

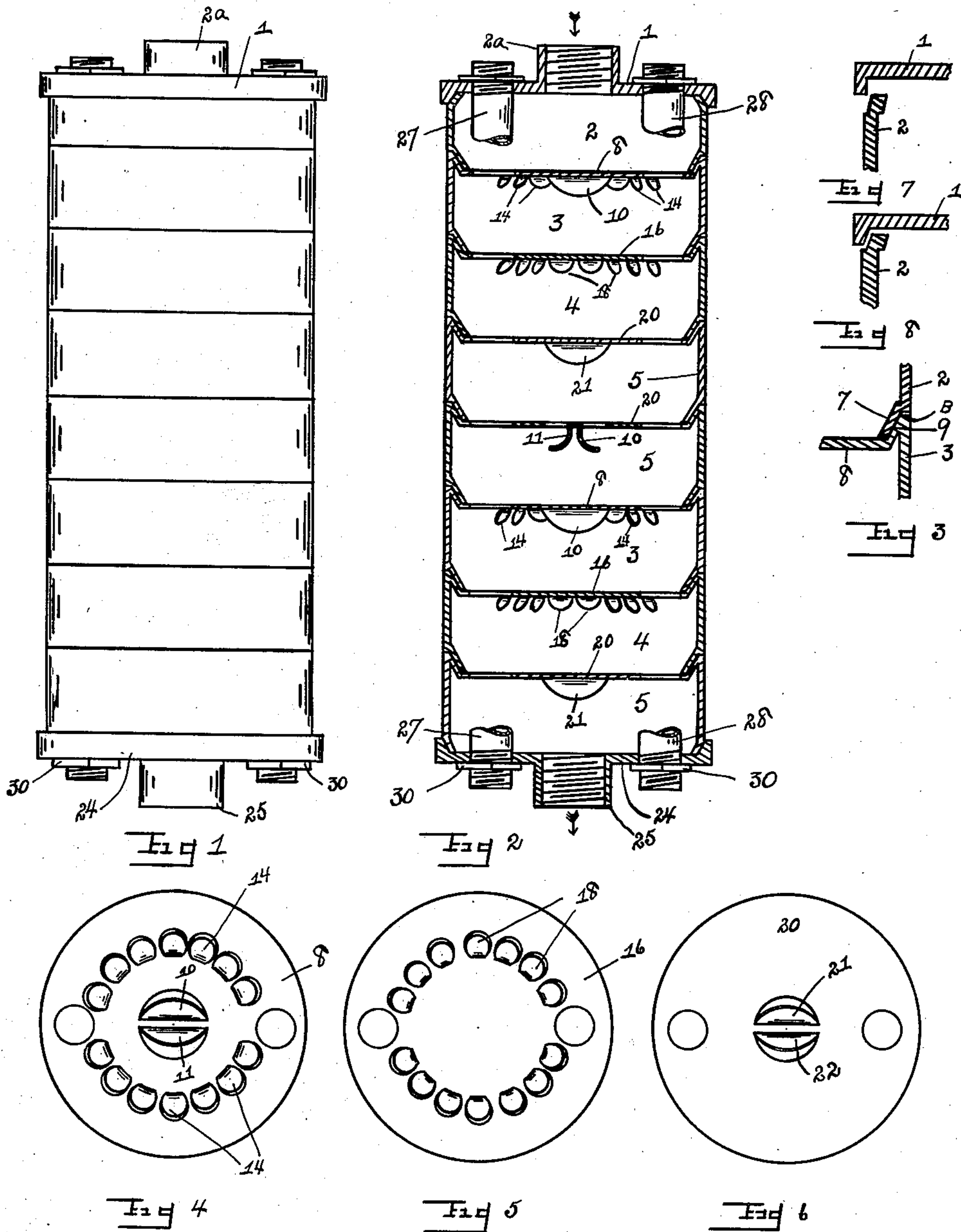
J. J. RADELL.

MUFFLER.

APPLICATION FILED JAN. 7, 1910.

956,170.

Patented Apr. 26, 1910.



WITNESSES:

*L. Wilder*  
*H. G. Bueck*

INVENTOR

JOHN J. RADELL

BY *Risley & Lane*  
 ATTORNEYS



# UNITED STATES PATENT OFFICE.

JOHN J. RADELL, OF UTICA, NEW YORK.

MUFFLER.

956,170.

Specification of Letters Patent.

Patented Apr. 26, 1910.

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*To all whom it may concern:*

Be it known that I, JOHN J. RADELL, a citizen of the United States, residing at Utica, in the county of Oneida and State of New York, have invented certain new and useful Improvements in Mufflers, of which the following is a specification, reference being had therein to the accompanying drawing.

My invention relates to an improved muffler, and I declare that the following is a full, clear, concise and exact description thereof, sufficient to enable one skilled in the art to make and use the same, reference being had to the accompanying drawings in which like reference characters refer to like parts throughout.

The invention is shown in the form of a muffler adaptable particularly to automobiles, but I do not limit myself to that particular use of the invention as it is capable of being used in a wide variety of applications and with different kinds of engines. Nor do I limit myself by the particular illustration here given, in matter, size, form or proportion, simply intending herein to illustrate one embodiment of the invention whereby to disclose its principles.

The invention includes the arrangement of a series of chambers of greater or less number, as may be desired, and which number may be increased or reduced according to conditions. These chambers provide a series of what may be called cushion chambers for the exhaust vapor while at the same time passages are provided so that the vapor may pass through the series.

Other particulars of the invention will appear from the description and drawings.

Figure 1 is a full side view of one form of the device. Fig. 2 is a vertical sectional view. Fig. 3 is a sectional view enlarged of a portion of the walls of abutting chamber members. Figs. 4, 5 and 6 are plan views of the several chambers. Figs. 7 and 8 are partial details in cross section.

Referring to the drawings in detail, I provide at one end of the muffler a cap or base 1 which is bored and provided with a bushing 2<sup>a</sup> for the connection of the intake of the exhaust. This base has its edge formed in a peripheral rim, as indicated in Fig. 2. Within this rim is set one of the chamber members, shown at 2, and which in this instance consists of a collar or ring of a given height and of a diameter to fit into

the peripheral rim on part 1. This ring it will be seen forms a chamber into which the exhaust first enters and which has a considerable space relative to the area of the exhaust pipe, so that the vapor of the exhaust disperses itself throughout the space formed by the ring and the adjacent members and acts as a buffer or cushion for the succeeding blast of the exhaust in so far as the vapor of the exhaust remains in the chamber until the succeeding blast is delivered.

It is to be noted that part 2 sets into part 1 with its wall at the upper edge bearing against the rim on part 1 which reinforces the collar at that point. The lower edge of the ring 2 is formed with an external shoulder, as seen in Fig. 3, so that the next member sets over the lower edge of part 2. In this way the pressure of the vapor at the lower edge of ring 2 is resisted both by ring 2 and the overlapping edge of ring or cup 3. This also enables me to form a tight joint and this result can be assisted by having the shoulder of ring 2 made on a bevel, as indicated at 7, the part 3 also being made on a bevel, as at 9, so that when the parts are assembled and joined together a tight joint between the several parts is assured. This result can also be secured at the point where ring 2 sets into rim 1, in which case either or both parts may be formed with a bevel. I next in order place a collar of perhaps the same height as part 2 and shown at 3. This collar, however, has a bottom 8 in which are formed a plurality of openings, some of centrally disposed and others group thereabout. These openings are made by cutting and pressing the bottom of chamber member 3 by dies which preferably cut part of a circle and turn up the severed edge of the portion within the circle so that as indicated in Fig. 2 there is on one side a flange or lip 10 turned up on an angle, with a corresponding flange or lip 11 on the opposite side of the center, as seen in Fig. 4, while at various other points in the bottom are flanges or lips 14 of a various number and position. These upturned flanges are in this chamber so placed that when the jet of exhaust enters the chamber formed by the ring 2, the central volume of the blast strikes the bottom 8 in the central portion thereof and part of it passes through the openings at flanges 10 and 11 which deflect it toward the sides of the chamber formed by collar 3.



Between the central openings or ports and the outer ones is a surface of unbroken bottom against which an outer portion of the jet impacts and whereby it is dispersed throughout the chamber formed by collar 2. Further outward portions of the jet are passed through the openings formed by the lips or flanges 14 and are impacted against the walls of the chamber formed by the ring or cup 3. The ring or cup 3 is formed with its edges beveled, as already indicated as to the upper edge and its lower edge is also beveled as indicated with reference to part 2. It will be understood while I speak of these edges being beveled to interfit, I do not specify such construction as essential to the invention, as other suitable methods might be employed for forming a suitable joint, such as dishing the bottom of one cup inwardly, leaving a shoulder as B upon which the adjacent cup correspondingly shaped is seated as seen in Fig. 3. The adjacent part 4 is formed similar to part 3 and comprises the side walls shown at 4 and the bottom 16. This bottom is formed only with a group of outer ports, shown at 18, and similar to those shown at 14 in Fig. 4. It will be seen by this arrangement that the gas or vapor which is passed into the chamber formed by part 3 and has been there thoroughly dispersed in the chamber forms something of a cushion for the succeeding blast as it enters, and being under pressure escapes through the openings 18, the central portion of the bottom 16 forming a buttress or firm surface for the impact of the vapor and its deflection and distribution throughout the chamber.

The vapor or gas having come into the chamber formed by ring 4 and having been dispersed therethrough by reason of the angular position of the flanges or lips 8 is met by the bottom of the succeeding ring which consists of the wall 5 and the bottom 20. In this bottom is centrally placed two oblique flanges or fins 21 and 22, Fig. 5, leaving an unbroken surface of the bottom 20 there around for the impact, deflection and distribution of the gas which enters chamber formed by the ring 4. The flanges 21 and 22 deflect the gas into the chamber formed by the member, ring 5. It will be seen that in this succession of rings or dishes, I provide as already stated a series of chambers for the vapor or gas, each having a space considerably larger than the area of the gas inlets thereto whereby a certain quantity of vapor remains in each chamber to take up the concussion of gas, but the vapor being under constant though uneven pressure finds its escape through a series of openings from one chamber to the other, but such openings are so made and placed in the metal that the currents of the exhaust are variously deflected from the passage of one chamber to

the other, and that the openings are so made and so arranged that the exhaust does not pass directly through the series of openings but must follow a certain tortuous or winding course which necessarily leaves a residuum of the gas for a cushion effect and breaks up the currents to prevent direct discharge of the gas through the muffler. In case a muffler of greater length is desired, these different chamber members may be duplicated, particularly 4 and 5, in alternate arrangement, so that if under certain conditions it is found desirable the muffler can be enlarged or even reduced in size. It is believed that in Fig. 2 is shown the minimum number of chamber members for a serviceable device, but if more be needed they can be added in any given extent, it being important in arranging them to have them so grouped that the passageway of the vapor will be sinuous as possible and that the openings into the chambers will not be directly opposite each other.

At 24 I show the top or cover which is formed similar to part 1, with a peripheral rim which may be formed on a bevel to inclose the upper edge of the adjacent part 5, which may be formed straight or on a corresponding bevel, one form being indicated in Fig. 7, and the other in Fig. 8. It has a central bore with bushing at 25 for the escape of the exhaust.

One important feature of the invention is the method in which the assembled members are secured. 27 and 28 are tubes having nuts or heads at one end and which are passed through the series of members and are threaded at the other end for nuts 30. In this way the assembled members can be brought tightly together so as to close the joints, the tubes being passed through bores in the several members, which bores, however, may be slightly larger than the tubes, thus providing additional passages for the gas. An important feature, however, is that these connecting members are tubular so that air passes through them and cools them off and consequently cools the exhaust vapor in the several chambers. The drawings show but two of these tubes, but it will be understood that any number of them may be employed and that they may be larger in size relative to the device than shown, and may be of the most suitable construction for the cooling effect.

While I have pointed out a form of construction whereby the edge of one member overlaps the other, particular attention is called to the strengthening effect of such construction, whereby the exhaust in any one chamber is met at the joints by the resistance of not only the wall forming that chamber but of the overlapping wall of the adjacent member, and that the wall of the member which receives the pressure is the



inner one of those overlapping edges, whereas were it the outer one the pressure on the wall would not have the resistance of the wall of the adjacent member.

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

1. A device of the character described comprising a plurality of circular chambers with  
10 transverse walls therebetween held together by hollow tubes adapted for air passages, the said walls being provided with apertures whereat are placed angularly disposed flanges whereby to deflect the exhaust, sub-  
15 stantially as described.

2. A muffler comprising a plurality of ring-like members carrying dish like partition members transverse the axis of the ex-  
20 haust, the said partition members being apertured for the passage of the exhaust, said apertures partially covered by upwardly, angularly disposed flanges, and the said several members being dismountably attached, sub-  
stantially as described.

25 3. A device of the character described comprising end members with peripheral rims thereon, a plurality of ring-like members having transverse sections apertured and said apertures provided with hooded flanges  
30 adapted to be assembled between the end members, and means for holding the same in assembled position, the said means comprising tubular members passing through the said series, substantially as described.

35 4. A muffler comprising end members, a plurality of interchangeable intermediate members, the same providing transverse partitions lengthwise of the device and tubular members adapted to form an air passage way  
40 whereby to hold a given number of the same in assembled position, substantially as described.

5. A device of the character described comprising a plurality of interfitting ringlike  
45 members, certain of the same being provided with transverse portions apertured for the passage of gas, the said ringlike members having their edges beveled to interfit, the

wall of one member being reinforced by the wall of the adjacent member at the point of  
50 greatest strain, substantially as described.

6. In a muffler of the character described, the combination of end members having peripheral rims adapted to reinforce the ad-  
55 jacent edges of ring like members having transverse sections with hooded apertures, substantially as described.

7. In a muffler of the character described, the combination of end members having peripheral edges or rims adapted to reinforce  
60 the adjacent edges of separable independent ring like members, having transverse sections with hooded apertures, substantially as described.

8. In a muffler, the combination of a plu-  
65 rality of independent, separable, ring like members, having transverse sections provided with hooded apertures, the edge of each ring like member adapted to reinforce  
70 the adjacent edge of each preceding member, substantially as described.

9. In a muffler of the character described, the combination of end members provided with peripheral rims adapted to reinforce  
75 the adjacent edges of adjacent ring like members having their remote edges beveled and reinforced by the correspondingly beveled edges of intermediate members, sub-  
stantially as described.

10. In a muffler of the character described, 80 the combination of end members and ring like members held together by a plurality of hollow tubes, said ring like members each having one edge formed to seat and rein-  
85 force the preceding member and having the remote edge beveled and shouldered to fit upon the shoulder of the next succeeding member, substantially as described.

In testimony whereof I have hereunto af-  
fixed my signature in the presence of two 90 witnesses.

JOHN J. RADELL.

Witnesses:

ELEANOR T. DE GIORGI,  
T. L. WILDER.