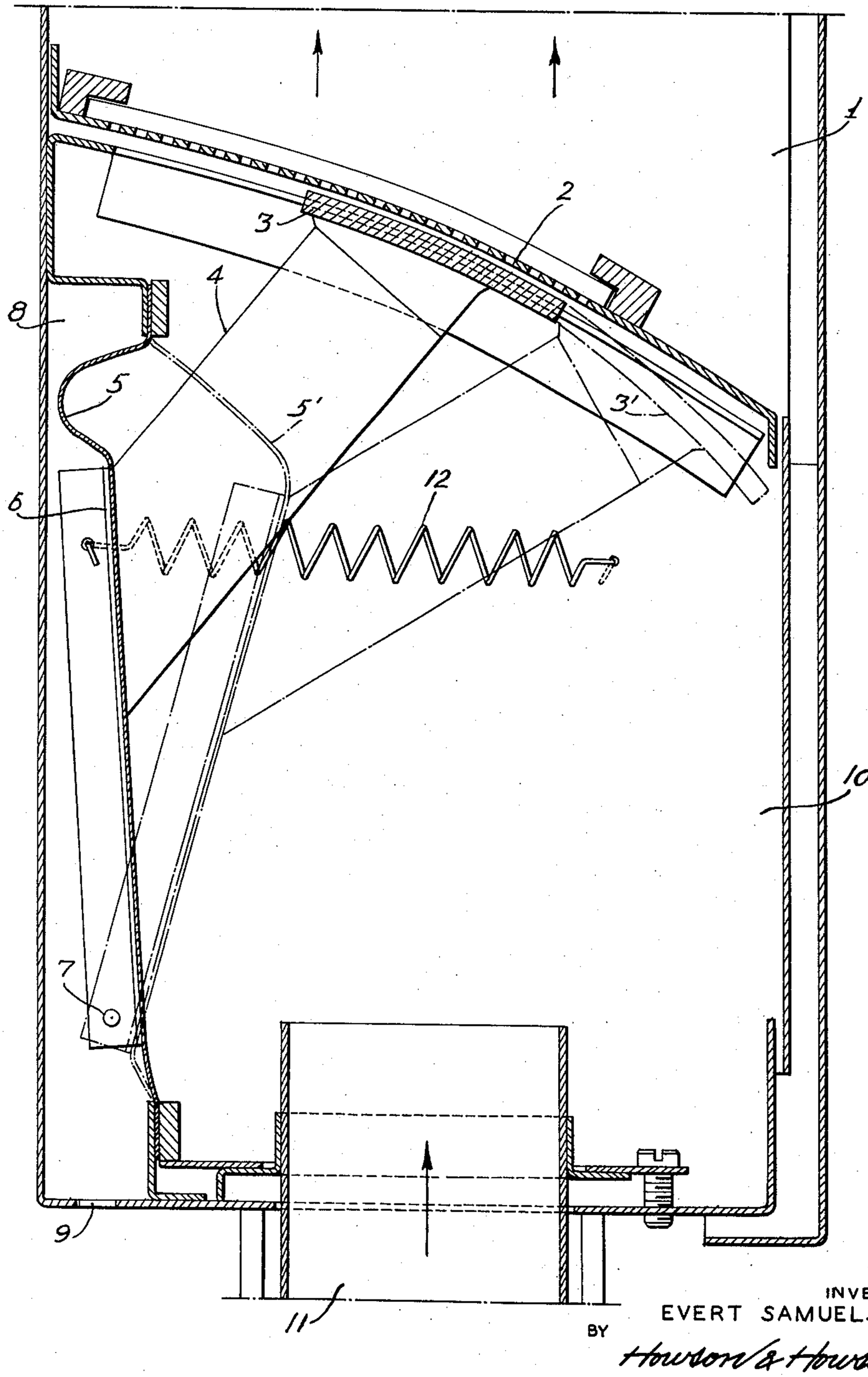
Sept. 2, 1958 E. SAMUELSSON 2,850,043

DEVICE FOR MAINTAINING THE VOLUMETRIC FLOW OF A GASEOUS MEDIUM CONSTANT

Filed Oct. 17, 1955



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United States Patent Office

2,850,043

Patented Sept. 2, 1958

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DEVICE FOR MAINTAINING THE VOLUMETRIC FLOW OF A GASEOUS MEDIUM CONSTANT

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Application October 17, 1955, Serial No. 540,947

Claims priority, application Sweden October 19, 1954

1 Claim. (Cl. 138—45)

The present invention relates to a device for maintaining the volumetric flow of a gaseous medium constant, and more particularly to a device consisting of a pressure sensitive means disposed in a channel or similar enclosure and a throttling means for the medium passing through the channel which is actuated by the pressure sensitive means and a counteracting torsional element.

A primary object of the present invention is to provide a device of simple mechanical form which maintains the volumetric flow through a channel substantially constant regardless of differences in pressure at the inlet end of the channel.

More specifically, the invention contemplates a device of the stated type in which the pressure sensitive means consists of a membrance (preferably rectangular) arranged at one side of the channel to form a wall thereof. The membrane is provided with a stiffening disc fastened to the rear side thereof, and the disc is swingably or pivotally mounted at the inlet end of the channel. The throttling means comprises an arched or arcuate damper plate operatively connected to said membrane and capable of pivotal movement with said disc along a partition disposed transversely to the cross-sectional flow area of the channel. The partition has the same arched or arcuate shape as the damper and is provided with one or more apertures which will be shielded or covered to a greater or lesser extent by the pivotal movement of the damper plate across the partition.

In accordance with a preferred embodiment of the invention, the flow area through the uncovered apertures in the transverse partition decreases in accordance with the square root of a pressure increase as the damper plate is displaced from its fully open position towards the position which affords greatest shielding or covering of the apertures.

The invention will now be described in greater detail with reference to the accompanying drawing.

The single figure of the drawing illustrates a sectional view through a channel embodying a regulating device made in accordance with the present invention.

Referring now to the drawing, the invention provides means for maintaining the volumetric flow of gaseous medium through a channel substantially constant. The channel 1 is provided with an inlet opening 11 for the gaseous medium, and spaced downstream from the inlet opening, is an arched or arcuate partition 2 having one or more apertures therein. A similarly arched or arcuate damper plate 3 is cooperable with the partition 2 to shield to a greater or lesser extent, the apertures in the partition 2. In the drawing, the damper is shown in full lines in its closed position, and in broken lines at 3' in

its fully open position. The damper plate 3 and the apertured partition 2 therefore constitutes a throttling means for the gaseous medium entering the channel 1 through the inlet 11. As is well known, the volumetric flow through the throttling means is computed by multiplying the flow area through the throttling means by the velocity of the medium passing therethrough.

The velocity of the medium flowing through the throttling means is determined by the pressure of the medium at the inlet 11. In accordance with the invention, pressure sensitive means is provided adjacent the inlet 11 to control the position of the damper plate 3. The pressure sensitive means comprises a membrane 5 forming a partition in the channel between the pressure in the channel at one side thereof, and atmospheric pressure at the other side, in the space 8. The space 8 communicates by means of one or more openings 9 with the atmosphere. A stiffening disc 6 is arranged on the rear side of the membrane 5 and is pivoted to the channel casing as indicated at 7. By reason of the pivotal connection, the membrane 5 will move between the full line position and the broken line position shown at 5', in response to the pressure difference between the static pressure in the inlet chamber 10 between the partition 2 and the inlet 11 and in the space 8 under the action of the counteracting spring 12. The stiffening disc 6 is connected to the damper plate 3 by means of an arm 4 so that the plate moves in response to movement of the membrane 5. Movement of the membrane 5 causes the plate 3 to swing along the lower side of the partition 2 and maintain the flow of gaseous medium constant. Thus, when the pressure in the chamber 10 increases, the membrane 5 causes the disc 6 to pivot counterclockwise, closing the damper plate 3. When the pressure decreases in the chamber 10, the disc 6 pivots clockwise, moving the damper plate 3 towards the open position shown at 3'. It is well known that an increase in pressure effects an increase in velocity of the medium, and the decreasing flow area caused by the movement of the damper plate 3 thereby compensates for the increasing velocity and maintains the volumetric flow constant.

In accordance with the preferred embodiment of the invention, the flow area left uncovered by the damper plate 3, through the partition, decreases in accordance with the square root of the pressure increase. For example, if the pressure is increased four (4) times, the flow area is reduced to a value equal to one over the square root of 4 (2) or to one half (.500) of the original area. If the pressure is increased three (3) times, the flow area is reduced to a value equal to 1 over the square root of 3 (1.73), or to .577 of the original area.

One embodiment of the invention has been herein illustrated and described, but changes and modifications may be made therein and thereto within the scope of the following claim.

I claim:

A device for maintaining constant the volumetric flow of a gaseous medium through a channel having an inlet, said device including pressure sensitive means comprising a flexible membrane mounted on one wall of said channel adjacent said inlet and forming a partition between the pressure in the channel at one side and atmospheric pressure at the other side, a disc pivotally mounted in said channel and fastened to said membrane to stiffen the same, and means to bias said disc inwardly of said

channel whereby said disc is pivotally actuated in response to changes in the static pressure at the inlet end of said channel, said device including also throttling means comprising an arcuate transverse partition mounted across said channel downstream of said pressure sensitive means, means defining apertures in said partition determining the flow area therethrough, an arcuate imperforate damper plate connected to said disc for pivotal movement therewith across said arcuate partition, the open limit position of said damper plate corresponding to the innermost position of said disc exposing apertures

to afford maximum flow through said apertured partition, and the closed limit position of said damper plate corresponding to the outermost position of said disc, covering said apertures to afford minimum flow through said apertured partition.

References Cited in the file of this patent

UNITED STATES PATENTS

2,250,614 Willer ---------- July 29, 1941