

[54] **ARRANGEMENT FOR QUIETLY
INFLATING SAFETY GAS BAGS IN
MOTOR VEHICLES**[75] Inventor: **Ernst Fiala**, Braunschweig-Querum,
Germany[73] Assignee: **Wolf-Dieter Klink**, Danziger Weg,
Germany[22] Filed: **Sept. 21, 1971**[21] Appl. No.: **182,490**[30] **Foreign Application Priority Data**

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[58] Field of Search.....137/255, 256, 263, 265, 572,
137/576; 280/150 AB

[56]

References Cited**UNITED STATES PATENTS**

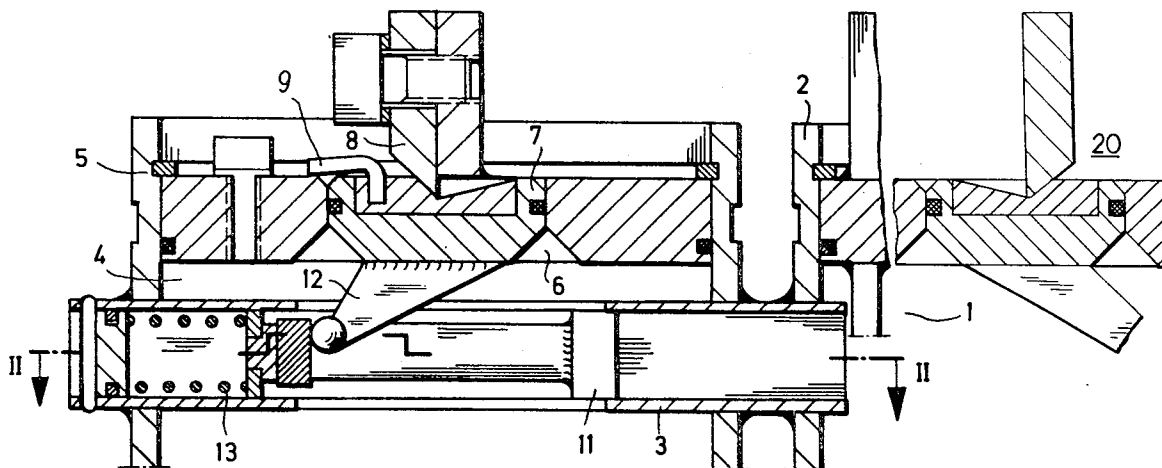
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[57]

ABSTRACT

An arrangement for quietly inflating safety gas bags in motor vehicles from a source of compressed gas. The source has at least two pressure vessels separated from each other and each of the vessels has a discharge outlet. A valve is mounted at each of the discharge outlets for controlling the passage of gas therethrough respectively. A release mechanism is mounted at the vessels for opening the valve of one of the vessels after the valve of the other vessel opens.

4 Claims, 2 Drawing Figures

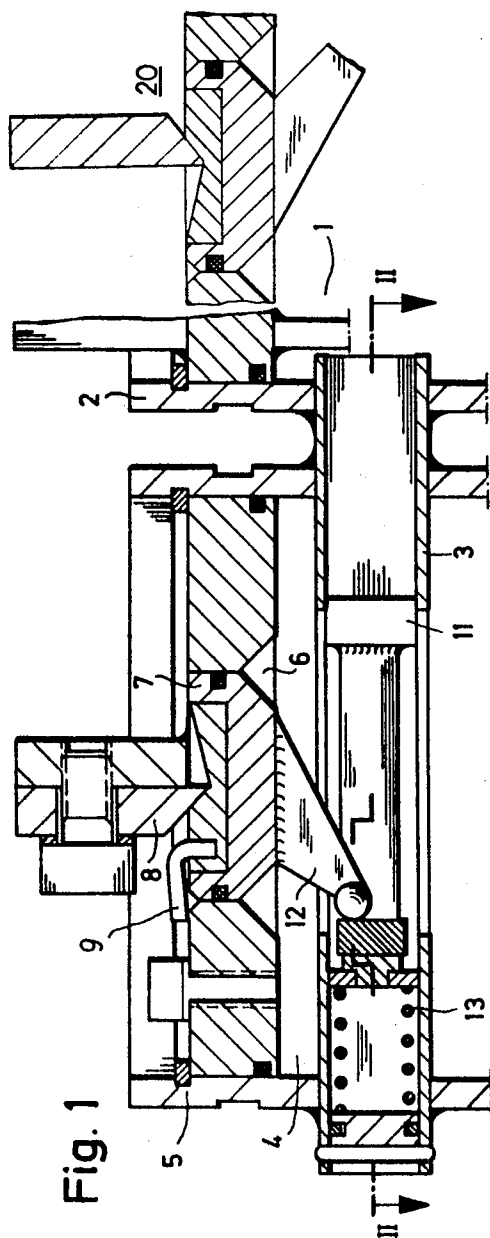


Fig. 1

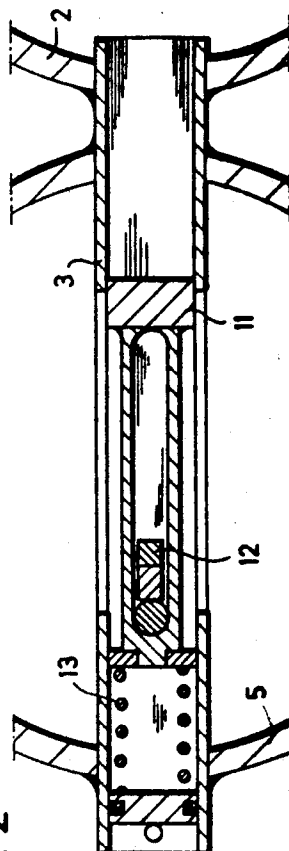


Fig. 2

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ARRANGEMENT FOR QUIETLY INFLATING SAFETY GAS BAGS IN MOTOR VEHICLES

My invention relates to an arrangement for quiet inflating gas bags in motor vehicles with compressed gas which is contained in a compressed gas vessel.

When the valves of this vessel are opened, detonation-like noises occur due to the decompression of the compressed gas and the sudden inflation of the gas bags, which under some circumstances can produce shock-like effects on the passengers of the vehicle.

It is an object of my invention to provide an arrangement for reducing considerably the noise associated with the filling of air bags.

According to a feature of the invention, the noises accompanying the filling of the gas bags can be reduced considerably if the compressed gas, for example, air is contained in at least two physically separated air spaces. The discharge outlets of these spaces are closed by valves which in the event of danger are opened sequentially with a short time delay between openings. This time delay can also be utilized to predetermine the course of the unfolding process of several air bags; furthermore, the product of pressure and volume per tank need thereby not be kept within critical limits.

Particularly advantageous configurations are obtained if the individual pressure spaces are connected with each other by a hollow cylinder member in which a piston is guided in a movable manner which in turn controls the valve that opens later in time. The piston is preferably coupled mechanically with a flap of this valve and is, in addition, acted upon by the pressure or force of a spring at one side thereof.

It is particularly of advantage, if several pressure spaces are provided having respective valves which are opened sequentially in time, to provide a small control vessel filled with gas under pressure ahead of the space which opens first; this control vessel is equipped with a valve which can be opened with little expenditure of energy. The time delay before the opening of the valve of the first space back of the control vessel is approximately 2 to 5 milliseconds and can be determined by the mass and effective working area of the piston.

Although the invention is illustrated and described herein as an arrangement for quietly inflating safety gas bags in motor vehicles, it is nevertheless not intended to be limited to the details shown, since various modifications may be made therein within the scope and the range of the claims. The invention, however, together with additional objects and advantages will be best understood from the following description and in connection with the accompanying drawing in which:

FIG. 1 is an elevation view, partially in section, of the arrangement of the invention for quietly inflating safety gas bags wherein two pressure vessels are disposed side by side, only the pertinent portions thereof being illustrated; and

FIG. 2 shows a sectional view taken along the line II—II in FIG. 1.

Reference numeral 1 designates the interior space of the pressure vessel 2. The valve 20 of vessel 2 is controlled, for example, by a release holding means such as disclosed in my copending application, Ser. No. 188,324 (F-5467), filed on Sept., 1971 and entitled:

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COMPRESSED GAS VESSEL FOR SAFETY GAS BAGS IN MOTOR VEHICLES. The interior space 1 is connected via a hollow cylinder member 3 with the interior space 4 of a further pressure vessel 5. The discharge outlet 6 of vessel 5 is closed by a valve flap 7. The valve flap 7 is supported in a knife-edge bearing 8 and is secured in the closed condition by a securing pin 9.

A piston 11 is guided in a movable manner in the hollow cylinder member 3. An extension 12 is connected with the piston 11 and is rigidly joined with the valve flap 7. The piston 11 is furthermore loaded in the direction toward the interior space 1 of the vessel 2 via a pressure spring 13, whose pressure, however, is transmitted, in the rest position via the extension 12 to the valve flap 7 and is taken up by the securing pin 9.

As soon as the valve 20 of the pressure vessel 2 is opened, the gas pressure in its interior space drops. Because of the pressure difference between the interior spaces 1 and 4 caused thereby, the piston 11 is displaced and the valve flap 7 is opened. The securing pin 9 is bent in the process.

In lieu of the securing pin 9, the knife-edge bearing 8 can also be arranged eccentrically so that upon the opening of the valve lid 7 by the piston 11, only the static moment resulting from the eccentric arrangement must be overcome.

It is possible and within the scope of the invention to connect the pressure vessel 5 with additional vessels which are controlled in a similar manner.

In an extreme situation the interior space 1 can be made very small. So for instance, it is possible within the scope of the invention to configure the hollow cylinder member 3 as a control pressure space and to equip it with a suitable controllable valve of low energy consumption.

I claim:

1. Arrangement for quietly inflating safety gas bags in motor vehicles from a source of compressed gas, said source comprising at least two pressure vessels separated from each other, each of said vessels having a discharge outlet, a valve mounted at each of said discharge outlets for controlling the passage of gas therethrough respectively, and release means mounted at said vessels for opening the valve of one of said vessels after the valve of the other one of said vessels opens.

2. Arrangement according to claim 1, said release means comprising a hollow cylinder member connecting the interior of said one vessel with the interior of said other vessel, a piston disposed in said cylinder member so as to be slidable therein, said piston being connected to said valve of said one vessel for opening said last mentioned valve after said valve of said other vessel opens.

3. Arrangement according to claim 2 said valve of said one vessel being a flap valve having a pivoted flap, said release means comprising a mechanical linkage for connecting said piston with said flap.

4. Arrangement according to claim 2, said release means comprising a spring braced against said piston for applying a force to one end thereof.

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