

No. 688,404.

Patented Dec. 10, 1901.

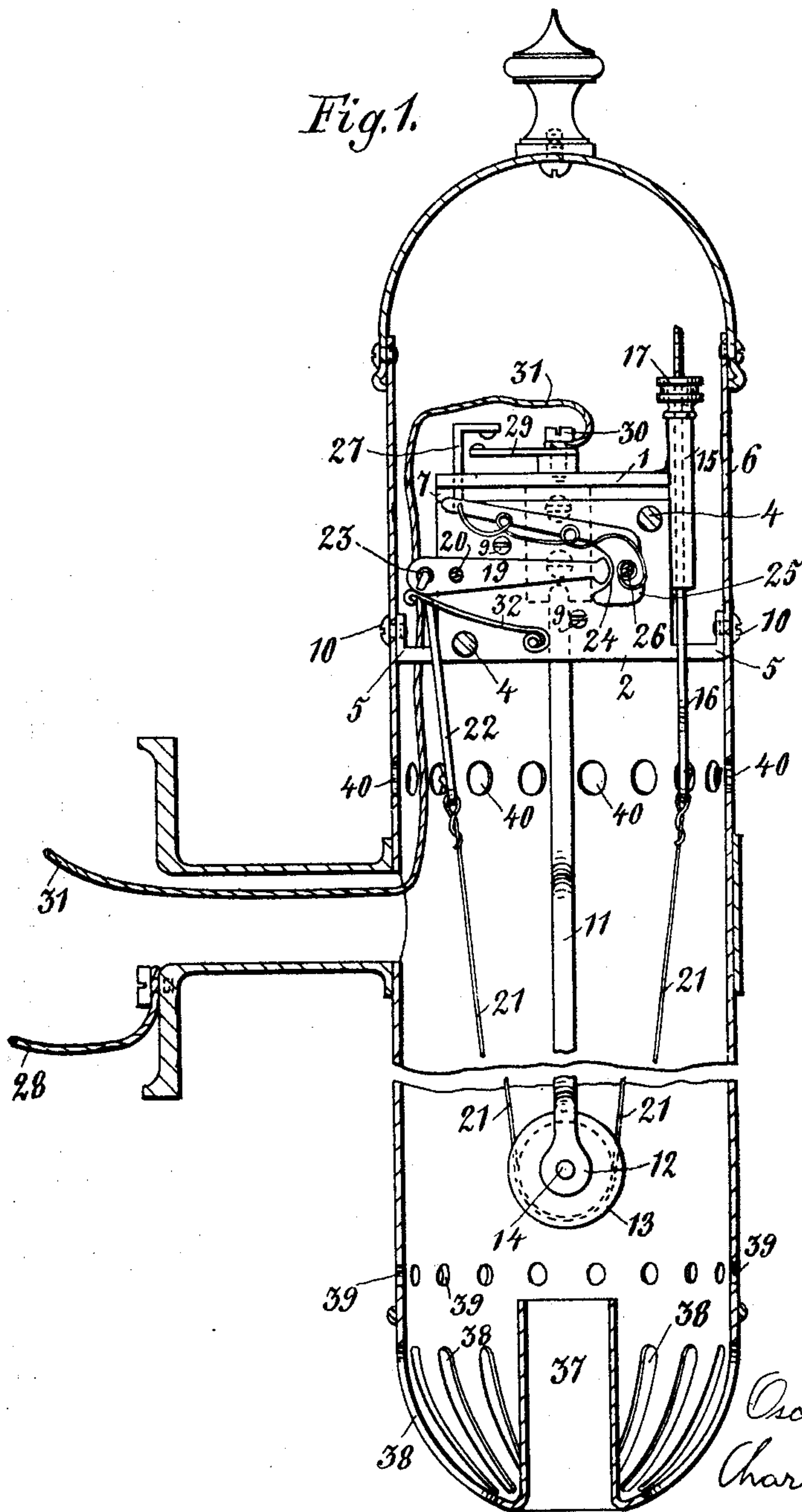
O. FREYMAN & C. TOLMAN.

SMOKE DETECTOR.

(Application filed Apr. 1, 1901.)

(No Model.)

2 Sheets—Sheet 1.



Oscar Freyman
Charles Tolman

Inventors

Witnesses:

John A. Paulson
Mastelmtce

By

Schreiter & Mathews
their Att'ys

No. 688,404.

Patented Dec. 10, 1901.

O. FREYMAN & C. TOLMAN
SMOKE DETECTOR.

(Application filed Apr. 1, 1901.)

(No Model.)

2 Sheets—Sheet 2.

Fig. 2.

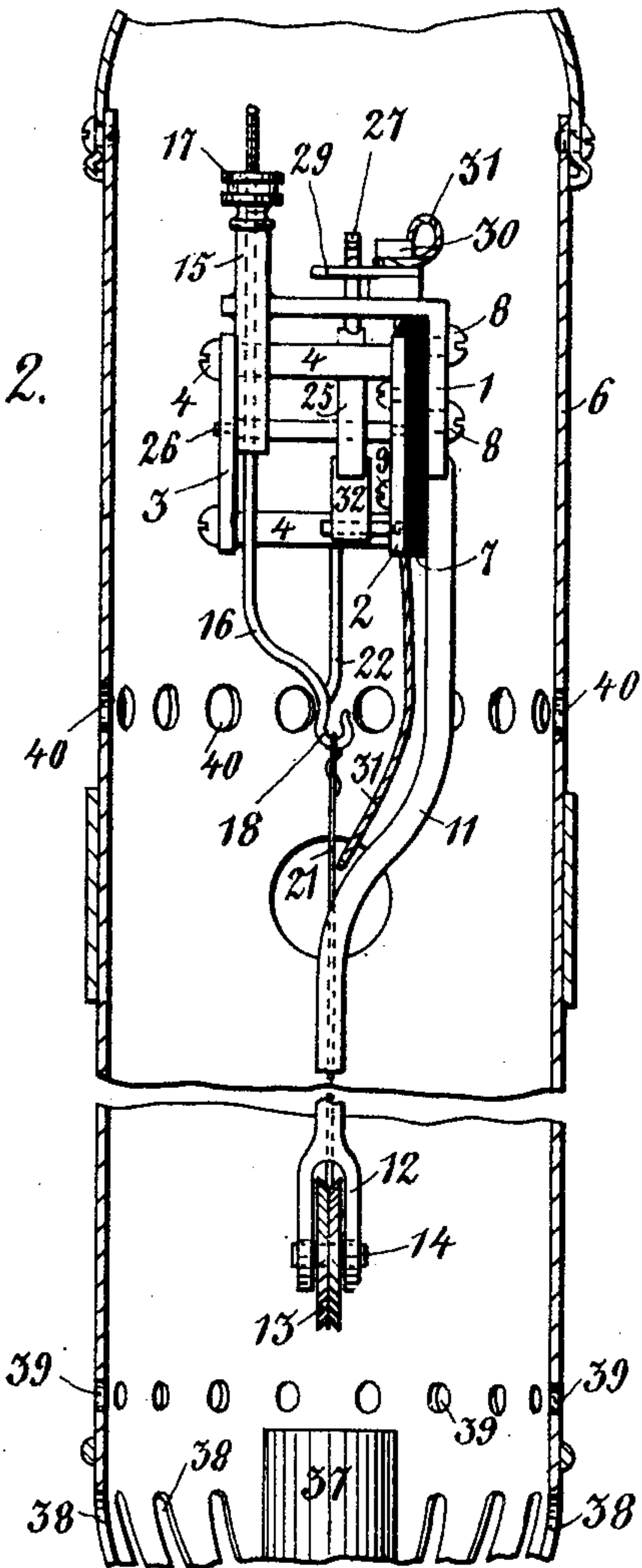
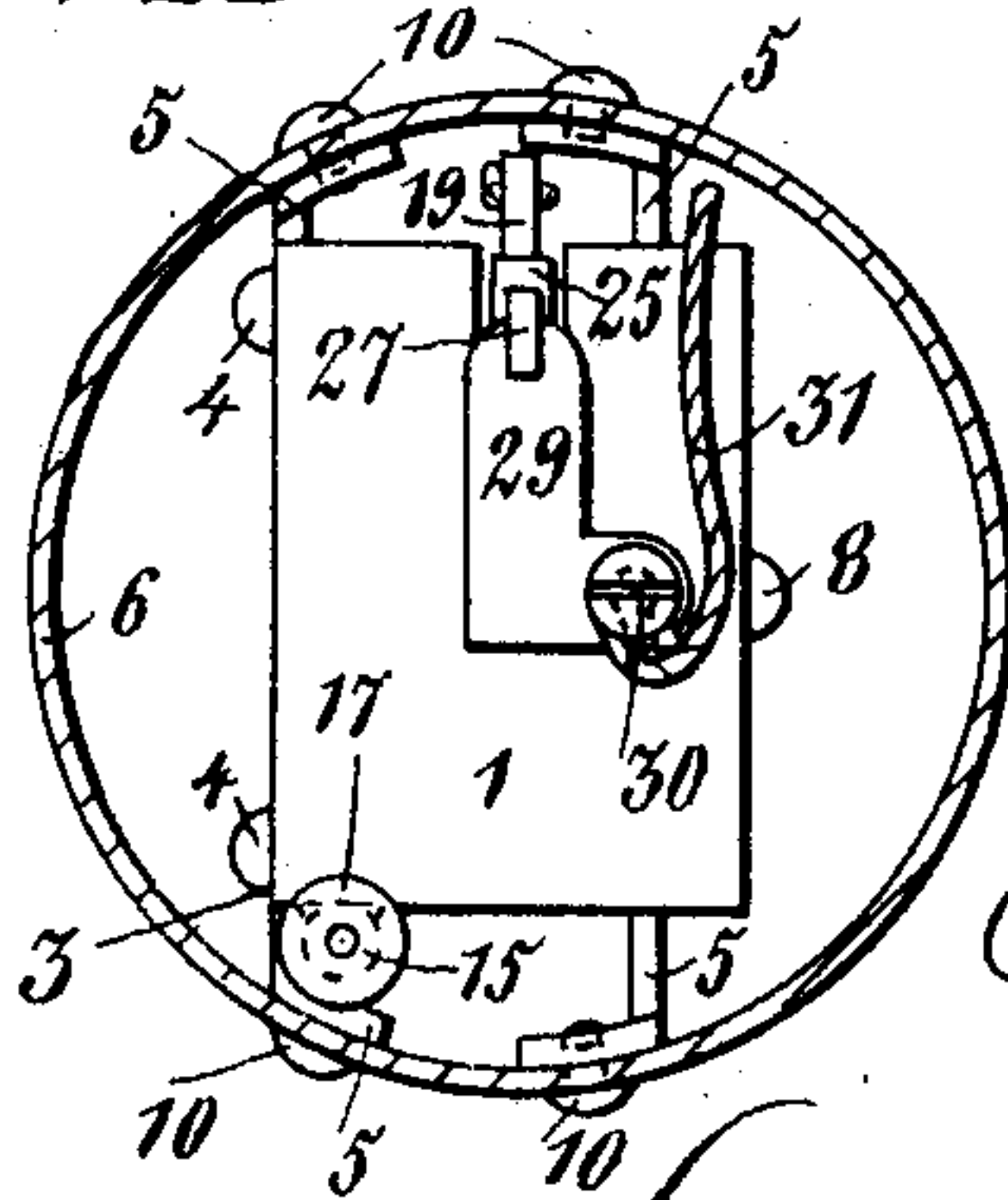


Fig. 3.



Witnesses:

John A. Paulson
Mastelmke

by

Schreiter & Mathews
their Att'ys

Oscar Freymann
Charles Tolman
Inventors

UNITED STATES PATENT OFFICE.

OSCAR FREYMANN AND CHARLES TOLMAN, OF BROOKLYN, NEW YORK,
ASSIGNORS TO AMERICAN EQUIPMENT COMPANY, OF NEW YORK, N. Y.,
A CORPORATION OF NEW YORK.

SMOKE-DETECTOR.

SPECIFICATION forming part of Letters Patent No. 688,404, dated December 10, 1901.

Application filed April 1, 1901. Serial No. 53,803. (No model.)

To all whom it may concern:

Be it known that we, OSCAR FREYMANN and CHARLES TOLMAN, of the borough of Brooklyn, county of Kings, city and State of New York, have invented certain new and useful Improvements in Smoke-Detectors, of which the following is a full, clear, and exact specification, reference being had to the accompanying drawings, wherein—

10 Figure 1 is an elevation partly-sectional view of an apparatus, smoke-detector, showing the embodiment of one part of our invention. Fig. 2 is a similar view of the same apparatus, taken at right angles to Fig. 1; and
15 Fig. 3 is a plan view thereof.

Our invention relates to automatic alarm devices; and it consists of the hereinafter-described apparatus for detecting and announcing the presence of smoke in the place where
20 the apparatus is located.

The operating parts of our newly-invented apparatus are arranged in and secured to a frame consisting of bracket 1, plates 2 and 3, bolts 4, joining the plates 2 and 3 together,
25 and brackets 5, whereby the frame is secured by screws 10 to the metallic casing 6 in closing the apparatus. Bracket 1 and plate 2 are joined to insulating-plate 7 by screws 8 and 9, respectively. Two oscillating levers, designated 19 and 25, respectively, are pivoted on
30 pins 20 and 26, set in plates 2 and 3. The longer arm of lever 19 engages in recess 24 of lever 25, and thereby its motion is transmitted to the other. Spring 32, secured to plate 2, acts upon the shorter arm of lever 19, pressing it upwardly, and thereby the longer arm of lever 25 and the movable contact-piece 27,
35 secured thereto, are drawn downwardly, thus pressing the movable contact-piece in contact with the stationary contact-piece 29, set on top of bracket 1 and secured thereto by screw 30. This stationary contact-piece 29 is connected by wire 31 to a battery or other generator of electric current, whereas the movable
45 contact-piece 27 is connected to the same battery or electric-current generator through lever 25, pin 26, plates 2 and 3, brackets 5, casing 6, and wire 28. In the same electric current is included an electric bell or other signaling device, and also an annunciator indi-

cating the location of the apparatus by number or otherwise, may be included therein.

The signaling device and the annunciator will operate when the electric circuit is closed by bringing the contact-pieces 27 and 29 together, and therefore the apparatus must normally be held in inactive position—to wit, with the contact-pieces separated from each other—and this must be accomplished by such means as are susceptible to smoke in the
60 sense that the effect of smoke upon these means will release the apparatus from this inactive position and render the mechanism actuating the movable contact-piece free to act and close the electric circuit. For this
65 purpose we use a thread of silk, a horsehair, or other similarly-composed fiber, which before using it we boil (in a closed vessel) in a six to ten per cent. solution of commercial soda for about twenty minutes and then dry
70 it, very moderately stretched, in a tube from which the air is exhausted. The diameter of the fiber should not be less than that of the coarse horsehair. It is better to twist or braid two or three of such fibers into a string
75 or cord, the capacity of such string or cord to be contracted by the treatment and elongated again when exposed to smoke being greater. The solution of soda must not be stronger than ten per cent., and nothing but
80 pure commercial soda must be used in preparing it. A strong solution might impair the tensile strength of the fiber, which of course must be sufficient for the purpose of this apparatus, or might even dissolve it.
85 The thread, hair, or string is contracted by the treatment, but retains its tensile strength, and acquires the quality to elongate when exposed to smoke.

We are unable to precisely explain what
90 transformation is produced in the fiber by treating it as hereinbefore explained or what particular component of smoke produces its elongation. We believe that the vapors of volatile oils produced by combustion or some
95 of the gases contained in the smoke produce the change in the composition of the fiber. We made numerous tests with fibers treated as above described and found that smoke invariably produced the elongation of the fiber
100

thus treated, though some smoke—as, for instance, smoke produced by burning wood—acts more rapidly than other. Upon this principle the construction of our smoke-detecting apparatus is based to the extent that we employ a thread, hair, string, or fiber thus treated for holding the movable contact-piece away from the stationary contact-piece and against the action of some device, as, for instance, the spring 32, forcing them together. The mechanism suitable for thus holding the contact-pieces separated may be variously arranged; but we consider the construction shown in the drawings the best suitable, in that it permits the use of a considerably long thread, hair, string, or other fiber, and in such manner that its whole length is exposed to the action of the smoke without unduly enlarging the size of the apparatus or affecting its sensitiveness or quickness of operation.

In the apparatus shown in the drawings the downwardly-pointing arm of bracket 1 is extended into a shank 11, which is preferably bifurcated on its end, and a grooved roll 13 is set between its tines 12 to loosely revolve on pin 14. On the end of the horizontal arm of bracket 1 sleeve 15 is secured, preferably soldered thereto, and in this sleeve the shank of hook 16 is inserted and held therein by nut 17. The shank is suitably bent so as to bring the hook 18 in line with the groove of roll 13 and also in line with lever 19, oscillating on pivot 20, set in the plates 2 and 3. Hook 22, engaged in hole 23, provided in the outwardly-projecting shorter arm of lever 19, is connected by thread, hair, string, or fiber 21 to hook 18, treated as hereinbefore described, the ends of thread 21 being tied, one to hook 18 and the other to hook 22, and the thread slid over roll 13. The thread is stretched taut by screwing nut 17 on the end of the shank 16, while the short end of lever 19 is pressed sufficiently far downward to separate contact-piece 27 from 29. In this manner also the sensitiveness of the apparatus is adjusted, because the farther away the contact-piece 27 is held from the contact-piece 29 the greater extension of the thread 21 will be required to set the apparatus in action, and vice versa.

The apparatus is preferably inclosed in a metallic casing 6, provided with an aperture 37 and perforations 38 and 39 near the bottom, through which the smoke may enter, and with apertures 40 above, through which the smoke is permitted to escape therefrom. The apertures are so arranged that the sensitive thread is in its whole length exposed to the action of the smoke passing through the casing. As hereinbefore explained, the smoke causes the sensitive thread to relax, and as the pull or spring 32 stretches it it releases lever 19, which by the action of spring 32 moves contact-piece 27 in contact with the contact-piece 29, and thus, closing the electric circuit, causes the signaling device and the annunciator to act. When the effect of the

smoke upon the sensitized fiber ceases, the apparatus is reset for action, because the sensitive thread contracts again; but it is necessary to readjust it, especially if it was exposed to smoke for a longer period of time, because the contraction of the thread is not equal to the extension thereof caused by the action of the smoke. When the operative quality of the sensitized thread or fiber is exhausted, it must be replaced by a new one, which is put in place in the manner as above described.

If the sensitive thread should deteriorate or break, the apparatus is thereby set in action, and consequently there is no danger of the apparatus being inoperative when its action may be required.

We claim as our invention—

1. The combination with an automatic circuit-closing device of a connecting device for holding the contact-pieces apart, said connecting device being sensitive to smoke, the smoke causing it to elongate and release the contact-pieces to close the circuit.

2. The combination with an automatic circuit-closing device of a connecting device for holding the contact-pieces apart, said connecting device being treated by a solution of commercial soda and then dried as herein described, whereby it is rendered sensitive to smoke, the smoke causing it to elongate and release the contact-pieces to close the circuit.

3. The combination with an automatic circuit-closing device comprising a stationary and a spring-actuated movable contact-piece, of a connecting device attached to the movable contact-piece, and holding it normally away from the stationary contact-piece, said connecting device being treated as herein described, whereby it is rendered sensitive to smoke, the smoke causing it to elongate and release the movable contact-piece.

4. The combination with an electric circuit-closing device comprising a stationary and a movable contact-piece and means for pressing the movable in contact with the stationary contact-piece, of a string or cord, attached to the movable contact-piece, and holding it apart from the stationary contact-piece, said string or cord being treated as herein described, whereby it is rendered sensitive to smoke, the smoke causing it to elongate and release the movable contact-piece.

5. The combination with a signaling device and mechanism for actuating it provided with a spring-actuated lever for setting the mechanism in and out of action; of a string or cord attached to the lever and holding it against the action of the spring, said string or cord being treated as herein described, whereby it is rendered sensitive to smoke, the smoke causing it to elongate and to release the lever.

6. A smoke-detecting device, comprising an electric battery, an electrically-actuated signaling device, a frame, automatic circuit-closing device mounted in the frame, electric conductors connecting the battery, the signaling device and the circuit-closing device; a con-

necting device, attached to the circuit-closing device so as to resist its action, said connecting device being treated as herein described, whereby it is rendered sensitive to smoke, the smoke causing it to elongate and to release circuit-closing device.

7. A smoke-detecting device comprising an electric battery, a signaling device provided with an electrical movement, a frame, a stationary and a movable contact-piece mounted in the frame; electric conductors connecting the battery, the signaling device and the contact-pieces; mechanism acting upon the movable contact-piece pressing it in contact with the stationary contact-piece, a connecting de-

vice attached to the mechanism acting upon the movable contact-piece and holding the movable contact-piece away from the stationary contact-piece; said connecting device being treated as herein described, whereby it is rendered sensitive to smoke, the smoke causing it to elongate and release the movable contact-piece.

OSCAR FREYMAN.
CHARLES TOLMAN.

Witnesses:

RICHARD COHN,
WILLIAM GROB,
CHARLES W. ENGELHARDT.