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SMOKE AND COMBUSTION INDICATOR

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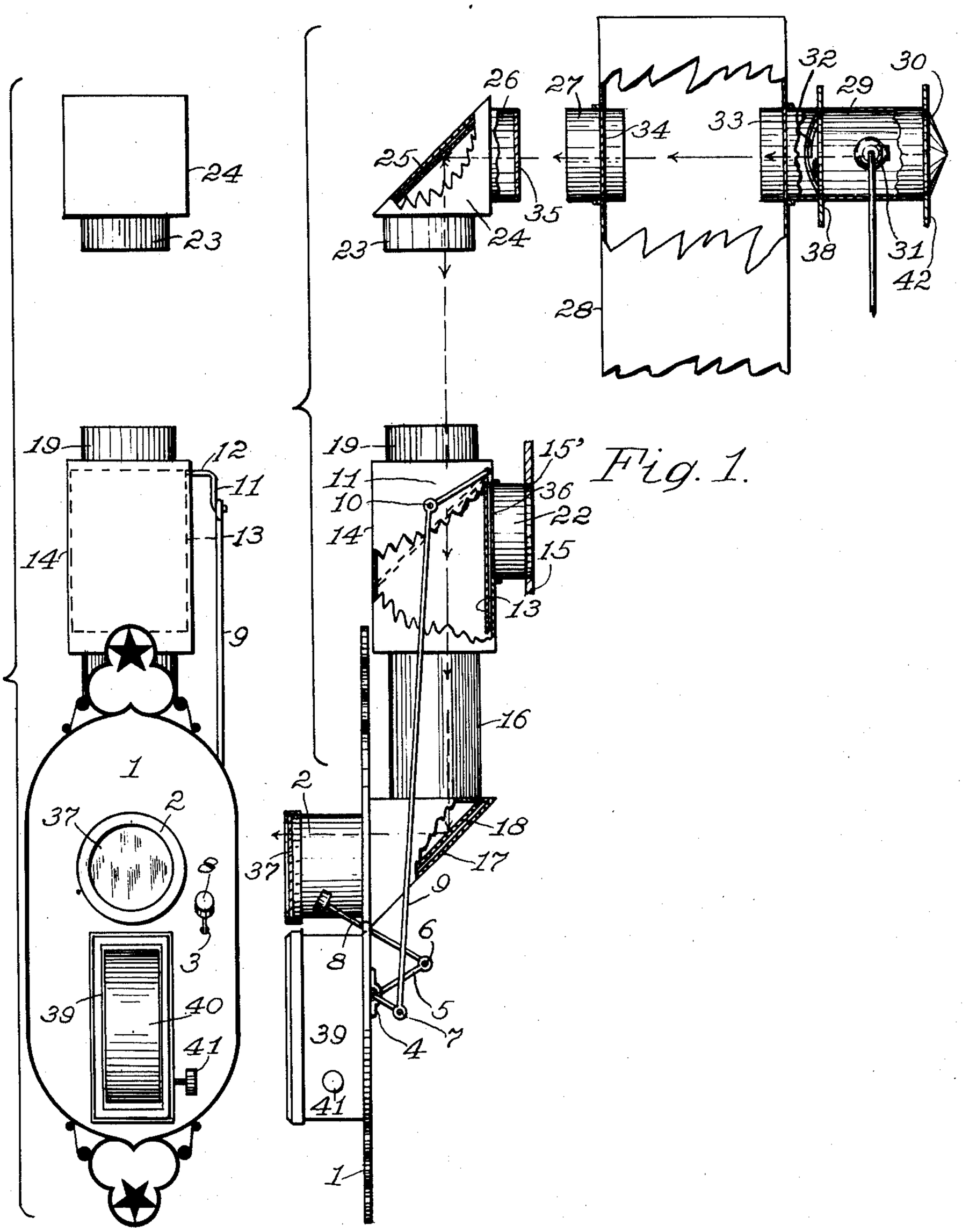

Fig. 1.

Fig. 2.

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SMOKE AND COMBUSTION INDICATOR

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2 Claims. (Cl. 88—14)

My invention relates to improvements in smoke and combustion indicators, and the object of my improvement is to furnish a device of this character adapted in construction and use for instant inspection of either a furnace fire, or the condition of escaping gases of combustion in a stack, operable quickly to effect either function, and which device may also be used for like or analogical purposes of any kind as desired.

This object I have accomplished by the means which are hereinafter described and claimed, and which are illustrated in the accompanying drawing, in which Fig. 1 is a front elevation of those parts of the invention which include the sight box with its reel of instructions, the junction box and means for manually shifting the inclosed reflector element, and the apical and lower inspection windows. Fig. 2 is a diagrammatic side elevation, showing the above parts as properly related to a furnace below and to a stack above including the accessory members for placing them in operative connections with the furnace and stack, and said figure showing parts in partial section or broken away and other parts in elevation.

The numeral 1 denotes a mounting panel on whose lower part is secured a boxing 39 with glazed front and which contains a movable reel of paper containing instructions for use by a fireman or others as to the functions of the apparatus and manner of operating it to discover the condition of the combustion in a furnace, or the condition and movement of the gases of combustion passing through the furnace stack. The numeral 2 denotes a hollow cylindrical member having front glazing 37 and opening through a communicating aperture in the plate 1 into a sight-box 17 triangular in vertical section having a sloping rear wall upon which is placed a mirror 18 of like slope.

The numeral 14 denotes a junction box above and communicating with the triangular box 17 below by means of a tubular member 16. The box 14 contains a mirror 13 mounted along its upper margin on a rock-shaft 12 (see Fig. 1) with end bearing holes in the box 14 and without this box having an end crank 11. On the rear face of the panel 1 is fixed a bearing member 4 seating a cross part of a bell-crank lever having the end arms 6 and 7, the arm 7 having an outturned termination pivotally connected with the lower end of a connecting-rod 9 whose upper end is pivotally connected with the termination of said crank 11 at 10. The outer end of the arm 6 is pivotally connected with the rear end of a push-rod 8 having at its forward end a discoidal handle, the rod 8 traversing an aperture 3 in the panel 1. The mirror 13 is shown in full lines as depending vertically in the junction-box 14. The dotted lines show the elevated position of said mirror as moved to close the junction-box by manual operation of the operating member 8 and the interlinked devices to the crank 11 as described.

I have shown at 15 a portion of a furnace casing having at 15' an opening in communication with the rear wall of the junction-box 14 by means of a short horizontal tube 22, and a glazed window-pane 36 interrupts the communication of the tube 22 with the box 14, and prevents entry of gases or smoke of combustion into the box 14.

The junction-box 14 has an upright short tubular member 19. This is spaced below and in vertical alinement with a short depending tubular element 23 on an angle-box 24 having a mirror lined inclined wall 25 facing the stack 28 and a tubular member 27 with medial glazing 34 fitted in an aperture in the stack, the angle-box 24 having a short tubular member 26 with end glazing 35 also facing the member 27. The glazing 34 is to prevent gases of combustion or smoke escaping into the room containing the apparatus previously described. The gap between the members 26 and 27 may be of any width according to convenience of installation.

The numeral 29 denotes a hollow cylindrical member, horizontally alined with the members 26 and 27 but positioned on the opposite side of the stack 28 from the latter and traversing an alined aperture in the stack, and closed at its rear end by a concave reflector 30 mounted on an apertured standard 42. Within the member 29 about midway of its ends is a lamp 31 focally alined with said reflector, and in advance of the lamp is a lens 32 focally alined with the lamp and reflector, the forward end of the member 29 closed by a glazed sheet 33 just in advance of the lens 32, the latter being mounted on a standard or support 38 apertured to seat on the member 29.

When the rockable mirror 13 is depending vertically, the view of the fire-box of the furnace 15 is cut off, while the members 19 and 24 are open to permit inspection of passing gases of combustion through the stack 28. A beam of light from the lamp 31 is reflected from the reflector 30 centrally through the lens 32, where it is intensified and passes through the stack gases, and the member 27 to span the gap between the latter and the elbow-coupling 24 to the mirror 25, the beam descending through the gap between the

elbow 24 and the tubular member 19 (which gap may be of any desired height), through the junction-box 14, also the member 16 and sight-box 17, to be reflected angularly by the mirror 18 horizontally through the sight-cylinder 2 and its glazing 37 to the eye of the inspector. The inspector thus may see the reflection of the gases of combustion in the stack 28, judge of their velocity of movement, notice their color or contamination in various degrees by smoke, and if much smoke is passing, the glazing 37 will be dark. He may then proceed to manipulate the firing of the furnace as may be necessary to effect perfect combustion of the fuel, with suitable variations of the air draft.

When the rockable mirror 13 is swung upwardly as indicated in the dotted lines, the inspector may view the furnace fire and likewise judge of its condition and the state of combustion of the fuel, and if necessary manipulate further firing accordingly, for if the firing produces much smoke, the sight glazing 37 will be dark.

My apparatus, with little or no alteration, may also serve for other purposes than viewing the conditions of the contents of furnace fire-boxes and their stacks, for instance, the periscope may be used to inspect a water column on boilers which are set high, or anywhere where a view inspection is to be taken of separated things.

My invention also embodies improvements upon my indicator for furnaces, United States Patent No. 723,303, granted March 24, 1903.

It is to be understood, that as various possible embodiments might be made of the above inventions, and as various changes might be made in the embodiment above set forth, that all matter herein set forth is to be interpreted as illustrative and not in a limiting sense.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is:

1. In apparatus of the character described for application to a furnace fire-box having a sighting aperture at one side above the fuel content therein, and to a chimney stack above and opening into the fire-box and having in opposite sides horizontally alined sighting apertures, in combination, a smoke and combustion indicating device, including a junction-box having a top, bottom and side aperture, a hingedly mounted closure plate in said box for swingably closing either said top or side aperture and having a mirror face on its under side, and elbows above and below said junction-box containing inclined mirrors, the upper elbow in alinement with said stack apertures, the side aperture of the junction-box alined with the fire-box aperture, and illuminating means for directing light through the alined stack apertures into the upper elbow.

2. In apparatus of the character described for application to a furnace fire-box having a sighting aperture at one side above the fuel content therein, and to a chimney stack above and opening into the fire-box and having in opposite sides horizontally alined sighting apertures, in combination, a smoke and combustion indicating device, including a junction-box having a top, bottom and side aperture, a hingedly mounted closure mirror in said box for swingably closing either said top or side aperture, elbows above and below said junction-box positioned in line therewith and containing mirrors for changing the direction of light traversing them, the upper elbow being positioned to receive light traversing said stack apertures, and to transmit it to the junction-box, the side aperture of the junction-box being alined with the fire-box aperture to receive light therefrom upon said hinged mirror in one position of the latter, means for swinging and releasably holding said swinging mirror to close either the top or the side aperture of the junction-box, a means of illumination positioned to project light through the stack alined apertures into said upper elbow and upon its mirror, a reflector adjacent said illuminating means to direct light therefrom through the stack apertures, and a condensing lens positioned between said illuminating means and the adjacent stack aperture.

ALBERT E. POWELL.