

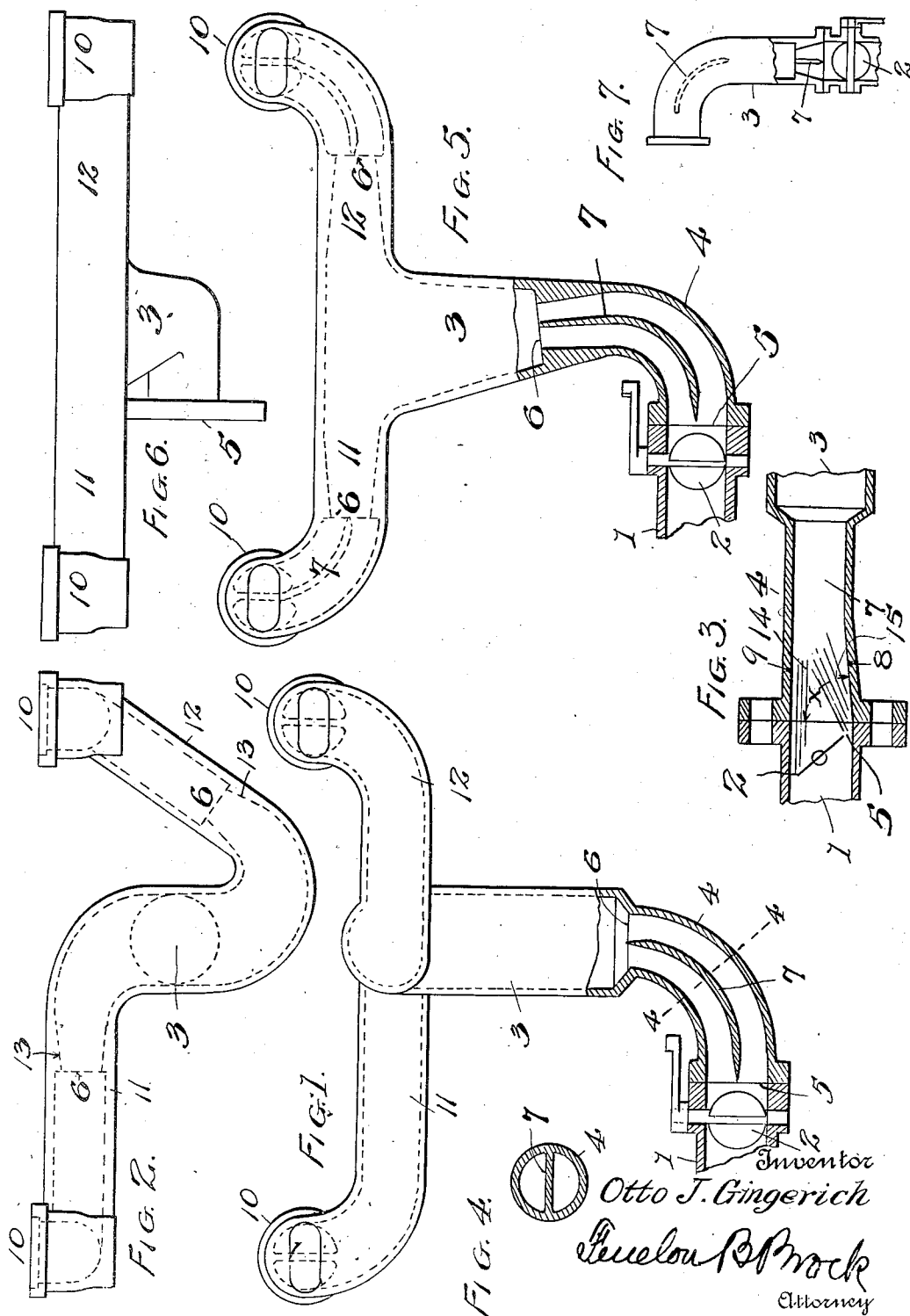
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FLUID OR MIXTURE SUPPLY FOR INTERNAL COMBUSTION ENGINES

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FLUID OR MIXTURE SUPPLY FOR INTERNAL-COMBUSTION ENGINES.

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My invention relates to the fluid or mixture supply for internal combustion engines. Its objects attain to a more equable mixture of the air and gasoline for the purpose of producing more perfect combustion, and to distribute such perfected mixture equally to each and every cylinder of the power unit.

When these objects and purposes have been attained defects in previous constructions and arrangements, such as uneven firing, missing at low speeds, and other like defects, are done away with.

Reference to the accompanying drawings, which illustrate one or more ways in which the principle of this invention may be carried out. Other means are obvious, or will readily suggest themselves.

Figure 1 represents a partial vertical section and elevation of a manifold to which my improvements have been applied.

Figure 2 is a top view of the same.

Figure 3 is a section taken along the curved line of the partition in the manifold.

Figure 4 is a horizontal section taken at line 4—4 of Fig. 1.

Figure 5 is a side elevation of a modified form of the invention, and Figure 6 is a top plan view of the same.

Figure 7 is a diagrammatic view (an end elevation partly broken away) showing the invention applied to a six-cylinder engine.

In the drawings 1 represents the pipe or port leading from the carbureter. 2 is the fluid control valve in the carbureter pipe, preferably of the butterfly type and located quite close to the port of the carbureter pipe.

3 in Figures 1 2 3 and 4 is one form of manifold connecting the pipe 1 with the fluid inlet system of the gas engine. This manifold consists of vertical tube 3 having at its lower end an elbow 4 with a horizontal inlet 5. The elbow is provided with restriction terminal 6. From inlet 5 to the restriction terminal 6 the change in cross section is gradual. Above restriction terminal 6 the tube 3 is abruptly enlarged in cross section. In this elbow is located also a partition 7 bisecting the inlet 5 horizontally and running up into tube 3 always bisecting the cavity of the elbow. A section parallel to this partition is shown in Figure 3 in conjunction with the outlet of a carbureter port 1 provided with a butterfly valve 2 shown in partly open position.

The axis of the butterfly valve is vertical

and the partition 7 is at right angles to it. Figure 3 shows also the variation in the walls of the elbow leading away from the inlet 5. Wall 8 located at the near point of the butterfly valve includes with the flanged surface of inlet 5 an angle X less than 90 degrees, while wall 9 includes at least an angle of 90 degrees.

The tube 3 terminates at its upper end into two horizontal branches, the inlets into which are at about right angles to the plane in which the elbow 4 is located. By easy curves these branches lead into the flanges 10 10 which connect with the engine cylinders. In suitable position in each branch is a restriction terminal having the same characteristics as the one located in the elbow i. e. gradual narrowing toward the narrowest part and abrupt widening after that.

Let us assume the throttle to be wide open. The mixture as it issues from the carbureter into the elbow encounters the gradually restricted passage in which its speed increases, the speed being greatest at the narrowest place 6. Due to the abrupt enlarging of the passage, the incoming mixture encounters a layer which does not travel as fast and the ensuing impact breaks the liquid constituents of the mixture at the restricted passage 6. Due to the higher speed of the incoming mixture in the tube 3 the vacuum will be increased or the pressure decreased. This action tends to evaporate the lighter liquid constituents of the mixture, thereby further increasing the combustibility of the mixture.

The centrifugal force generated as the mixture passes through the elbow in a curve causes the heavier constituents thereof to tend to fly toward the outer wall of the elbow. The partition 7 however subdivides the stream before it enters the curved path into two streams and guides them into the vertical tube 3, thereby preventing the formation of a heavy mixture on the outside curve of the elbow and of a lighter mixture on the inside of the elbow. The composition of the mixture or fluid is illustrated in Figure 4 (a section on line 4—4 Figure 1) where it is assumed that there are two layers of heavy and two layers of light mixture in order as shown. These layers as they come to the restricted terminals 6 are deflected and broken up into a homogeneous mixture in the tube 3. A further mixing must ensue in the branch pipes 11 and 12,

by reason of the restricted passages 13 so that a final mixture of exceptional combustibility reaches the cylinders. Due to the branching off at right angles neither group of cylinders is favored; both groups obtain the same amount of the blended heavy and light mixture; and the result is equal firing in all cylinders.

Again assume that the throttle is nearly closed. The mixture issues from the carbureter outlet in two streams, one marked 14 past the far end of the throttle disk (being most likely light) the other marked 15 past the near end of the throttle disk (being most likely heavy). The heavy stream impinging upon the inclined surface 8 is deflected into the center of the passage and beyond where it strikes the light stream 14 and produces a thoroughly homogeneous mixture due to the intermingling of the two streams at an angle to each other.

The partition, at high or low speeds, splits up the stream regardless as to whether it is located in a curve near the carbureter, or in a straight section of the manifold.

Subsequently the mixture is guided, refined, and distributed exactly as in the former case.

It will be noted from the preceding description that the invention has been described in connection with a gas manifold for a four cylinder engine which is interchangeable with manifolds now in use.

Figures 5 and 6 show the invention applied in a different form to a four cylinder inlet manifold.

It is obvious that my invention may be applied to two cylinder six, eight, or other multiple cylinder gas engines.

The header of the manifold, by which is meant the end connected to the carbureter has essentially a partition extending from the carbureter far enough to prevent segregation of the mixture due to centrifugal force, and located at approximately right angles to the axis of the butterfly valve, where that valve is employed. Similar partitions in other parts of the manifold may be likewise located at curved points, care being taken to position the partitions in a plane at right angles to the line of action of the centrifugal force acting upon the traveling mixture in the curves.

These features assist in the equal distribution of the mixture to all the cylinders. Essential also is one or more passages in the manifold (either in the header, elbow, vertical tube or branch pipes) of gradually diminishing cross section in the line of feed to a restriction terminal followed by an abrupt enlargement in the area of the tube. Essential also, where a butterfly valved carbureter is employed, is an interior surface inclined toward the axis in that part of the header connected to the carbureter, and opposite to

an interior surface parallel to the axis of the header. Said inclined surface restricting the passage of fluid in the direction of the flow is located at a point nearest to the adjacent near-point of the disk of the valve. The opposite wall, parallel to the header axis, is located at the nearest point to the far-point of the disk of the valve. This is clearly shown in Figure 3.

A plurality of parallel partitions in the manifold may be used if desired.

The invention is based on the laws governing the flow of a fluid, and the effect of a vacuum therein. If a fluid rushes through a passage at high speed, and that passage gradually diminishes to a restricted point beyond which there is an abrupt increase in cross section, the fluid in the enlarged passage will slow up in speed. The succeeding volume of fluid continually pressing at high speed toward the restricted point pours itself upon the slower moving, relatively expanded or attenuated fluid in the larger portion of the passage where it breaks up all symmetry of the fluid formation. This sudden decrease of pressure tends to induce a partial vacuum and cause the air to condense and the gasoline to volatilize. The two are thus brought into a more intimate mixed condition and a more combustible mixture.

Again, if a fluid such as a gas, is drawn or forced through a curved pipe, at considerable speed, the centrifugal force acting thereon tends to compel the heavier portions of the fluid against the outer bend of the curved pipe and thereby separate the lighter portions of the fluid in an inner radius therein. If a curved partition be inserted therein before the point where the action of centrifugal force takes place and continued around the curve the mixed stream of fluid may be divided and the action of centrifugal force neutralized to more or less extent.

Again the flow of a fluid through a passage in which a butterfly valve is placed causes a much larger volume of fluid to be intercepted and follow the surface of the disk, facing the stream (assuming the disk is not fully open) along said surface and discharging over the edge thereof at a point farthest from the fluid inlet. By placing a restriction or abutment in the passage as close to the valve as possible on the opening side in the line of flow, this heavier flow is deflected across the passage into the lesser or lighter stream and thoroughly mixed.

Figure 7 is a diagram of a manifold (end view) for a six cylinder engine. Here the partition 7 is straight and bisects the header inlet in the straight portion. It might also be provided with partitions 7 in the curved branches thereof. A front view is not deemed necessary.

Claims:

1. A manifold having an axially parti-

tioned gradually restricted passage immediately terminating in an abrupt enlargement.

5 2. A manifold having an axially partitioned curved passage which is gradually restricted to a contiguous abrupt enlargement.

3. A manifold having the inlet to the header provided at one side with an axial

wall and opposite thereto a wall inclined to the axial wall.

4. A manifold having the header inlet provided at one side with an axial wall and opposite thereto a wall inclined to the axial wall, and a gradually restricted and abrupt enlargement portion intermediate thereof.

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