

[54] **GAS GENERATOR FIRE ALARM**
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[52] **U.S. Cl.** 116/106, 102/90, 116/112,
149/85
[51] **Int. Cl.** **G08b 17/00**
[58] **Field of Search** 116/5, 103, 104,
116/105, 106, 112; 102/65, 66, 90; 9/321,
323, 324; 149/85

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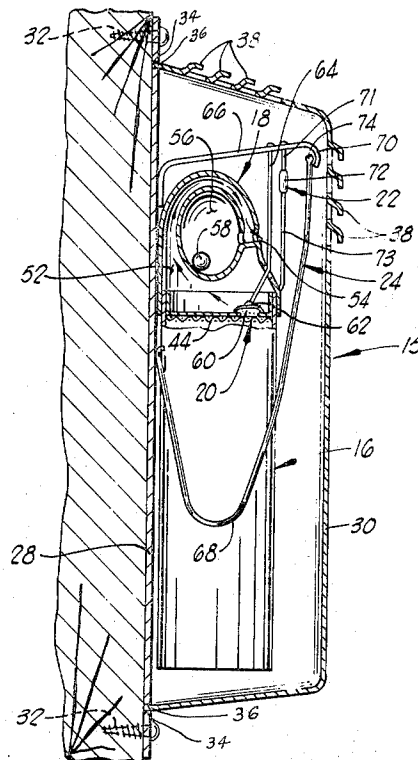
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Primary Examiner—Louis J. Capozzi
Attorney—John H. Widdowson

[57] **ABSTRACT**

A fire alarm is contained in a housing. There is a gas generator connected to a whistle. An ignitor starts the gas generator. More particularly, a fire alarm with a gas generator operated whistle noisemaker is actuated by excessive heat in the vicinity of the fire alarm.

4 Claims, 8 Drawing Figures



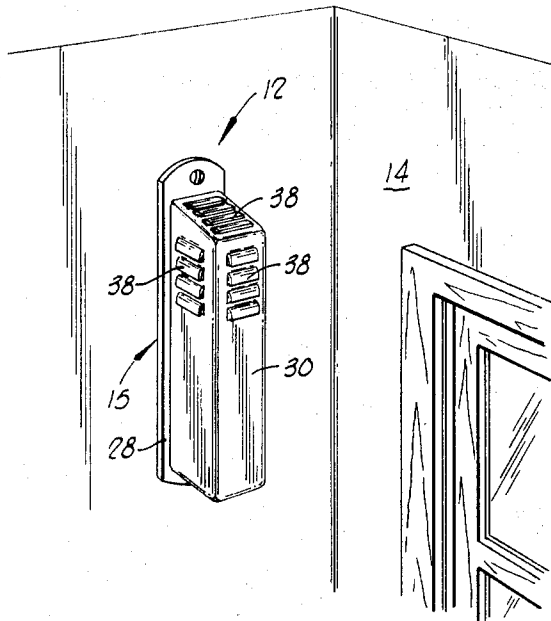


FIG. 1

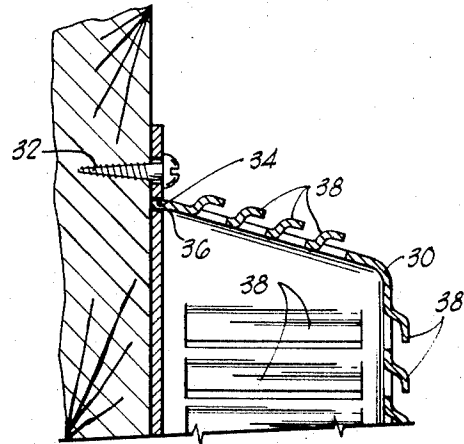


FIG. 4

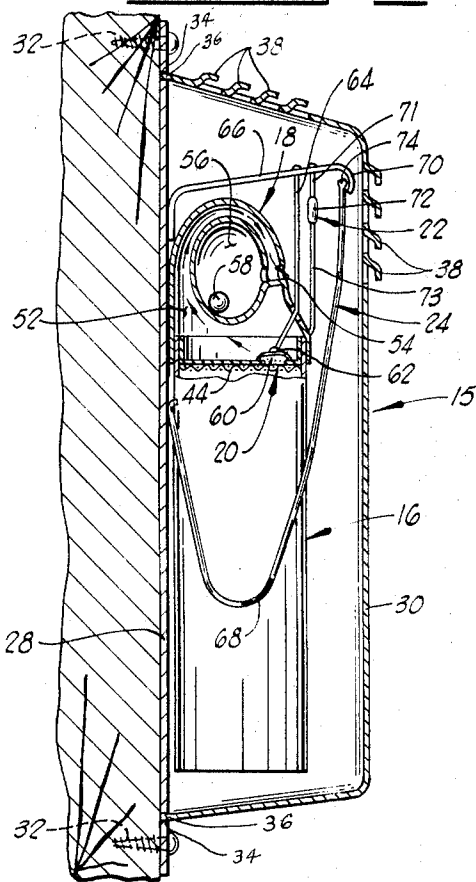


FIG. 2

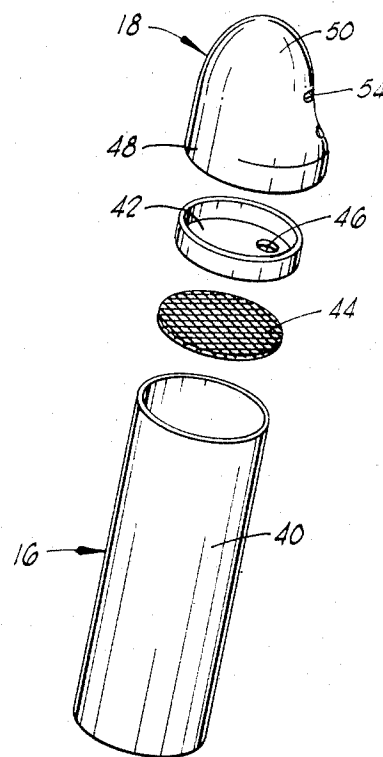
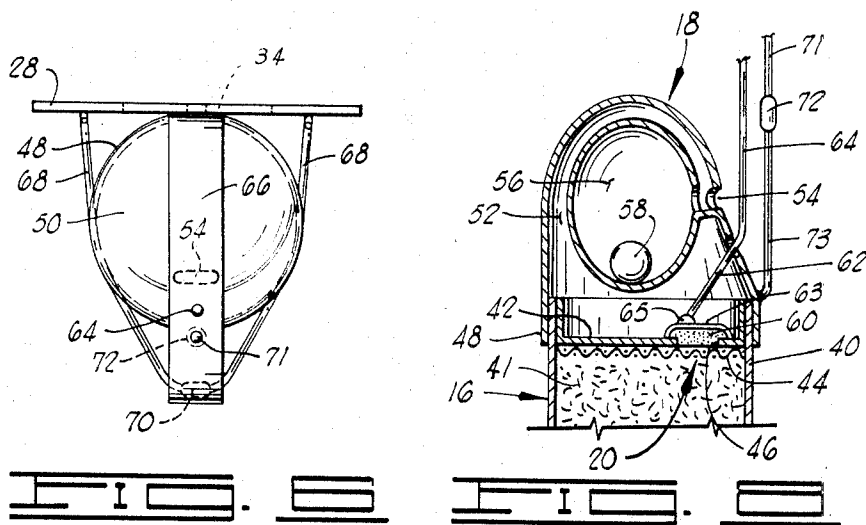
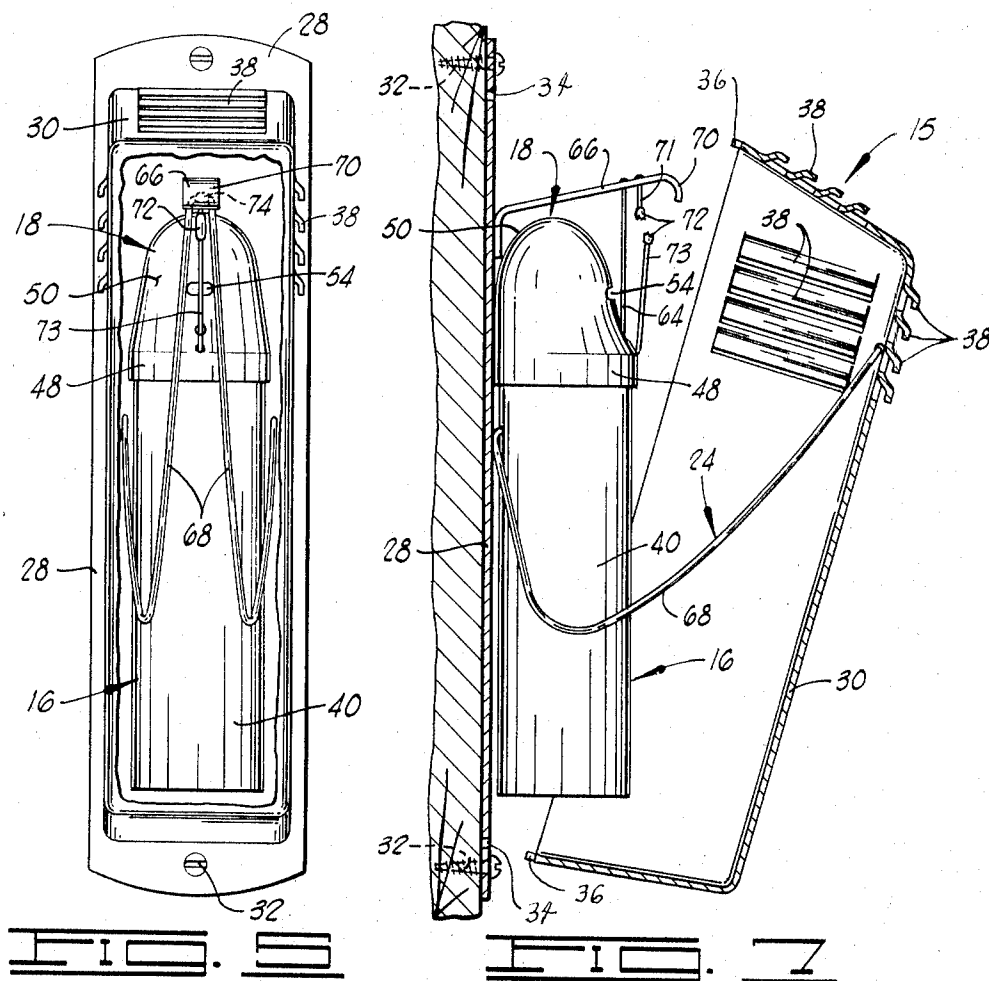


FIG. 3



GAS GENERATOR FIRE ALARM

Many types of fire alarms and fire detecting and warning devices are known in the prior art. Generally these devices use a compressed fluid held in a container to operate a whistle, horn or the like, or they use a chemical reaction to create gaseous fluid that is used to produce a single loud noise. Additional types of fire alarm devices utilize electrical means to actuate bells, horns, etc. The electrical fire alarms require either an outside source of power or batteries for their operation. The compressed fluid type fire alarms use different gaseous fluids to operate them which must be contained in a sealed container until use. The compressed fluid fire alarms require considerable maintenance because they must be periodically checked to determine if the fluid has leaked from the container or is still in it and if the associated valves and signaling device are in proper operating condition. The chemically operated fire alarms generally require little attention, since they are usually sealed units.

In one preferred embodiment of this invention, a gas generator fire alarm includes an ignitable gas generator with gas generating fuel sealed therein connected to a whistle and contained in a housing with a removable cover. The housing has a mount member and an elongated cover member which can be easily mounted on an upright wall or the like. The gas generator is preferably constructed of a cylindrical container connected directly to the whistle with a space therebetween for the fuel ignitor. The fuel ignitor is preferably connected to a spring urged fuse outside the container. A first spring is provided to operate the fuel ignitor and another second spring is provided which is held by the first spring and when released knocks the housing from the mount. The fire alarm is put in operation by excessive heat in the vicinity which actuates the fuse which allows the first spring to move the ignitor thereby igniting the fuel and releasing the second spring member that knocks the cover from the housing. Gas generated by the fuel in the container passes directly into the whistle and produces a loud whistling noise.

One object of this invention is to provide a gas generator fire alarm overcoming the aforementioned disadvantages of the prior art devices.

Still, one other object of this invention is to provide a gas generator fire alarm having a gas generator using a combustible fuel to provide gas for operation of a whistle noisemaker.

Still another object of this invention is to provide a gas generator fire alarm with a housing enclosing a whistle noisemaker and gas generator and in operation the cover of the housing removed.

Various other objects, advantages, and features of the invention will become apparent to those skilled in the art from the following discussion, taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a perspective view taken from below of the gas generator fire alarm mounted on the inside wall of a building, with the fire alarm shown in an enlarged size;

FIG. 2 is a cut away side elevation view of the fire alarm showing the interior of the housing and the inside of the whistle;

FIG. 3 is an exploded perspective view of the gas generator and the whistle;

FIG. 4 is an enlarged cut away side elevation view of the attachment of the housing mount and the housing cover;

FIG. 5 is a side elevation view of the fire alarm taken from the cover side thereof having a portion of the cover removed for clarity exposing the covered elements of the fire alarm;

FIG. 6 is a top plan view of the fire alarm with the cover thereof removed for clarity;

FIG. 7 is a side elevation view of the fire alarm with portions thereof cut away for clarity with the fire alarm being in the position it will assume when activated, the cover being spaced from the mount; and

FIG. 8 is an elevation view of the whistle and upper portion of the container having portions thereof removed for clarity exposing the interior of the whistle, the ignitor, and the interior of the upper end portion of the container.

The following is a discussion and description of preferred specific embodiments of the gas generator fire alarm of this invention, such being made with reference to the drawings, whereupon the same reference numerals are used to indicate the same or similar parts and/or structure. It is to be understood that such discussion and description is not to unduly limit the scope of the invention.

Referring to the drawings in detail and in particular to FIG. 1, the gas generator fire alarm of this invention, indicated generally at 12, is shown mounted on the inside wall of a building 14. The gas generator fire alarm 12 includes a housing 15 to enclose the gas generator 16, whistle 18, ignitor 20, fuse 22, and spring assembly 24.

The housing 15 includes a mount member 28 and a cover member 30 forming an elongated rectangularly shaped enclosure. The mount member 28 is rectangularly shaped with holes in the end portions so it can be attached to a wall or the like by screws 32 as shown in FIG. 2. Also, the mount member has an elongated transverse slot in each end as indicated at 34 in FIG. 4. The cover member 30 has the end edge portions 36 of the housing ends extending slightly past the longer edges of the housing sides. The end edge portions 36 of the cover 30 fit into the slot 34 and are pressed against its extreme outer edges in order to hold the cover in place, as shown in FIG. 4. A plurality of louvers 38 are formed into the end and side portions at one end of the cover member 30; this end of the cover 30 is preferably positioned at the whistle end of the fire alarm.

The gas generator 16 has an elongated cylindrical container 40 to hold the fuel; it is closed on one end and has the other end 42 removable. The fuel 41 is preferably a solid type fuel in a particulate form of a utilized form that substantially fills the container 40 to a point spaced below the removable end 42. The removable container end 42 is constructed to slip inside the walls of the container 40. A screen 44 is placed below the end 42 to hold the fuel in place and function as a filter. The container end 42 has an aperture 46 therethrough which is used for an outlet for the gas when the gas generator is operating. The outlet end of the gas generator 16 has the removable end 42 spaced below the end of the container 40 so as to form a space between the removable end 42 and the outlet edge of the container 40.

The whistle 18 has an enlarged cylindrical inlet 48 and a dome 50 containing an annular passageway 52

and the outlet 54. The enlarged inlet 48 is a flange-like portion of the dome 50 and is sized to fit over the outlet end of the container 40. The whistle 18 is constructed as shown in FIGS. 2 and 8 with a cavity adjacent to the container end 42, and an annular whistle passageway 52 communicably connecting the outlet aperture 46 and the whistle dome outlet 54. When the whistle 18 is in operation, gas can flow from the outlet aperture 46, through the cavity adjacent to the container end 42, through the annular whistle passageway 52 and out the dome outlet 54 into the atmosphere. The annular passageway 52 is curved in a ring about a central cavity 56; it decreases in cross-section size with length from the inlet and terminates with an open end at the edge of the outlet 54. The cavity 56 is annular on the inside thereof and contains a worbler ball 58. As the gas flows through the passageway 52 and from the outlet 54, the worbler ball 58 is moved about in the cavity 56 by the gas currents; as it passes the outlet aperture 54, it changes the pitch of the sound that the whistle 18 makes.

The ignitor generally indicated at 20 is used to ignite the solid fuel. It is partially contained in the space between the container 40 and the whistle 18. The ignitor 20 includes an ignitable plug 60 covering the outlet aperture 46 in the container's removable end 42, and a striker member 62 in contact with the ignitable plug 60, as shown in FIG. 2 and FIG. 8. The ignitable plug 60 is preferably a plug of phosphorous material composition that is protected from the atmosphere by a covering 63 of wax material. The striker member 62 has a tip 65 constructed of a material that when pulled across the wax covering 63 will penetrate it, contacting and scratching or abrading on the plug 60 to ignite it. The tip 65 of the striker member 62 is on the end of an elongated stem 64 which passes outside the whistle and is connected to the main spring 66 of the spring assembly 24. The striker tip 65 is constructed of a material having sufficient abrasive properties to penetrate the wax covering 63 on the plug 60 and scratch or abrade it sufficiently to cause the plug 60 to ignite; numerous materials known in the art have these properties and can be used; one such material having these properties is Carborundum or silicon carbide. The fire alarm 12 when in a set condition has the several elements thereof in the position shown in FIGS. 2, 5, 6 and 8. In this position the cover 30 is in place on the mount 28 as shown. The main spring 66 is attached to the mount 28 and passes around the dome 50 of the whistle 18, it is held in a restrained position by the fuse 22 and it holds a second spring 68 in a restrained position. The second spring 68 is positioned between the mount 28 and outer end 70 of the main spring 66. The preferred arrangement of the spring assembly 24 is shown in FIG. 2, FIG. 5 and FIG. 6. The outer end 70 of the main spring 66 is curved to hook over the end of the second spring 68. The fuse assembly 22 has a low melting point portion 72 connected by a wire 71 or the like to the main spring 66 and by another wire 73 to the enlarged inlet portion 48 of the whistle 18; it holds the springs 66 and 68 in the position shown until excessive heat causes it to separate. The low melting point portion 72 is constructed of a material having a relatively low melting point that would be melted or substantially weakened so as to be easily separable due to excessive heat such as created in a house fire or the like; numerous materials have the described properties, thus could be used; for example,

one such material having these properties is common solder. The striker member 62 has a stem 64 which is preferably a stiff spring-like member and is formed so that as it is pulled by the main spring 66 the tip 65 will be forced into contact with the ignitable plug 60 and moved as described when the fire alarm 12 is actuated.

FIG. 2 shows the gas generator fire alarm 12 in the set position or the position it is kept until activated. When excessive heat is present, such as during a fire, the low melting point portion 72 of the fuse assembly 22 separates freeing the main spring 66 from its normally restrained position; the main spring 66 moves generally upward and thereby pulls the striker stem 64 upward pulling or moving the striker tip 64 across the wax covering 63 on the ignitable plug 60 which causes the plug 60 to ignite which in turn causes the fuel in the container 40 to be ignited and generate a quantity of gaseous fluid. Simultaneously with movement of the main spring 66 and second spring 68 is released from its normally restrained position and its end 74 hits or strikes the interior of the cover 30 and knocks the cover 30 from the mount 28. When the main spring 66 moves up it may or may not pull the tip 65 of the striker stem 64 from the dome 50. FIG. 7 shows the cover 30 being knocked away by the spring 68 after the fuse link portion 72 has separated. The cover 30 is removed from the housing 15 so the whistling noise will not be restricted or muted. The fuel preferably used in the fire alarm is a combination of a combustible material and an oxidizer which when ignited will produce a large quantity of gaseous fluid. One such type of fuel is the combination of synthetic rubber as the combustible material and ammonium nitrate for the oxidizer. It is to be noted that several different combinations of materials will serve adequately as fuel for the fire alarm 12, and it is not to be restricted to use with a single fuel. As gas is produced by the gas generator, it flows through the passageway 52 and out the outlet 54 producing a whistling noise, the worbler ball 58 moves about inside the cavity 56 and changes the tone of the whistle somewhat by its motion. The whistle 18 preferably has a shrill and penetrating tone which can be heard for a substantial distance.

A feature of the gas generator fire alarm 12 of this invention is that once it has been sounded and the fuel oxidized it can be rebuilt to be used again, provided of course it is not destroyed in a fire. This rebuilding can be done by removing the gas generator 16 and whistle 18 from the mount 28, separating them, then removing the container end 42 so the container 40 can be cleaned and refilled. With the container 40 refilled the removable end 42 can be replaced, the outlet aperture sealed with the ignitable plug 60, the striker member 62 replaced, and the whistle 18 replaced on the gas generator 16. The gas generator 16 and whistle 18 are remounted with the mount 28, the springs 66 and 68 reconnected and another fuse 22 installed so the housing cover 30 can be replaced.

In the manufacture of the gas generator fire alarm 12 of this invention, it is obvious the container 40 can be filled with a solid fuel which, at this time, is sufficient to produce gaseous fluid that will operate the whistle 18 for a considerable period of time. Also, as will be apparent, chemical ignitors can be employed in place of the ignitable plug 60 and striker member. Also, as will be obvious to those skilled in the art, specific ignitable

chemicals such as phosphorous can be used as the ignitor which is protected from the air by a covering such as wax and exposed for use.

As will be apparent from the foregoing description of the applicant's gas generator fire alarm, relatively inexpensive and uncomplicated means have been provided for warning of a fire or excessive heat. The gas generator fire alarm is economical to manufacture, simple to use, and can be used over or rebuilt if necessary or possible.

While the invention has been described in conjunction with preferred specific embodiments thereof, it will be understood that this description is intended to illustrate and not to limit the scope of the invention, which is defined by the following claims.

I claim:

1. A fire alarm comprising:

- a. a housing, and therein,
- b. a gas generating means having a container having an outlet aperture and containing a quantity of an ignitable solid fuel gas generating compound,
- c. fuse means to ignite said gas generating means having an ignitable plug solid fuel member sealing said container outlet aperture and a solid and separable thermal fuse actuator directly connected to said plug fuel member, and

d. whistle means communicably connected to said gas generating means container outlet,

said means to ignite said gas generating means is adapted to be activated by said thermal fuse actuator being affected by excessive heat in the vicinity of said fire alarm, thereby causing said ignitable member to ignite and in turn causing said solid fuel gas generating compound to ignite said gas generating means to generate a gas which passes through said container outlet and through said whistle means producing a loud whistling noise.

2. The fire alarm as described in claim 1, wherein:

- a. said container has an elongated cylindrical shape with said outlet aperture in one end thereof,
- b. said whistle means has a body member adapted to attach said container on said one end thereof over said outlet aperture,

c. said fuse means has a striking member in contact with said ignitable member and movable thereacross to ignite same, and

d. said striking member has means to move same from outside said container and said whistle means.

3. The fire alarm as described in claim 2, wherein:

a. said housing has a mount member and a removable cover member,

b. said mount member is adapted to hold said fire alarm on a supporting surface, said mount member is attached to said container member and said whistle member and has a spring means attached thereto adapted to move said striking member moving means and remove said removable cover member from said mount member, and

c. said spring means has a first spring member attached said striking actuator moving means with said thermal fuse member attached said first spring member and said gas generating means to hold said first spring in a restrained condition, and a second spring member in a compressed condition positioned between said mount member and said first spring member adapted to when released by said first spring member strike said cover member removing same from said mount member.

4. The fire alarm as described in claim 3, wherein:

a. said thermal fuse actuator is an elongated member and has a separable fuse portion therein said fuse portion is adapted to hold said first spring member in a fixed position in said restrained condition and release same for operation of said fire alarm,

b. said separable fuse portion is a low melting point material adapted to separate when heated,

c. said first spring member is a leaf spring member attached said mount member positioned therearound said whistle means having a curved end portion adapted to hold said second spring member, and

d. said second spring member is a leaf spring member positioned alongside said gas generator means and said whistle means when in said compressed position.

* * * * *

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,785,334 Dated January 15, 1974

Inventor(s) Thomas A. Waldeck

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 2, line 53, delete "of" and insert -- or --.

Claim 3, paragraph (c), line 2, delete "actuator" and insert

-- member --;

line 3, delete "member" and insert

-- actuator --.

Signed and sealed this 21st day of May 1974.

(SEAL)

Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents

UNITED STATES PATENT OFFICE
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