Dec. 5, 1933. H. W. SIMPSON 1,937,990

ENGINE MUFFLER AND MANIFOLD CONSTRUCTION

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FIG. 1

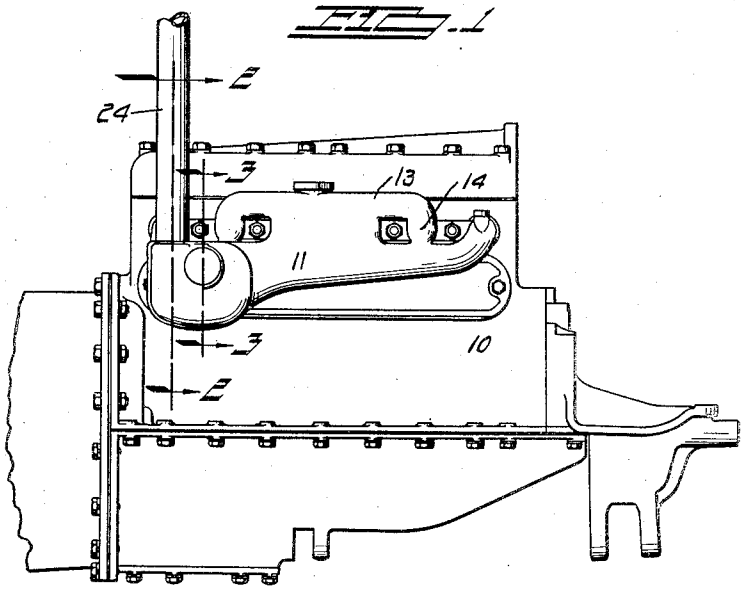


FIG. 2

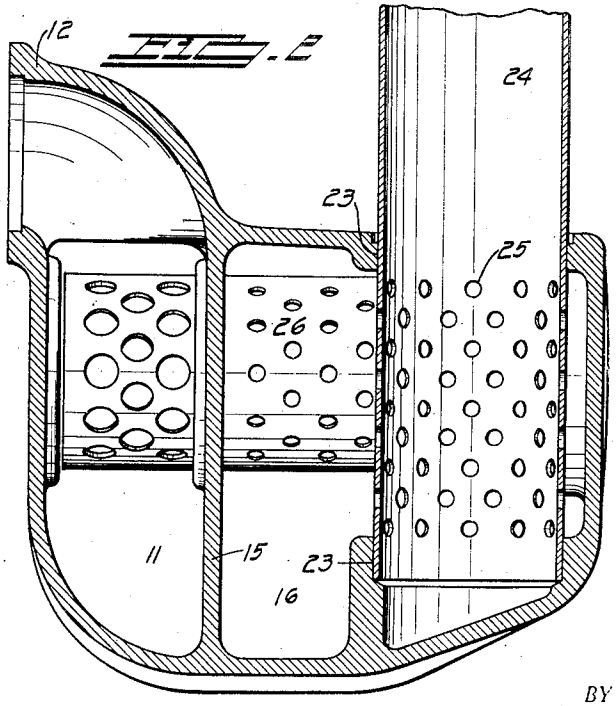
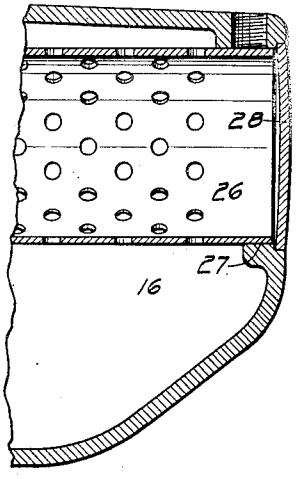


FIG. 3



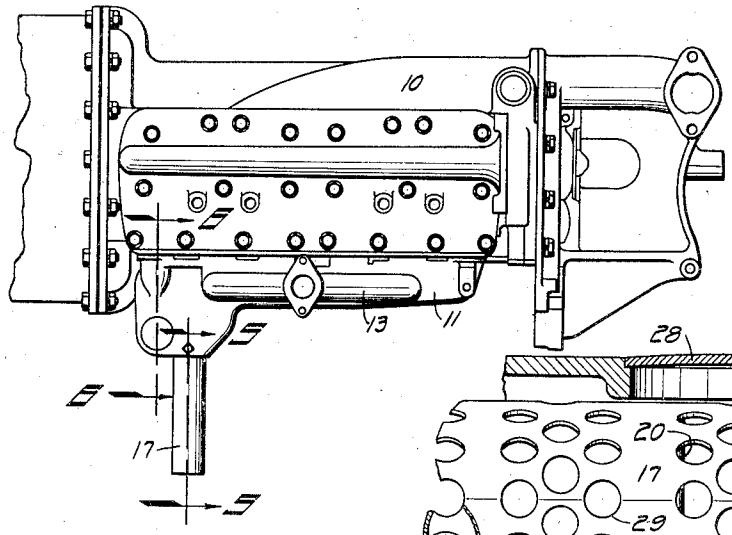
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ENGINE MUFFLER AND MANIFOLD CONSTRUCTION

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FIG. 4



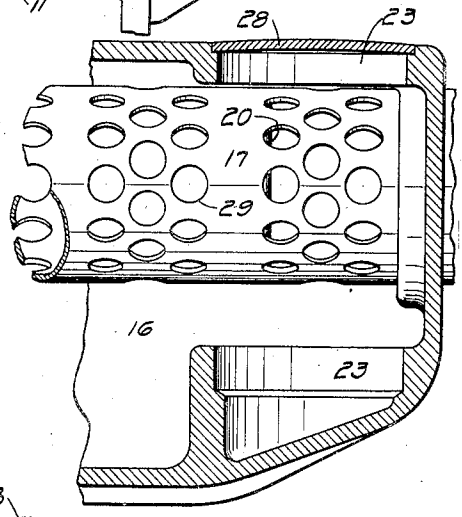


FIG. 6

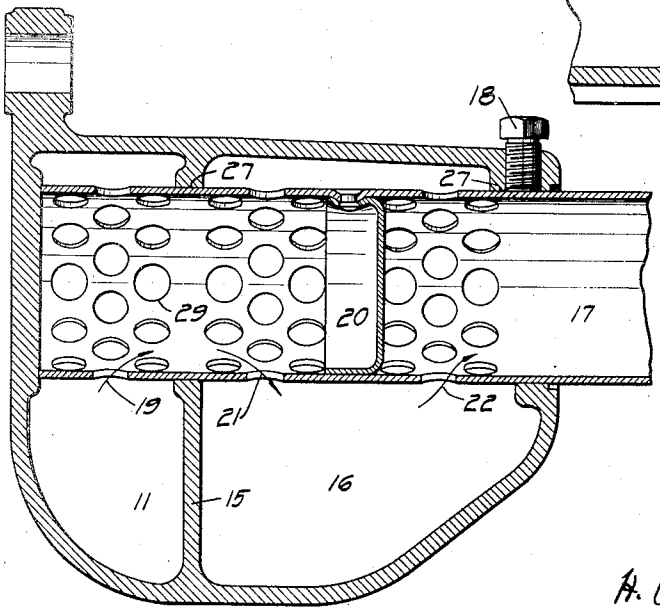


FIG. 5

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ENGINE MUFFLER AND MANIFOLD CONSTRUCTION

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FIG. 7

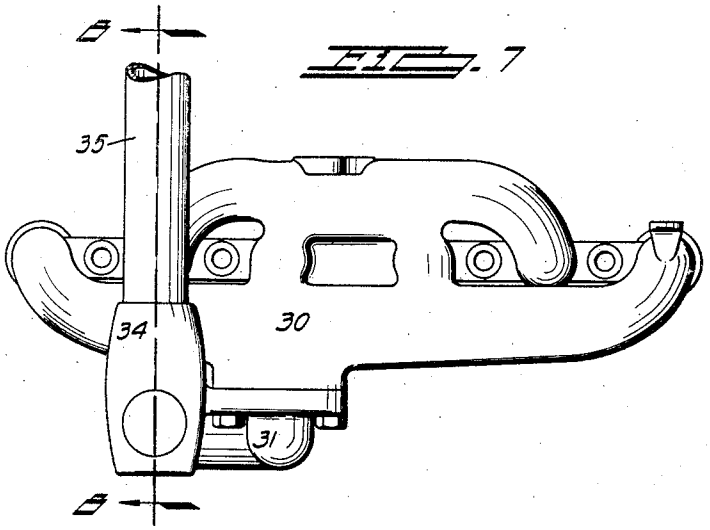
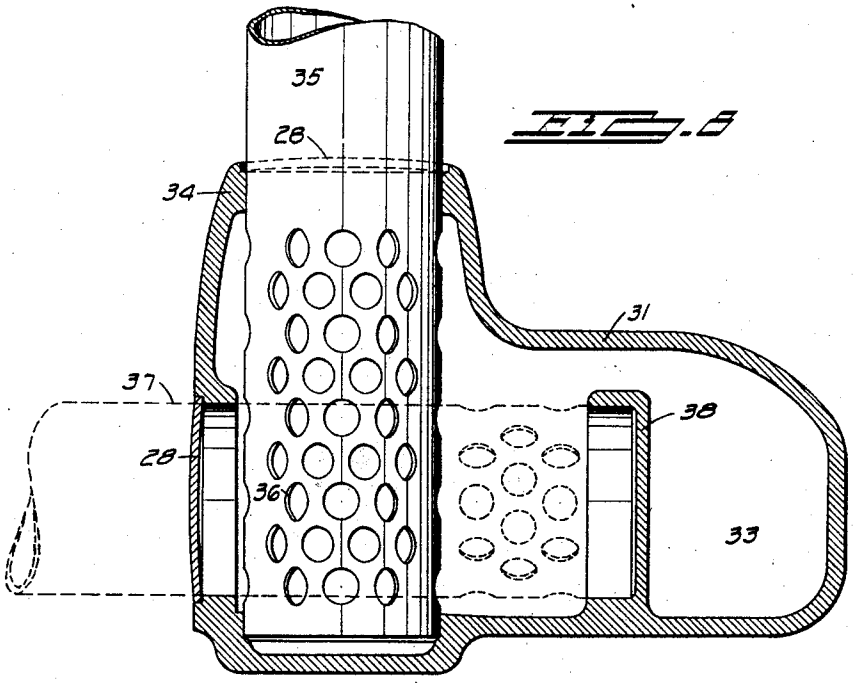


FIG. 8



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Dec. 5, 1933. H. W. SIMPSON 1,937,990

ENGINE MUFFLER AND MANIFOLD CONSTRUCTION

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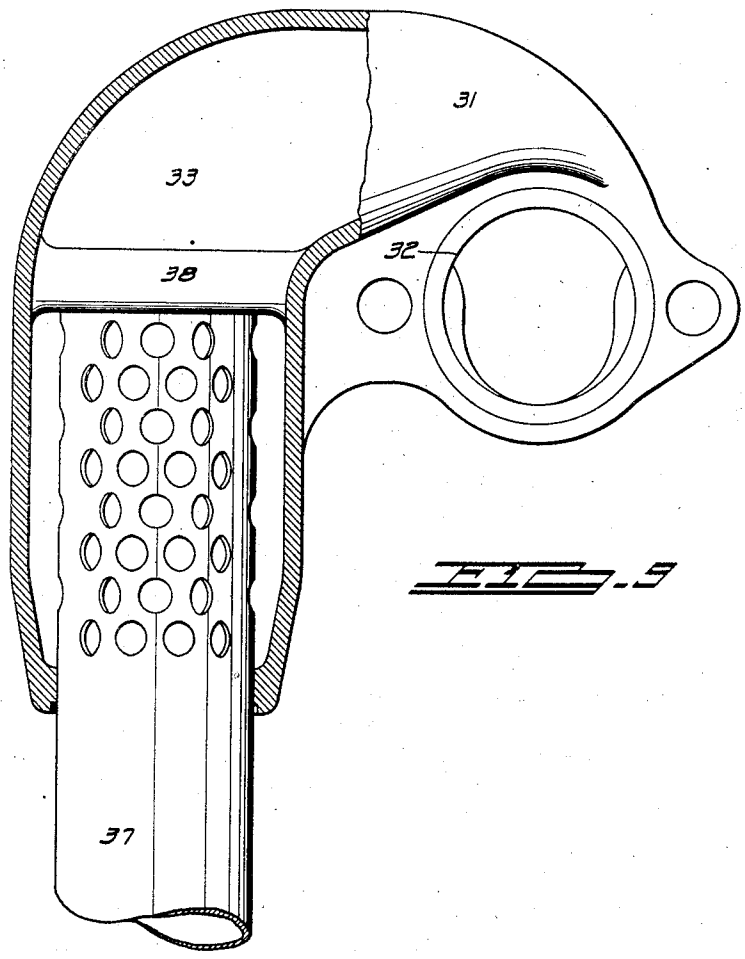


FIG. 3

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Patented Dec. 5, 1933 1,937,990

UNITED STATES PATENT OFFICE

1,937,990

ENGINE MUFFLER AND MANIFOLD CONSTRUCTION

Howard W. Simpson, Dearborn, Mich., assignor to Ford Motor Company, Dearborn, Mich., a corporation of Delaware

Application February 18, 1932. Serial No. 593,820

4 Claims. (Cl. 60—29)

The object of my invention is to provide a muffler and manifold construction of simple, durable and inexpensive construction.

A further object of my invention is to provide a combined muffler and manifold which is especially adapted for use on farm tractors whereby the exhaust gases of the engine may be discharged either a considerable distance above the tractor or to one side thereof, whichever arrangement suits the particular user best.

Specifically, one form of my invention comprises a manifold having a chamber cast integrally therewith, through which chamber an exhaust pipe extends with its inner end projecting into the manifold. This pipe is provided with a plurality of apertures and a baffle plate therein so placed that the gases must enter the pipe from the manifold through certain of these apertures, then flow out through other apertures into the chamber and then flow back through still others to be discharged from the pipe. This repeated throttling equalizes the pressure pulsations in the gas and consequently muffles the noise therefrom. It will be noted that the exhaust pipe itself forms an essential element of the muffler and it is the purpose of this device to provide a muffler design in which such pipe may be inserted either vertically or horizontally and still the function thereof will be accomplished in either position.

As will be noted from the drawings two different designs of mufflers are shown, the one comprising a unit adapted to be used in place of the manifold on the Fordson tractor, and the other adapted to be attached to the manifold of existing Fordson tractors whereby owners of such tractors may avail themselves of the advantages of this device. The first mentioned device is essentially for initial installation on tractors while the second mentioned device is for servicing tractors now in the hands of owners, whereby their investment in the standard manifold will not be thrown away.

With these and other objects in view my invention consists in the arrangement, construction and combination of the various parts of my improved device, as described in the specification, claimed in my claims, and illustrated in the accompanying drawings, in which:

Figure 1 shows a side elevation of a tractor engine having my improved manifold and muffler installed thereon with the exhaust pipe extending therefrom in a vertical direction.

Figure 2 shows a sectional view, taken on the line 2—2 of Figure 1.

Figure 3 shows a sectional view, taken on the line 3—3 of Figure 1.

Figure 4 shows a plan view of the above mentioned engine having the exhaust pipe extending horizontally therefrom.

Figure 5 shows a sectional view, taken on the line 5—5 of Figure 4.

Figure 6 shows a sectional view, taken on the line 6—6 of Figure 4.

Figure 7 shows a standard Fordson tractor manifold having another form of my device attached thereto whereby some of the advantages of the previously pictured structures are obtained.

Figure 8 shows a sectional view, taken on the line 8—8 of Figure 7, and

Figure 9 shows a plan view of the attachment shown in Figure 7 with the exhaust pipe installed in a horizontal position and with a portion thereof broken away to better illustrate this construction.

Referring to the accompanying drawings, I have used the reference numeral 10 to indicate a Fordson tractor for which my device is particularly suitable. This exhaust manifold consists essentially of a casting 11 having a plurality of conduits 12 extending upwardly therefrom in position to coact with the exhaust ports of the engine, whereby the exhaust gases are conducted through the conduits 12 into the horizontal portion of the manifold. An intake manifold 13 is cast integrally with the exhaust manifold 11 in position spaced thereabove and is provided with a downwardly extending conduit 14 from each end thereof whereby the intake gases are conducted to the intake ports of the engine. The above described construction is quite common in tractor designs and it is not the purpose of this application to claim any invention in this particular design of intake and exhaust manifolding, however, the feature of my construction which will now be described is believed to be of patentable merit.

It will be noted from Figures 4 to 6 that the manifold 11 is provided with an outer wall 15 which extends the entire length thereof and that the rear portion of the manifold 11 is cast integrally with an expansion chamber 16. This chamber is adapted to receive an exhaust pipe in either a horizontal or vertical position whereby a muffler action will result. Referring to Figure 5 a pair of horizontally aligned openings 27 are provided in the wall 15 and outer wall of the chamber 16 through which openings an exhaust pipe 17 extends. The inner end of the exhaust

pipe 17 butts against the inner wall of the manifold 11 while its outer end extends a short distance outwardly from the side of the tractor. This pipe is secured in place by a set screw 18. The enclosed end of this pipe is apertured with a plurality of small openings 29 so that portion of the pipe which extends into the manifold 11 will conduct the exhaust gases from the manifold into the pipe, as shown by the arrow 19. A baffle plate 20 is secured in the pipe 17 in a central location in the chamber 17 whereby the exhaust gases entering from the manifold 11 will be forced in the direction shown by arrow 21 into the chamber 16. Inasmuch as the plate 20 is located centrally in the chamber, the exhaust gases are then conducted back into the pipe 17, as shown by arrow 22, from which they flow otherwise unhindered to the end of the exhaust pipe.

The muffling of the gases, due to the repeated expansion and throttling through these three sets of small openings, sufficiently quiets the engine for tractor use without excessively increasing the back pressure of the exhaust. It is not believed that any new function arises in the operation of this muffler, but it is believed that commercial advantages arise for the reason that by drilling a single hole in the manifold casting and inserting therein a perforated exhaust pipe, a very efficient muffler is formed with practically no more machine work than is required to secure the ordinary exhaust pipe to the conventional manifold.

The above described arrangement is suitable for most purposes, nevertheless for some uses it is desirable to exhaust the gases above the driver's head, this arrangement being especially desirable in territories having little prevailing wind as it lessens the accumulation of exhaust gases close to the ground. I have, therefore, constructed this device so that with a minimum of labor it may be assembled, as shown in Figure 1, wherein an exhaust pipe extends vertically from the muffler. In order to accomplish this an opening 23 is formed in the top wall of the chamber 16 in position spaced rearwardly from the axis of the openings 27 whereby a vertically extending exhaust pipe 24 may be inserted therein. It will be noted that the lower end of the exhaust pipe 24 is piloted in the bottom of the chamber 16 and that the portion of the exhaust pipe within the chamber 16 is perforated at 25 to receive exhaust gases from the chamber and conduct them upwardly to the top of the exhaust pipe. When this installation is required, a short perforated tube 26, shown in Figures 2 and 3, is inserted in the openings 27 in the same manner as the pipe 17 so that the exhaust gases will be conducted inwardly through the perforations in the inner end of the tube then into the chamber 16 by way of the perforations in its outer portion. The exhaust gases from the chamber 16 then enter the pipe 24 through the perforations 25 from which they are conducted out through the top of this vertical pipe.

It will be apparent from the foregoing that when the horizontal exhaust pipe 17 is used that the opening 23 in the upper wall of the chamber 16 must be closed and likewise, when the vertical exhaust pipe 24 is used then the opening 27 in the outer wall of the chamber must also be closed. I have, therefore, provided each of these openings with a recessed shoulder thereon whereby a Welch plug 28 may be secured over either of these openings to effectively seal the chamber 16 against the discharge of gas through the unused opening. The plug 28 comprises a circular disk of concave section which after being inserted in a cylindrical pocket is flattened and thereby expanded to retain itself in position.

The procedure in marketing this device is to ship the manifold assembled to the motor, the exhaust pipes 17 and 24 and the tube 26 and plug 28 being shipped unassembled. When the buyer decides which type of exhaust pipe is most suitable for his particular use, the dealer simply inserts the desired pipe in place and then closes up the remaining opening with the plug to complete the installation. This procedure is inexpensive and does not require a special manifold or muffler construction.

Referring now to the construction shown in Figures 7—9, it will be seen that I have provided an attachment which may be readily secured to a standard Fordson tractor manifold whereby either a horizontal or vertical exhaust pipe can be provided. The standard manifold is shown at 30, which manifold is provided with a flanged opening in the bottom thereof adapted to be connected to an exhaust pipe which extends to the rear of the tractor. My attachment is adapted to be likewise connected to the manifold in place of the existing exhaust pipe and consists of a hollow casting, designated generally by the numeral 31, having a flanged opening 32 in its top face. The exhaust gases from the manifold flow into an L-shaped chamber 33 in the casting 31 wherein they are conducted rearwardly and then outwardly, the casting being so shaped for this purpose. The outer end of the casting 31 is formed with a vertical cylindrical shaped boss 34, the upper end of which is apertured to receive a vertically extending exhaust pipe 35. It will be noted that the pipe 35 extends substantially the length of the cylinder and that the enclosed end thereof is provided with a plurality of apertures 36 whereby the exhaust gas in the chamber 33 may enter this pipe and be discharged therefrom above the driver's head. Considerable muffling of the exhaust noises is obtained by throttling the gas through these openings.

It may, however, be desirable to extend the exhaust pipe from the side of the tractor in which case a short exhaust pipe 37, as in Figure 9, is inserted through a horizontal opening in the side of the cylinder 34, the inner end thereof being anchored and closed by a boss 38. The enclosed end of this pipe is also apertured to receive the exhaust gas from the engine. Both the horizontal and vertical openings in the cylinder 34 are shouldered to receive a Welch plug whereby the opening not in use may be closed. Thus, the tractor owner may, with a minimum of expense, equip his existing tractor with a fairly good muffler and may further have the option of extending the pipe therefrom either vertically or horizontally.

Among the many advantages arising from the use of my invention, it may be well to mention that my single combined muffler and manifold is far cheaper to construct than any other equally efficient device with which the applicant is familiar. Further, this device being constructed of relatively few parts should give long life and require little or no service.

Some changes may be made in the arrangement, construction and combination of the various parts of my improved device without departing from the spirit of my invention, and it is

my intention to cover by my claims such changes as may reasonably be included within the scope thereof.

I claim as my invention:

1. A muffler construction adapted to silence the exhaust gas noise of internal-combustion engines comprising, a chamber disposed adjacent to the exhaust manifold of said engine, said chamber and manifold having a passageway therebetween whereby the exhaust gases from said manifold will flow into said chamber, an exhaust pipe projecting through an opening in said chamber to position a substantial distance therewithin, the enclosed portion of said exhaust pipe having a plurality of relatively small openings therethrough whereby the exhaust gas will be throttled by said openings when entering said exhaust pipe, a second opening in said chamber disposed at substantially right angles to said exhaust pipe, and a plug forming a closure for said second mentioned opening, for the purpose described.

2. A muffler, as claimed in claim 1, wherein a single wall separates the manifold and muffler, whereby an opening in said wall forms the passageway between the manifold and muffler.

3. A device, as claimed in claim 1, wherein said exhaust pipe projects in a vertical direction from said chamber.

4. A muffler, as claimed in claim 1, wherein a single wall separates the manifold and muffler, said wall having an opening therein which forms a passageway between the manifold and muffler, and wherein a perforated tube extends through said openings in position so that one end is disposed in the muffler and the other end in the manifold, whereby the exhaust gases in flowing from the manifold to the muffler will be throttled by said perforations.

HOWARD W. SIMPSON.