W. H. & O. C. UNKE.

EXHAUST SILENCER.

APPLICATION FILED OCT. 17, 1912.

1,081,348. Patented Dec. 16, 1913.

Fig. 1.

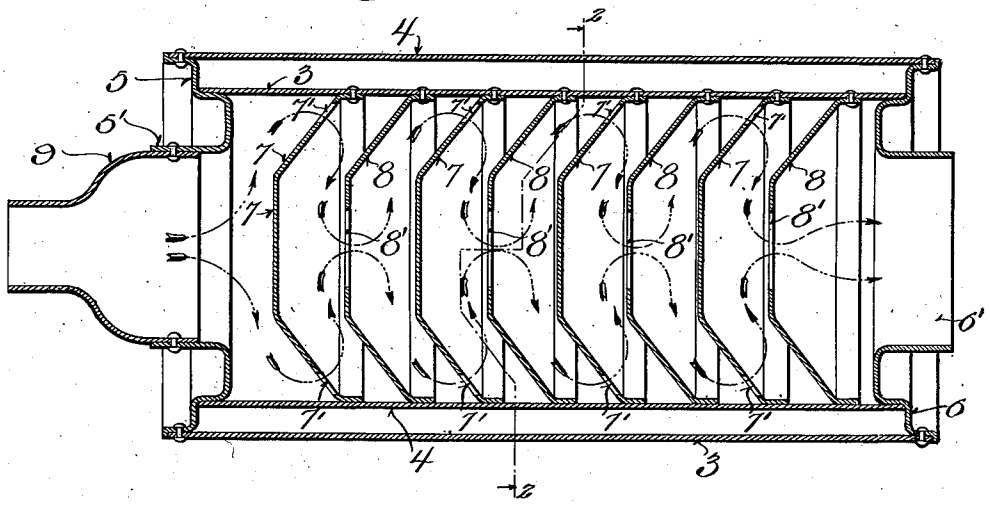
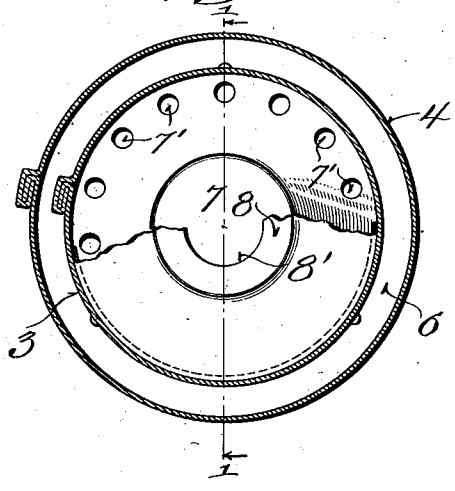


Fig. 2.



Witnesses:
Casmir Young
May Dabney

Inventors
William H. Unke
Otto C. Unke
By Richard Young
Attorneys

UNITED STATES PATENT OFFICE.

WILLIAM H. UNKE AND OTTO C. UNKE, OF MILWAUKEE, WISCONSIN, ASSIGNORS, BY MESNE ASSIGNMENTS, TO YALE STEEL STAMPING COMPANY, OF OOSTBURG, WISCONSIN, A CORPORATION OF WISCONSIN.

EXHAUST-SILENCER.

1,081,348. Specification of Letters Patent. Patented Dec. 16, 1913.

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To all whom it may concern:

Be it known that we, WILLIAM H. UNKE and OTTO C. UNKE, both citizens of the United States, and residents of Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Exhaust-Silencers; and we do hereby declare that the following is a full, clear, and exact description thereof.

Our invention consists in what is herein particularly set forth with reference to the accompanying drawings and pointed out in the claims of this specification its object being to provide simple, light, strong, durable and efficient silencers for the exhaust of internal combustion engines, especially those employed for automobile propulsion, said silencers being designed to effectually eliminate back pressure in said engines.

Figure 1 of the drawings illustrates a longitudinal section view of a silencer in accordance with our invention, and is indicated by line 1—1 in the next described figure. Fig. 2 of said drawings indicates a transverse sectional view of the silencer having a breaker thereof partly broken away, this view being indicated by line 2—2 in Fig. 1.

Referring by numerals to the drawings, 3 indicates a cylindrical inner jacket, 4 an outer cylindrical jacket and 5, 6, heads of a casing for breakers 7, 8 of a silencer in accordance with our invention, these several parts being preferably of sheet-steel of suitable gage to render said silencer as light as possible without sacrifice of strength, and it is preferable to have the seams of said jackets bar-locked and spot-welded. The jackets 3 and 4 are concentric, and their diameters are such as to provide for sufficient space between the two. The heads 5 and 6 are fashioned to have slip-fit in the ends of the jackets aforesaid, and they are preferably riveted or otherwise permanently secured in the outer jacket, the space between said jackets being sealed by said heads to thus provide for a dead-air cushion in said space. Each head is shown provided with a central opening and an outwardly extending annular flange. Engaging the flange 5′ of the head 5 is a bushing 9 for the engagement of the exhaust pipe of an internal combustion engine, the bushing being preferably riveted or otherwise rigidly secured in said flange. A pipe-extension (not shown) of the silencer may be coupled to the flange 6′ of the head 6.

The breakers 7 and 8 are disposed alternately within the inner jacket 3 of the casing, said breakers being conical partition plates provided with flanges that are parallel to said jacket and riveted or otherwise rigidly secured thereto. All of the breakers extend rearward toward the head 5, and they are approximately equidistant apart, their ends of least diameter being parallel to said head. Each breaker 7 is provided with apertures 7′ at regularly recurring intervals circumferentially of the same adjacent to its forward end of greatest diameter, and each breaker 8 is centrally open. The total area of the apertures 7′ of each breaker 7, and the area of the central opening 8′ of each breaker 8 is approximately equal. It is also to be noted that the combined area of all the apertures in each breaker 7 and of the central opening in each breaker 8 is intended to be equal to or greater than the area of the mouth of the exhaust-pipe to which the silencer is coupled, and the dimensions of the two-jacket casing and of said breakers therein, as well as the number of these breakers may be varied indefinitely in proportion to the volume of gases to be exhausted through said silencer. In practice, the disposition of the breakers is such that the exhaust under pressure leaving the engine will first encounter a breaker 7, the gases being diffused to pass through the apertures in said breaker into the space between the same and the breaker 8 next beyond, where they are deflected by the latter breaker to find their way through its central opening into the next forward space, and so on through the silencer, the flow of said exhaust being continuous in one direction but tortuous as indicated by the arrows in Fig. 1, to thereby break its velocity and tone, the tortuosity being virtually tangential to the axis of said silencer and at an angle of approximately 20°, in order to attain the best results. The dead-air cushion between the jackets 3 and 4 serves as a neutralizer between the temperature within the silencer and that of the atmosphere, in order to provide for uniformity of expansion and con-

traction of the silencer throughout, the provision for said dead-air cushion being an important feature of our invention.

We claim:—

1. An exhaust-silencer comprising a pair of concentric jackets, centrally open heads closing space between the jackets to thereby provide a dead air cushion in said space, a series of conical partition-plates at intervals within the inner jacket constituting breakers apertured at intervals circumferentially thereof adjacent to their ends of greatest diameter, and another series of centrally open similar plates within said inner jacket also constituting breakers alternating with those aforesaid, said breakers being approximately equidistant apart, their ends of least diameter parallel to the rear head toward which they extend and the area of opening approximately the same in each.

2. An exhaust-silencer comprising a pair of concentric jackets, centrally open heads closing space between the jackets to thereby provide a dead air cushion in said space, a series of conical partition-plates at intervals within the inner jacket constituting breakers apertured at intervals circumferentially thereof adjacent to their ends of greatest diameter, and another series of centrally open similar plates within said inner jacket also constituting breakers alternating with those aforesaid, said breakers being approximately equidistant apart, their ends of least diameter parallel to the rear head toward which they extend, the area of opening approximately the same in each and their disposition such that a breaker of the first series is first in opposition to the exhaust.

3. An exhaust-silencer comprising a pair of concentric jackets, centrally open heads closing space between the jackets to thereby provide a dead air cushion in said space, a bushing engaging an outwardly extending annular flange with which the rear head is provided, the bushing being for engagement with an exhaust-pipe of an engine, a series of conical partition-plates at intervals within the inner jacket constituting breakers apertured at intervals circumferentially thereof adjacent to their ends of greatest diameter, and another series of centrally open similar plates within said inner jacket also constituting breakers alternating with those aforesaid, said breakers being approximately equidistant apart, their ends of least diameter parallel to said rear head toward which they extend and the area of opening approximately the same in each.

4. An exhaust-silencer comprising a pair of concentric jackets, heads closing space between the jackets to provide a dead air cushion in said space and having central openings as well as outwardly extending annular flanges, a series of conical partition-plates at intervals within the inner jacket constituting breakers apertured at intervals circumferentially thereof adjacent to their ends of greatest diameter, and another series of centrally open similar plates within said inner jacket also constituting breakers alternating with those aforesaid, said breakers being approximately equidistant apart, their ends of least diameter parallel to the rear head toward which they extend and the area of opening approximately the same in each.

In testimony that we claim the foregoing we have hereunto set our hands at Milwaukee in the county of Milwaukee and State of Wisconsin in the presence of two witnesses.

WILLIAM H. UNKE.
OTTO C. UNKE.

Witnesses:
CASANARE YOUNG,
MAY DOWNEY.