

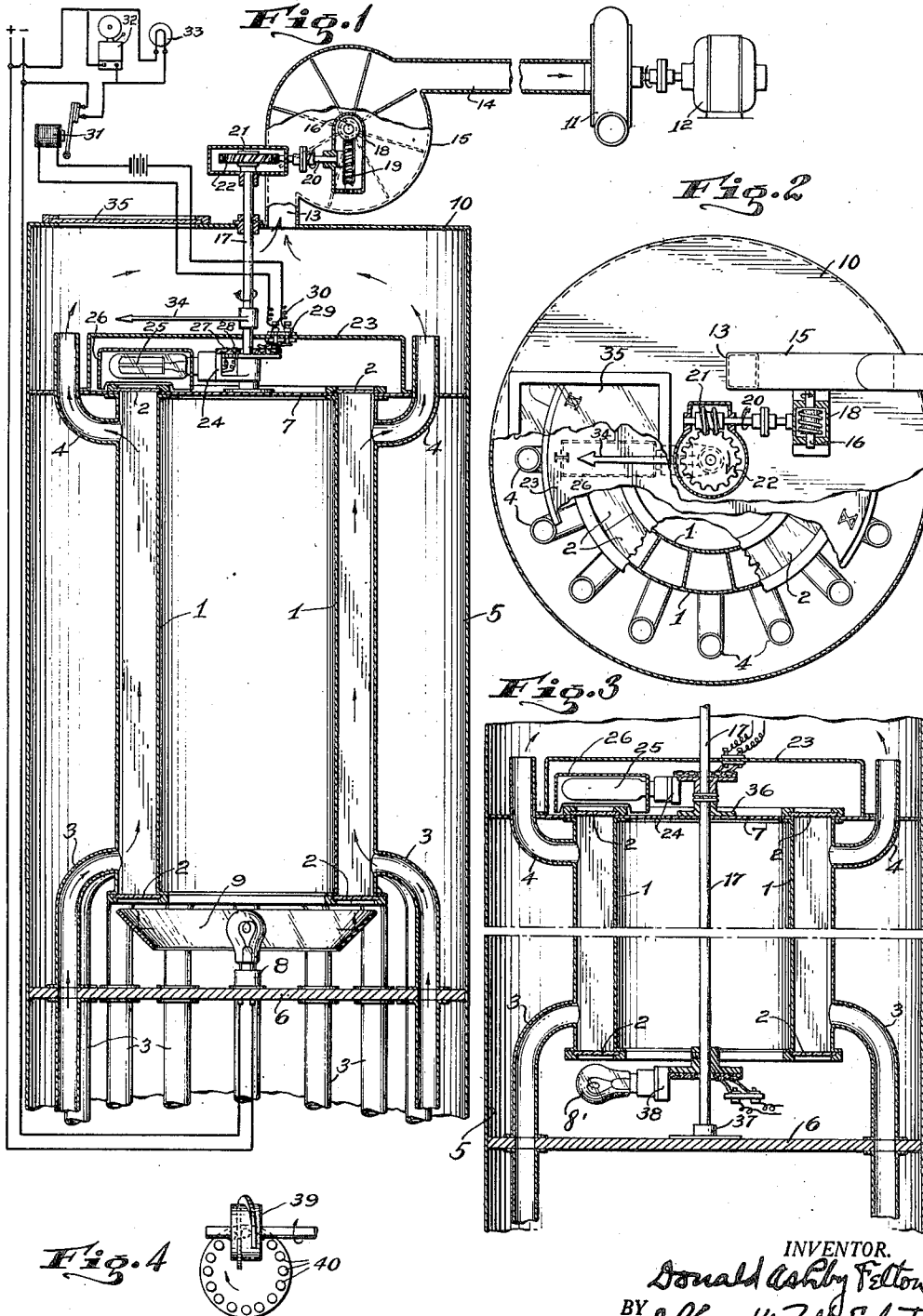
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APPARATUS FOR DETECTING FIRES

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APPARATUS FOR DETECTING FIRES

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This invention consists in apparatus for carry-
ing out a method of detecting fires at different
localities and particularly in the holds of ships or
other compartments, which consists in continu-
ously passing from each locality a confined stream
of the atmosphere of that locality, grouping said
streams, testing them in situ in the group one by
one for smoke by illuminating such streams,
maintaining a light-sensitive cell subject to such
illumination, and causing the cell to receive selec-
tively in succession such light as passes thereto
thereby indicating smoke when present. The
illumination of the stream flows may be by pass-
ing emanations from a light source lengthwise
through all the grouped stream flows in situ in
the group, either all at once or one at a time, and
individually and successively onto a smoke de-
tector, as a selenium, or other photoelectric cell
or means sensitive to emanations from a light
source.

The method may be carried out with the aid
of a considerable variety of apparatus and not
alone with the particular apparatus chosen for
illustration in the drawing which apparatus how-
ever, is part of the invention and is considered
preferable to other embodiments.

Referring to the drawing: Fig. 1 is a sectional
elevation of a smoke detector device illustrating
one embodiment of the invention; Fig. 2 is a plan
corresponding to Fig. 1 with parts broken away
to show internal structure. Fig. 3 is a sectional
elevation of a modified and preferred form, and
Fig. 4 is a detail plan of an intermittent driving
connection applicable to either form of the device.

In both the illustrated embodiments of the
invention, pipes 1 are organized in a fixed group—
preferably parallel to, equidistant from, and
spaced at equal angles around a common axis.
These pipes, which may be cross-partitioned off
from an annular casing, as indicated, so as to
be contiguous, are of opaque material, as brass,
and have light entry portions and light exit por-
tions, the ends, in the structures of Figs. 1 and 3,
wherein the pipes are open to the passage of
light through both ends which are closed with
glass or other transparent or translucent mat-
erial 2. They are each in communication with
a different hold of a ship, or other separate com-
partment, by an inlet pipe 3 near one end, and
with common exhaust means by an outlet pipe
4 near the other. The streams are thus con-
ducted through grouped elongated parallel courses.
It is convenient to locate this assemblage of pipes
in an outer casing 5, wherein it is supported by
the cross-partitions 6 and 7 near opposite ends

of the casing. The partition 6 may serve to sup-
port a fixed source of light as the lamp 8, co-
axial with the circle in which the pipes are lo-
cated and whose rays, reflected by the angular,
annular mirror, or set of mirrors, 9, are re-
flected at the same time lengthwise into and
through each of the pipes equally. In this ar-
rangement the pipes are contiguous, thus avoiding
light variation between pipes. The end por-
tion 10 of the casing 5 divided off by the partition
7 and which constitutes a common sub-atmos-
pheric pressure chamber to which all the outlet
pipes 4 deliver is in communication with an ex-
haust fan 11, driven by electric motor 12 and of
a size suited to the needs of the particular instal-
lation, by piping 13, 14, which includes an inter-
mediate air motor 15 having shaft 16 and which
through suitably housed reducing gearing, con-
tinuous or intermittent, slowly rotates the shaft
17 located in the common axis of the circle of
the pipes and mounted in bearings on the parti-
tion 7 and the end of the casing 5 respectively, as
indicated. This gearing, continuous worm and
worm wheel in Figs. 1 and 2, is as follows, worm
18 on shaft 16, worm-wheel 19 on one end of
shaft 20, worm 21 on the other and worm-wheel
22 on shaft 17. The shaft 17 passes through a
light excluding blackened flanged cover member
23, and has a radial arm 24 within the dark cham-
ber thus formed and which carries a smoke de-
tector member 25, as a selenium or other photo-
electric cell or other means responsive to emana-
tions from the lamp. The smoke detector is pref-
erably a closed circuit detector. The member
25 has the screen or hood 26 shielding it from ex-
traneous light, and is located in a control circuit
including commutator rings 27, 28, contact springs
29, 30, respectively pressing thereon, a source of
current and relay 31 which on the presence of
smoke in the stream under examination closes
the normally open circuit of signal bell 32 and
signal light 33. The sensitive cell is within range
of light passing through the light exit portions of
the pipes, i. e. where such light can reach and
affect it. The change in illumination due to the
smoke alters the current flow in the control cir-
cuit in the known way according to the nature
of the cell, or equivalent device and its circuit.
Shaft 17 has a radial arm 34 constituting a
pointer, and cover 23 a dial numbered to corre-
spond with the several pipes and their compart-
ments, the dial and pointer being observable
through the transparent window 35 and indicating
the location of the fire.

In the apparatus illustrated and just described

in detail and in other apparatus in which the invention may be embodied, there is a smoke detector scanner having in operative alignment a smoke detector cell and a source of emanations to which said cell is sensitive. Each of the simultaneously-maintained stream flows has a portion accessible to said emanations, the said portions being grouped for test, and means are provided for causing said line of operative alignment to extend into one of said portions onto said cell and for shifting said line to cause it to extend in each said stream flow portion onto the cell.

By applicant's method streams of the atmosphere of each hold under supervision are produced, grouped and continuously maintained with a regular rate of flow and are tested individually and repeatedly in situ in the group, i. e. without diversion of any stream, the testing being accomplished by illuminating said undiverted streams, all at once or one at a time, and causing emanations from the light source emergent from the respective stream flows to fall, in turn, upon the smoke detector member, detection of fire being indicated by the electric signal and the particular hold ascertained by observing the pointer through the window 35. The details of electric indication may be varied as desired. The rate of rotation of the shaft 17 is such that the selenium cell sweeps over the ends of the respective pipes slowly enough to permit adequate examination and testing thereby of each pipe and its compartment. The flow of all the pipes is uniform, as is also the distribution of light to the respective tubes.

The embodiment of the invention illustrated in Fig. 3 is in all respects the same as that of Figs. 1 and 2, save that the shaft 17 is extended through bearing 36 on partition 7 to bearing 37 on partition 6 and carries just below the lower ends of the pipes a radial arm 38 in the same vertical plane as that of the arm 24 and carrying a lamp 8' at its end, the electrical connections being essentially as in Fig. 1 or otherwise suitable, so that the light and cell are presented at the same time to the opposite ends of each pipe in turn. The vertical arrangement is most convenient but evidently not essential.

Where desired the drive of the shaft 17 in either of the embodiments may be intermittent with a dwell at each position of registry of the cell, or cell and light bulb, with a pipe. As illustrated in Fig. 4, where an intermittent worm drive is shown, the straight part of the worm 39 produces a dwell, and the angular part pushes the adjacent pin or stud 40 to the right as there indicated.

I claim:

1. Apparatus for detecting fires at different localities comprising a plurality of pipes leading respectively from such different localities and organized into a group, means for continuously and simultaneously passing streams of atmosphere from the several localities through the respective pipes, and maintaining them in established several normal courses in which also they are tested, a light responsive stream-analyzing and signaling system comprising a light source for illuminating the stream flows while undiverted from their said normal courses and a light responsive member and means for bringing said system into light responsive and stream flow analyzing relation with each stream flow in its established normal course and in turn.

2. Apparatus for detecting fires at different localities comprising means for producing and

simultaneously maintaining separate atmospheric stream flows from said respective localities in like established several courses in which also they are tested and which are grouped, light sensitive means for testing said stream flows individually for suspended particles, means for illuminating individual stream flows in situ in the group, means including a moving member for subjecting in turn each illuminated stream flow while in its established normal course to test by said light sensitive means, an electric signal controlled by said light sensitive means, and operative connections between said light sensitive means, and said signal.

3. Apparatus for detecting fires at different localities by ascertaining the presence of particles suspended in atmospheric stream flows respectively therefrom, comprising means for continuously and simultaneously producing stream flows of the atmosphere from the respective localities and maintaining them in like established normal courses circularly grouped and in which also they are tested, a light sensitive member, a signal controlled by said light sensitive member, means for illuminating said stream flows in their established normal courses, and means including a rotary driven member for bringing said light sensitive member and said illuminating means into cooperative relation with the stream flows individually and in turn so as to ascertain the presence of suspended particles therein.

4. Apparatus for detecting fires at different localities comprising a group of pipes each corresponding to one of said localities and in communication with its atmosphere, means for continuously and simultaneously passing streams of atmosphere from the several localities through the respective pipes, each pipe having a light entry portion and a light exit portion, means comprising a light source for transmitting light to said pipes through said light entry portions to the stream flow, a light sensitive cell common to said pipes located within range of light passing through said exit portions, and means for causing said cell to receive thereon in turn such light from said source as passes through the light exit portion of each said pipe.

5. Apparatus as set forth in claim 4 having the pipes arranged in a circle and having their light entry portions at one end and their light exit portions at the other, the light sensitive cell being mounted for rotation about the axis of the circle into line with each of the light exits in turn.

6. Apparatus for detecting fires at different localities comprising a group of pipes each corresponding to one of said localities and in communication with its atmosphere, means for continuously and simultaneously passing a stream of atmosphere from each locality through the pipe in the group corresponding thereto, each pipe having a light entry portion and a light exit portion, means comprising a light source for transmitting light to said pipes through said light entry portions to the stream flow and from said light exit portions, a smoke detector member common to said group, sensitive to emanations from the light source and located within range of light passed through said light exit portions, and driven means maintaining the smoke detector member subject to illumination by said light source and subjecting it successively and selectively to emanations from the light source after their passage through the respective stream flows.

7. Apparatus for detecting fires at different

localities comprising a group of pipes each corresponding to one of said localities and in communication with the atmosphere of that locality, and means for passing atmosphere from each locality through the pipe in the group corresponding thereto, said pipes having both ends open to the passage of light and their ends from which the light issues being contiguous to each other and arranged in a circle, means comprising a light source located at one end of said group for passing light lengthwise through the respective stream flows, a smoke detector member common to said group, sensitive to emanations from the light source and located at the other end of said group, and driven means rotatable about an axis containing the center of the circle maintaining the light detector member within the field of illumination and subjecting it successively and selectively to emanations from the light source after their passage through respective observation pipes.

8. Apparatus for detecting fires in compartments comprising a series of grouped pipes each in communication with one of the compartments, means for producing and simultaneously maintaining a stream of atmosphere from each of said compartments through said respective pipes, each pipe having a light entry portion and a light exit portion, means comprising a light source for transmitting light to said pipes through said light entry portions to the stream flow, a smoke detector member common to said group and movable in a prescribed path past said light exit portions, said smoke detector member being sensitive to emanations from the light source, and means for moving said smoke detector member into line in turn with said light exit portions to receive such emanations as pass therethrough.

9. Apparatus for detecting fires in compartments comprising a series of grouped compartment pipes each in communication with one of the compartments, means for producing and simultaneously maintaining a stream of atmosphere from each of said compartments through said respective pipes, said pipes having light entry portions at one end and light exit portions at the other, a source of light common to said pipes at the light entry end of the group and reflector means adjacent the light entry ends of the pipes and facing the light source for simultaneously reflecting light from said light source through the light entry portions of all of said pipes, and a smoke detector member responsive to light passing through the light exit portions and mounted for movement past them, and means for moving said smoke detector member into line in turn with said light exit portions.

10. Apparatus for detecting fires in compartments comprising a series of grouped pipes each in communication with its respective compartment, and having ends permitting the passage of light therethrough, means for producing and simultaneously maintaining a stream of atmosphere from each of said compartments through said respective pipes, a source of light and a smoke detector member responsive to emanations therefrom located respectively at opposite ends of said pipes and fixed in line with the pipe ends and with each other for movement as a unit, and means to move both said smoke detector member and said source of light into line with each of said streams in turn whereby the emanations from the light source pass through the stream being tested on to the smoke detector member.

11. Apparatus for detecting fires at different localities comprising a group of pipes each corresponding to one of said localities and in communication with its atmosphere, means for continuously and simultaneously passing streams of atmosphere from the several localities through the respective pipes, each pipe having means affording light rays ingress to said stream flows and egress therefrom, means comprising a light source for illuminating said stream flows, a light sensitive member within range of light after its emergence from said stream flows, and driven means including a moving part for maintaining said light sensitive member subject to illumination by light emergent from each stream flow in situ and in turn.

12. Apparatus for detecting fires in compartments comprising a fixed set of grouped pipes having both ends closed with transparent or translucent material and arranged in a circle, a sub-atmospheric pressure chamber, piping placing each pipe in communication near one end with its compartment and near the other with said chamber to produce and maintain streams through said pipes for the atmosphere of the respective compartments, a shaft coaxial with the circle of pipes, a light source for passing light lengthwise through each of said streams from one end, a smoke detector member sensitive to emanations from the light source, said member being carried by said shaft beyond the end of the set of pipes from which the light issues and at the same radial distance from the common axis as the adjacent pipe ends, indicating means operatively connected electrically to said smoke detector member, and means for rotating said shaft to bring the smoke detector member into line with each of said pipes in turn thus subjecting said member to light which has passed through the pipe being tested.

13. Apparatus for detecting fires in compartments comprising a fixed set of grouped pipes having both ends closed with transparent or translucent material and arranged in a circle, a subatmospheric pressure chamber, piping placing each pipe in communication near one end with its compartment and near the other with said chamber to produce and maintain streams through said pipes of the atmosphere of the respective compartments, a shaft coaxial with the circle of pipes, a light source, and a smoke detector member sensitive to emanations therefrom, both carried by said shaft in fixed spaced relation to each other beyond the opposite ends of the pipe group at the same radial distance from the common axis as the adjacent pipe ends, indicating means operatively connected electrically to the smoke detector member, and means for rotating said shaft to bring the smoke detector member and light source into line with each of said pipes in turn thus subjecting the smoke detector member to light which has passed through the pipe being tested.

14. Apparatus for detecting fires in compartments comprising a series of parallel compartment pipes each having both ends closed by transparent or translucent material and arranged in a circle, means for producing and simultaneously maintaining a stream of its atmosphere from each of said compartments through said respective pipes, a smoke detector member and means for rotating it about the center of said circle in a path adjacent and opposed to one set of said closed ends to bring it in regular succession during each rotation into

alignment with each stream, and means for passing light through said streams from the other set of closed ends on to said smoke detector member.

5 15. Apparatus for detecting fires in compartments comprising a series of parallel compartment pipes each having both ends closed by transparent or translucent material, means for producing and simultaneously maintaining a
10 stream of atmosphere from each of said compartments through said respective pipes, a smoke detector member and a light source held in fixed relation thereto beyond and in line with the opposite ends of said pipes, and means for moving
15 said light source and smoke detector simultaneously in paths adjacent said respective ends to pass light through each of said streams in succession from the light source onto the smoke detector.

20 16. Apparatus for detecting fires in compartments comprising an external casing, cross partitions therein, one of which divides off from one end of the casing, a sub-atmospheric chamber, a fixed group of parallel pipes located in
25 the casing between said partitions, said pipes being arranged in a circle and spaced at equal angles about its center and registering with openings in the partition walling off the sub-atmospheric chamber, means for connecting each
30 pipe adjacent one end to a compartment and adjacent the other to the sub-atmospheric pressure chamber to maintain simultaneously a flow through said pipes of the respective atmosphere
35 of said compartments, the ends of said pipes being closed with transparent or translucent material, a dark chamber formed within the sub-atmospheric pressure chamber at the side of the said cross partition and facing the same and the adjacent ends of said pipes, a shaft coaxial with
40 the circular set of pipes, a hooded smoke detector member within said dark chamber carried by said shaft at the same radial distance from its axis as that of the pipes, signalling means operatively connected electrically to said
45 smoke detector member, means to rotate said shaft to cause the smoke detector member to move successively into line with the adjacent ends of said pipes in turn, and a light source for passing light through each of said pipes from
50 its other end lengthwise of the pipe on to the smoke detector member in line with said pipe.

17. Apparatus for detecting fires at different localities comprising grouped pipes each corresponding to one of said localities and in communication with its atmosphere, means for continuously and simultaneously passing streams
55 of atmosphere from the several localities through the respective pipes, each pipe having a light entry portion and a light exit portion, means comprising a light source for transmitting light to said pipes through said light entry portion
60 to the stream flow and from said light exit portion, a light sensitive cell common to said pipes located within range of light passed through said light exit portions, and means for causing said
65 cell to receive thereon in turn, in a continuous succession, light from said source passed through said light entry and light exit portions of each said pipe.

70 18. Apparatus for detecting fires at different localities, as set forth in claim 17, in which the means for continuously and simultaneously passing streams of atmosphere from the several localities through the respective pipes includes a
75 common sub-atmospheric chamber with which

the light delivery ends of the pipes are in communication and air evacuating means in communication with said chamber, and in which the light entry portions of the pipes are at one end
5 of the pipes and the light exit portions are at the other, and a dark chamber containing and protecting the light sensitive cell and facing the light exit ends of the pipes.

19. Apparatus for detecting fires at different localities, as set forth in claim 17, in which the
10 pipes have parallel contiguous portions equidistant from a common longitudinal axis and have also light entry and light exit portions at opposite ends, and in which there is a chamber facing the light exit portions of the pipe ends
15 and containing the light sensitive cell, means for blocking off extraneous light from said cell, and indicator means operable by said cell when smoke is present in the observation pipe being tested.

20. Apparatus for detecting fires at different localities, as set forth in claim 17, in which contiguous parallel pipe portions open at each end
20 to the passage of light are provided by concentric cylinders and radial partitions equally subdividing the annular space between the cylinders and in which the light-sensitive cell is rotatable over and in line with the contiguous pipe ends about their common longitudinal axis,
25 means for blocking off extraneous light from said cell, and means for rotating said cell about said axis.

21. Apparatus for detecting fires at different localities comprising a group of pipes each in communication with its respective locality, said
35 pipes having contiguous parallel portions equidistant from a common longitudinal axis and each having ends permitting the passage of light therethrough, a sub-atmospheric pressure chamber with which said pipes are in communication,
40 means for continuously withdrawing air from said sub-atmospheric chamber thereby producing continuous simultaneous stream flow through said pipes from the several localities, means comprising a source of light for passing
45 light into said pipes through the pipe ends remote from the sub-atmospheric chamber, a second chamber facing the other set of pipe ends and receiving light passed lengthwise through said pipes, a movable light sensitive cell within
50 said second chamber and opposed to the adjacent set of pipe ends, means for rotating said cell about the axis of said group of pipes to bring it successively into line with the respective pipes, means for blocking off extraneous light from said cell, a circuit for said cell including rotary commutator connections, and an indicator electrically operable by said cell circuit.

22. Apparatus for detecting fires at different localities comprising means for simultaneously
60 maintaining separate atmospheric stream flows from each such locality, a smoke detector scanner having in operative alignment a smoke detector cell and a source of emanations to which said cell is sensitive, each said stream flow having a
65 portion accessible to said emanations, said portions being grouped for test, means for causing said line of operative alignment to extend into one of said portions onto said cell and for shifting said line to cause it to extend in each said
70 stream flow portion in turn onto the cell.

23. Apparatus for detecting fires at different localities comprising grouped pipes each in communication with the atmosphere of the different localities, means for simultaneously maintaining
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separate atmospheric stream flows from each such locality through the corresponding pipe, a smoke detector scanner having in operative alignment, a smoke detector cell and a source of emanations to which said cell is sensitive, each
5 said stream flow having a portion accessible to said emanations, said portions being grouped for test, an extraneous-light-excluding hood enclosing said cell but having an opening admitting
10 said emanations, means for causing said line of operative alignment to extend into one of said portions and through said opening onto the cell and for shifting said line to cause it to extend in each said stream flow portion, one at a time,
15 onto the cell.

24. Apparatus for detecting fires at different localities comprising grouped pipes each in communication with the atmosphere of the different localities, means for simultaneously maintaining
20 separate atmospheric stream flows from each such locality through the corresponding pipe, a smoke detector scanner having in operative alignment a smoke detector cell and a source of emanations to which said cell is sensitive, each

said stream flow having a portion accessible to said emanations, said portions being grouped for test, an extraneous-light-excluding chamber, an extraneous-light-excluding hood within said
5 chamber, said hood enclosing said cell but having an opening admitting said emanations, and said hooded cell being movable past said stream flow portions with its said opening facing the same, means for causing said line of operative
10 alignment to extend into one of said portions and through said opening onto the cell and for shifting said line to cause it to extend in each stream flow portions, one at a time, onto the cell.

25. Apparatus as set forth in claim 23 in which
15 the pipes and the stream flow portions accessible to emanations from the cell are grouped in a circle about an axis and in which means rotatable about the said axis is provided for shifting said line of operative alignment from one
20 of said accessible portions to the next to cause it to extend in turn in each such portion and onto the smoke detector cell.

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