June 15, 1948. F. G. ROHM 2,443,326

CARBURETOR AIR-BOX

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FIG. 1

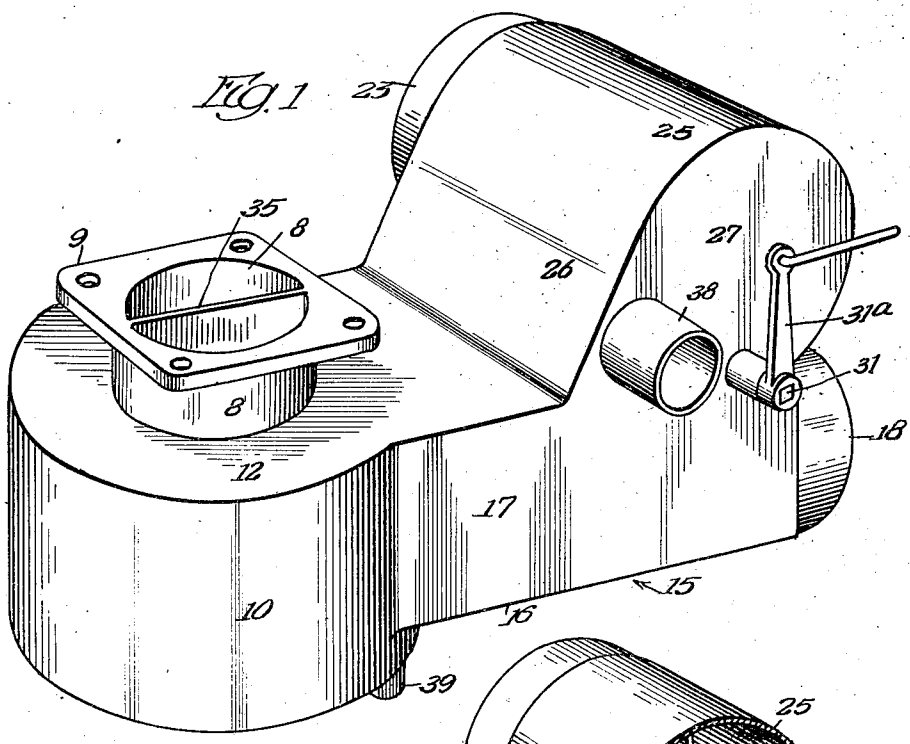
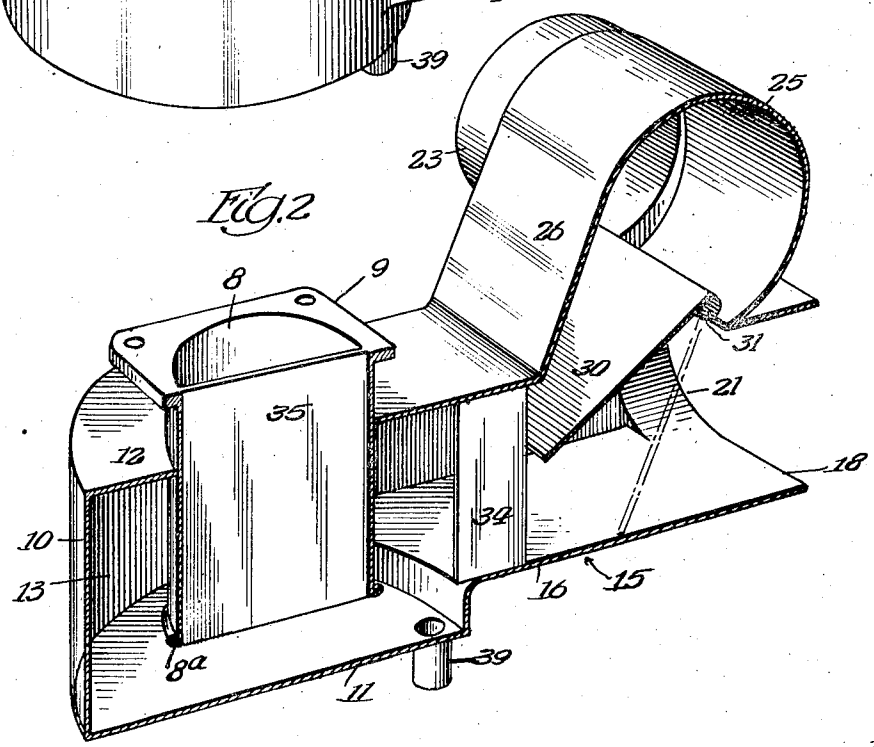


FIG. 2



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Fig. 3

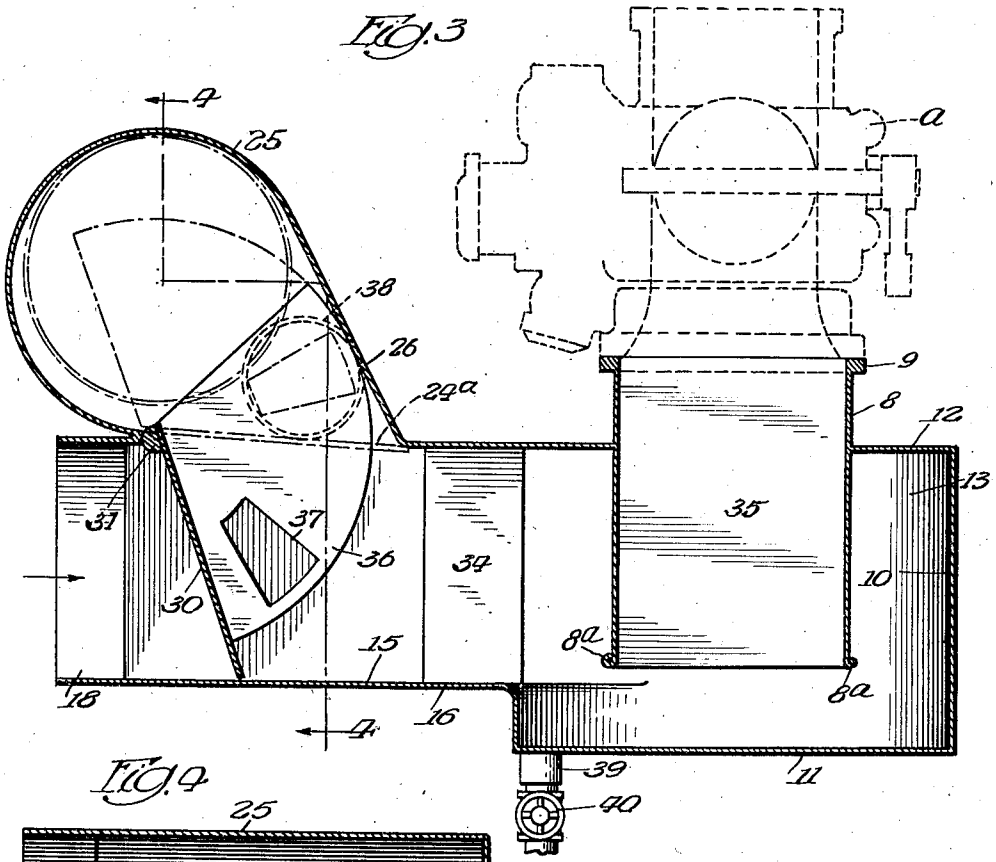


Fig. 4

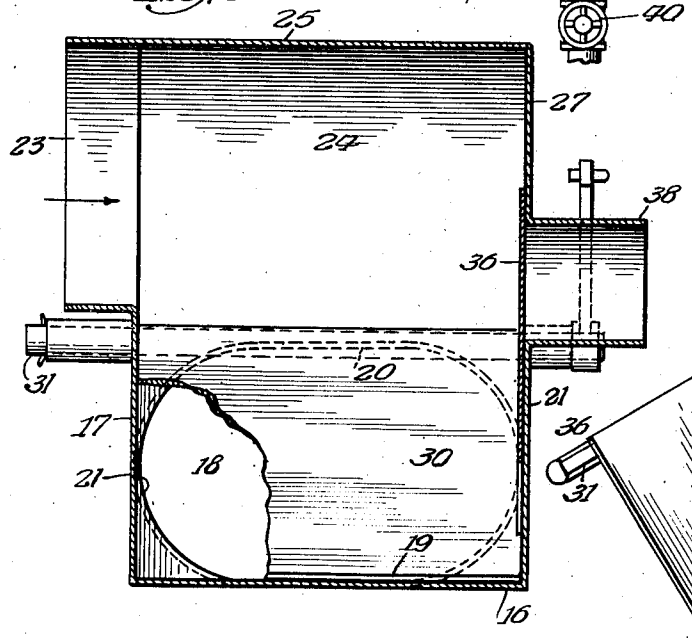
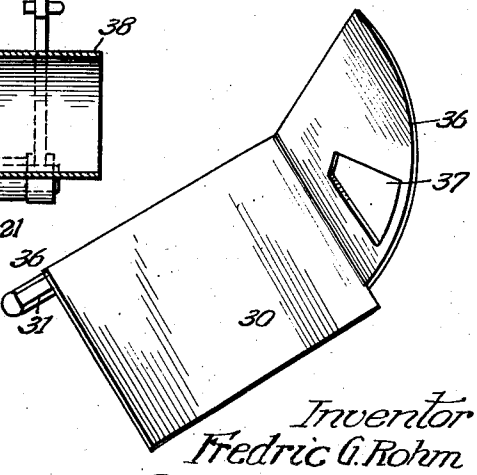


Fig. 5



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CARBURETOR AIR BOX

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Application October 5, 1944, Serial No. 557,291

1 Claim. (Cl. 261—14)

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The invention relates to carburetor air-boxes.

In the use of air-boxes for delivering hot and cold air to carburetors used on an internal combustion engine it has been found that retardance to the air by the box and a good mixture of hot and cold air influence the horse-power output of the engine.

One object of the invention is to provide an improved carburetor air-box, which selectively delivers hot or cold air or a mixture thereof to the carburetor, for achieving the maximum horsepower by the engine.

Another object of the invention is to provide an air-box for delivering hot or cold air or a mixture thereof to the carburetor in which the hot and cold air are caused to travel in the same direction, to produce a uni-directional air-flow for minimum retardance and turbulence.

Another object of the invention is to provide an air-box for delivering hot or cold air or a mixture thereof to a carburetor which is simple in construction and efficient in operation.

Other objects of the invention will appear from the detailed description.

The invention consists in the several novel features hereinafter set forth and more particularly defined by claim at the conclusion hereof.

In the drawings:

Fig. 1 is a perspective of an air-box embodying the invention.

Fig. 2 is a sectional perspective.

Fig. 3 is a longitudinal section.

Fig. 4 is a section taken on line 4—4 of Fig. 3.

Fig. 5 is a perspective of the gate valve for controlling the delivery of hot air or cold air to the carburetor.

The invention is exemplified in an air-box which comprises a cylindrical tube 8 which is provided at its outer or upper end with a flange 9 by which the air-box may be connected to the air intake of a carburetor *a* indicated by dotted lines in Fig. 3. The lower or inner end of tube 8 is open and is surrounded by an annular chamber 13 which is formed in a casing which comprises a cylindrical wall 10 concentric with and spaced annularly from the tube 8, a bottom wall 11 spaced from the inner end of the tube 8 for the flow of air from the casing into the lower end of the tube 8 for the flow of air from chamber 13 into the inner or lower end of the tube 8, and a top wall 12 which is joined to the tube 8 in spaced relation from its upper end. The casing is also provided with an inlet leg or trunk 15 which is substantially rectangular in cross-section and formed of sides 17 joined to the cylindrical wall

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10, the bottom wall 16 and a top formed by an extension of the top wall 12 of the chamber 13. The outer end of the inlet-leg 15 is provided with an inlet 18 for the entry of cold air into the casing. This inlet has straight top and bottom members 19 and 20 joined by cylindrical side portions 21. The cold air may flow longitudinally through the leg 15 to the chamber 13. A chamber 24 for hot air extends transversely across the inlet leg adjacent cold air inlet 18 and is formed by a partially cylindrical transverse wall 25 and an inclined wall 26 between wall 25 and the top wall of the inlet leg. A tubular inlet 23 for hot air is connected to one end of chamber 24. An opening 24^a is formed in the top of the inlet leg for the flow of hot air into said leg. The opposite end of chamber 24 is provided with an end wall 27. The inclined wall 26 between cylindrical portion 25 and the top wall of the inlet leg form a duct which slopes downwardly and laterally toward the chamber 13, and between the chamber 24 and the top of the inlet leg. The inlet 23 is connected to a suitable source of hot air, such for example as a heating jacket around the exhaust pipe of the engine. Hot air entering the inlet 23 passes into the chamber 24 which extends transversely across the casing, and may flow downwardly and angularly into the inlet leg of the casing.

A valve or gate 30 is fixed to a shaft or rod 31 which extends across the top of the casing and is journaled therein. An arm 31^a is fixed to rod 31 for selectively setting the gate 30 in positions for controlling the supply of hot, cold or mixed hot and cold air to the carburetor. The gate 30 extends transversely across the inlet leg between the opening 24^a and the cold air inlet 18 and is adapted to swing from an inclined position as illustrated in full lines in Fig. 3, to completely cut off the entry of cold air into the inlet leg 15, to approximately horizontal position indicated by dotted lines in Fig. 3 to completely cut off the entry of hot air into the inlet leg 15, or to any intermediate position for controlling the flow of a mixture of hot and cold air in any desired proportions to the portion of the inlet leg leading to chamber 13. The controlled air, whether hot, cold or mixed hot and cold air, to the inlet leg flows longitudinally through the inlet leg to the chamber 13. A straight vane or baffle 34 is centrally disposed in the inlet leg 15 between the gate 30 and the annular chamber 13. This vane functions to directionally control the air to flow in a substantially straight path through leg 15 toward chamber 13, prevents any

initial swirling of the air in the inlet leg so that the air, whether from the hot air chamber 14 or the cold air inlet 18, or both, will flow in a substantially straight path through the inlet leg into the annular chamber 13 without substantial retardance. From vane 34 the air flows around the annular chamber 13 downwardly to the space between the inner end of the tube 8 and the bottom 11 of chamber 13. A vane 35 extends diametrically across tube 8 and from the bottom to the top thereof and functions to direct the air from chamber 13 longitudinally through tube 8 in a substantially straight path into the carburetor. The internal diameter of the tube 8 conforms to the extreme outer edge of the usual carburetor inlet flare. The lower end of tube 8 is formed with a bead 8a which forms a round edge around which the air will flow when entering the lower end of the tube 8. The air from the lower portion of chamber 13 enters the inner end of tube 8 and is directed by the vane 35 longitudinally of the tube in a substantially straight path without substantial retardance to the air. This prevents turbulence or swirl of the air in transit through the tube and to the carburetor which results in retardance of the air.

In practice it has been found advantageous to bleed some of the hot air from the chamber 24 when gate 30 is set to cut off the flow of hot air to the inlet leg and to permit only cold air to flow to the carburetor. For this purpose gate 30 is provided with a sector shaped ring 36 which is provided with a slot 37 for communicating with a tubular hot air outlet 38 in the end wall 27 of the hot air chamber 24. When gate 30 is set to completely or nearly cut off the flow of hot air from chamber 24 into the inlet leg, slot 37 will wholly or partially register with the outlet 38 and bleed some of the hot air from the chamber 24 thereby preventing overheating of the exhaust system. This bleeding of the hot air from the chamber 24 reduces the pressure therein so that it will not be forced into the inlet leg of the casing and prevents undesirable pressure of hot air in the chamber 24 when the gate is set to admit a small proportion of hot air into the inlet leg. A drain 39 is connected to the bottom 11 of the chamber 13 for the condensate which may accumulate in said chamber and is usually provided with a valve 40 for controlling the discharge of the condensate.

The operation will be as follows: When it is desired to deliver only hot air to the carburetor, the gate 30 will be set to cut off the entry of cold air from inlet 18 to the inlet leg, as shown by full lines in Fig. 3, and hot air will flow from inlet 23 into chamber 24 and from chamber 24 downwardly and angularly into and toward the inner end of the inlet leg where the vane 34 will direct the air in a substantially straight path to the annular chamber 13. From chamber 13 the air will flow around the lower beaded edge 8a of the tube 8 and will be directed through the tube in a substantially straight direction to the inlet of the carburetor, the vane 35 causing this directional flow so that there will be no swirling turbulence in the air stream flowing to the carburetor and no substantial retardance to the air. If the gate 30 is set into the position indicated by dotted lines in Fig. 3 to supply only cold air to the carburetor, hot air will be bled from chamber 24 through slot 37 and outlet duct 38 while cold air from inlet 18 will flow straight through the inlet leg into chamber 13 and then into tube 8 from which it flows to the carburetor. Vanes 34 and 35 in all positions of gate 30 will function as before described to cause the desired directional flow of the air through the inlet leg and the tube 8. When it is desired to deliver mixed hot and cold or tempered air to the carburetor, the gate 30 will be set into an intermediate position depending upon the proportion of hot and cold air desired. Cold air from inlet 18 will then flow into the inlet leg under gate 30 and hot air will be directed into the leg between inclined wall 26 and the gate 30 so that both the hot and cold air will be unidirectional in leg 15. Vane 30 will prevent initiation of a swirl in the leg 15 and cause the mixed air to flow through the inlet leg in a straightened path into the annular chamber 13 from which the mixed air will flow in a directly upward path, being thus directioned by the vane 35 to prevent swirling of the air passing to the inlet of the carburetor.

In practice, it has been found that the pressure drop of air to the carburetor is minimized by the directional control of, with the minimum of retardance to, the flow of the air; that a good mixture of hot and cold air is attained when desired; that the flow of air to the carburetor is uniform; and that the power loss resulting from the use of the air-box is minimized.

In practice it has also been found that the construction and relative proportions of the parts are of importance in achieving the objects of the invention. It has been found that the height of the tube 8 should be at least equal the height of the inlet leg 15, preferably greater in height, and that the vane 34 should be of sufficient length to prevent an initiation of swirling of the air to the inlet leg. For example, in a box with an inlet leg a ¾" in height and 4½" in width; a hot air chamber 24, 3½" in diameter; an annular chamber 13, 5" in diameter and 3½" in height; and a tube 8, 2⅝" in diameter; the vane 34 should be at least 1" in width and the vane 35 should be at least 3½" in height. With these proportions it has been found that the pressure drop caused by the box of the air flow to the carburetor will be reduced to the minimum, the flow to the carburetor will be undisturbed, and the resultant power loss will be reduced to a minimum.

The invention exemplifies a carburetor air-box which is efficient in its operation and provides for good mixture of hot and cold air substantially unretarded flow to the carburetor and a low power loss, and has been found by test to materially improve the fuel distribution to the individual cylinder of the engine.

The invention is not to be understood as restricted to the details set forth, since these may be modified within the scope of the appended claim without departing from the spirit and scope of the invention.

Having thus described the invention, what I claim as new and desire to secure by Letters Patent is:

An air-box forming a separate unit from a carburetor and attachable to the outside of the carburetor casing around the outer end of the inlet passage of the carburetor comprising: a substantially straight cylindrical tube having an outer end for connection to the inlet leg of the air intake on the outside of the carburetor and its inner end open; a casing including a substantially cylindrical wall spaced from and forming a cylindrical portion chamber around the tube, an end wall joined to the tube adjacent its outer end and an opposite end wall spaced from the open

inner end of the tube, a substantially straight inlet leg extending substantially at right angles having one of its ends communicatively connected to the cylindrical chamber portion and a cold air inlet at its opposite end; a single substantially straight vane in and extending across the inlet leg adjacent the side of the casing substantially parallel with the axis in the tube; the casing including a wall forming an approximately cylindrical hot air chamber extending transversely across the inlet leg adjacent the outer end of the tube and communicatively connected with the inlet leg and provided with a hot air inlet connected to one end and a bleed opening at the opposite end of the hot air chamber; and a gate extending across and pivoted to swing from a position approximately parallel to one wall of the leg and across the inlet leg for controlling the flow of hot air from the hot air chamber to the inlet leg and cold air through the inlet leg to the cylindrical chamber around the

casing, the gate being provided with a wing for controlling the flow through the bleed opening.

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