No. 877,431. PATENTED JAN. 21, 1908.

L. A. JONES.

EXHAUST CONDENSER.

APPLICATION FILED MAR. 20, 1907.

2 SHEETS—SHEET 1.

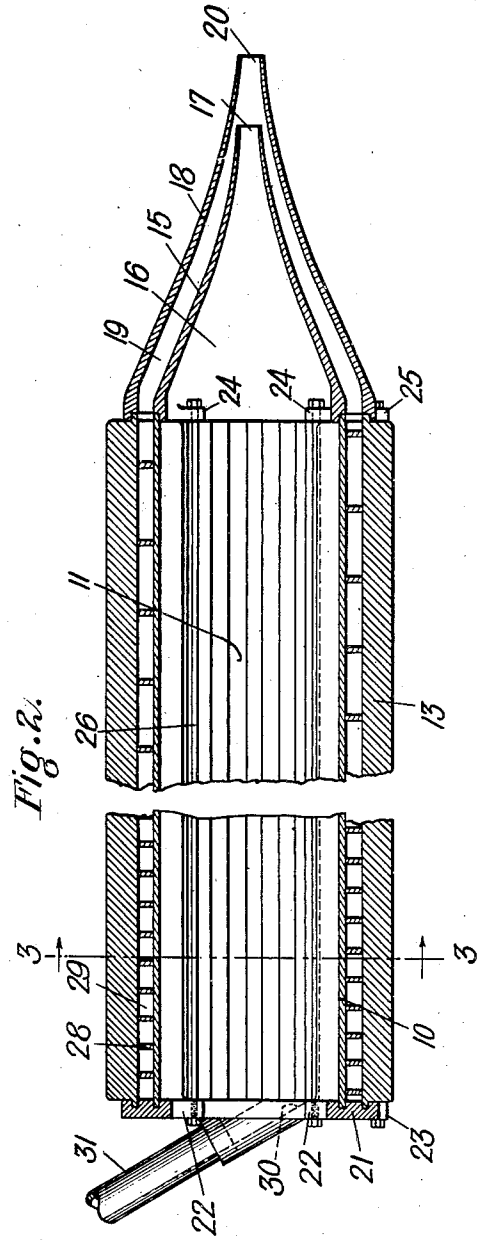

Fig. 2.

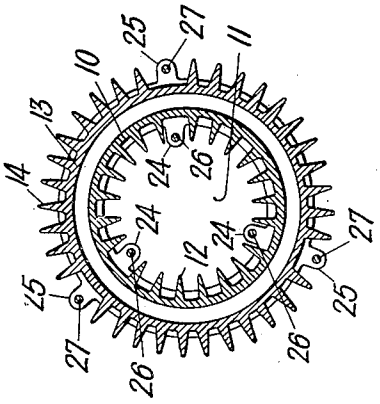

Fig. 3.

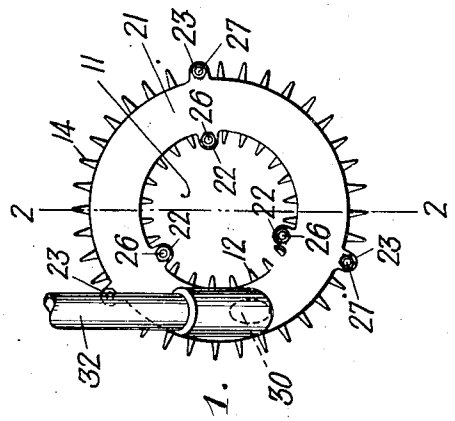

Fig. 1.

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2 SHEETS—SHEET 2.

Fig. 4.

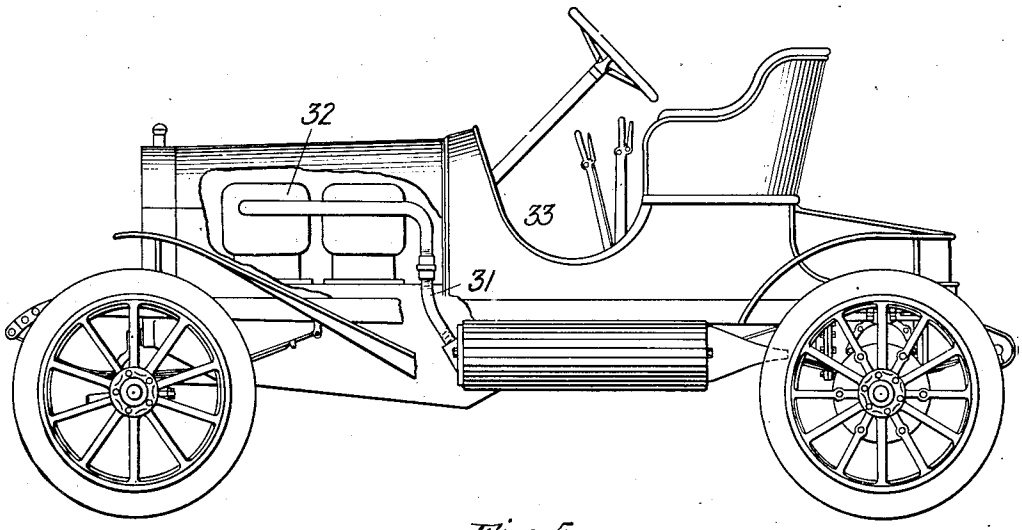


Fig. 5.

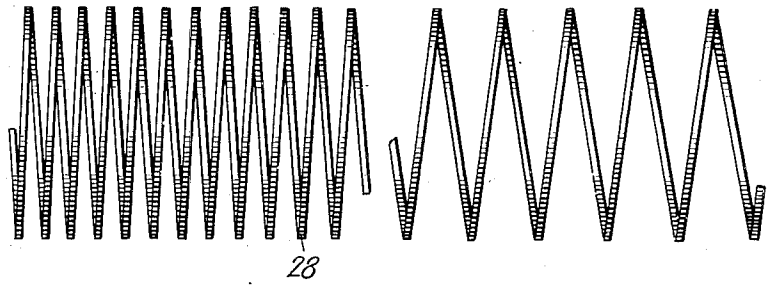
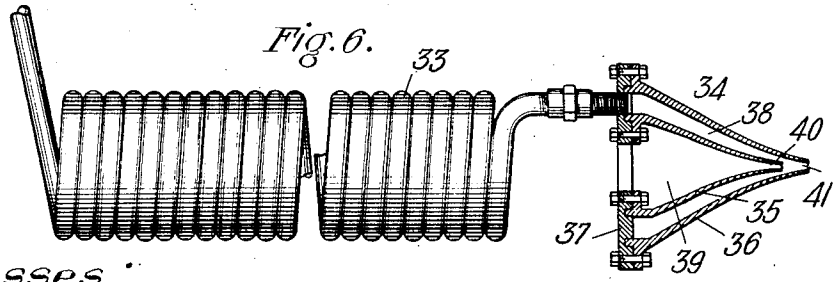


Fig. 6.



Witnesses:
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UNITED STATES PATENT OFFICE.

LOUIS A. JONES, OF CAMBRIDGE, MASSACHUSETTS.

EXHAUST-CONDENSER.

No. 877,431. Specification of Letters Patent. Patented Jan. 21, 1908.

Application filed March 20, 1907. Serial No. 363,501.

To all whom it may concern:

Be it known that I, LOUIS A. JONES, a citizen of the United States, residing at Cambridge, in the county of Middlesex and State of Massachusetts, have invented new and useful Improvements in Exhaust-Condensers, of which the following is a specification.

This invention relates to improvements in condensers for motor vehicles driven by engines employing an expansive agent, such as gas or steam.

In motor cars driven by internal combustion engines it is the usual practice to silence the exhaust by connecting the exhaust pipe of the engine to a muffler having perforated baffle plates or other like devices the purpose of which is to break up the exhaust gas into a number of small streams before allowing said gas to escape into the atmosphere. It is a well known fact that such mufflers cause a back pressure which reduces the power of the engine five or six per cent.

The object of this invention is to provide devices by means of which the exhaust is silenced without back pressure.

The invention consists in a device adapted to receive and rapidly cool or condense the hot gas so that it is released into the atmosphere without noise.

The invention again consists in a device by means of which a partial vacuum is created in the condenser, muffler, or other connections leading to the exhaust ports of the engine.

The invention finally consists in the combination and arrangement of parts set forth in the following specification and particularly pointed out in the appended claims.

Other objects and advantages will appear more fully hereinafter.

Referring to the drawings: Figure 1 is a front elevation of my improved condenser. Fig. 2 is a section taken on line 2—2 of Fig. 1, looking toward the left. Fig. 3 is a section taken on line 3—3 of Fig. 2, looking toward the right. Fig. 4 is a side elevation of a motor car showing the condenser applied thereto, the car being partly broken away to better disclose the condenser and piping to the engine. Fig. 5 is a detail side elevation of the helical member, partly broken away to save space. Fig. 6 is a side elevation of a modified form of my invention shown partly in elevation and partly in section, and partly broken away to save space.

Like numerals refer to like parts throughout the several views of the drawings.

In the drawings, 10 is a tube having a substantially cylindrical air passage 11 therethrough, said tube being provided with a plurality of projections 12 which in this instance are ribs extending longitudinally of said tube. A second tube 13 surrounds the tube 10 concentric therewith, there being an annular space between said tubes, while the tube 13 is provided with exterior projections 14 similar to the projections 12. The projections 12 and 14 may take other forms if desired. A substantially frusto-conical tube 15 is connected to the tube 10 and forms a continuation thereof, said tube 15 having a substantially frusto-conical air passage 16 forming a continuation of the air passage 11, said air passage 16 terminating in an outlet orifice 17. A substantially frusto-conical tube 18 surrounds the tube 15 concentric therewith and forming a continuation of the tube 13, there being a space or passage 19 between said tubes, said passage terminating in an outlet orifice 20.

An annular cap-plate 21 closes one end of the annular space between the tubes 10 and 13, said cap-plate being provided with a plurality of ears 22, and a plurality of ears 23. The tube 15 is provided with a plurality of ears 24 corresponding to the ears 22, while the tube 18 is similarly provided with a plurality of ears 25 corresponding to the ears 23. A plurality of rods or bolts 26 connect the ears 24, respectively, to the ears 22, while a plurality of rods or bolts 27 connect the ears 25, respectively, to the ears 23, said bolts rigidly clamping the whole structure together.

A helical member or baffle plate 28, shown in detail in Fig. 5, is interposed between the tubes 10 and 13, said member being preferably an increase pitch helix. The introduction of the helical member 28 forms a helical gas passage 29, which increases in cross-sectional area from the inlet orifice 30 to its outlet, that is, to its junction with the passage 19.

Referring now to Fig. 4, an exhaust pipe 31 tapped into the cap-plate 21 is connected to an engine 32 which may be an internal combustion engine, said engine being adapted to drive the motor car 33. The device of my invention is placed longitudinally of the car 33 and it will be seen that as said car travels toward the left air will rush through the passage 11, outwardly through the ori-

fice 17 and thence outwardly through the orifice 20. It will be seen that said current of air will induce a current in the passages 19 and 29 and will cause a partial vacuum therein. The hot exhaust from the motor 32 passes through the exhaust pipe 31, through the inlet orifice 30 into the helical passage 29 and passes repeatedly around the air passage 11. The projections 12 and 14 radiate very rapidly the heat which is imparted thereto by the hot gas, the motion of the car causing said projections to constantly come into contact with cool air, the effect being like a blast along both the interior and exterior of the condenser. It will be seen that the hot gas is thus rapidly cooled and diminished in pressure and at the same time is allowed by the continually increasing area of the passage 29 to expand until its pressure is entirely lost. The exhaust on its entrance at the orifice 30 is a hot, rapidly moving intermittent or pulsatory stream of gas, and by the time it reaches the passage 19 is transformed into a comparatively cool body of gas. The rapidly moving stream of air which passes outwardly through the orifice 17 creates a powerful suction which prevents back pressure in the passages 19 and 29, and said stream mixing with the gas from the passage 19 passes outwardly in a substantially steady stream through the orifice 20, there being practically no pulsation to the current.

In Fig. 6, I have shown a modified form of my invention in which the condenser is in the form of a helical pipe 33 connected to a vacuum creating device 34. The vacuum creating device 34 comprises two frusto-conical tubes 35 and 36, and an annular cap-plate 37, there being a gas passage 38 separating said tubes. The tube 35 surrounds an air passage 39, said air passage terminating at its right hand end in an outlet orifice 40. The pipe 33 leads into the passage 38 and said passage terminates in an outlet orifice 41. The device 34 may be connected to any other form of muffler if desired.

Having thus described my invention, what I claim and desire by Letters Patent to secure is:

1. An exhaust condenser provided with an air passage having an inlet and an outlet orifice, and provided with a helical gas passage repeatedly surrounding said air passage, said gas passage having an inlet and an outlet orifice.

2. An exhaust condenser provided with an air passage having an inlet and an outlet orifice, and provided with a helical gas passage repeatedly surrounding said air passage, said gas passage increasing in cross-sectional area from its inlet orifice to its outlet orifice.

3. An exhaust condenser provided with an air passage having an inlet and an outlet orifice, and provided with a helical gas passage repeatedly surrounding said air passage, said gas passage increasing in cross-sectional area according to a fixed ratio from its inlet orifice to its outlet orifice.

4. An exhaust condenser provided with an air passage having an inlet and an outlet orifice, and provided with a gas passage surrounding said air passage, said gas passage having an inlet and an outlet orifice, the wall separating said air passage from said gas passage being provided with projections extending into said air passage.

5. An exhaust muffler provided with an air passage having an inlet and an outlet orifice, and provided with a gas passage surrounding said air passage, said gas passage having an inlet and an outlet orifice, the wall surrounding said gas passage being provided with exterior projections.

6. An exhaust muffler provided with an air passage having an inlet and an outlet orifice, and provided with a gas passage surrounding said air passage, said gas passage having an inlet and an outlet orifice, the wall separating said air passage from said gas passage being provided with projections extending into said air passage, and the wall surrounding said gas passage being provided with exterior projections.

7. An exhaust muffler provided with an air passage having an inlet and an outlet orifice, and provided with a gas passage surrounding said air passage, said gas passage having an inlet and an outlet orifice, the wall separating said air passage from said gas passage being provided with longitudinal ribs extending into said air passage, and the wall surrounding said gas passage being provided with longitudinal exterior ribs.

8. The combination with an exhaust condenser, of a device provided with a substantially frusto-conical centrally arranged air passage having an inlet and an outlet orifice, said device being also provided with a gas passage surrounding said air passage and connected to said condenser, said gas passage terminating in an outlet orifice.

9. A device of the character described provided with a substantially frusto-conical and substantially straight centrally arranged air passage having an inlet and an outlet orifice, said device being also provided with a gas passage surrounding said air passage, said gas passage having an inlet and an outlet orifice.

10. In combination, an exhaust condenser provided with an air passage having an inlet and an outlet orifice, and provided with a gas passage surrounding said air passage, said gas passage having an inlet and an outlet orifice; and a device provided with a substantially frusto-conical centrally arranged air passage connected to said first-named air

passage, said device being also provided with a gas passage surrounding said second-named air passage and connected to said first-named gas passage.

11. In combination, an exhaust condenser provided with a central air passage having an inlet orifice, and provided with a helical gas passage surrounding said air passage, said gas passage having an inlet orifice; and a device provided with a substantially frusto-conical centrally arranged air passage connected to said first-named air passage and having an outlet orifice, said device being also provided with a gas passage surrounding said second-named air passage and connected to said first-named gas passage, said second-named gas passage terminating in an outlet orifice.

12. In a device of the character described, an inner tube, an outer tube arranged concentrically with said inner tube, there being a space between said inner and outer tubes, a substantially frusto-conical inner tube connected to said first inner tube and forming a continuation thereof, a substantially frusto-conical outer tube connected to said first outer tube and forming a continuation thereof, and an annular cap-plate closing said space at one end.

13. In a device of the character described, an inner tube provided with interior projections, an outer tube arranged concentrically with said inner tube, there being a space between said inner and outer tubes, said outer tube being provided with exterior projections, a substantially frusto-conical inner tube connected to said first inner tube and forming a continuation thereof, a substantially frusto-conical outer tube connected to said first outer tube and forming a continuation thereof, and an annular cap-plate closing said space at one end.

14. In a device of the character described, an inner tube provided with interior projections, an outer tube arranged concentrically with said inner tube, there being a space between said inner and outer tubes, said outer tube being provided with exterior projections, a substantially frusto-conical inner tube connected to said first inner tube and forming a continuation thereof, a substantially frusto-conical outer tube connected to said first outer tube and forming a continuation thereof, an annular cap-plate closing said space at one end, and a helical member interposed in said space between said inner and outer tubes.

15. In a device of the character described, an inner tube provided with interior projections, an outer tube arranged concentrically with said inner tube, there being a space between said inner and outer tubes, said outer tube being provided with exterior projections, a substantially frusto-conical inner tube connected to said first inner tube and forming a continuation thereof, a substantially frusto-conical outer tube connected to said first outer tube and forming a continuation thereof, an annular cap-plate closing said space at one end, and a helical member of constantly increasing pitch interposed in said space between said inner and outer tubes.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

LOUIS A. JONES.

Witnesses:
CHARLES S. GOODING,
SADIE V. MCCRATHY.