April 25, 1939. R. CONNOR 2,156,010

SKY WRITING DEVICE

Filed April 26, 1937 3 Sheets-Sheet 1

Fig. 1

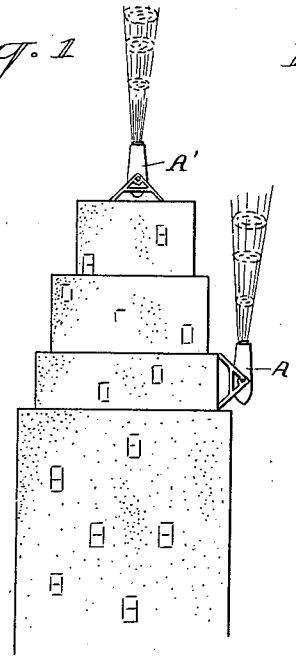


Fig. 2

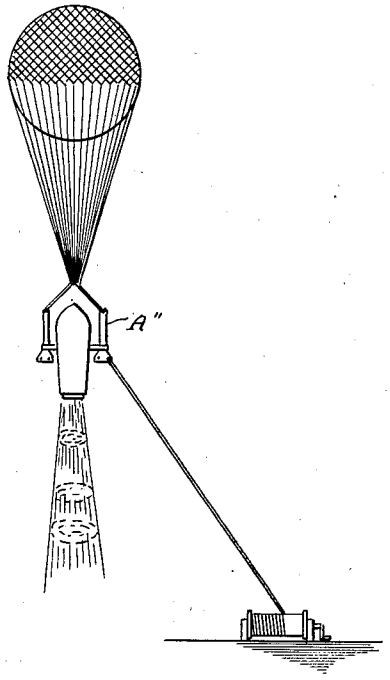


Fig. 5

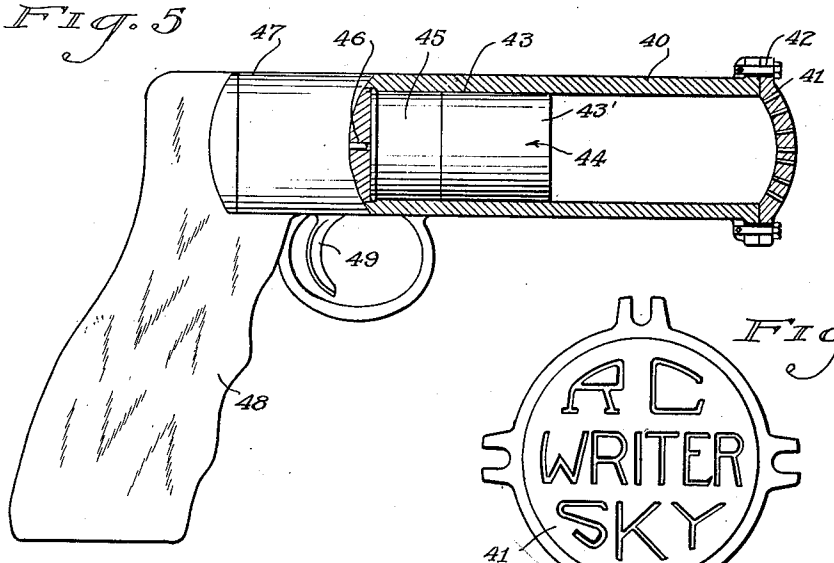


Fig. 6

Robert Connor
INVENTOR

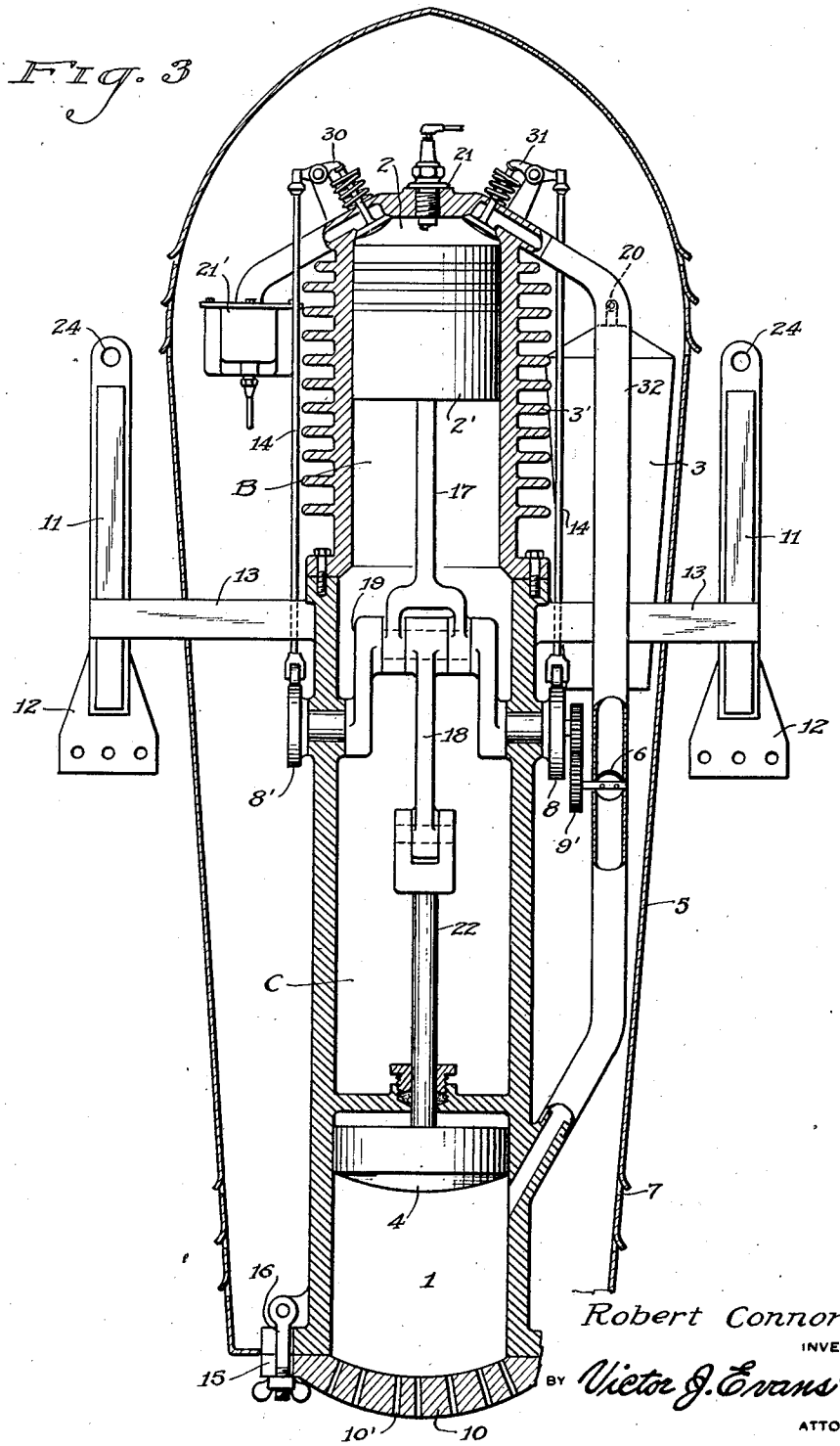
BY Victor J. Evans & Co.
ATTORNEYS

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SKY WRITING DEVICE

Filed April 26, 1937 3 Sheets-Sheet 2

Fig. 3



Robert Connor
INVENTOR

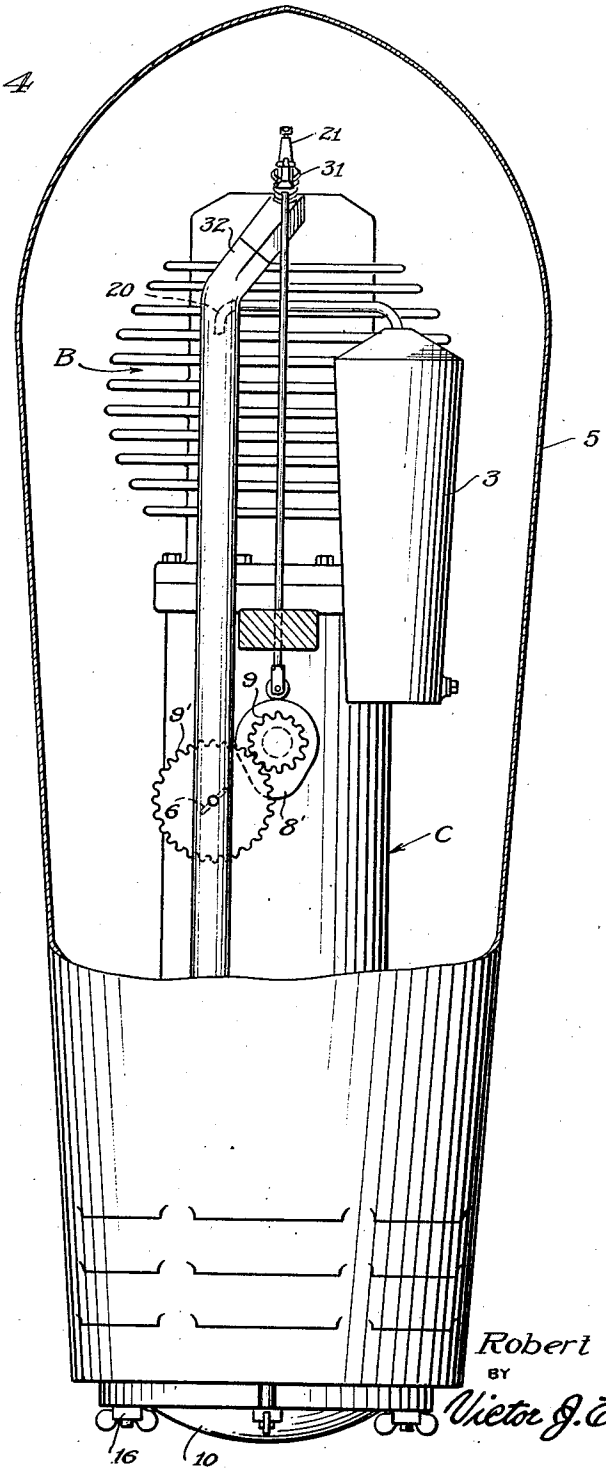
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April 25, 1939. R. CONNOR 2,156,010

SKY WRITING DEVICE

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Fig. 4



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Patented Apr. 25, 1939

2,156,010

UNITED STATES PATENT OFFICE

2,156,010

SKY WRITING DEVICE

Robert Connor, Brooklyn, N. Y.

Application April 26, 1937, Serial No. 139,042

5 Claims. (Cl. 40—127)

This invention relates to visual signalling, and especially to signalling, informing, or advertising by means of a gaseous medium or vapor, standing out against the sky or other background, and contrasting therewith. More particularly, the invention is concerned with the production and control of legible formations of a smoke or gas in the sky, popularly known as sky-writing.

The chief object of the invention is to provide methods and means for improving upon, or limiting, the present necessity for employing a moving aircraft of the airplane type in order to produce sky-writing, whereby to obviate the need for skilled operatives and expensive aircraft and other apparatus, instead making it possible for even a layman to do sky-writing, and to do it over or in areas where the manoeuvring necessary to airplane sky-writing is prohibited at any altitude where the sign would be effective.

Another object of the invention is to provide methods and means whereby sky-writing can be done in, or from, a fixed location or position, and the whole sign formed instantaneously, whereby to eliminate the usually highly disadvantageous drifting or blurring of the sign which usually begins before the writing is complete.

A particular object of the invention is to provide an apparatus for sky-writing which will be so simplified, and manufacturable of such inexpensive material, that it can readily be made on a large scale in order to constitute it a stock article.

The other objects and advantages of the invention will be made manifest as this specification proceeds.

Some of the presently preferred embodiments of the invention are shown in the accompanying drawings, and described in the following matter, but by way of exemplification only, the invention being limited in its embodiments only by the scope of the subjoined claims.

In these drawings:

Fig. 1 is a fragmentary elevation of a building having one form of the device in use thereon, two of the alternative locations of the device being shown;

Fig. 2 shows one form of the device mounted on an aerostat;

Fig. 3 is a vertical longitudinal, substantially central section of the form of device shown in Figs. 1 and 2;

Fig. 4 is an elevational view, partly broken away, of the same device from another angle;

Fig. 5 is a sectional side elevation of another form of the device, and

Fig. 6 is a front elevation of a part of the device.

In all the embodiments, the essential principle involved is that of taking a quantity of gaseous medium sufficient to constitute the entire sign when fully expanded, segregating it in one mass or body, and then forcing the entire gaseous-body thru means for dividing the mass into legible formations at the outlet of the device, thus forming a sign complete in all details but of a diminutive size, and then forcing this simulacrum suddenly and bodily outwardly into the surrounding medium and allowing it to expand. It further comprises manual, remote, and automatic control of the production of the design; and also production of successive series of the same, or different but intellectually connected, designs, at regularly spaced, controlled intervals in successive bursts or emissions, so that before the first emission has been dissipated by air current or the like, there will be another, or several other, designs expanding into complete visibility.

In the embodiments shown in Figs. 1 and 2, the device of Figs. 3 and 4 is mounted in several different ways. In Fig. 1 the device A is shown as having a cradle mount attached to the side of a set-back portion of an office building, the cradle and mount being such as to lay the axis of the cannon-like device A substantially vertically. In the position A' of Fig. 1, the device is mounted on horizontally extending cradles, but also with its axis vertical. In both positions, the mounting adapts the device to use with perfect safety in crowed building zones where persons passing on the sidewalks sub-adjacent to the building shown can readily perceive the display emitted as they walk along the sidewalk.

In Fig. 2 the same device as is shown in Figs. 3 and 4 is mounted for suspension beneath an aircraft, by means of mounting means A'' to be later particularized.

The device of Figs. 3 and 4 constitutes the remote, or automatic, control form of my device, as contra-distinguished from the manually controlled or portable form shown in Fig. 5.

The large form of my device comprises a casing or shield 5, here shown as simulating the outline of an old-fashioned piece of ordnance, and enclosing a prime-mover B here shown as a single cylinder internal combustion engine having a vertical cylinder B and an elongated crank case C, continued further in the form of a chamber or compartment 1. The internal combustion engine has, in the usual manner, a cylinder 2, a piston 2', a connecting rod 17, a crank shaft 19, an inlet valve 30, an outlet valve 31, a conventional type of ignition device 21, a suitable car-

buretor 21', etc., and cam means 8' on the crank shaft for operating the valves and the ignition properly, by means of cam followers, tappet rods 14, valve tappets, and valve springs. The exhaust valve 31 has an appropriate type of conduit 32 connected therewith.

A suitable container 3 for gaseous material under pressure is mounted on the side of the engine, and has an ejector outlet 20 opening into the conduit 32, and adapted to be operated by the exhaust occurring once in a cycle of the engine. Suitable spur gears 9 and 9' are provided in connection with the crank shaft and one of them, 9', is connected with a butter-fly valve 6, in the conduit 32, in such a manner as to be opened when the exhaust gases of each cycle enter the conduit 32, in order to allow the mixture of exhaust gases and the increasedly vaporizable gases in the container 3 to pass into chamber 1. The crank shaft 19 also operates a connecting rod 18, connected to a piston 22 suitably packed off from the chamber 1, substantially as shown, and having a gas tight piston head 4 reciprocable therein.

The lower end of the compartment 1 is open and has a stencilling member 10 hinged at one side thereof and clampable by wing nuts and pivot bolts 16 at the other side.

The construction just described is adaped to be mounted on a suspended support by means of axles 13 connected to members 11, preferably including shock absorbing means, and suspension points 24, as well as mounting plates 12, whereby the device may be mounted as shown in Fig. 2, with the recoil prevented from reaching the suspending craft.

The container 3 is adapted to contain any kind of sky-writing or display-making gaseous medium, such as that which is at present employed, for example, a fluid such as gaseous sulfur trioxide, phosphorous pentachloride, titanium tetrachloride and the like. As the exhaust valve 31 is opened during the cycle of the engine the exhaust gases passing the ejector 20 induce a predetermined amount of gas out of the container 3, past the open butter-fly valve 6, and into the compartment 1 just as the piston head reaches it. The piston head, operated in due course of the cycle of the engine, thereupon suddenly urges the entire mass of gaseous material needed for a sign against the apertures 10' in the stencil head, the gaseous medium then emerging as a perfect replica of the desired display as cut in the stencils shown in Fig. 6 but in compact, miniature form. This disc then floats upwardly or is projected downwardly, as the case may be, the gas expanding all the while until it reaches the maximum degree of legibility, whereupon it begins to lose form.

It is to be understood that this device can be mounted on other bases than the offsets or other portions of office buildings shown in Fig. 1, and than stationary aircraft; for example, it may be mounted on moving aircraft and the decks of ships, etc., for flare or true signalling purposes.

The device shown in Figs. 5 and 6 is an adaptation of the principle for manual control, and is essentially a flare pistol or rocket pistol, comprising an elongated chamber or barrel 40 having a stencil head 41 and securing means 42 on the end thereof, and a chamber 43 for a cartridge 44 consisting essentially of a propellant chamber 45 containing a mild explosive and a chamber 43' containing the gaseous medium to be used in the sky-writing procedure. The pistol also has a firing pin 46, and a breakable breech 47 for loading the cartridges therein, as well as a handle 48 and trigger 49.

It is usually desirable, in all forms of the device, to first attract and focus the public attention to the desired point before commencing the display, and to this end a detonator can be applied to the pistol to first attract attention before firing the cartridge, or in the case of the device of Figs. 3 and 4, the spark may be so retarded as to cause a back-fire before beginning the display, in order to attract attention.

It is to be noted, with reference to the form shown in Fig. 5, that it is well adapted for use before a crowd, by one standing on a level with the crowd, which may, for example, be seated in a grand-stand, the pistol being fired horizontally, and the display disc then being projected to stand vertically, whereas with the device of Figs. 3 and 4, the discs are projected singly or successively to lie in a horizontal plane.

I claim:

1. A visual-signalling device, comprising a substantially cylindrical casing, a container for gaseous material formed of and positioned near an end of said casing, a prime-mover of the type having an exhaust, said exhaust being adapted to induce a predetermined quantity of gas from the container at timed intervals, a chamber for receiving said gas and exhaust, means for urging a mass of the gas mixture outwardly of said chamber, and means comprising a relatively diminutive foraminous simulacrum mounted on the end of said casing for dividing the mass of gas mixture into a pre-formed but miniature representation of said sign before it leaves the device.

2. A device for sky-writing, comprising means for containing sky-writing smoke, a foraminous stencil-plate, means for discharging said smoke thru the stencil at timed and controllable intervals, and means for suspending the device from an aerostat with the ejection-zone pointing downwardly.

3. A device for sky-writing, comprising means for containing sky-writing smoke, a relatively diminutive foraminous simulacrum, means for discharging said smoke thru said simulacrum at timed and controllable intervals, and means for mounting the device on an aeronautical device with the ejection-zone pointing downwardly.

4. A device of the type described for sky-writing predetermined characters comprising a prime mover having a substantially cylindrical combustion chamber, a piston slidable therein, a rotatably supported crank shaft associated with said piston whereby reciprocating movement of said piston is translated into rotative movement of said shaft, means associated with said shaft for periodically introducing combustible material in said cylinder, igniting said material and removing the products of combustion, an exhaust line from said prime mover, a container for sky-writing fluid associated with said exhaust line whereby fluid from said container can enter said exhaust line, means associated with said shaft for periodically altering the flow of gases in said exhaust line, means associated with said line for receiving and momentarily retaining a predetermined mass of sky-writing fluid and exhaust gas mixture comprising a substantially cylindrical casing, a foraminous relatively diminutive simulacrum of the characters to be sky-written carried on and substantially closing one end of said casing, and means whereby during operation of the prime mover predetermined masses

of material are intermittently passed from said exhaust line into said casing and, after subdivision of the mass by passage through said foraminous simulacrum, ejected from the device to produce, upon expansion, the desired legible character.

5. A device of the type described for sky-writing predetermined characters comprising a prime mover having a substantially cylindrical combustion chamber, a piston slidable therein, a rotatably supported crank shaft associated with said piston whereby reciprocating movement of said piston is translated into rotative movement of said shaft, means associated with said shaft for periodically introducing combustible material in said cylinder, igniting said material and removing the products of combustion, an exhaust line from said prime mover, a container for sky-writing fluid associated with said exhaust line whereby fluid from said container can enter said exhaust line, means associated with said shaft for periodically altering the flow of gases and in said exhaust line, means associated with said line for receiving and momentarily retaining a predetermined mass of sky-writing fluid and exhaust gas mixture comprising a substantially cylindrical casing, a foraminous relatively diminutive simulacrum of the characters to be sky-written carried on and substantially closing one end of said casing, an opening in said casing adjacent said simulacrum communicating with said exhaust line, a piston slidable in said casing and means for imparting reciprocating movement thereto comprising members associating said piston and the crank shaft of said prime mover whereby, during operation of the prime mover, predetermined masses of material are intermittently passed from said exhaust line into said casing and, by movement of said piston, after subdivision of the mass by passage through said foraminous simulacrum, ejected from the device to produce, upon expansion, the desired legible character.

ROBERT CONNOR.