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APPARATUS FOR DETECTING FIRES IN HOLDS, ETC

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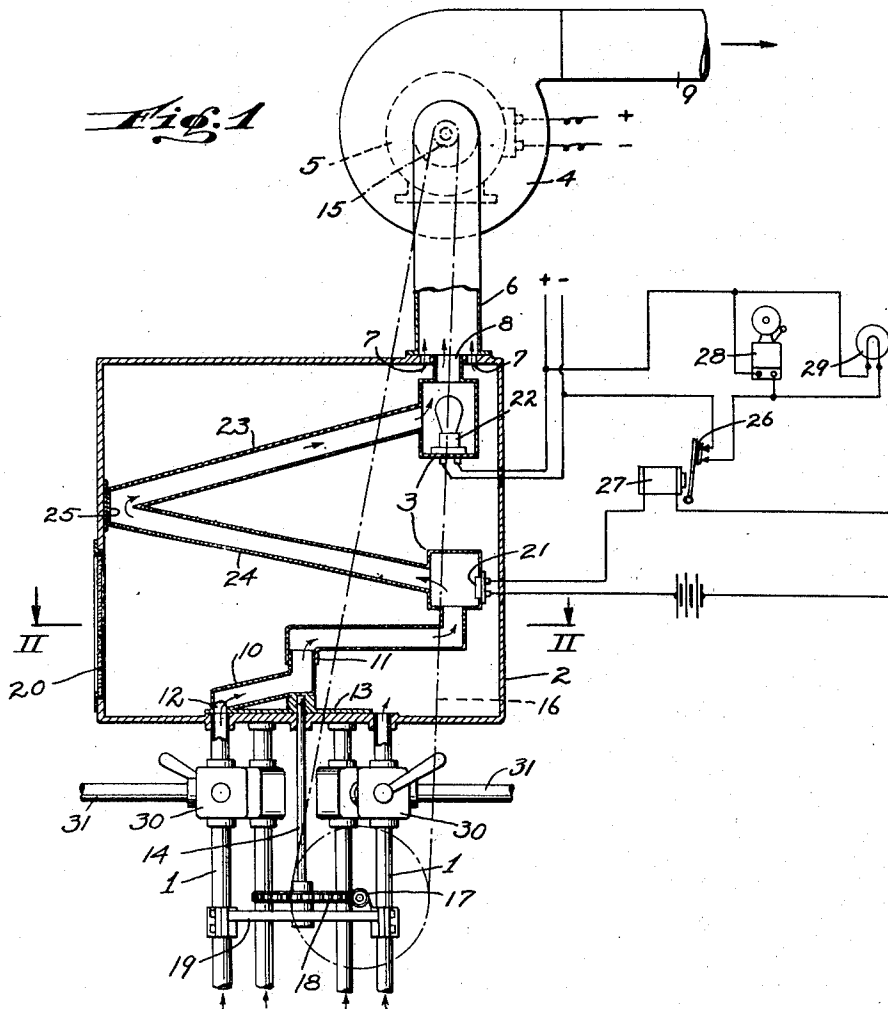
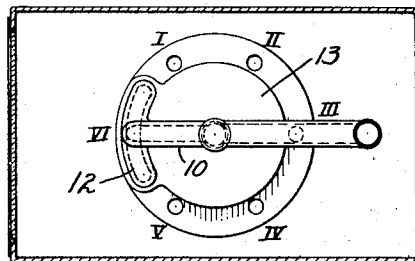


Fig. 2



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APPARATUS FOR DETECTING FIRES IN
HOLDS, ETC.

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16 Claims. (Cl. 177—311)

This invention relates to apparatus for detecting fires in different localities, as the holds of ships, or other compartments, by which continuous streams of the atmosphere of each of a number of compartments are produced and caused to continue to flow from the respective compartments while the stream flows are diverted, one at a time, through a single smoke detector. The apparatus includes, in addition to stream flow producing means, a single smoke testing device, and a movable and preferably rotary switching member having a stream flow deflecting duct in communication with the smoke testing device and which is brought into communication with each of the compartments one at a time. The streams are caused to flow continuously and simultaneously from each of the compartments, and by being individually switched through the smoke detector they are tested successively for smoke preferably at regular intervals and in a definite order.

These stream flows are made available for individual visual observation so that they are all simultaneously and continuously subject to inspection, either visually or by light responsive means. Double safeguard is thus provided against failure of the signalling apparatus and against inattention.

The invention consists in the subject matter thus indicated and more fully described in the following specification and set forth in the claims.

Referring to the drawing, Fig. 1 is an elevation, partly in section, and to some extent diagrammatic.

Fig. 2 is a horizontal section on the line II—II Fig. 1.

In the apparatus chosen as illustrating one embodiment of the invention, hold pipes 1 extending from the interior of different holds are grouped and arranged to deliver stream flows to the interior of the closed cabinet or chamber 2, where they are subject, on emergence, to individual visual inspection. These pipes are shown as having their open ends extending through the bottom wall of the cabinet and terminating flush with its inner surface, these open ends being arranged in a circle as indicated in Fig. 2. The smoke detector proper, generally indicated by the numeral 3, is located within the closed cabinet as a measure of compactness and convenience, but not of necessity; it preferably makes use of a photo-electric cell, as referred to below, although other detecting means can be employed. Means for causing flow simultaneously and continuously

through the several hold pipes is provided in the suction fan 4 driven by motor 5 and whose intake pipe 6 communicates by openings 7 with the interior of the closed cabinet 2 and by the exit opening 8 with the interior of the smoke detector. The fan thus draws streams of air, etc. through the several hold pipes and the cabinet, and exhausts through the delivery pipe 9. A movable by-passing switch member having a duct or passage 10 and normally in swivelled connection with the lower end 11 of the smoke detector passage has its open end 12 adapted to be brought successively and repeatedly into registry with the open ends of the hold pipes 1 to cause the stream of atmosphere from the hold pipe, with which at any moment it is in registration, to be diverted and to pass through the testing device to which in turn the several stream flows are thus delivered before they pass to the common chamber. In the construction illustrated, the duct or passage 10 is provided by a tubular member which is part of a disc 13 resting on the bottom of the cabinet 2 and driven by shaft 14 and its mouth 12 is arc-shaped as indicated in Fig. 2 so that it is constantly in communication with a hold pipe outlet and connects them successively with the detector mechanism. The arcuate mouth opening is long enough to span two adjacent outlets, thus to maintain a continuous flow through the detector mechanism or testing device. The shaft 14 is driven at a slow rate by any suitable means as for example from the fan motor shaft 15 by belt or sprocket chain 16, worm 17, and worm wheel 18, the worm shaft and the shaft 14 being supported in any suitable way as by the base support 19 clamped to the hold pipes as indicated. The speed of rotation is preferably such that the mouth 12 takes about ten seconds to pass each hold pipe. The switch member is preferably visible and, in the construction shown in the drawing, wherein it is completely enclosed, the observation window 20 in the closed cabinet commands the travelling by-passing member and the ends of the hold pipes which are labelled with hold designations, so that it can be determined at any time which hold is connected with the testing device.

The illustrated smoke detector is essentially a tube having at one end a selenium or other photo-electric cell 21 or a bulb type detector and at the other a lamp 22 whose rays are directed lengthwise of the tube upon the cell, which tube is in communication at one end, through the rotating conduit 10, with the selected hold-pipe and at the other with the stream producing

means, i. e. the fan. The pipe referred to (23—24) is V-shaped in form thus saving space, a mirror 25 being provided at the apex of the V to reflect the rays of light upon the cell. This arrangement has the decided advantage of providing, in a compact form, a long path for the light, through the atmosphere being examined or tested so that any smoke which it contains is certain to have its effect in diminishing the light falling on the cell and thereby altering, and in the case of a selenium cell, sharply reducing the current in the cell circuit, thus causing the armature 26 of the relay magnet 27 to drop back and complete the alarm circuit bridged across the main leads as indicated, thus to operate an electric bell 28, signal lamp 29, or the like. The particular hold from whence smoke is withdrawn will thus be immediately indicated to the observer at the window. It will be understood that known smoke detector structure may be used in which light thrown on the light sensitive cell by reflection from particles in the stream flow from a locality in which fire has started affects conditions in the cell circuit and causes actuation of the alarm.

Three-way valves 30 of conventional type may be associated with each of the hold pipes 1 for closing their outlets to the cabinet and connecting them to a supply pipe 31 by which CO₂ or other extinguishing agent may be delivered into the hold affected for extinguishing the fire therein.

Continuous flow through all the hold pipes insures instant passage of a fresh sample of hold atmosphere through the testing device as it makes each connection. This enables the continued and repeated testing individually of all the streams of atmosphere from the several holds one by one. The dimensions of the conduits and orifices are such that the rate of flow of all the streams, including the one passing through the testing device, at full registry, is substantially the same, and the fan is customarily so run as to produce flow at uniform velocity.

It will be understood that the invention is subject to embodiment in various structures.

I claim:—

1. Apparatus for detecting fires in different localities comprising a series of pipes corresponding individually to said respective localities and having ends grouped in a circle and equally spaced angularly, a chamber to which said ends open, a hollow smoke testing device, a stream-receiving-and-switching means in said chamber in communication with the inlet side of said smoke testing device and having an arcuate mouth opposed to said pipe ends and of a length to span two pipe ends, means for rotating said stream-receiving-and-switching means about an axis in which the center of said circle lies to receive said streams continuously and individually in regular succession during each rotation and by-pass and separately test each stream, and means for maintaining under negative pressure said chamber and pipes, and said smoke testing device and stream-receiving-and-switching means for simultaneously producing continuous stream flows through said individual pipes and successively testing the individual stream flows.

2. Apparatus for detecting fires in different localities comprising a series of grouped pipes corresponding individually to said respective localities, a smoke detector having hollow structure and maintained under negative internal pressure and thereby adapted for the flow of a stream of

atmosphere therethrough, a movable stream-switching sampling duct in communication with said smoke detector and subject to the negative internal pressure condition therein, means for placing said stream-switching sampling duct in communication in turn with each of said pipes, and means for producing continuous stream flow through said pipes and through said sampling duct and said smoke detector, the stream flow through the smoke detector at any given time being a continuous stream flow of the atmosphere of the locality with which the sampling duct is then in communication.

3. Apparatus for detecting fires in different localities comprising a smoke detector having hollow structure and thereby adapted for the flow of a stream of atmosphere therethrough, a series of pipes, each corresponding to a particular locality, means for simultaneously producing continuous flow of the atmosphere of each locality through the corresponding pipe, a movable stream-switching member in communication with the inlet side of said smoke detector, means for placing said member successively in communication with said pipes one at a time, and means for producing stream flow through said smoke detector and stream-switching member from the individual pipe then in communication therewith.

4. Apparatus for detecting fires in different localities comprising a cabinet, a series of pipes corresponding respectively to the several localities and having ends opening to the interior of said cabinet, a smoke detector, a duct in communication with the inlet side of said smoke detector and having at its free end a mouth, and means for causing registration between said mouth and each of said pipe openings one by one, a common means both for simultaneously producing continuous flow of the atmosphere of each locality through its pipe and for producing continuous flow through the cabinet and also separately through the said duct and the smoke detector.

5. Apparatus for detecting fires in different localities comprising a chamber, a series of pipes corresponding to the several localities and having ends opening to the interior of said chamber and having their open ends grouped in a circle, a smoke detector, a stream-by-passing rotary duct in communication with the said smoke detector on its inlet side and having at its free end a mouth, means for rotating said duct member about the center of the circle to cause its mouth to repeatedly sweep slowly around said circle and successively register with the open ends of said pipes, and means for simultaneously producing continuous flow of the atmosphere of each locality through the corresponding pipe and for producing flow through the chamber and the smoke detector separately, the latter flow passing through the stream-by-passing duct.

6. Apparatus for detecting fires in different localities, comprising a series of grouped pipes corresponding to the several localities, a photoelectric smoke detector, means for continuously producing flow of atmosphere through the pipe corresponding to each locality and for producing flow through said smoke detector, a movable stream-receiving-and-by-passing connecting means in communication with said smoke detector on its inlet side and with said flow-producing means, and means for establishing separate communication between said stream-receiving and by-passing connecting means and each of said pipes in turn to by-pass the streams individually and successively through said smoke

detector in a regular predetermined order and thereby test them separately.

7. Apparatus for detecting fires at different localities comprising a series of grouped pipes corresponding respectively to the several localities, a smoke detector having a hollow structure and thereby adapted for the flow of a stream of atmosphere therethrough, a rotary stream switching sampling duct in communication with the inlet of said smoke detector, means for placing said stream switching sampling duct in communication in turn with each of said pipes, and means for producing flow through said smoke detector of a continuous stream of the atmosphere of the respective locality with which the stream switching duct is then in communication and for simultaneously producing stream flows to the atmosphere through each of the other pipes.

8. Apparatus for detecting fires at different localities comprising a plurality of pipes, corresponding respectively to the several localities, a smoke detector having a stream passage therethrough, a common chamber to which said pipes open, means for producing and maintaining atmospheric stream flows from the several localities through said pipes and chamber, and a rotary stream flow switch device having a duct in communication with the inlet of the smoke detector and common to said pipes, the switch device duct and the smoke detector passage forming hollow air handling connections interposed between the pipes and the said means for producing and maintaining continuous atmospheric stream flows for connecting said pipes, one at a time, to the smoke detector, while all the continuous stream flows are maintained.

9. Apparatus for detecting fires at different localities comprising a series of pipes corresponding to the several localities and having open ends arranged in a circle, a smoke detector, a rotary switch member concentric with said circle and having a duct in communication with the inlet of said smoke detector and provided with an open end facing the open ends of the pipes in the adjacent plane, a common air chamber to which the pipes open, and means for simultaneously producing continuous flow of the atmosphere of each locality through the corresponding pipe and for producing separate flow of one of said streams at a time through the switch member and the smoke detector and flow of all the rest through the common air chamber to the atmosphere.

10. Apparatus for detecting fires at different localities comprising a series of pipes corresponding to the several localities and having open ends grouped in a circle and opening to a surface, a smoke detector, a rotary switch member concentric with said circle and having a disc portion in contact with the surface to which the smoke detector pipes open, said switch member having a duct or passage in communication with the smoke detector inlet and terminating in an open end through the said disc member facing the open ends of the pipes and at the same radial distance from the common center as the ends of the smoke detector pipes, means for rotating said switch member about the said axis to cause its open end to sweep slowly around said circle and successively connect the individual pipe ends with the smoke detector, and means for simultaneously producing continuous flow of the atmosphere of each locality through the corresponding pipe and for producing separate flow through the respective pipe, switch member and

smoke detector then in communication and through the remaining pipes to the atmosphere.

11. Apparatus for detecting fires in different localities, comprising a series of grouped pipes corresponding to the several localities, a smoke detector, means for continuously producing flow of atmosphere through the pipe corresponding to each locality and for producing flow through said smoke detector, a movable stream-receiving-and-by-passing connecting means in communication with said smoke detector on its inlet side and with said flow-producing means, and means for establishing separate communication between said stream-receiving and by-passing connecting means and each of said pipes in turn to by-pass the streams individually and successively through said smoke detector in a regular predetermined order and thereby test them separately.

12. Apparatus for detecting fires at different localities comprising a series of grouped pipes corresponding to the several localities, a smoke detector having hollow structure provided with a gas inlet and a gas outlet, a movable member having a duct provided with an inlet and with an outlet in communication with the gas inlet of the smoke detector, means for simultaneously producing and maintaining flow of atmosphere through said pipes and for producing stream flow through said duct and said smoke detector, and means for moving the inlet of the duct of said movable member into mutual internal communication with each of said pipes in turn, thereby subjecting each stream flow to individual test for smoke, said movable member having a visible portion indicating by its position the stream flow being tested.

13. Apparatus for detecting fires at different localities comprising a series of pipes corresponding to the several localities, a chamber with which said pipes communicate, hollow structure maintained under negative internal pressure and thereby adapted for the flow of a stream of atmosphere therethrough and including a signaling smoke detector and a movable stream-selecting duct in communication with the interior of the smoke detector, means for continuously producing atmospheric stream flows through the pipes corresponding to the several localities and for producing stream flow through said hollow structure, said duct acting to select and divert said stream flows one at a time to said smoke detector, and means for affording visual observation of the respective stream flows, all stream flows being thus simultaneously and continuously subject to inspection.

14. Apparatus for detecting fires at different localities comprising a series of pipes corresponding to the several localities, a hollow smoke detector, means for producing and maintaining atmospheric stream flows through said pipes and for producing stream flow through said smoke detector, means permitting visual inspection of said stream flows, and means for diverting said stream flows one at a time to said smoke detector, all the stream flows thus being simultaneously and continuously subject to inspection.

15. Apparatus for detecting fires at different localities comprising a series of pipes corresponding to the several localities, a hollow smoke detector, means for producing and maintaining atmospheric stream flows through said pipes and for producing stream flow through said smoke detector, an observation chamber to which said pipes open and wherein their stream flows are individually subject to visual inspection, and

means for diverting said stream flows, before they pass to said chamber, one at a time to said smoke detector, all the stream flows being thus simultaneously and continuously subject to inspection.

5 16. Apparatus for detecting fires in different localities comprising a series of pipes organized with their ends in a circular group and corresponding individually to said respective localities,
10 hollow structure maintained under negative internal pressure and thereby adapted for the flow of a stream of atmosphere therethrough and including a smoke detector of the light responsive

cell electrically operated signal type and a stream selecting duct mouth in communication therewith, driven means for rotating the duct mouth about the axis of the group into communication in turn with each of said pipes, and means for 5 producing continuous stream flow through said pipes and through said hollow structure, the stream flow through said hollow structure at any given time being a continuous stream flow of the atmosphere of the locality with which the 10 selecting duct is then in communication.

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