May 23, 1933. A. C. REFSGAARD 1,910,565

AUTOMOBILE HEATER AND MUFFLER

Filed Nov. 8, 1929

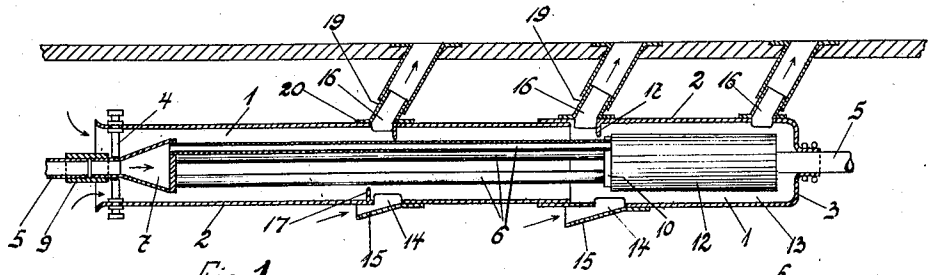


Fig. 1.

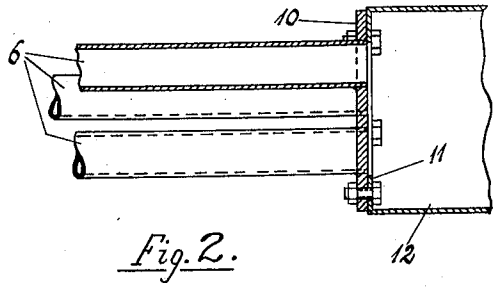


Fig. 2.

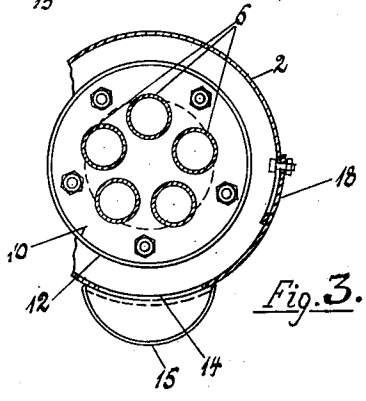


Fig. 3.

Inventor.

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Patented May 23, 1933 1,910,565

UNITED STATES PATENT OFFICE

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AUTOMOBILE HEATER AND MUFFLER

Application filed November 8, 1929, Serial No. 405,693, and in Germany October 1, 1929.

This invention relates to an apparatus for heating vehicles driven by internal combustion engines in which the exhaust elements of the engine are surrounded by an air heater and the jacket of the air heater is adjustable as regards inner diameter for regulating the temperature of heating air or the quantity of heating air, according to my patent application Ser. No. 328,415 filed December 26th, 1928 and which has matured into Patent No. 1,788,742 issued January 13, 1931.

In order to utilize more economically the heating capability of the exhaust gases of the engine and to enlarge the effective heating surface for the air heater, a set of pipes surrounded by the air heater is according to the invention built into the exhaust pipe of the engine, the exhaust gases flowing through these pipes and the air to be heated in the air heater flowing around these pipes. As the size of this set of pipes cannot be determined so accurately as to produce a uniform heating air temperature of for example 20° C. for the different types of vehicles, the adjustability of the inner diameter of the air heater offers a very advantageous means for subsequently adjusting the temperature or the quantity of the heating air flowing through the air heater. For effectively utilizing the set of pipes as also the lower and rear part of the air heater, air admission openings are provided preferably below the set of pipes in the casing of the air heater, through which openings the air can flow into and through the air heater transversely to the set of pipes.

In order further, to enable the exhaust gases to flow into the pipes as far as possible silently and without forming eddies, the end of the set of pipes toward the inflow side is connected to a nozzle-like connecting piece, which serves at the same time for building the set of pipes into the exhaust pipe. At the other end, the set of pipes is connected to the bottom of the exhaust silencer, so that no separate nozzle-shaped connecting piece is required at this end.

An embodiment of the invention is illustrated by way of example in the accompanying drawing in which:

Fig. 1 shows the heating device in longitudinal section.

Fig. 2 shows a portion of the set of pipes on a larger scale in longitudinal section.

Fig. 3 shows a cross section through the complete air heater.

The air heater consists of an envelope 2, which together with a bottom plate 3 forms an air heating chamber 1 open towards the front. By means of the bottom plate 3, and also by means of screws 4 or other means of fixation the envelope 2 is securely held and centered in the exhaust pipe.

A set of pipes composed of a number of pipes 6 is built in the exhaust pipe 5. For fitting a nozzle-shaped connecting piece 7 is employed, which is connected to the exhaust pipe 5 by means of a sleeve 9.

The other end of the set of pipes 6 is connected to the bottom 11 of the silencer 12 by means of a flange-like connecting piece 10, so that the engine exhaust gases can flow from the set of pipes directly into the silencer. The bottom plate has for this purpose a sufficiently large aperture so that the pipe 5 also terminates freely in the space of the silencer 12.

The pipes 6, any desired number of which may form the set, extend either straight, in spiral shape or in any other shape, and they may have ribs or the like for enlarging the heating surface. The pipe set 6 forms a complete unit together with the connecting pieces 7, and 10 respectively to be kept in stock and to be subsequently built in the exhaust pipe. The pipes of the set can also if desired, be rolled, welded or soldered directly in the bottom plate 11 of the silencer in which case the flange connecting piece 10 is omitted.

By connecting the set of pipes directly to the bottom plate of the silencer not only the flow resistances and the noises in the exhaust pipe are reduced but a separate intermediate support is rendered unnecessary thereby. Consequently it is also advantageous to connect the set of pipes directly to the bottom plate of the silencer. However in order to enable the set of pipes to be hermetically enclosed at this end by envelope 2 which is adjustable in diameter, the silencer must also

be partially or entirely enclosed by the air heater envelope. The complete enclosing of the silencer presents the further advantage that the relatively large surface of the silencer can at the same time also be utilized as heating surface for the air heater and the envelope 2 of the air heater acts at the same time as silencer. As however the silencers in different types of automobiles vary considerably in diameter, it is therefor advisable for fitting the air heater to make the envelope 2 of the air heater adjustable in diameter. By means of the adjustable casing it is moreover also possible to regulate the air passage within the range of the silencer.

In order that the heating capability of the set of pipes 6 and the lower and rear part 13 of the air heater may be advantageously utilized, air admission openings 14 are provided in the envelope 2 below the set of pipes. The air entering therethrough flows through the air heater transversely to the set of heating pipes and thereby comes in better contact with the heating elements. The air admission openings 14 are preferably arranged, so that the air must first flow through the greatest possible distance in the air heating chamber 1 before it reaches the nearest outlet opening 16 in the direction of its flow, one, two, three or more of these outlet openings being provided in the envelope 2 according to the size of the motor vehicle and to the size of the air heater. On the admission openings 14 scoop-shaped catch plates 15 are arranged, which guide the air into the air heater. In order to obtain a good air circulation as also a proper in- and out-flow of the air to and from the air heater, guide plates 17 are preferably fitted at suitable points in the air heater. By subsequent bending of the catch plates 15 the admission openings can be more or less exposed or entirely closed.

After fitting the set of pipes 6 in the envelope 2 the air heater may be adjusted owing to its adjustable longitudinal seam 18 to an inner diameter according to the heating capability of the set of pipes. The catch plates 15 as also the pipe sockets 19 of the outlet openings 16 are preferably removable and, in order to obtain a good packing, fixed by yieldable flanges 20 on the envelope 2 of the air heater so that they can subsequently adjust themselves to the envelope and to the desired position.

I claim:—

A heating device for automobiles, comprising in combination with the exhaust pipe and the silencer of the automobile, a set of heating pipes built in said exhaust pipe and directly terminating in said silencer, and a cylindrical envelope of adjustable diameter surrounding said set of heating pipes and said silencer, said envelope having an aperture at its front end and apertures around its circumference to allow the air to be heated to brush past said set of pipes in longitudinal and transverse directions.

In testimony whereof I affix my signature.

ANTON CARL REFSGAARD.