Dec. 29, 1942. C. N. CAHUSAC ET AL 2,306,589

OBSERVATION WINDOW

Original Filed Jan. 23, 1940

Fig. 1.

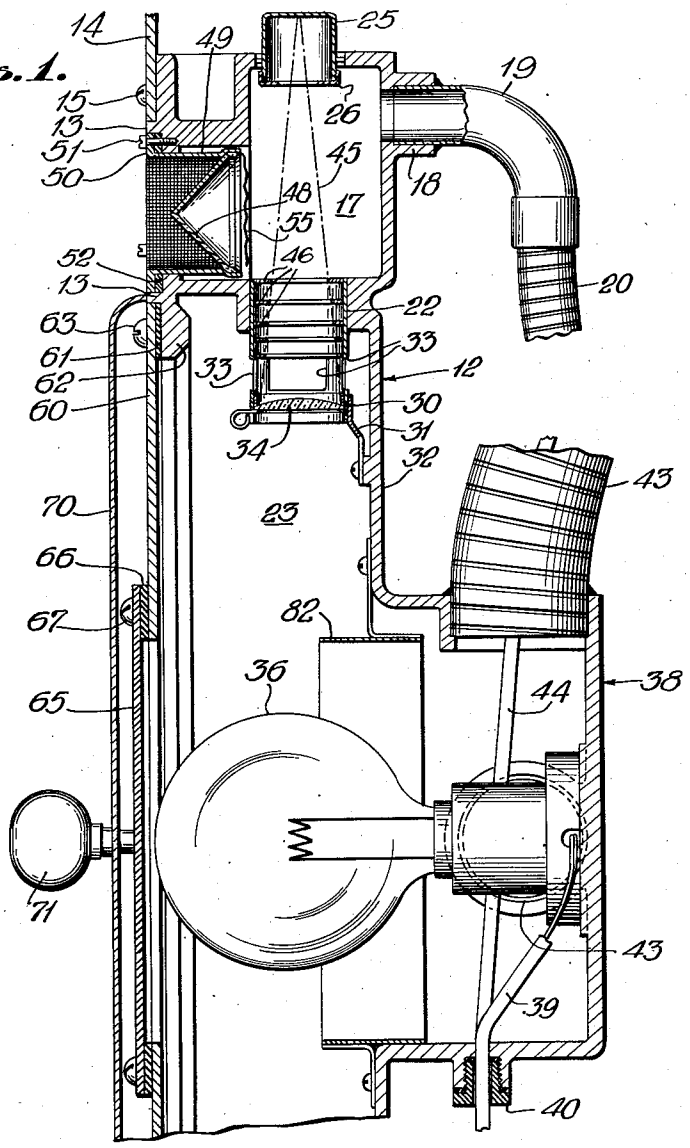
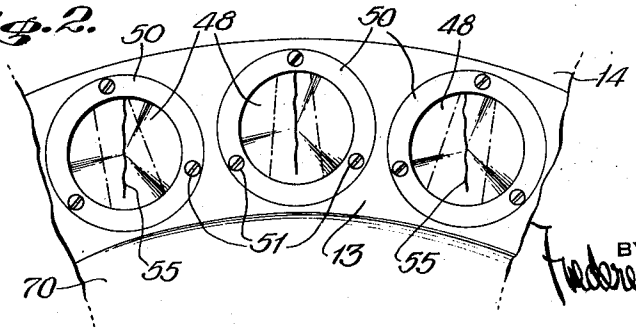


Fig. 2.



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OBSERVATION WINDOW

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Original application January 23, 1940, Serial No. 315,194. Divided and this application February 16, 1942, Serial No. 431,074

7 Claims. (Cl. 88—14)

This invention relates to improvements in smoke detecting apparatus and more particularly to improvements in observation windows through which are observed a beam of light and air circulation indicating means. This application is a division of our application Serial No. 315,194, filed January 23, 1940.

The main object of this invention is the provision of an improved observation window constructed so as to prevent glare resulting from the reflection of light from its exterior surfaces from interfering with viewing a beam of light and a means for indicating circulation of air drawn through a detector chamber.

More specifically one object of the invention is to provide an observation window and air circulation indicating means which is readily adapted to be used in connection with any one of a circular series of radially extending detector chambers.

Other objects of the invention will appear from the following description taken in connection with the drawing, in which—

Fig. 1 is a vertical section through the detector housing showing one of the detector chambers in longitudinal section; and

Fig. 2 is a front elevational view broken away indicating the circular arrangement of the series of observation windows and detector chambers.

Only so much of the apparatus has been disclosed as is believed to be necessary to disclose the invention claimed herein and in order to avoid confusion only one detector chamber has been disclosed in Fig. 1, which is the chamber located at the upper side of the apparatus.

The apparatus illustrated for the purpose of disclosing the invention comprises a hollow detector housing 12 constructed as a casting and of circular form. This housing may be provided with an annular flange 13 projecting through an opening in a cabinet 14 and may be secured to the cabinet by screw bolts 15 as indicated.

The detector housing or casting 12 is provided with a series of radially extending detector chambers 17 in communication with extensions 18 only one of which is disclosed. Mounted within these extensions 18 and secured thereto by sealing welds are elbows 19 to which are secured flexible tubes 20 which are connected to other tubes not disclosed, in communication with various compartments or rooms. The inner ends of the detector chambers communicate as by ports 22 with a common exhaust chamber 23.

The outer end of each detector chamber is preferably sealed by means of a cup 25 of the configuration shown, provided with a diaphragm 26 at its open end to trap light reflected from the closed end of the cup. The free edge of the diaphragm is preferably thin and formed as shown to prevent reflection of light therefrom. The inner surfaces of the cup and diaphragm are preferably painted a dull black to absorb and thereby prevent reflection of light out of the mouth of the cup.

Lens holders 30 may be frictionally held in position in the inner ports 22 of the detector chambers 17 by springs 31 secured to the rear wall 32 of the detector casting as indicated. The inner portions of the lens holders are provided with circumferentially spaced openings 33 to provide communication with the common exhaust chamber 23. Suitably supported in the inner end of the lens housing is a converging lens 34.

A common source of light such as the light bulb 36 may be employed to transmit light into all of the detector chambers 17, and for this purpose it is supported on an outwardly offset portion 38 on the rear wall 32 of the housing and has its filament located at the intersection of the axis of the housing and the axes of all of the lenses and detector chambers. Current for the light may be supplied over circuit wires 39 which pass out through the housing through an air tight seal comprising a hollow threaded plug 40 and washers as indicated.

A suitable suction pump mechanism may be connected to the offset portion 38 by flexible tubes 43 and the motor for driving the pump may be operated over a circuit 44 if desired.

For the purpose of preventing any stray light emanating from the conical light beam 45 Fig. 1 from striking any part of the inner surfaces of the lens holder and detector chamber, the lens holder is preferably provided with a series of annular diaphragms 46 of the size and arrangement shown.

The beam of light may be observed through a window 48 suitably supported in the inner end of a holder 49, the outer end of which is provided with a supporting flange 50 secured by screw bolts 51 passing through the flange and through an air tight gasket 52 and threaded into the housing 12. The window 48 is in the form of a cone with the point of the cone facing toward the observer. The angle of the apex of the cone may vary, that shown being ninety degrees (90°). The apex of the cone is located inwardly of the outer end of the holder 49 at such a distance that none of the light rays impinging on the cone can be reflected by direct reflection in a direction parallel

with the axis of the cone into the eye of the observer. The inner face of the wall of the holder is preferably painted a dull black so that direct and reflected rays impinging on said surface will be absorbed. It is preferred to use a window of the form of a circular cone and a holder of the form of a cylinder which facilitates the construction, assembly, and mounting of these parts as all of the windows may be of the same construction and may be mounted in any position in any of the openings in the housing provided to receive them.

For the purpose of detecting whether or not the suction mechanism is operating and each of the suction tubes is clear, a short length of thread **55** or the like is attached to and suspended from the highest point of the inner end of the window holder by any suitable means. It extends vertically diametrically across the window on one side of the light beam **45** and is visible by exterior light reflected therefrom, so that its stationary condition or its movement caused by a circulating stream of air may be readily observed. This diametral relation of the air detecting thread to the observation window is readily made possible because of the cylindrical shape of the window holder.

The front of the casting is closed by a composite cover comprising as one of its elements an annulus **60** seated on a gasket **61** on an inwardly extending annular flange **62** on the casting to which the annulus is secured by means of screw bolts **63**. If desired for the purpose of making the annulus **60** more readily detachable, the screw threaded bolts may pass through bayonet slots, not shown, in the annulus **60**. The other element of the cover consists of a disk **65** which may be sealed on the annulus **60** by means of a gasket **66** and secured against the front face of the annulus by means of screw bolts **67** which for the purpose of making the disk **65** more readily detachable may pass through bayonet slots, not shown, in the disk **65**. By making the disk **65** separate from the annulus **60** access may be had to the source of light **36** by merely removing the disk **65**. Both the disk and the annulus may be enclosed by a cover plate **70** provided with shouldered knobs **71** rotatably mounted in the cover plate and threaded into the annulus **60**.

In operating the device the suction pump is set in operation and air is drawn from each of the rooms or compartments through the associated detector chamber **17** and if desired the cabinet may be provided with numbers or the like indicating the rooms with which the detector chambers are associated. For the purpose of increasing the vision, the front part of the cabinet above the doors and the cover plate **70** and the exposed flange **13** of the detector casting may be painted a dull black and the inside of the detector chambers may be painted a dull black to increase the visibility. When clear air is drawn from the rooms, the beams of light in the detector chambers will not be visible. When, however, smoke is drawn through the detector chambers the beam or beams in the detector chambers corresponding to the rooms from which smoke is drawn will become visible.

A light deflecting band **82** may be suitably supported on the rear wall casting to prevent light rays from striking the rear wall of the casting.

The air circulation detectors **55** may be viewed at any time to determine whether or not the suction pumps are working and the various tubes leading from the various rooms or compartments are open. Any movement of air due to the operation of the suction pump will cause the detectors to move.

While the invention has been described with reference to a preferred form of apparatus, it is to be understood that this has been done for purposes of disclosure and is not to be considered limitative, and that the right to all such changes as fall within the principles of the invention and the scope of the appended claims is reserved.

We claim:

1. In an apparatus of the character described comprising a plurality of detector chambers, observation openings for said chambers, a conical observation window supported in the inner end of each opening with the apex of the window directed toward the observer, the angle of the apex of the conical window and the distance of the apex of the conical window from the outer end of the opening being so chosen and related that all of the rays of exterior light impinging on the outside face of the window will be reflected outwardly divergingly at an angle to the axis of the window.

2. In an apparatus of the character described comprising a plurality of detector chambers, observation openings for said chambers, a conical observation window supported in the inner end of each opening with the apex of the window directed toward the observer, the angle of the apex of the window and the distance of the apex of the window from the outer end of the opening being so chosen and related that all of the rays of exterior light impinging on the outside face of the window will reflect outwardly divergingly at an angle to the axis of the window, the inner face of the wall of said opening being light absorbing.

3. In an apparatus of the character described comprising a plurality of detector chambers, observation openings for said chambers, cylindrical observation window holders supported in said openings, observation windows in the form of circular cones supported in the inner ends of said holders with the apices of the cones directed toward the observer, the angle of the apex of the cone and the distance of the apex of the cone from the outer end of the holder being so chosen and related that all of the rays of exterior light impinging on the outside face of the cone will be reflected outwardly divergingly away from the axis of the cone.

4. In an apparatus of the character described comprising a plurality of detector chambers, observation openings for said chambers, cylindrical observation window holders supported in said openings, observation windows in the form of circular cones supported in the inner ends of said holders with the apices of the cones directed toward the observer, the angle of the apex of the cone and the distance of the apex of the cone from the outer end of the holder being so chosen and related that all of the rays of exterior light impinging on the outside face of the cone will be reflected outwardly divergingly away from the axis of the cone, the inner faces of the walls of said holders being light absorbing.

5. In an apparatus of the character described comprising a housing provided with a plurality of detector chambers extending radially of the housing and arranged in a circular series, a circular series of observation openings for said chambers, observation windows in the form of

circular cones, cylindrical window holders mounted in said openings, the apex of the cone being directed toward the observer and the angle of the apex of the cone and the distance of the apex of the cone from the outer end of the holder being so chosen and related that the rays of exterior light impinging on the outside face of the cone will be reflected outwardly divergingly at an angle to the axis of the cone, each of the holders being provided with a flange having perforations and the housing being provided with corresponding threaded openings about each of said openings to receive screw bolts passed through the openings in the flanges of said holders, whereby each observation window may be mounted in any of the observation openings of said chambers.

6. In an apparatus for detecting suspended matter in fluids, the combination of a detector chamber, means for causing the fluid with the suspended matter to flow axially of said chamber, means for projecting a beam of light through the chamber parallel with its axis, an observation window for observing the illuminated suspended matter in a direction at right angles to said axis, and a flexible member located between the light beam and the window and adapted to be moved by said flow of fluid and observable by exterior light.

7. In an apparatus for detecting suspended matter in fluids, the combination of a detector chamber, means for causing the fluid with the suspended matter to flow axially of said chamber, means for projecting a beam of light through the chamber parallel with its axis, an observation window for observing the illuminated suspended matter at right angles to said axis, said observation window being in the form of a cone with its apex facing the observer, a cylindrical holder for said window, and a flexible member mounted on the inner end of said holder at the upper side thereof and suspended diametrically across said window and adapted to be moved by the flow of fluid through said chamber.

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