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HOT AIR SUPPLY TO INTAKE MANIFOLDS

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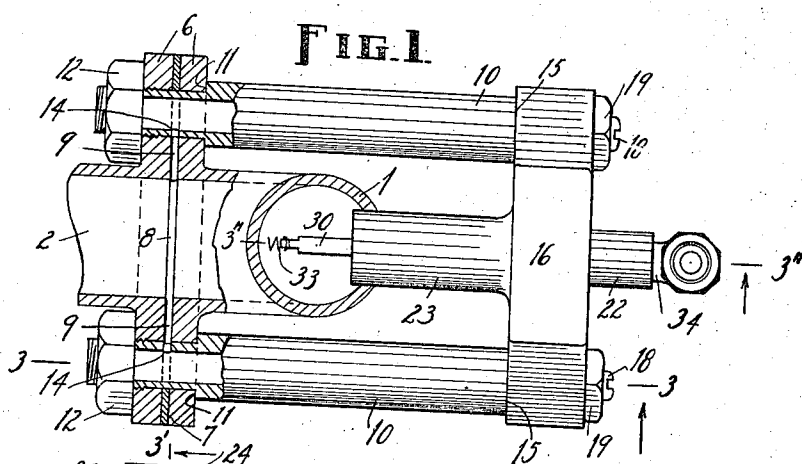


FIG. 2.

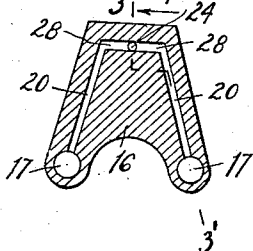
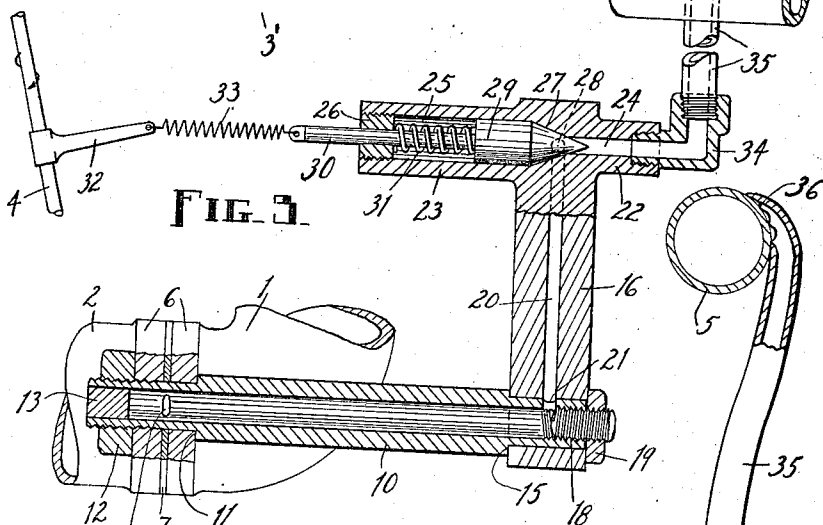


FIG. 4.

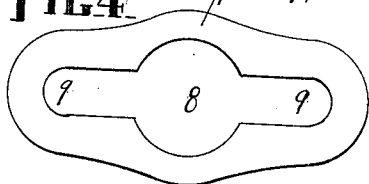


FIG. 5.

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HOT-AIR SUPPLY TO INTAKE MANIFOLDS.

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To all whom it may concern:

Be it known that I, FREDERICK W. SCHRAMM, a citizen of the United States of America, and a resident of Springfield, in the county of Hampden and State of Massachusetts, have invented a new and useful Hot-Air Supply to Intake Manifolds, of which the following is a specification.

My invention relates to improvements in attachments for the intake or inlet manifolds of internal-combustion engines, and consists generally of a particular form of gasket for the coupling between the carburetor and the inlet manifold of the engine, tubular members which replace the bolts usually provided for such coupling, and opening through said gasket into the manifold passage, a certain peculiar distributor mounted on said tubular members and opening into the same, a valve for said distributor, means to operate said valve from and with the member by means of which the needle-valve of said carburetor is manipulated by the operator at a point behind the dashboard of the machine, and a tubular connection between said distributor and the outside of the exhaust pipe of said engine, together with such other parts and members as may be necessary or desirable in order to render the attachment complete in every respect, all as hereinafter set forth.

It is well known that the exhaust pipe of an internal-combustion engine becomes very hot and radiates a large amount of heat, and the primary object of my invention is to provide such engine with comparatively simple and inexpensive means for heating with such hot air the combustible mixture discharged from the carburetor into the inlet manifold, such hot air being introduced directly into such mixture, whereby the quality of said mixture is improved, the speed and power of the engine increased, and a saving in fuel effected.

Another object is to produce an attachment of this character which can be readily attached to the coupling between the carburetor and inlet manifold of the engine, and arranged in effective relation to the exhaust pipe of said engine.

A further object is to control the passage through the device of the hot air from the exterior of the exhaust pipe, through the me-

dium of the same rod that is provided for controlling or operating the needle-valve of the carburetor.

Other objects and advantages will appear in the course of the following description.

I attain the objects and secure the advantages of my invention by the means illustrated in the accompanying drawings, in which—

Figure 1 is a top plan and partial section of a hot-air supply for inlet manifolds, which embodies a practical form of my invention; Fig. 2, a reduced, central, longitudinal section through the distributor; Fig. 3, a vertical section taken on lines 3—3 in Fig. 1, following the general directions indicated by lines 3'—3' in Fig. 2, and on lines 3''—3'' in Fig. 1, looking in the direction of the associated arrows; Fig. 4, a plan of the special gasket used in the attachment, and, Fig. 5, a detail illustrating the manner in which connection or contact is made with the exhaust pipe.

Similar reference characters designate similar parts throughout the several views.

In the first two views a fragmentary portion, in section and elevation respectively, of an inlet manifold is represented at 1; the adjacent terminal portion, also in section and elevation respectively, of a carburetor at 2; and part of a rotatable rod at 4 for the adjustment of the needle-valve (not shown) of said carburetor. A fragment of an exhaust pipe appears at 5 in Fig. 3, and the same is shown in cross section in Fig. 5. These parts and members are old and well known. The carburetor 2 and the manifold 1 are provided at adjacent ends with coupling flanges 6 as usual, which flanges extend outwardly from opposite sides of said carburetor and manifold, and are perforated to receive bolts by means of which such flanges are secured together with a gasket between. A gasket is here represented at 7, but the same differs from the gasket commonly used, as explained below.

The gasket 7, Fig. 4, has a large central opening 8 therethrough with oppositely-disposed extensions or slots 9—9, such slots communicating at their inner ends with said opening, and projecting outwardly into the longitudinal or horizontal parts or arms of said gasket. The opening 8 is of the same

diameter as that of the adjacent terminals of the passages in the carburetor 2 and the manifold 1, and said passages communicate with each other through said opening. The width of each slot 9 in the gasket 7 corresponds with the diameter of the companion bolt openings through the flanges 6 on either side of the central, vertical plane of the carburetor and manifold, with which openings the outer end of said slot registers when said gasket is properly arranged between said flanges.

The flanges 6 are secured together and the gasket 7 tightly compressed between them and the adjacent ends of the carburetor 6 and manifold 1, by means of a pair of horizontal, tubular members or tubes 10. The tubes 10 have, adjacent to their inner or rear terminals, shoulders 11—11 which abut the front face of the flange 6 on the manifold 1, and the terminal portions of said tubes back of said shoulders pass through the bolt openings in both flanges 6 and through the gasket slots 9, and project beyond the back side of the carburetor flange to receive nuts 12—12, such terminal portions being externally screw-threaded for that purpose. The nuts 12 are screwed up tightly on the protruding, rear terminals of the tubes 10, against the back side of the carburetor flange 6. Thus the flanges 6 are securely held together with the gasket 7 between by the shoulders 11 and the nuts 12, and the tubes 10 are firmly supported and held in place. The rear end of each tube 10 is closed by a plug 13. Orifices 14—14 are located in adjacent sides of the tubes 10 in position to register with the gasket slots 9, so that passageways are formed, from the passages in said tubes to the passage in the manifold 1, through the orifices 14 and slots 9 and the opening 8, as clearly shown in Fig. 1.

Each tube 10 is further provided with a shoulder 15 which is located adjacent to the forward end thereof. Mounted on the forward terminal portions of the tubes 10 is a member which I term a distributor 16, such distributor having transverse openings 17—17 in the base portions thereof to receive said terminal portions of said tubes. The interior of the passage in each tube 10 is screw-threaded adjacent to the forward end of such passage to receive an adjusting screw 18. The screws 18 are provided with nuts 19 by means of which said screws are locked after adjustment, and the distributor 16 is held securely in place on the tubes 10, since said nuts 19 bear against the front side of said distributor and force the latter against the shoulders 15. There are two oblique passages 20 in the distributor 16 which passages connect at their bottom ends with the openings 17 below, and there is an orifice 21 in the top of each tube 10 so located that one of said passages connects at the bottom with

said orifice, thus establishing communication between said passage and the interior of said tube.

The distributor 16 is provided just below the top in the transverse center with a front projection 22 and a rear projection 23. There is a horizontal passage 24 which extends from the longitudinal, central plane of the distributor 16 forwardly through the projection 22, and a horizontal passage 25 of larger diameter in the projection 23, said passages being in line with each other. The rear end of the passage 25 is closed by a plug 26, and a valve-seat 27 is formed at the forward terminal of said passage where the same joins the passage 24. Two oppositely-disposed, longitudinally-extending passages 28 connect the passages 20 at the top with the inner or rear end of the passage 24.

A valve 29 is located in the passage 25 and adapted to close the valve-seat 27. The valve 29 has a stem 30 which extends rearwardly from said valve through the plug 26 and beyond the same. A spiral spring 31 encircles the valve-stem 30 between the plug 26 and the valve 29, and normally retains said valve on the valve-seat 27.

The adjusting rod 4 is provided with an arm 32, and a spiral spring 33 has one end connected with said arm and the other end connected with the valve-stem 30. The spring 33 when contracted is weaker than the spring 31, but the relative strengths of said springs are such that, when said first-named spring is expanded, the resistance of said second-named spring is overcome, and the valve-stem 30 is actuated rearwardly, thus moving the valve 29 off of the valve-seat 27. The construction and arrangement of parts are such that these actions take place when the rod 4, with the arm 32, is partially rotated in the direction of the encircling arrow. When the rod 4 with its arm is then actuated in the opposite direction, the force of the spring 33 is decreased to an extent which enables the spring 31 to move the valve 29 into closed position. The extent to which the valve 29 is opened or closed depends, of course, on the amount of movement imparted to the arm 32 by the rod 4. The greater the amount of rotation imparted to the rod 4, in the direction 10 to close the needle-valve and which is that of the encircling arrow, the wider the valve 29 is opened and the larger the exit from the passage 24 to the passages 28; and the greater the amount of rotation of said rod, in the opposite direction, the more nearly said valve 29 is closed and the smaller said exit becomes, until said last-named valve is completely closed and communication entirely cut off between said passages.

Tapped into the front end of the extension 24 is an elbow 34 arranged with one

terminal directed upwardly, and tapped into this terminal is a pipe 35. The pipe 35 extends upwardly from the elbow 34, and has its upper terminal (36, Fig. 5) introduced between the exhaust pipe 5 and the longitudinal central plane of the engine, and preferably in contact with said exhaust pipe. As clearly shown in Fig. 5, the terminal 36 is open and shaped to conform generally to the contour of the outer surface of the exhaust pipe 5, but must not fit said pipe so snugly as to prevent the entrance of air into such terminal. If desired, the edges of the terminal 36 may be serrated, in order to enable air to enter the pipe 35 in sufficient volume. When the valve 29 is open, hot air from the exterior of the exhaust pipe 5 is sucked into the terminal 36 and passes through the pipe 35 and the elbow 34 into the passage 24 where it may be retarded to a greater or less extent, according to the position of said valve, and onward to the manifold 1, through the intervening passages and openings. The hot air is drawn in by the suction of the pistons of the engine.

The size of each orifice 21 may be increased or decreased by adjusting the associated screw 18 out or in, thus limiting or regulating the maximum volume of hot air that can escape from the passage 22 above said orifice into the passage in the tube 10 in which said orifice is located.

Although the operation of this hot-air supply device as a whole will be generally understood from the foregoing description, a brief explanation of the same is given below.

When the arm 32 is disposed by the rod 4 in the position illustrated in Fig. 3, the valve 29 is in closed position, but the needle-valve is wide open or at least in position to admit a comparatively large volume of liquid fuel into the carburetor 2. Upon partially rotating the rod 4, in the direction of the encircling arrow, to decrease the aforesaid volume of fuel, the valve 29 is opened, through the medium of the arm 32, the spring 33, and the valve-stem 30, to permit hot air from outside of the exhaust pipe 5 to be sucked in, through the pipe 35, the elbow 34, the passages 24, 28, and 20, the orifices 21, the tubes 10, the orifices 14, and the slots 9 and openings 8 in the gasket 7, to the manifold 1. The hot air enters the opening 8 laterally from approximately diametrically opposite directions, so that the necessary balance is obtained and maintained, and said air intermingles to the best advantage with the combustion mixture which is being drawn into the manifold 1 from the carburetor 2. The combustible mixture is thus heated by the hot air, with the result that a greatly improved and more highly combustible mixture is delivered to

the cylinders of the engine, and less liquid fuel is needed and consumed. Since less liquid fuel is needed, the needle-valve of the carburetor can be more nearly closed than would be the case in the absence of the hot air supplied by means of my attachment, wherefore is effected the saving in fuel, and with this are attained greater engine power and speed, due to the improved mixture finally delivered to the cylinders. As the rod 4 is manipulated from time to time to increase or decrease the flow of liquid fuel, the valve 29 is correspondingly actuated to increase or decrease the volume of the supply of hot air from the exhaust. When the rod 4 is turned on its axis to close the needle-valve as far as its permanent adjustment permits, the valve 29 is opened wide, but this is of no particular importance.

Although the attachment is designed more especially for machines of the Ford type, it may be adapted for other types of machines.

More or less change in the shape, size, construction, and arrangement of some or all of the parts of this device may be made, without departing from the spirit of my invention or exceeding the scope of what is claimed.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination, in an attachment of the class described, with the carburetor and manifold and the exhaust pipe of an engine, of a distributor communicating with the interiors of said carburetor and manifold at approximately diametrically opposite points, and a pipe in open communication at one end with said distributor, and open at the other end, said last-named open end being placed against the outside of said exhaust pipe, and the edges of the opening in said last-named end being irregular so as to leave spaces between the same and said exhaust pipe.

2. The combination, in an attachment of the class described, with a carburetor, an inlet manifold, and a coupling between said carburetor and manifold, which coupling has approximately oppositely-disposed end portions that project beyond said carburetor and manifold, of independent tubular members connected with said projecting-end portions, and opening through said coupling into said manifold, a distributor mounted on said tubular members and having therein a passage to receive hot air from the outside of an exhaust pipe, and passages communicating with said first-named passage and with said tubular members, a valve to control the escape of said air from said first-named passage, and operating means for said valve.

3. The combination, in an attachment of the class described, with a carburetor, an inlet manifold, and a coupling between said

carburetor and manifold, which coupling has approximately oppositely-disposed end portions that extend beyond said carburetor and manifold, of independent tubular members
 5 connected with said projecting-end portions, and opening through said coupling into said manifold, a distributor mounted on said tubular members and having therein a pas-
 10 sage to receive hot air from the outside of the exhaust pipe, and passages communicat-
 ing with said first-named passage and with said tubular members, a valve to control the
 escape of said air from said first-named pas-
 15 sage, means for operating said valve, and adjustable members arranged in said tubu-
 lar members to regulate the entrance of the hot air from said distributor into said tubu-
 lar members.

4. In an attachment of the class described,
 20 a distributor having therein lower trans-
 verse openings for the reception of tubular
 members, hot-air-receiving and valve-re-
 ceiving passages which are in line with each
 25 other and parallel with the axes of said
 openings, and passages which extend out-
 wardly and downwardly to connect said hot-
 air-receiving passage with said openings.

5. The combination, in an attachment of
 the class described, with a carburetor and
 30 an inlet manifold, both having perforated
 coupling flanges, and a gasket receivable be-
 tween said flanges, said gasket having there-
 in a large central opening and slots extend-
 ing outwardly from said opening, of tubular
 35 members receivable in the perforations in
 said flanges and in said slots, and opening
 laterally into the latter, and means to secure
 said tubular members in place and bind said
 flanges and gasket together.

6. The combination, in an attachment of
 the class described, with a coupling between
 a carburetor and inlet manifold, provided
 with approximately diametrically opposite
 45 passageways opening into the passage in
 said manifold, and an exhaust pipe, of tubu-
 lar members connected with said coupling
 at approximately diametrically opposite
 points and opening into said passageways,
 50 a distributor mounted on said tubular mem-
 bers and having therein passages which open
 into said members and other passages which
 open into said first-named passages, a tubu-
 lar connection leading from one of said last-
 named passages to the exterior of said ex-
 55 haust pipe, but not penetrating the same, a
 valve arranged in said distributor to open
 and close the passage into which said tubu-
 lar connection opens, an operating means for
 said valve.

7. The combination, in an attachment of
 the class described, with a coupling between
 a carburetor and inlet manifold, provided
 with approximately diametrically opposite
 65 passageways opening into the passage in
 said manifold, and an exhaust pipe, of tubu-

lar members connected with said coupling at
 approximately diametrically opposite points
 and opening into said passageways, a
 distributor mounted on said tubular mem-
 70 bers and having passages therein which open
 into said members and other passages which
 open into said first-named passages, a tubu-
 lar connection leading from one of said last-
 named passages to the exterior of said ex-
 75 haust pipe, but not penetrating the same,
 a valve arranged in said distributor to open
 and close the passage into which said tubu-
 lar connection opens, a spring arranged nor-
 mally to maintain said valve in its closed
 80 position, and means to open said valve.

8. The combination, in an attachment of
 the class described, with the coupling be-
 tween a carburetor and inlet manifold, pro-
 vided with approximately diametrically op-
 85 posite passageways opening into the passage
 in said manifold, and an exhaust pipe, of tubu-
 lar members connected with said coupling
 at approximately diametrically opposite
 points and opening into said passageways, a
 distributor mounted on said tubular mem-
 90 bers and having passages therein which open
 into said members and other passages which
 open into said first-named passages, a tubu-
 lar connection leading from one of said last-
 named passages to said exhaust pipe outside
 95 of and without penetrating the same, a valve
 arranged in said distributor to open and
 close the passage into which said tubular
 connection opens, said valve having a stem,
 a spring arranged normally to maintain said
 100 valve in its closed position, and means to
 open said valve, such means consisting of a
 rotatable rod provided with an arm, and
 a spring connecting said arm with said stem.

9. The combination, in an attachment of
 the class described, with laterally-extending
 105 perforated flanges at adjacent ends of a car-
 buretor and an intake manifold, a gasket
 centrally perforated and longitudinally slot-
 ted to register with the passages in said car-
 buretor and manifold and the perforations
 110 in said flanges, and an exhaust pipe, of tubes
 inserted in said perforations and the slots in
 said gasket, and having orifices therein to
 open into said slots, means to secure said
 115 tubes to said flanges and to bind said flanges
 and gasket together, a distributor mounted
 on said tubes and having therein passages
 which open into said tubes and other pas-
 120 sages which open into said first-named pas-
 sages, a tubular connection leading from one
 of said last-named passages to said exhaust
 pipe outside of the same, a valve arranged
 in said distributor to open and close the pas-
 125 sage into which said tubular connection
 opens, and operating means for said valve.

10. The combination, in an attachment of
 the class described, with the coupling be-
 130 tween a carburetor and inlet manifold, pro-
 vided with lateral passageways opening into

the passage in said manifold, orificed tubes connected with said coupling and opening through certain of the orifices into said passageways, a distributor mounted on said tubes, and having therein passages which open into said tubes through certain others of said orifices, and other passages which open into said first-named passages, a tubular connection leading from one of said last-named passages to the exterior of said exhaust pipe, a valve arranged in said distributor to open and close the passage into which said tubular connection opens, and operating means for said valve.

11. The combination, in an attachment of the class described, with laterally-extending perforated flanges on adjacent ends of a carburetor and an intake manifold, a centrally-perforated and longitudinally-slotted gasket between said flanges, with the perforation therein registering with the passages in said carburetor and manifold, and the slots therein registering with the perforations in said flanges, and an exhaust pipe, of tubes the rear terminal portions of which are introduced into the perforations in said flanges and pass through said slots, and have orifices therein to open into said slots, said tubes being shouldered to abut the manifold flange, and said terminal portions being externally screw-threaded, nuts on the screw-threaded parts behind the carburetor flange, a distributor mounted on the forward terminal portions of said tubes, the latter being shouldered to form abutments for said distributor behind, and internally screw-threaded at their forward ends, adjusting screws in said ends, nuts on said screws to abut the front side of said distributor, said tubes having therein orifices adjacent to said screws, and said distributor having therein passages which open into said last-named orifices, and other passages which open into said first-named passages, a tubular connection leading from one of said last-named passages to said exhaust pipe outside of the

same, a valve arranged in said distributor to open and close the passage therein into which said tubular connection opens, and operating means for said valve.

12. The combination, in an attachment of the class described, with laterally-extending perforated flanges on adjacent ends of a carburetor and an intake manifold, a centrally-perforated and longitudinally-slotted gasket between said flanges, with the perforation therein registering with the passages in said carburetor and manifold, and the slots therein registering with the perforations in said flanges, and an exhaust pipe, of tubes the rear terminal portions of which are introduced into the perforations in said flanges and pass through said slots, and orifices therein to open into said slots, said tubes being shouldered to abut the manifold flange, and said terminal portions being externally screw-threaded, nuts on the screw-threaded parts behind the carburetor flange, a distributor mounted on the forward terminal portions of said tubes, the latter being shouldered to form abutments for said distributor behind, and internally screw threaded at their forward ends, adjusting screws in said ends, nuts on said screws to abut the front side of said distributor, said tubes having therein orifices adjacent to said screws, and said distributor having therein passages which open into said last-named orifices, and other passages which open into said first-named passages, a tubular connection leading from one of said last-named passages to said exhaust pipe outside of the same, a spring-pressed valve arranged in said distributor to open and close the passage into which said tubular connection opens, said valve having a stem, a rotatable rod provided with an arm, and a spring connecting said arm with said stem.

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Witnesses:

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