B. E. HAGEN.

HOT AIR HEATER FOR AUTOMOBILES.

APPLICATION FILED JULY 22, 1919.

1,400,815. Patented Dec. 20, 1921.

2 SHEETS—SHEET 1.

Fig. 1

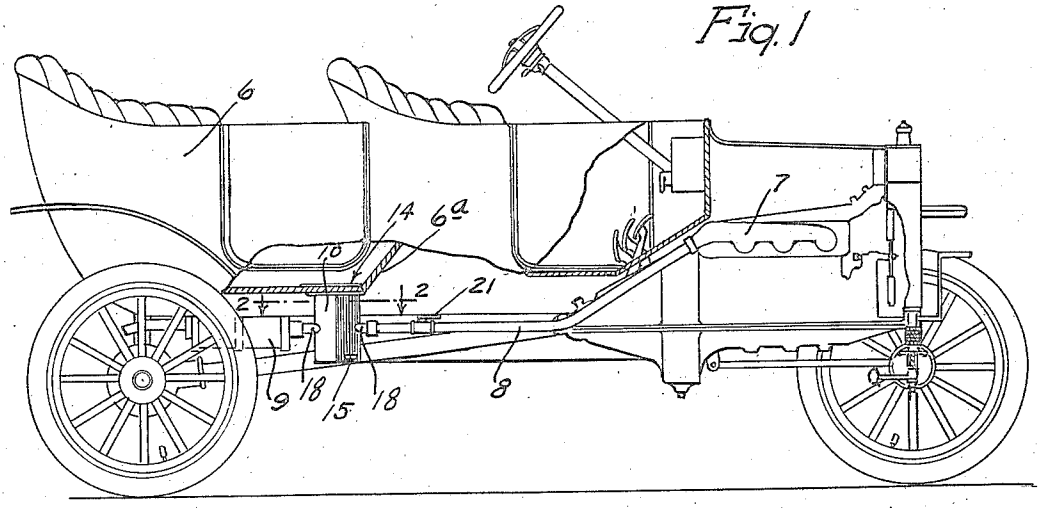


Fig. 2

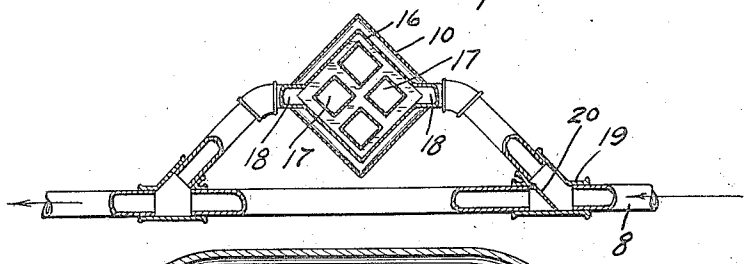
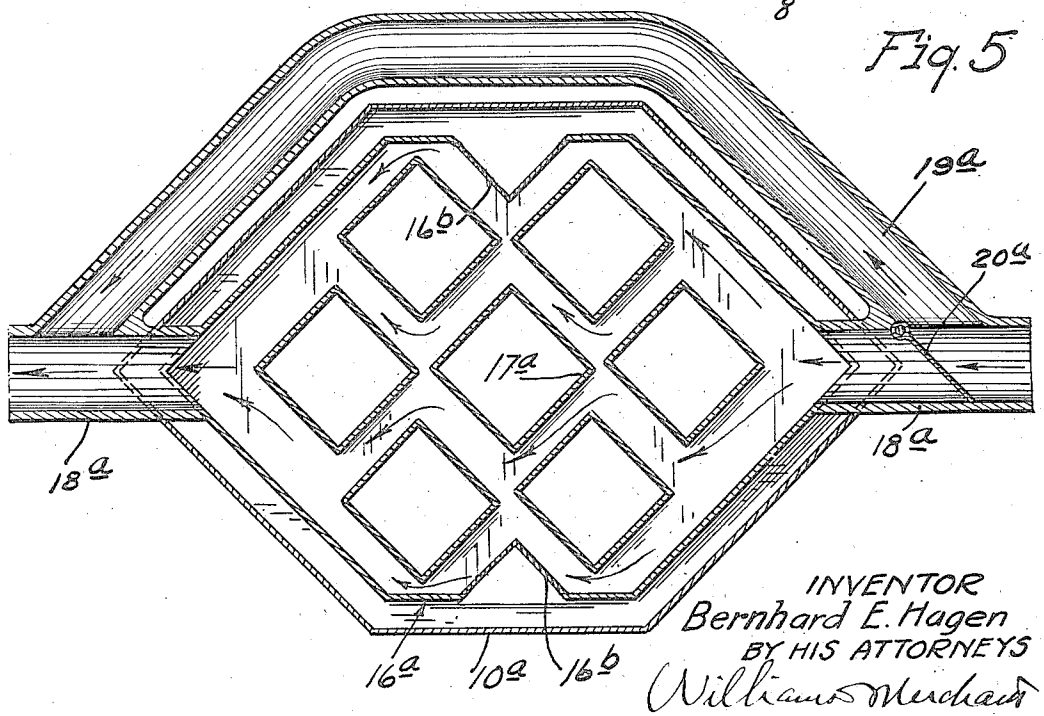


Fig. 5



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2 SHEETS—SHEET 2.

Fig. 3

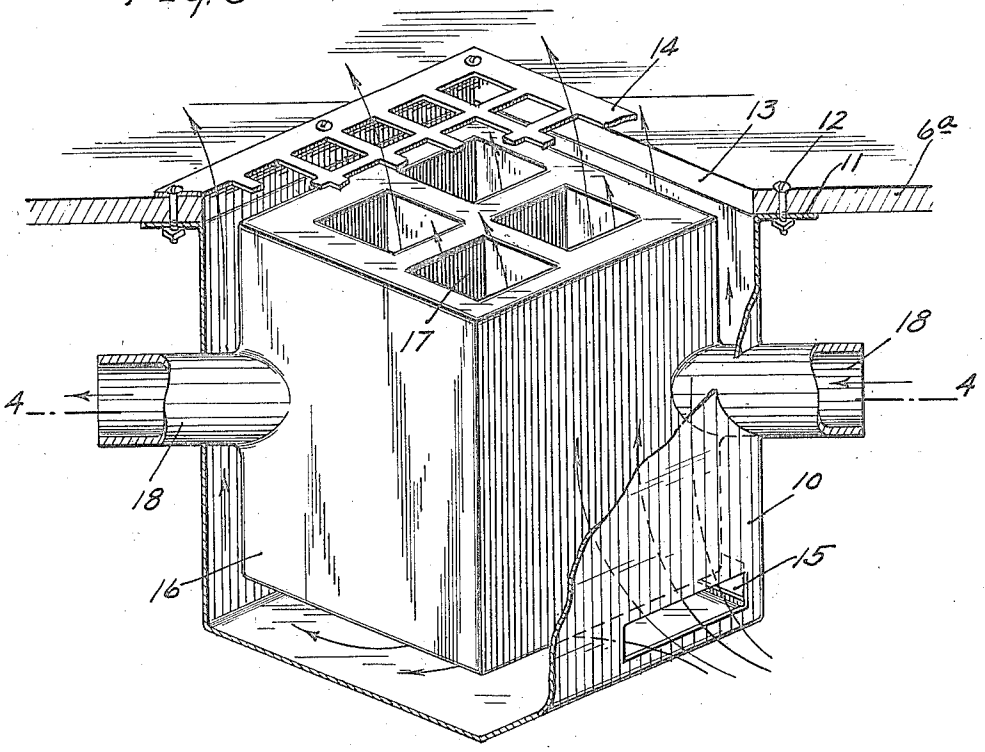
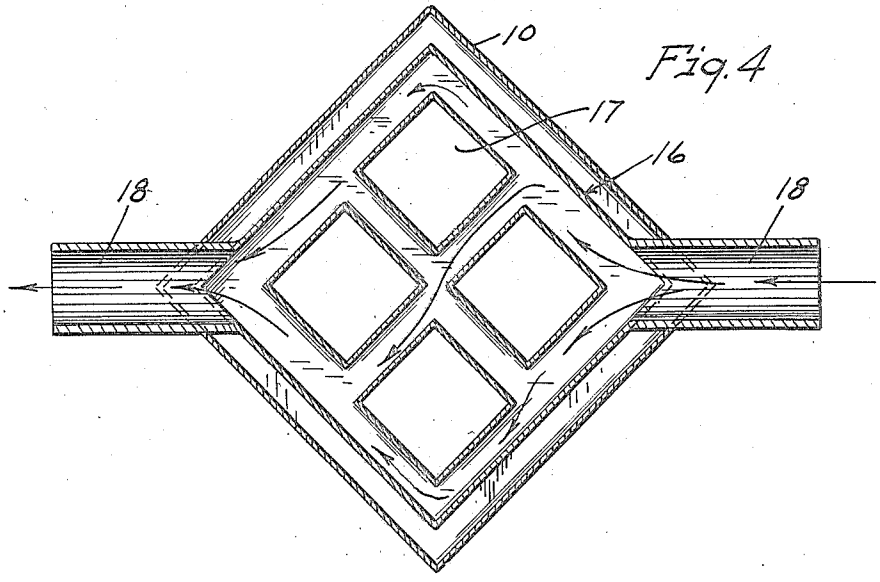


Fig. 4



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HOT-AIR HEATER FOR AUTOMOBILES.

1,400,815. Specification of Letters Patent. Patented Dec. 20, 1921.

Application filed July 22, 1919. Serial No. 312,536.

To all whom it may concern:

Be it known that I, BERNHARD E. HAGEN citizen of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Hot-Air Heaters for Automobiles; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention has for its object to provide a simple and efficient hot air heater for automobiles which utilizes the waste gas of the exhaust of the engine; and to such ends, generally stated, the invention consists of the novel construction and combination of parts hereinafter described and defined in the claims.

The invention, as applied to automobiles, is illustrated in the accompanying drawings wherein like characters indicate like parts throughout the several views. Referring to the drawings:—

Figure 1 is a side elevation with some parts broken away and some parts sectioned, showing my improved heater applied to an automobile of standard construction.

Fig. 2 is a view partly in plan and partly in horizontal section on the line 2—2 of Fig. 1, showing the heater and the main and branch exhaust pipes;

Fig. 3 is a perspective partly in full and partly in section, showing the heater and illustrating the manner in which it is applied to the floor of the automobile;

Fig. 4 is a horizontal section through the heater approximately on the line 4—4 of Fig. 3; and

Fig. 5 is a view corresponding to Fig. 4 but illustrating a slightly modified form of the heater.

Of the parts of the automobile it is only desirable for the purposes of this case to particularly note the automobile body 6, the floor 6^a thereof, the internal combustion engine 7, exhaust pipe 8 and muffler 9.

The heater shown in Figs. 1 to 4, inclusive, is a rectangular structure made up of a box-like outer shell 10 closed at its bottom but open at its top and formed with outturned flanges 11 secured by nut-equipped bolts or screws 12 to the floor 6^a, said floor being provided with a large rectangular opening 13 of the size of the interior of the said outer shell. This opening 13 is covered by an open grate or perforated plate 14 which will prevent the lap robe or any other article of any considerable size from dropping into the casing 10. The casing 10 is set with its sides at angles of forty-five degrees to the longitudinal and transverse axes of the automobile body, and in its front sides, near its closed bottom, it is provided with air intake ports 15.

Located within the outer casing 10 and spaced from the bottom and sides thereof and from the register plate 14, is a box-like rectangular inner shell 16 through which rectangular hot air tubes 17 are passed. The casing 10, shell 16 and tubes 17 are of thin metal, preferably sheet metal, but may be cast. When made of sheet metal, the tubes 17, at their ends, can be welded to the top and bottom plates of the shell 16 by the well known autogenous or oxy-acetylene welding process.

The sections 18 of a branch exhaust pipe are extended through openings in the front and rear corners of the shell 10 and are welded, or otherwise secured to the margins of the correspondingly formed holes in the front and rear corners of the shell 16. The ends of the branch exhaust pipe 18 are coupled into the main exhaust pipe 8 by means of Y couplings 19. A switch valve 20 (see Fig. 2) is preferably placed in the front Y coupling 19 and provided with an extended lever or hand piece 21 shown only in Fig. 1, by means of which said valve may be set in the position shown in Fig. 2, so as to throw the exhaust through the heater, or may be set into a position to cut out the heater and throw the exhaust entirely through the main exhaust pipe.

It is important to note that the rectangular flues 17, as well as the sides of the casing 10 and shell 16 are set obliquely to the line of travel of the machine and to the sides thereof, and moreover, that the said flues are staggered so that the hot exhaust gases between the front channels will be deflected against the angular corners of the rear flues. By this arrangement, therefore, the exhaust gases are deflected back and forth and caused to come into contact with all of the surfaces of all of the flues, as well as into contact with the four walls, top and bottom of the inner shell 16. This combined with the way in which the outer shell 16 is spaced

form the outer casing 10, gives a maximum heating efficiency. The air drawn in through the ports 15 will, in part, be drawn through the flues, and in part circulated upward through the space between the shell 10 and casing 16, and thus the air will be heated before it is delivered into the car. Moreover, it is important to note that the air intake ports 15 have less cross section, and hence, less air conducting capacity than the flues and air passages through the heater. This prevents the cold air from being drawn too rapidly into the heater and retards the flow of air long enough to insure proper heating thereof before it is introduced into the car.

The outer casing and heater shown in Fig. 5 are like that previously described, except that they are elongated so as to provide for a large number of rectangular flues 17^a and so as to form the outer shell 10 with parallel side portions 10^a and the inner shell 16 with side walls 16^a having V-shaped indentations 16^b. In this arrangement, an exhaust by-pipe 19^a connects the two direct pipe sections 18^a; and a pivoted valve 20^a is provided for directing the hot exhaust gas, at will, either through said Y pipe 19 or through the inner shell of the heater. Obviously, the heater shown in Fig. 5 will work like the heater shown in the other views, except that it will have more heating capacity and is, therefore, better adapted for large cars.

Obviously, a heater of the kind described may be cheaply made and very easily installed in a car already in use. Its application requires simply cutting a hole in the floor of a car and applying, in the main exhaust pipe, the coupling for the branch exhaust pipe of the heater which is to be attached.

What I claim is:

1. A hot air heater for automobiles comprising an outer box-like casing, an inner box-like shell spaced from the walls and bottom thereof, and having branch exhaust pipe connections extended through said outer casing, the said inner shell having angular vertical flues, and a grating applied at the top of said heater casing and adapted to cover the floor in the automobile.

2. A hot air heater for automobiles comprising an outer box-like casing, an inner box-like shell spaced from the walls and bottom thereof, and having branch exhaust pipe connections extended through said outer casing, the said inner shell having vertical flues, and a grating applied at the top of said heater casing and adapted to cover the floor in the automobile, the said flues being angular in cross section and set zigzag so as to deflect the hot gases from one flue to the other and against the side walls of said inner shell.

3. A hot air heater for automobiles comprising an outer box-like casing, an inner box-like shell spaced from the walls and bottom thereof, and having branch exhaust pipe connections extended through said outer casing, the said inner shell having vertical flues, and a grating applied at the top of said heater casing and adapted to cover the floor of the automobile, the walls of said outer shell being oblique to the longitudinal axis of the automobile and the front oblique walls thereof having air intake ports near their lower portions.

4. In an automobile having an internal combustion engine with an exhaust pipe extended therefrom, a hot air heater comprising a box-like outer casing having rearwardly flaring vertical front walls, said shell being secured to the floor of an automobile in alinement with an opening therein, and disposed with the corners thereof in the longitudinal axis of the automobile, the front walls of said outer shell having air intake ports near their lower portions, a grating covering the floor opening, a box-like inner shell having walls that are parallel to but spaced from the walls of said outer casing, rectangular air tubes extended vertically through said inner shell and staggered in respect to each other, and branch exhaust pipe sections extended from the front and rear corner portions of said inner shell and connected to said main exhaust pipe.

5. In an automobile having an internal combustion engine with an exhaust pipe extended therefrom, a hot air heater comprising a box-like outer casing having rearwardly flaring vertical front walls, said shell being secured to the floor of an automobile in alinement with an opening therein, and disposed with the corners thereof in the longitudinal axis of the automobile, the front walls of said outer shell having air intake ports near their lower portions, a grating covering the floor opening, a box-like inner shell having walls that are parallel to but spaced from the walls of said outer casing, rectangular air tubes extended vertically through said inner shell and staggered in respect to each other, with their walls parallel to the walls of the inner shell, branch exhaust pipe sections extended from the front and rear corner portions of said inner shell and connected to said main exhaust pipe, and a switch valve at the junction of said main exhaust pipe with the front end of said branch exhaust pipe.

6. In an automobile having an internal combustion engine and an exhaust pipe connected thereto and extending rearwardly thereof, a heating device comprising a box-like casing with a grated open upper end disposed in the floor of the automobile and depending therefrom, a closed box-like casing therein having its walls par-

allel to the walls of the first mentioned casing and having vertical angular flues extending therethrough and terminating at the top and bottom surface thereof, said first mentioned casing having ports in its lower side portion, and valved means connected to the exhaust pipe and passing through the outer casing for directing exhaust gases into and through the inner casing and around the flues therein.

In testimony whereof I affix my signature in presence of two witnesses.

BERNHARD E. HAGEN.

Witnesses:

BERNICE G. BAUMANN,

HARRY D. KILGORE.