



# UNITED STATES PATENT OFFICE

2,066,544

## VARIABLE THROAT FOR FLUID PASSAGES

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Application February 12, 1935, Serial No. 6,227

6 Claims. (Cl. 261—62)

This invention has for an object the provision of a variable throat device adapted to be inserted in tubes, or passages through which fluids are adapted to pass and by means of which the effective area of the passage is varied by expanding and contracting the throat. The device is particularly, though not necessarily, applicable to Venturi tubes forming parts for carburetors and used in connection with automotive engines wherein liquid fuel is mixed with air and vaporized and it is desirable to provide means in the Venturi tube for varying the area thereof according to fuel requirements.

Preferably, my invention contemplates the provision of an annular throat formed of compressible and resilient material, such for instance as synthetic rubber, or the like, adapted to be inserted and held in a tube and normally elongated so as to provide a passage therethrough of maximum area and contracted at will by suitable means for reducing the area of the passage therein. To accomplish such a result I prefer to so mount the throat in a tube that one end thereof is held against movement while the other end is movable in the direction of the fixed end, thereby contracting the intermediate wall thereof so as to restrict the passage to a desired extent.

An object, also, is to provide a device of the character mentioned having substantially thick and reinforced ends and a relatively thinner intermediate wall which may, though not necessarily, be provided with a plurality of embedded and longitudinally disposed fine tensioned wires for maintaining the annular form of the throat when the same is contracted. Other objects may appear as the description of my invention progresses.

In the accompanying drawing I have shown a preferred form of device subject to modification, within the scope of the appended claims without departing from the spirit of my invention. In said drawing:

Fig. 1 is an elevation showing the throat applied to a Venturi tube of a carburetor, partially in section and expanded;

Fig. 2 is a sectional elevation of the same on line 2—2 of Fig. 1;

Fig. 3 is a sectional elevation of the same, similar to Fig. 2, showing the throat contracted;

Fig. 4 is a sectional plan of the same on line 4—4 of Fig. 1;

Fig. 5 is a sectional plan of the same on line 5—5 of Fig. 3;

I have elected to apply my improved throat to

the Venturi tube T of a carburetor C, for varying the effective area of the passage 1 in said tube, but it will be understood that the same or a modified form of device may be used for other purposes. Usually a Venturi tube T is associated with a float chamber 2 from which liquid fuel is admitted to the Venturi tube through a passage 3 in a jet 4 and a throttle valve V is mounted at the top of said tube for regulating the volume of air admitted thereto through the air inlet 5 at the bottom of the tube.

In order to adapt tube T to the use of my improved throat I provide the usual neck 6 with a flange 7 adapted to be secured to the intake manifold of an internal combustion motor and an enlarged chamber 8 below chamber 1 and terminating with a horizontal shoulder 9 at the junction of chambers 1 and 6. Thus, a seat is provided below the valve V for the reception of my throat A and the throat is confined between the shoulder 9 and a loose ring 10 mounted in the lower portion of the tube.

Throat A has thickened upper and lower portions 11 and 12, respectively, and an intermediate web portion 13 which is substantially thinner than the end portions 11 and 12 so as to permit the flexing of the intermediate wall inwardly of passage 1 from the normally expanded position shown in Fig. 1 to the contracted position shown in Fig. 3. Preferably the ends 11 and 12 have metal rings 14 and 15, respectively, embedded therein for reinforcing the end portions of the throat and preventing the distortion thereof when the intermediate portion 13 is contracted. Said intermediate portion 13 has a plurality of tensioned wires 16 uniformly spaced apart and longitudinally disposed therein with their ends abutting the rings 14, and 15, for the purpose of uniformly contracting the intermediate portion when the ends of the throat are moved together or one of said ends is moved in the direction of the other end.

The ring 10 is vertically movable within the chamber 8 and forms a seat for the lower end of throat A, as shown in Figs. 1 and 2, whereby the throat is confined between said ring and the shoulder 9. Ring 10 has a pair of trunnions 17, 17 extended through vertical slots 18, 18, in opposite sides of tube T and the ends of said trunnions are pivotally connected to links 19, 19, which are, in turn, connected at points 19', 19', to the ends pivotally held on tube T at points 21, 21.

Valve V is as usual mounted on a transverse shaft 22 and may be provided with an operating

lever 23 externally of the neck 6, and a cam extension 24 may be provided on the lower portion of said lever for engagement with an arm 25 extended outwardly from yoke 20 for the purpose of regulating the movement of said yoke and the throat A to correspond to the opening and closing of valve V. Arm 25 may be held in yieldable engagement with cam 24 by means of a tension spring 26, as shown, or otherwise, so as to insure the restoration of the throat to normal position. As indicated in Fig. 3 the throat A is adapted to be completely contracted when the valve V is completely closed and completely expanded when said valve is completely open.

In operation, as valve V is gradually closed the ring 10 is correspondingly elevated in the chamber 8 and contracts the throat A by moving the lower end thereof upwardly in the direction of the upper end, thereby restricting the passage 1 corresponding to the opening of the throttle valve. Conversely, as valve V is opened the throat gradually expands until it attains the normal position shown in Fig. 1, thereby providing a maximum area of passage 1 and a maximum volume of air into the tube T. The throat A may be operated independently of valve V if desired.

The tensioned wires 16 may be longitudinally or diagonally disposed and of any suitable number and arrangement which will permit the uniform and ready contraction of the throat at a point intermediate its ends, prevent buckling of the intermediate portion of the throat and insure a restoration of the throat to a normal form at the completion of each operation. It should be noted that the bodily movement of one end of the throat towards the other end causes the relatively thin annular wall intermediate said ends to flex bodily inward and thereby the throat is bodily circumferentially contracted to restrict the passage therethrough.

What I claim, is:

1. A device of the character described comprising: a tube having a fluid inlet at one extremity and an outlet at its other extremity, an integral annular resilient and compressible throat mounted therein coaxially with the interior of said tube, and adjustable means associated with and for compressing said annular member longitudinally whereby the annular wall thereof will be circumferentially contracted for restricting the effective area of said tube, said throat having annular metallic reinforcing members imbedded in the thickened extremities thereof for preventing the distortion of said extremities.

2. A device of the character described comprising: a tube, an integral annular throat therein having a continuous wall and formed of compressible and resilient material and normally elongated so as to provide an opening therethrough of maximum area, and means associated therewith for compressing said throat longitudinally whereby the wall thereof intermediate the extremities may be contracted for reducing the effective area of said tube, and metallic stiffening means at the ends of said throat for preventing

the distortion of said ends when said intermediate wall is contracted.

3. A device of the character described comprising: a venturi having an air inlet and an outlet, means for injecting a liquid fuel into said venturi, and a longitudinally and circumferentially contractible rubber throat within said tube and formed of resilient material, said throat being normally elongated for providing a passage of maximum area and adapted when contracted to provide a passage therethrough of reduced area, said throat having end portions of greater thickness and stiffness than the intermediate wall thereof, for preventing the distortion of said end portions when said intermediate wall is contracted and expanded, means for holding one end of said throat against movement and means for moving the other end thereof in the direction of said first mentioned end for contracting the wall of the throat.

4. A device of the character described comprising: a venturi having an air inlet and an outlet, means for injecting a liquid fuel into said venturi, and a longitudinally and circumferentially contractible integral throat within said tube and formed of resilient material, said throat being normally elongated for providing a passage of maximum area and adapted when contracted to provide a passage therethrough of reduced area, said venturi having means therein and engaged by one end of said throat for preventing the longitudinal movement of said throat bodily, and means engaging the other end of said throat and adapted when moved in said venturi to move the end of the throat adjacent said last mentioned means in the direction of the immovable end thereof, whereby the intermediate wall of said throat is necessarily compressed and contracted.

5. In variable throats for fluid passages, a tube, an integral elongated annular throat therein formed of compressible and resilient material and having the annular wall thereof between its ends formed relatively thin and adapted to flex bodily inward incident to compression of said throat longitudinally by a bodily movement of one end of the throat towards the other end thereof and compressing means associated with said throat for moving one end thereof towards the other end, said throat returning to normal position by the inherent resilient action thereof.

6. In variable throats for fluid passages, a tube, an integral elongated annular throat therein formed of compressible and resilient material and having the annular wall thereof between its ends formed relatively thin and adapted to flex bodily inward incident to compression of said throat longitudinally by a bodily movement of one end of the throat towards the other end thereof and compressing means associated with said throat for moving one end thereof towards the other end, said throat returning to normal position by the inherent resilient action thereof, and tensioned wires reinforcing said throat.

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