

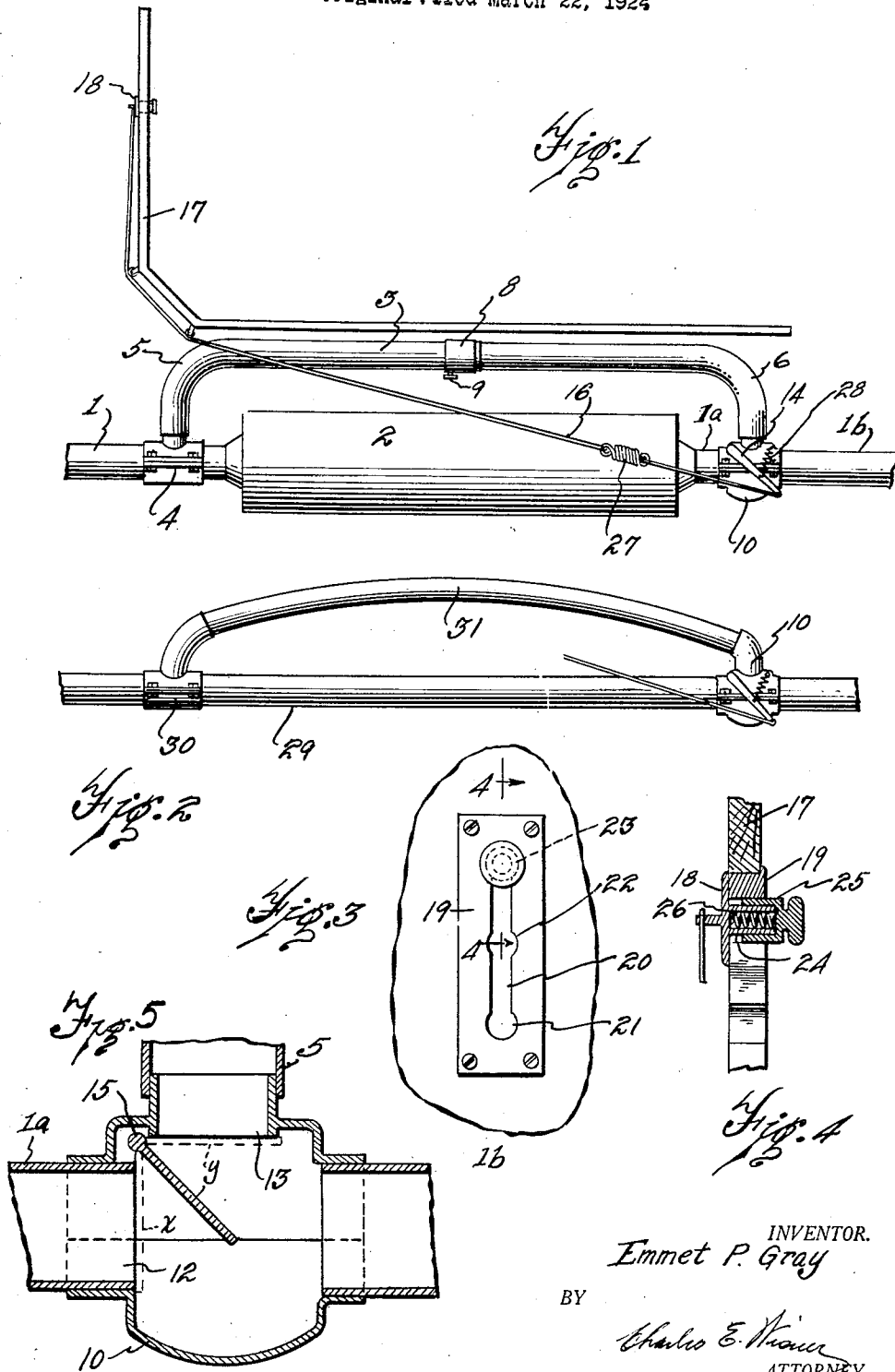
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CONDUIT CONSTRUCTION

Original Filed March 22, 1924



UNITED STATES PATENT OFFICE.

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CONDUIT CONSTRUCTION.

Original application filed March 22, 1924, Serial No. 701,239. Divided and this application filed November 6, 1924. Serial No. 748,056.

This invention relates to conduit construction and is a division of my application Serial No. 701,239, filed March 22, 1924, for exhaust conduits for internal combustion engines.

The principal object of the invention is to provide a conduit for the flow of fluids permitting bypassing of a portion or all of the fluid to one side of the main conduit or maintaining the bypass free from flow of fluid at will. There are many uses to which a conduit for flow of fluids embodying the features of construction hereinafter described may be utilized and, while the construction is particularly adaptable for use in conjunction with the exhaust conduit of an internal combustion engine, it is to be understood that the invention is not confined to such use.

A further object of the invention is to provide an exhaust conduit for an internal combustion engine and a bypass extending from the main conduit forward of the muffler to the tail pipe of the muffler or discharge end of the main conduit to the rear of the muffler and provided with a valve at the point of junction of the bypass and discharge end of the main conduit adapted to control flow through either of the conduits or adapted to be positioned to permit unrestricted flow through both the main and bypass conduits.

By the provision of the conduit as a bypass around the muffler in the exhaust line of an internal combustion engine with a valve at the point of connection of the discharge end of the bypass with the discharge end of the main conduit, back pressure is relieved and a construction is secured in which the exhaust to atmosphere is practically without noise. With a valve at the discharge end of the main conduit as above stated, which will permit an unrestricted flow through both conduits when desired, gases are caused to pass through the bypass by the suction of the exhaust passing through the main conduit as well as by the pressure at the inlet end of the bypass. Thus, practically unrestricted flow of the exhaust gases in the muffler and bypass conduit is secured which, due to its discharge into the flow from the muffler so intermingles the two streams of the gas flow as to eliminate the explosive effect thereof at the point of emission from the main conduit.

These and other objects and the several

novel features of the invention are herein-after more fully described and claimed, and the preferred form of construction of a conduit embodying my invention is shown in the accompanying drawings in which—

Fig. 1 is an elevation showing my improved conduit construction as applied to the exhaust conduit of an internal combustion engine.

Fig. 2 is an elevation of a conduit showing my invention in its simplest form.

Fig. 3 is a detail of a control means for the valve.

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

Fig. 5 is a vertical section taken through the valve mechanism.

The use of the invention as part of the exhaust conduit of an internal combustion engine is shown in Fig. 1 in which the main conduit 1 receiving the exhaust gases from the engine leads directly into the muffler 2 which may be of any improved type and which discharges to atmosphere through the continuation 1^a of the conduit. In this instance of use of the invention a bypass 3 is connected at the forward end by means of the casting 4 to the main conduit 1 which it is to be understood is apertured to permit unrestricted passage of the gas from the conduit 1 into the conduit 3. Preferably the casting 4 is formed of two parts bolted together about the main conduit.

The bypass 3 is formed of two similar parts 5 and 6 preferably formed of flexible tubing and the adjacent ends of the parts 5 and 6 may be connected together by a member 8 secured to one of the members and detachably secured to the other member by means of the thumb screw 9 as indicated in Fig. 1. The valve case 10 on the discharge pipe 1^a is shown in detail in Fig. 5 in which it will be seen that the discharge pipe is in two parts 1^a and 1^b extending into hubs provided in the casting 10, the body of which is greater in diameter than the diameter of either of the parts of the discharge conduit. In this casing 10 is pivotally supported a valve plate 11 which is so mounted that it may be moved to close the end 12 of the pipe 1^a or to close the outlet 13 in the casing leading to the part 5 of the bypass 3 as indicated by the dotted lines *x* and *y* in said Fig. 5. As shown in full lines in said figure, the valve may be set to occupy a position inter-

mediate the openings 12 and 13 in which case there is a free flow permitted through both of the conduits, the casing 10 being so formed that the full area of flow through the pipe 1^a is permitted with the valve in this intermediate position and the full area of flow also permitted through the opening 13.

The valve is operated by means of a lever 14 connected with the extending shaft like portion of the part 15 of the valve plate 11. To this lever is connected a cable 16 which extends from the lever 14 to a point forward of the dash 17 of an automobile body and is there connected to an operating member 18 shown particularly in Fig. 4. The specific form of the operator is not an essential part of the invention and is here illustrated merely to show a means for operating the valve. The operator shown consists of an apertured plate 19 set into the dash 17 and is provided with a vertical slot 20 having a series of enlargements 21, 22 and 23. The actuator is formed of a base having a hollow part 24 about the size of and adapted to slide in the slot 20. The part 24 extends forwardly toward the operator's side of the dash board. On this member 24 is an external tubular member 25 provided with a knob and connected with the member 24 by a spring 26. This member 25 has a body of practically the size of the enlargements 21, 22 and 23, and it will be readily understood that, by pulling the member 25 outwardly toward the operator and out of the slot and enlargements of the plate 19, the member 24 may then be moved upwardly or downwardly in the slot 20 and when positioned at any one of the enlargements the member 25 may be released and drawn into the enlargement by the said spring 26. By reason of the member 25 practically fitting the said enlargements the actuator member is set in position and thus holds the valve in the corresponding position in the valve case. There is also a spring 27 forming part of the cable or line 16 and there is also a spring 28 attached to the lever 14 and tending to turn the valve 11 to the position shown by dotted lines *y* in Fig. 5 closing the outlet to the bypass. It is therefore evident that the valve member 11 is spring actuated in one direction to close the bypass and requires to be manually moved in the other direction toward the end 12 of the conduit.

When applied to an exhaust of an internal combustion engine as indicated in Fig. 1 and with the valve 11 positioned as shown in Fig. 5 to allow a free flow of gases through the bypass, back pressure on the engine is materially reduced. This permits use of the bypass as a cutout discharging through the usual tail pipe of the exhaust line and without noise heretofore apparent in the use of the usual cutouts in the exhaust conduit of an internal combustion engine. This reduc-

tion of noise is due principally to the fact that back pressure is materially relieved forward of the muffler and a considerable portion of the gases passes through the bypass while a portion also passes through the line directly. The flow through the line 1, 1^a and 1^b and through the valve chamber meets the flow through the bypass at the tail end of the exhaust conduit and the merging of these two streams of flow tends to reduce the force of successive exhaust impulses particularly as the impulses do not reach the valve at the same instant.

The invention may be applied to any type of conduit through which fluids may be discharged and in which no muffler is provided. The invention therefore is practically shown in Fig. 2—namely, the main conduit and the bypass conduit having an inlet and outlet opening directly to the main conduit, the outlet line opening through the valve chamber 10 which contains a valve that is exactly similar to that shown in Figs. 1 and 5 and functions in an identical manner. The bypass may lead to any structure through which it is desired to bypass the fluid flowing through the main line and by the positioning of the valve as shown the flow through the main line 29 may be divided at the inlet end 30 of the bypass and may flow through both the main conduit and the bypass or as will be readily understood, be made to flow only through the bypass to the discharge end or entirely through the main line to the discharge end, all depending upon the utilization made of the bypass.

The fundamental features of this invention is in the provision of the valve at the discharge end of the bypass to the main line. Thus, with a valve in the position for instance as shown in Fig. 5 or in some intermediate position between the two openings 12 or 13 of the valve casing, the flow through the main line producing flow through the bypass—that is, fluid is drawn through the bypass line 3 of Fig. 1 or 31 of Fig. 2. It has heretofore been usual in the use of a bypass conduit to provide a valve at the inlet end of the bypass conduit and to cause flow in the bypass conduit by pressure in the main conduit. With my improved construction the flow through the bypass conduit is produced by the aspirating effect of flow through the main conduit and thus tends to reduce pressure in the bypass. This is important in various uses of the invention. For instance with exhaust conduits of an internal combustion engine in which the bypass is connected with a heater or other device, leakage of gas due to pressure in the bypass is materially reduced. In case the valve occupies the position *x* of Fig. 5 closing the main conduit, the flow through the bypass is unrestricted and back pressure is eliminated due to the freedom of

flow. With the valve in the intermediate position shown in Fig. 5, flow through both main and bypass conduits is unrestricted and the flow is not primarily produced in the bypass through back pressure developed in the main conduit.

From the foregoing description it is evident that the device is of simple and inexpensive character; is productive of more efficient operation of the exhaust conduit of an internal combustion engine, and is applicable to various constructions of conduits for flow of fluids particularly gaseous fluids, and that the various objects of the invention are secured by the construction described.

I claim:

1. An exhaust conduit for internal combustion engines comprising a main conduit, a bypass conduit having an inlet continuously open to the main conduit and an outlet opening to the said conduit between the said inlet point and the discharge end thereof, a valve at the said point of connection of the bypass outlet with the main conduit, a housing for the valve enlarged on one side, said valve consisting of a plate hinged on that side of the bypass outlet opening to-

ward the forward end of the main conduit and being adapted to be turned to close the bypass outlet or to various positions intermediate the bypass outlet and main conduit or turned to position to open the bypass outlet to a certain extent without restriction of flow through the main conduit.

2. An exhaust conduit for internal combustion engines comprising a main conduit, a muffler forming part of the main conduit, a bypass having an inlet freely open to the main conduit forward of the muffler and an outlet opening to the main conduit at the rear of the muffler, a housing forming part of the main conduit to which the said outlet of the bypass opens, a valve in the housing having a hinge point toward the muffler discharge and adapted to be turned to close the bypass outlet or the main conduit or to an intermediate position, said housing being larger in cross section than the main conduit permitting the valve to be moved to an intermediate position without restriction of flow through the main conduit, and means for adjusting the valve.

In testimony whereof I sign this specification.

EMMET P. GRAY.