, the hook 29 of the closure 27 may be connected with a link of the chain 30 lower than that shown in Figure 2, allowing the closure 27 to be placed in the desired position.

The screens 17, 17 are an additional flame control to prevent the passage of flames into the further portions of the device, and are designed to prevent the passage of the flames beyond this point for the short space of time necessary to fuse the member 35.

It is evident that my device is equally effective if the fumes become heated above the fusing point of the member 35, even if the fumes are not ignited, and hence, it presents an efficient means whereby fumes heated above a desired temperature may be prevented from passing into the manifold by incorporating a fusible member of the proper character.

While the device is automatic in its working operations, it may be tested, or operated, by hand if desired. The closure 20 may be raised and lowered by means of the cable 23 and the closure 27 may be raised and lowered by means of the cable 34.

The modification of my device, shown in Figures 3 and 4, comprises a flue 50, the lower extremity of which is connected with an apparatus (not shown) in which fumes are produced, or evolved, the fumes passing through the flue 50 in the direction of the arrows. The flue 50 is connected with the conduit 51, opening into the practically air-tight control chamber 12, which, in turn, is connected to the screen chamber 15 by means of the conduit 16. The screen chamber 15 contains two spaced screens 17, 17 and is connected to the manifold 18 by the conduit 19. The closure 27, pivoted at 28, and capable of closing the normal exit of the conduit 51, is maintained in an open position by the cable 34, containing the fusible link

35, which is attached to the arm 33 of the closure 27 and passes through the guide 36, over the idlers 37, 37 and carries a weight 38. The weight 38 is just sufficient to maintain the closure 27 in an open position. The abnormal exit, or upper extremity, of the flue 50 carries the loose closure 53, the escape of fumes into the atmosphere during normal operation being prevented by the annular flange 54 of the closure 53 resting within the water seal, or sand seal, 55.

The operation of this modification is as follows:

During normal operation, the fumes pass through the lower portion of the flue 50, thence through the conduit 51, the control chamber 12, the conduit 16, the screens 17, 17, the screen box 15, the conduit 19 and the manifold 18. In the event of a fire within the conduit 51, or an increase of temperature above the fusing point of the member 35, the member 35 will melt, allowing the closure 27 to close the normal exit of the conduit 51. The pressure of fumes and gases thus formed will cause the closure 53 to be forced from the top of the flue 50, thus allowing the hot, or ignited fumes, to escape into the atmosphere. In the event of an explosion, the closure 53 will be forcibly expelled from its position and thus divert the flames, or explosive forces, from the direction toward the further treating members, or units, of the apparatus and toward the atmosphere.

By "closure" I mean any pivotal, sliding or other closure means which will accomplish the described results.

I do not limit myself to the particular size, number, shape, material or arrangement of parts as shown and described, all of which may be varied without going beyond the scope of my invention as shown, described and claimed.

What I claim is:—

1. In a fume control device, in combination, a fume conduit having a normal exit and an abnormal exit, a closure capable of closing the normal exit of the conduit, a closure closing the abnormal exit of the conduit and means whereby a predetermined temperature within the conduit will close the normal exit and open the abnormal exit.

2. In a fume control device, in combination, a fume conduit having a normal exit and an abnormal exit, a closure capable of closing the normal exit of the conduit, means for normally maintaining the normal exit in an open condition, a closure closing the abnormal exit of the conduit and means whereby a predetermined temperature within the conduit will close the normal exit and open the abnormal exit.

3. In a fume control device, in combination, a fume conduit having a normal exit and an abnormal exit, a closure capable of closing the normal exit of the conduit, means for normally maintaining the normal exit in an open condition, a closure closing the abnormal exit of the conduit and means whereby an increased pressure within the conduit will open the abnormal exit and allow the passage of fumes therethrough.

4. In a fume control device, in combination, a fume conduit having a normal exit and an abnormal exit, a closure capable of closing the normal exit of the conduit, a closure capable of closing the abnormal exit of the conduit and means whereby the closing of one exit will automatically open the other exit.

5. In a fume control device, in combination, a fume conduit having a normal exit and an abnormal exit, a pivotal closure capable of closing the normal exit of the conduit, a pivotal closure capable of closing the abnormal exit of the conduit, means for maintaining the normal exit in an open condition while the abnormal exit is in a closed condition and means whereby the closing of the normal exit will automatically open the abnormal exit.

6. In a fume control device, in combination, a fume conduit having a normal exit and an abnormal exit, a closure capable of closing the normal exit of the conduit, a closure capable of closing the abnormal exit of the conduit, fusible means for maintaining the normal exit in an open condition and means whereby the fusing of the fusible means will close the normal exit and open the abnormal exit.

7. In a fume control device, in combination, a fume conduit, a normal exit of the conduit, a closure capable of closing the normal exit, an abnormal exit of the conduit opening into the atmosphere, a closure capable of closing the abnormal exit and means whereby the closing of the normal exit will automatically open the abnormal exit to the atmosphere.

8. In a fume control device, in combination, a fume conduit, a normal exit of the conduit a closure capable of closing the normal exit, an abnormal exit of the conduit, a closure capable of closing the abnormal exit and means whereby a rise of temperature within the conduit will close the normal exit and open the abnormal exit.

9. In a fume control device, in combination, a fume conduit, a normal exit of the conduit, a closure capable of closing the normal exit, an abnormal exit of the conduit, a closure capable of closing the abnormal exit, and means whereby an abnormally high temperature of fumes within the conduit will close the normal exit and open the abnormal exit.

10. In a fume control device, in combination, a fume conduit, a normal exit of the conduit, a closure capable of closing the

normal exit, an abnormal exit of the conduit, a closure capable of closing the abnormal exit and means whereby an explosion within the conduit will open the abnormal exit and allow the escape of fumes therethrough.

11. In a fume control device, in combination, a fume conduit, a normal exit of the conduit, a pivotal closure capable of closing the normal exit, an abnormal exit of the conduit, a pivotal closure capable of closing the abnormal exit, connecting means between the two closures, means for maintaining the normal exit in an open condition while the abnormal exit is closed and means for releasing the maintaining means allowing the normal exit to be closed while the connecting means automatically opens the abnormal exit.

12. In a fume control device, in combination, a fume conduit, a normal exit of the conduit, a closure capable of closing the normal exit, an abnormal exit of the conduit, a closure capable of closing the abnormal exit, connecting means between the two closures, means for maintaining the normal exit in an open condition while the abnormal exit is closed, separate means for opening and closing the abnormal exit without disturbing the normal exit and means for releasing the maintaining means allowing the normal exit to be closed while the connecting means automatically opens the abnormal exit.

13. In a fume control device, in combination, a fume conduit, a screen chamber a normal exit of the conduit connected to the screen chamber, screens within the chamber interposed within the path of fumes passable therethrough, a closure capable of closing the normal exit, an abnormal exit of the conduit, a closure capable of closing the abnormal exit and means whereby a rise of temperature within the conduit will close the normal exit and open the abnormal exit.

14. In a fume control device, in combination, a fume conduit, a chamber a normal exit of the conduit connected with the chamber, a closure within the chamber capable of closing the normal exit, an abnormal exit of the conduit, a closure capable of closing the abnormal exit and means whereby a rise of temperature in the chamber will close the normal exit and open the abnormal exit.

15. In a fume control device, in combination a conduit, a normal exit of the conduit connected with a chamber, a chamber, a closure within the chamber capable of closing the normal exit, an abnormal exit of the conduit connected with a second chamber, a second chamber, a closure within the second chamber capable of closing the abnormal exit and means whereby a rise of temperature in the first chamber will close the normal exit and open the abnormal exit diverting fumes from the conduit into the second chamber.

16. In a fume control device, in combination, a fume conduit, a chamber a normal exit of the conduit connected with the chamber, a pivotal closure within the chamber capable of closing the normal exit, an abnormal exit of the conduit, a pivotal closure capable of closing the abnormal exit and means whereby a rise of temperature in the chamber will close the normal exit and open the abnormal exit.

17. In a fume control device, in combination a conduit, a normal exit of the conduit connected with a chamber, a chamber, a pivotal closure within the chamber capable of closing the normal exit, an abnormal exit of the conduit connected with a second chamber, a second chamber, a pivotal closure within the second chamber capable of closing the abnormal exit and means whereby a rise of temperature in the first chamber will close the normal exit and open the abnormal exit admitting fumes from the conduit into the second chamber.

18. In a fume control device, in combination, a fume conduit, a control chamber, a normal exit of the conduit connected with the control chamber, means connecting the control chamber with a screen chamber, a screen chamber, screens within the screen chamber disposed in the path of fumes passing therethrough, a pivotal closure within the control chamber capable of closing the normal exit, an abnormal exit of the conduit connected with a second chamber opening into the atmosphere, a second chamber, a pivotal closure within the second chamber capable of closing the abnormal exit, means for connecting the closures and means within the control chamber whereby, upon a rise of temperature therein, the normal exit will be closed and the abnormal exit opened thereby diverting the passage of fumes within the conduit from the screen chamber through the second chamber into the atmosphere.

19. In a fume control device, in combination, a fume conduit, a control chamber, a normal exit of the conduit connected with the control chamber, means connecting the control chamber with a screen chamber, a screen chamber, screens within the screen chamber disposed in the path of fumes passing therethrough, a closure within the control chamber capable of closing the normal exit, an abnormal exit of the conduit connected with a second chamber opening into the atmosphere, a second chamber, a closure within the second chamber capable of closing the abnormal exit, means for connecting the closures and fusible means within the control chamber whereby, upon a rise of temperature therein, the normal exit will

be closed and the abnormal exit opened thereby diverting the passage of fumes within the conduit from the screen chamber through the second chamber into the atmosphere.

20. In a fume control device, in combination, a fume conduit, a control chamber, a normal exit of the conduit connected with the control chamber, means connecting the control chamber with a screen chamber, a screen chamber, screens within the screen chamber disposed in the path of fumes passing therethrough, a closure within the control chamber capable of closing the normal exit, an abnormal exit of the conduit connected with a second chamber opening into the atmosphere, a second chamber, a closure within the second chamber capable of closing the abnormal exit, means for connecting the closures and means within the control chamber whereby, upon a rise of temperature therein, the normal exit will be closed and the abnormal exit opened thereby diverting the passing of fumes within the conduit from the screen chamber through the second chamber into the atmosphere.

21. In a fume control device, in combination, a fume conduit, a normal exit of the conduit, a closure capable of closing the normal exit, an abnormal exit of the conduit, a closure capable of closing the abnormal exit, means whereby the normal exit closure may be placed in a predetermined position with respect to the normal exit while the abnormal exit is maintained in a closed condition and means whereby the closing of the normal exit will open the abnormal exit.

22. In a fume control device, in combination, a fume conduit, a normal exit of the conduit, a closure capable of closing the normal exit, an abnormal exit of the conduit, a closure capable of closing the abnormal exit, means whereby the normal exit closure may be placed in a predetermined position with respect to the normal exit while the abnormal exit is maintained in a closed condition and fusible means whereby the closing of the normal exit will open the abnormal exit.

23. In a fume control device, in combination, a fume conduit, a normal exit for fumes passing therethrough a second conduit exit, and means whereby a rise of temperature of the fumes will divert the passage of fumes from the normal exit to the second conduit exit.

24. In a fume control device, in combination, a fume conduit, a normal exit for fumes passing therethrough a second conduit exit connected with the atmosphere and means whereby a rise of temperature of the fumes will divert the passage of fumes from the normal exit into the atmosphere.

25. In a fume control device, in combination, a fume conduit, a normal exit for fumes passing therethrough, a second conduit exit, and fusible means whereby a rise of temperature of the fumes will divert the passage of fumes from the normal exit to the second conduit exit.

26. In a fume control device, in combination, a fume conduit, a normal exit for fumes passing therethrough, a second conduit exit connected with the atmosphere and fusible means whereby a rise of temperature of the fumes will divert the passage of fumes from the normal exit into the atmosphere.

Signed at New York, in the county of New York and State of New York, this 11th day of October, 1920.

VERN K. BOYNTON.