

E. H. BULLERT.
HOT AIR INTAKE.

APPLICATION FILED MAR. 31, 1910.

Patented Mar. 7, 1911.

2 SHEETS-SHEET 1.

986,357.

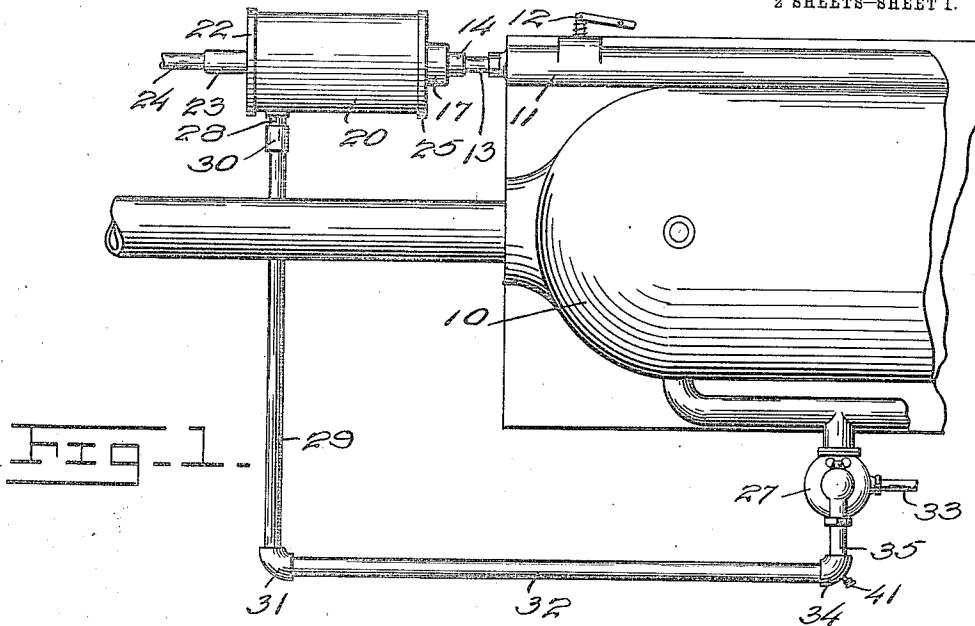


Fig. 1.

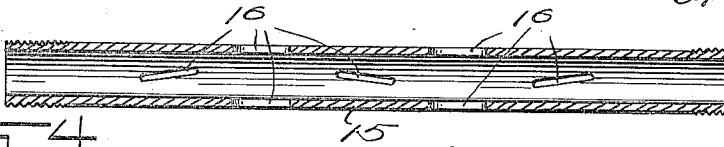


Fig. 4.

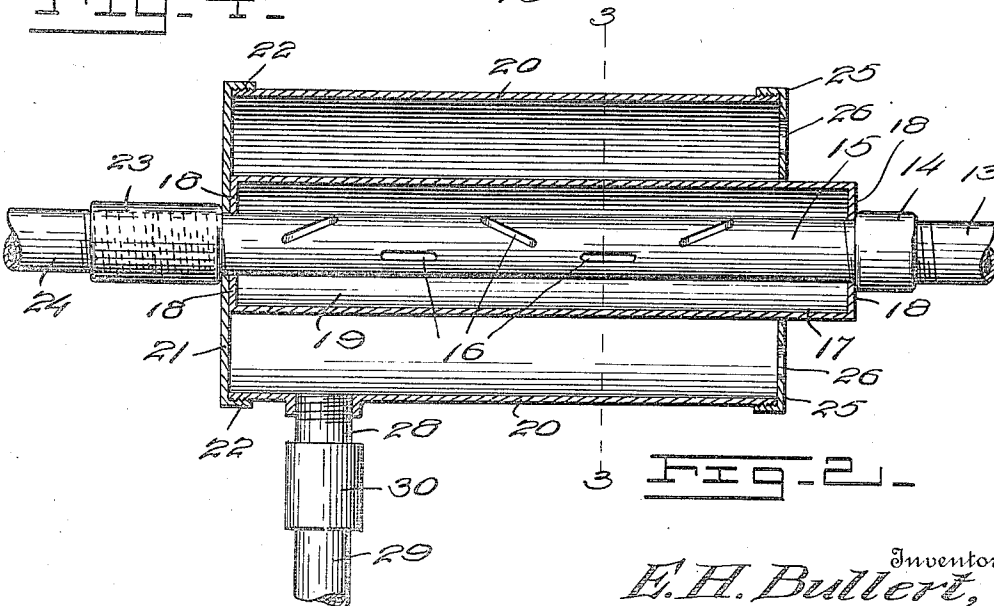


Fig. 2.

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A. H. Lincoln

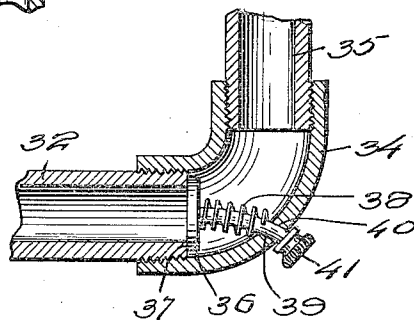
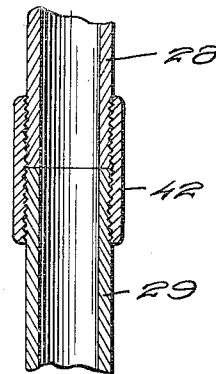
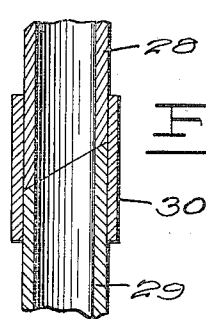
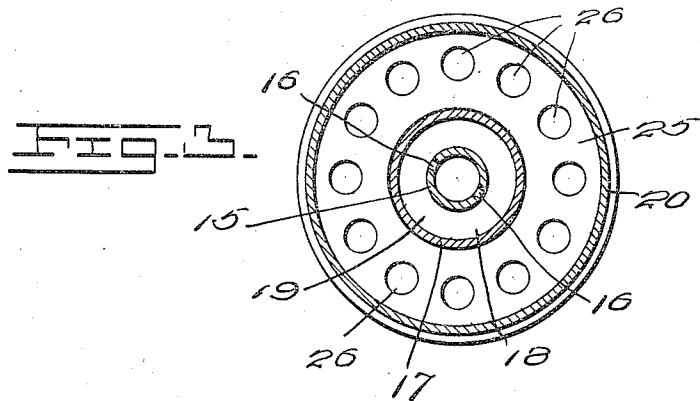
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2 SHEETS—SHEET 2.



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HOT-AIR INTAKE.

986,357.

Specification of Letters Patent.

Patented Mar. 7, 1911.

Application filed March 31, 1910. Serial No. 552,668.

To all whom it may concern:

Be it known that I, EDWARD H. BULLERT, a citizen of the United States, residing at Stewart, in the county of McLeod and State of Minnesota, have invented certain new and useful Improvements in Hot-Air Intakes, of which the following is a specification.

This invention relates to hot air intakes for explosive engines and more especially to a device of this character adapted to heat the air supplied to the engine, so that the explosive mixture formed with the gasolene vapor, will be thoroughly vaporized, thereby furnishing a most desirable mixture for deriving the greatest amount of power.

An object of this invention is to provide a novel form of device or heater, so that the exhaust gases from the engine may be employed to thoroughly heat the supply of air before its passage into the carbureter, such mixture formed with the gasolene vapor being thoroughly vaporized without any separate or previous heating of the gasolene on its way to the carbureter.

Another object is to provide a construction which will be very simple and which can be applied to any gas engine of the usual form, without a great deal of expense for special fittings in applying the same, so that the device may be manufactured independent of the engine and afterward applied, thereby allowing the same to be attached to any engine of the ordinary type.

Another object is to provide means whereby the connection leading from the heater, for supplying the air to the engine may be conveniently detached, so that the device is rendered capable of ready use in cold weather, when it is desirable to heat the air supply but may be readily detached in warm weather when it is not desired to further heat the air supply.

A still further object is to provide a suitable means for regulating the supply of heated air to the carbureter automatically, according to the amount of gasolene supplied in conjunction therewith.

Other objects and advantages will be apparent from the following description, and it will be understood that changes in the specific structure shown and described may be made within the scope of the claims with-

out departing from the spirit of the invention.

In the drawings; Figure 1 is a plan view of my improved heater, showing the same as applied to a gasolene combustion engine of the usual or ordinary type, Fig. 2 is a detailed view of my device detached from the engine, showing the same partly in elevation and partly in section centrally of its diameter, Fig. 3 is a cross sectional view on the line 3—3 of Fig. 2, Fig. 4 is a central longitudinal sectional view of a portion of the exhaust pipe, where disposed within the heating drum, Fig. 5 is a detailed sectional view of a modified form of coupling used in connection with my device. Fig. 6 is a detailed view of a check valve used in connection with the supply pipe for the hot air, and adapted to regulate the supply to the carbureter of the engine, Fig. 7 is a detail sectional view of my preferred form of coupling member, used in connection with the outlet pipe for the hot air.

Referring to the drawings in detail, I have shown my improved heater as applied to a gas engine, of the ordinary or any preferred type, which is provided with the usual casing 11 of any desired form, though I have shown the same as comprising a cylindrical extension disposed exteriorly of the cylinder and having the usual intermittently operated exhaust valve 12 and the exhaust pipe 13 leading from the casing of the valve 12 and secured thereto in any desired manner.

Detachably secured to the exhaust pipe 13 by means of a sleeve 14 is a short section of pipe 15, forming a continuation of said exhaust pipe, said short section 15 and the end of the exhaust pipe 13 being exteriorly screw threaded for engagement with the interiorly screw threaded portion of the sleeve 14, by which said parts are securely held in position. The short section of pipe 15 is provided with a plurality of openings 16 therethrough adapted to permit the exhaust gases, in passing through the exhaust pipe, to escape therefrom, for a purpose to be hereinafter more fully described. The openings 16 may be disposed in any relation best adapted for this purpose, although I have preferably shown the same as elon-

gated longitudinally of the length of the pipe and disposed in staggered relation in such position, such openings being also disposed in registry with each other upon the diametrically opposite sides of the pipe, as is more clearly shown in Fig. 4 of the drawings.

It is obvious that any number of openings may be employed, so as to permit a proper amount of the exhaust gases to escape there-through, for thoroughly heating the air supply to a proper degree and in connection with the above it is also to be noted that I have shown three of such openings disposed in registry with a similar number of openings upon the opposite side of the pipe section and a pair of openings disposed intermediate the aforesaid openings and also upon the diametrically opposite sides of the pipe section, as in the other instance. By the provision of such form of openings and the particular arrangement of the same, as set forth, it will be seen that since the exhaust gases are discharged through the pipe section 15 under pressure of the engine piston on its exhaust stroke, that sufficient heat will be generated by the escape of the gases through the openings by having them somewhat elongated and by having them disposed in staggered relation, the gases will not be allowed to escape under the explosive impulse, without passing through said openings and it will be further apparent that all impurities will be thoroughly separated from the gases and retained in the pipe section, to be discharged upon the next exhaust of the engine, so that the escaping gas for the heating of the air will be in the best condition for such heating purposes.

Mounted upon the pipe section 15 and with its forward end in abutment with the collar 14 is a cylindrical casing 17, the ends of said casing being provided with the in-turned flanges 18, one of which is in engagement with the collar 14 as aforementioned said flanges being adapted to snugly fit upon the pipe section 15 at each end thereof, so as to prevent the escape of gases therefrom, which pass through the openings 16 and into the intervening space 19, between the casing 17 and the pipe 15.

Disposed over the pipe section and casing is a cylindrical drum 20, the rear end 21 of which, comprises a cap having the flange portion 22 which is interiorly screw threaded for engagement with the exteriorly screw threaded end of the drum 20 and by which such parts are held securely together, said rear end or cap being snugly mounted upon the pipe section 15 outwardly of the rear in-turned portion 18 of the casing 17 disposed thereon, said pipe section 15 being exteriorly screw threaded at its rear end, whereby

the interiorly screw threaded collar 23 may be adapted for securing a correspondingly screw threaded pipe section 24, which may be extended a suitable distance therefrom for the proper discharge of the exhaust gases or may be carried off for any desired purpose. The forward end of the drum 20 has a cap 25 similarly secured thereto, as the cap 21 but said cap 25 is snugly mounted upon the casing 17, preferably to the rear of its forward end and has a plurality of openings 26 arranged concentrically there-through, between the walls of the casing and the body portion of the drum 20, so that a sufficient amount of air may be drawn into and heated by the heat of the exhaust gases within the casing 17. It is also apparent that by reason of disposing the pipe section 15 through the casing 17, as the gases pass through said pipe, a suction will be created by the gases passing there-through so as to keep a thorough circulation through the forward openings, into the casing and out of the rear openings 16 and prevent the gases from lagging within the intervening space, thereby insuring the thorough heating of the air supplied through the openings 26 within the drum 20.

In order to carry off the warm or heated air from the drum to the carbureter or vaporizer 27, which has a suitable valve controlled connection with the engine cylinder, in order that the vaporized gas may be supplied thereto, I provide the rear end of the drum with a leadoff formed of a short section of pipe, as shown at 28 and such section is secured to the surrounding wall or body portion of the drum in any suitable manner, though I have shown this section as being provided with exterior screw threads adapted for engagement with an interiorly screw threaded aperture through the drum. As shown in Fig. 7 of the drawings, the end of this pipe section 28 outwardly of the drum is provided with a beveled surface adapted to snugly engage a correspondingly formed end on a pipe section 29, such surfaces when in engagement, being held in position by means of a collar 30 disposed snugly and slidably thereover and fully encompassing the same, it being apparent that should it be necessary to detach the pipe section 29, it is only necessary to slide the collar 30 upon either of the sections 28 or 29, whereupon the section 29, the elbow joint 31 and an extended portion 32 may be swung outwardly to disengage the coacting beveled surfaces.

In order to discharge the heated air into the carbureter, which is provided with a suitable supply pipe 33 for gasoline in a vaporized or unvaporized state, I provide a second elbow joint 34 and a pipe section 35

having connection with the carbureter. The elbow 34 is provided with a check valve for automatically regulating the amount of air fed into the carbureter and adapted to be operated intermittently by the movement of the engine piston to its outward stroke at which time the supply of gas and air is sucked thereinto, for the next explosion by a suitable igniter, as is well known in the art. This check valve comprises the head 36 which is seated against a shoulder 37 formed by the end of the pipe section 32, said head being adapted to be normally held against the shoulder by means of a coil spring 38 disposed around a curved stem 39, rigidly secured to the head and extending through an opening 40 intermediate the ends of the elbow joint 34, said stem being provided with an operating head 41 if desired, which is removably secured thereto, so that the valve head and its attached stem and the spring may be removed through the openings at either end of the elbow joint.

A further manner of detachably securing the pipe sections 28 and 29 is shown in Fig. 5 of the drawings, wherein said sections are provided with exteriorly screw threaded ends adapted to be coupled together by means of an interiorly screw threaded collar or coupling member 42, so that by detaching the pipe section 29, the supply of warm air to the carbureter through the heating device may be cut off.

From the foregoing description, it is apparent that air supplied to the drum will be thoroughly heated in its passage through the drum and around the casing 17 by the exhaust gases passing through the casing 17, and will be supplied automatically to the carbureter as required through the medium of the check valve, thereby insuring a most desirable vaporization of the combustible mixture and preventing the supply of gasoline to the engine cylinder; thus avoiding the formation of carbon within the cylinder and upon the supply valves, as has been found to be very objectionable, inasmuch as it interferes with the free operation thereof. Furthermore, the provision of the casing 17 disposed around the short pipe section 15 which is provided with the openings 16 to allow the exhaust gases to escape there-through to heat the casing, permits said casing and the drum to be manufactured of lighter or sheet material, for all useful purposes of the invention. It will also be noted, that by having the collar 23 in engagement with the cap 21 at the rear end of the drum, which cap is positioned against the flange 18 of the casing 17, the several parts are rigidly held in position and inasmuch as the exhaust pipe passes through the casing and drum, a very desirable form of muffler

is also provided, thereby doing away with the necessity of providing a separate muffler and greatly reducing the cost of fittings, as well as enhancing the value of my device.

What is claimed is:

1. In an internal combustion engine, an exhaust pipe therefor, a casing mounted upon said pipe with an intervening space and closed ends, said exhaust pipe having a plurality of openings therein adapted to discharge the exhaust gases within said space, a drum mounted upon said exhaust pipe at its rear end and provided with openings in its forward end through which air is adapted to pass and be heated by the heat generated within the casing, an outlet for the drum, a carbureter having communication with the engine cylinder and connections between the outlet and carbureter for supplying heated air thereto.

2. An internal combustion engine comprising the cylinder thereof having a suitable exhaust valve and a carbureter for supplying vaporized gases thereto, an exhaust pipe leading from said valve and comprising a short section of pipe provided with a plurality of openings, a casing carried by the pipe, a drum disposed thereon rearwardly of the forward end of the casing, said drum having a plurality of concentrically arranged openings in its forward end for the passage of air to be heated by the heat generated by the exhaust gases in the pipe and casing and valve connections between the drum at its rear end and the carbureter.

3. In combination, an engine cylinder provided with an exhaust passage, an exhaust pipe detachably secured thereto, a casing disposed on said pipe, securing means at the forward and rear ends of said casing to prevent longitudinal movement thereof upon the pipe, said pipe having communication with the interior of the casing, a drum disposed upon the casing with its rear end mounted on the pipe rearwardly of the casing, said drum being adapted for the passage of air through its forward end, a carbureter for supplying a gaseous mixture to said cylinder, an oil supply therefor and detachable connections between the drum and the carbureter whereby the supply of air thereto may be regulated.

4. In an internal combustion engine, a cylinder therefor, a carbureter for supplying a gaseous mixture to said cylinder, an exhaust valve for said cylinder, an exhaust pipe leading from said valve, said pipe being provided with a plurality of openings disposed in staggered relation longitudinally of its length, a casing snugly mounted around said pipe with an intervening space, the exhaust gases discharged through said

pipe being adapted to pass through said intervening space to thoroughly heat said casing, a cylindrical drum snugly mounted upon said casing at its forward end and the exhaust pipe at its rear end, said drum having a plurality of openings arranged concentrically through its forward end and adapted to permit the passage of air through the drum to be heated by its passage around the casing, pipe connections between the rear

end of the drum and the carbureter and a valve disposed in said connections and adapted to automatically regulate the discharge of heated air to the carbureter.

In testimony whereof I affix my signature, 15
in presence of two witnesses.

EDWARD H. BULLERT.

Witnesses:

FRED REHSE,

L. S. RICHARDS.