Oct. 8, 1940. H. H. BOYCE 2,216,763

CARBON MONOXIDE PURIFIER AND MUFFLER

Filed June 3, 1939

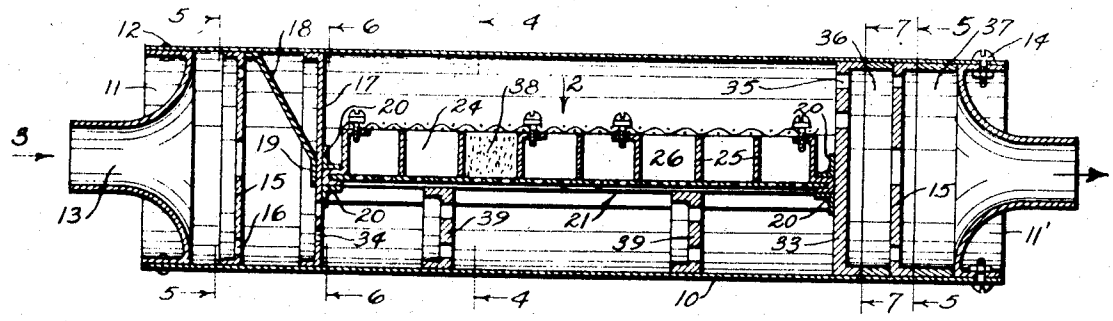


FIG. 1

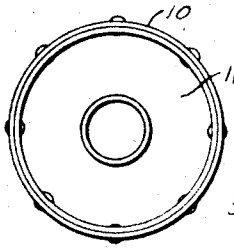


FIG. 3

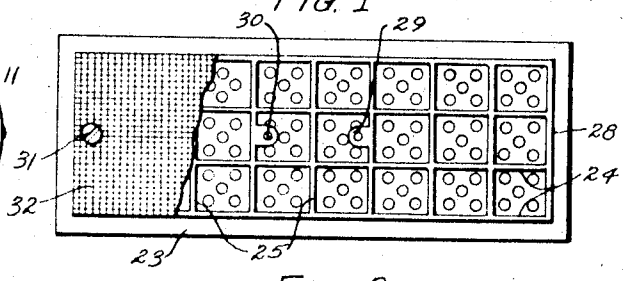


FIG. 2

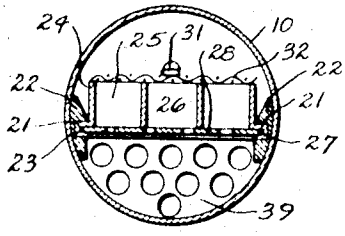


FIG. 4

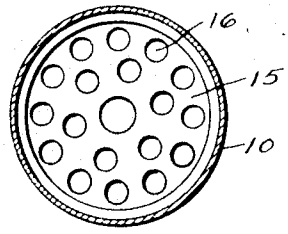


FIG. 5

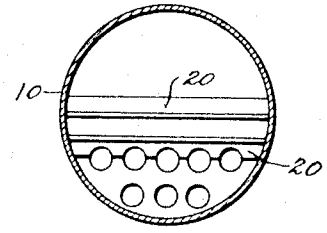


FIG. 6

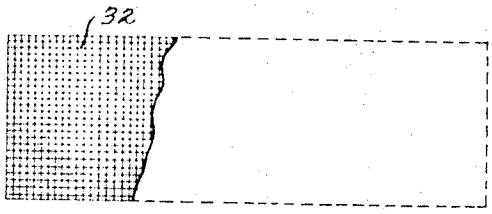


FIG. 8

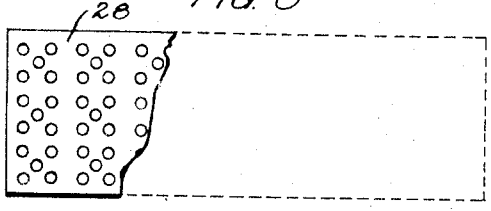


FIG. 9

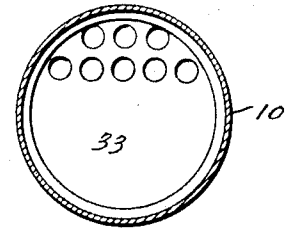


FIG. 7

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Patented Oct. 8, 1940

2,216,763

UNITED STATES PATENT OFFICE

2,216,763

CARBON MONOXIDE PURIFIER AND MUFFLER

Hiram H. Boyce, Denver, Colo., assignor of one-half to Glenn W. Pierce, Denver, Colo.

Application June 3, 1939, Serial No. 277,263

2 Claims. (Cl. 183—46)

This invention relates to improvements in carbon monoxide purifiers and mufflers of a type designed for use more especially with gasoline driven automobiles.

It is well known that exhaust gases from automobile engines contain a big percentage of carbon monoxide gas, which, as is well known, is very poisonous and is responsible for a large number of deaths each year.

It has, for a long time, been recognized that a great service would be done by anyone who could devise a practical means for converting the monoxide gas in engine exhausts into harmless carbon dioxide and for this purpose various inventions have been made and patented.

The exhaust from an internal combustion engine of the gasoline type is very noisy unless muffled by a suitable apparatus and it is therefore customary to provide all automobile gas engines with mufflers to reduce the noise of the exhaust.

It is an object of this invention to produce a device that shall be especially well adapted for use in neutralizing carbon monoxide exhaust gases and also to reduce the noise of the exhaust.

It is another object of this invention to produce a device of the type indicated which shall be so constructed that the chemicals employed for neutralizing or oxidizing the carbon monoxide can be readily replaced when consumed by the chemical action that is constantly taking place.

A still further object of this invention is to produce a device which shall be very effective for the purpose of reducing the noises from the exhaust and which shall be so constructed and of such size that it can be readily substituted for the mufflers now employed.

The above and other objects that may appear as this description proceeds are attained by means of a construction and an arrangement of parts that will now be described in detail, and for this purpose reference will be had to the accompanying drawing in which the invention has been illustrated in its preferred form, and in which:

Figure 1 is a longitudinal diametrical section through the gas neutralizer and muffler;

Figure 2 is a top plan view of the filter element looking in the direction of arrow 2, Figure 1, parts being broken away to better disclose the construction;

Figure 3 is an end view looking in the direction of arrow 3, in Figure 1;

Figure 4 is a transverse section taken on line 4—4 Figure 1;

Figure 5 is a transverse section taken on lines 5—5 Figure 1;

Figure 6 is a transverse section taken on line 6—6, Figure 1;

Figure 7 is a section taken on line 7—7, Figure 1;

Figure 8 is a fragmentary plane view showing the cover of the filter element; and

Figure 9 is a fragmentary view showing the foraminated bottom of the filter element.

In the drawing reference numeral 10 designates an elongated tubular member which, in the embodiment shown, is cylindrical and numeral 11 designates an end wall or closure that is permanently attached to the tubular member by rivets 12, or it may be spotwelded in position. The end closure 11 is provided with an opening 13, which, for the purpose of this description will be considered as the inlet opening. Positioned in the other end of the tubular member is a closure 11' of the same shape and size as the one already described and which, therefore, has been designated by a similar reference numeral. The opening in the last mentioned end wall will be considered as the outlet opening. The end wall at the outlet is removably held in place by means of bolts 14 or other equivalent means. At the intake end of the muffler, a baffle plate or diffuser 15 has been shown. This plate has also been shown in side elevation in Figure 5, from which it will be seen that it is provided with a plurality of openings 16. This diffuser or baffle serves to break up the gas stream as it enters through the opening 13 and assists greatly in obtaining silent operation. The baffle plate 15 may be spot-welded in position as it does not have to be removed. Positioned a short distanse to the right of baffle plate 15, is a transverse partition 17 which may also be spotwelded in position. In the drawing a diagonal brace 18 has been shown, which is permanently attached to the partition at 17. The function of this brace is primarily to space the transverse partition the right distance from the baffle plate. Two parallel angle irons 20, or some other equivalent means are secured to one side of the transverse partition 17 and form between their opposing flanges a groove or recess to which reference will hereafter be made. Secured to the inner surface of the tubular member 10 are two longitudinally extending strips 21, provided with spaced inwardly extending flanges 22 and which serve as guideways for the reception of the flanges 23 of the longitudinally extending partition which is shown in top plan view in Figure 2. This partition may be a cast-

ing and is provided with spaced longitudinally extending walls **24** and spaced transversely extending walls **25** that form a grid having rectangular pockets **26** for the reception of the chemicals which serve to neutralize the carbon monoxide and also to muffle the exhaust. It will be seen that the flanges **23** of the guide or partition are provided with grooves **27** on their inner surfaces and these serve to receive the edges of the foraminated bottom **28**. Some of the transverse partitions **25** are provided with lugs **29** that, in turn, are provided with threaded openings **30** for the reception of screws **31** that serve to hold the reticulated cover **32** in place on the top of the grid-like frame. The cover **28** is desirable for the reason that it retains the chemicals in place during handling and shipment of the device and also prevents the chemicals from being forcibly removed from the pockets **26** by explosions taking place in the exhaust pipe, which sometimes occur when a charge in one or more of the cylinders fails to ignite.

In the drawing the bottom has been shown as provided with a few openings or holes, but in the actual construction, the foraminations in the bottom are comparatively small and in greater number than would appear from an inspection of the drawing.

The grid-like member which has been described is positioned by being slidably inserted into the guideways in members **21** and the front end of the partition is positioned between the transverse angles **20** so that this partition or grid will be removably secured to the interior of the tubular member **10** in such a way that it divides the latter into two compartments, one of which is shown below the grid-like partition and the other above. After the grid-like partition has been put into place, a transverse partition **33** is inserted through the open end of the tubular member and so adjusted rotarily that the corresponding end flange of the grid-like partition enters the space between the angles **20**. It will now be seen that the interior of the tubular member is divided into two compartments as explained and that any gas passing from one to the other must pass through the pockets **26** and through the chemicals that are contained in them. The transverse partition **17** is provided with several openings **34** which establish communication between the inlet **13** and the compartment below the guide partition while the transverse partition **33** has corresponding openings **35** that communicate with the compartment above the grid partition. After the partition **33** has been put into place, a spacer ring **36** is then inserted, after which the foraminated baffle or diffuser plate **15** is inserted and positioned in contact with the ring **36**. Another ring, which has been designated by reference numeral **37**, is now inserted, after which the removable end wall is put into position and secured in place by the bolts or screws **14**.

The device above described, when assembled in the manner shown in Figure 1, forms a filter and muffler element that can be inserted in the exhaust pipe of an internal combustion engine in the same manner as is now done with the ordinary mufflers and the pockets **26** are filled with chemicals which have been indicated in a general way by reference numeral **38** and these chemicals, of which several are well known, have the properties of neutralizing carbon monoxide and changing it to carbon dioxide and therefore when exhaust gases containing carbon monoxide pass through this muffler, they will be rendered harmless due to the oxidizing action of the chemicals, and in this way the danger of monoxide poisoning is greatly reduced, if not entirely eliminated.

In my copending application, Serial No. 213,435, filed June 13, 1938, a monoxide neutralizing apparatus has been shown in which the neutralizing chemicals are charcoal, calcium carbonate, calcium hydroxide and calcium sulfate and for the purpose of this explanation the chemicals **38** may be considered the same as those enumerated, although any other chemicals that will serve the purpose can be employed.

Attention is called to the fact that with the present construction, the longitudinally extending grid-like partition can be removed quite readily by first taking out the bolts **14** and removing the end wall at the outlet end of the muffler. Ring **37**, transverse baffle plate **15**, ring **36** and transverse partition **33** can then readily be removed after which the grid-like partition can be withdrawn through the open end, the flanges **27** being guided in the guides illustrated in Figure 4. When the partition is withdrawn, the pockets can be refilled with chemicals, after which it is reinserted and the members which were removed are replaced, and in this way the chemical action of the device can be maintained effective at all times.

In the drawing supports **39** have been shown underneath the grid-like partition and are intended to assist in reducing the noises of the exhaust due to their gas defining action, but these supports can be dispensed with without seriously interfering with the operation of the device.

Where no other means have been shown for securing members to the tubular member **10**, it is to be understood that the parts are spotwelded or brazed in position. The transverse muffles **15** are inserted for the purpose of obtaining a quieter action as they serve to diffuse the gases and to reduce their velocities, but quite effective operations can be obtained without the use of these diffusing plates.

From the above description it will be apparent that the device described and illustrated on the drawing is simple and of substantial construction and that it can be readily attached to the exhaust pipe of an internal combustion engine or substituted for the ordinary muffler now in common use and which will not only muffle the sounds from the exhaust, but also make the exhaust gases practically harmless by converting the monoxide gas to a dioxide.

Having described the invention what is claimed as new is:

1. A combined gas purifier and muffler comprising, an elongated hollow member having both ends closed, one end closure being readily removable, the removable end closure having an inlet opening, a foraminated diffuser extending across the interior of the hollow member and spaced from the inner surface of the removable end closure, a partition extending transversely of the hollow member and spaced from the inner surface of the diffuser, opposed guideways on the inner surface of the hollow member, and a grid-like partition slidably supported on the guideways, the last named partition having a foraminated bottom whereby pockets are formed for the reception of a gas purifying chemical, the removable end closure forming part of a means for holding the grid-like partition from moving longitudinally, the transverse partition having

openings positioned wholly on one side of the grid-like partition, the other end closure having an opening positioned on the other side of the last named partition whereby any gases passing through the muffler will also pass through the filter material.

2. A combined gas purifier and muffler comprising an elongated hollow member having both ends closed, one end closure being readily removable, the end closures having openings, two longitudinally spaced transverse partitions, each partition being spaced from its corresponding end wall, a perforated diffuser plate positioned between each end closure and the corresponding transverse partition, and spaced from the latter, a longitudinally extending filter element extending between the two transverse partitions dividing the space between them into two compartments, one transverse partition having openings communicating wholly with one compartment and the other having openings communicating wholly with the other compartment, whereby gases entering through the opening in one end wall and leaving through the opening in the other end wall will also pass through the diffusers and through the filter.

HIRAM H. BOYCE.