

No. 825,010.

PATENTED JULY 3, 1906.

B. W. SNOW.
MUFFLER.

APPLICATION FILED DEC. 27, 1905.

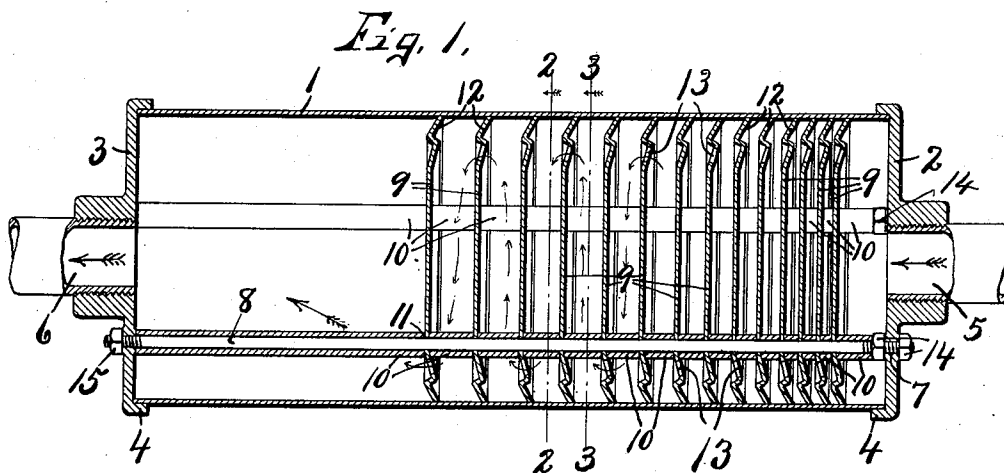


Fig. 2.

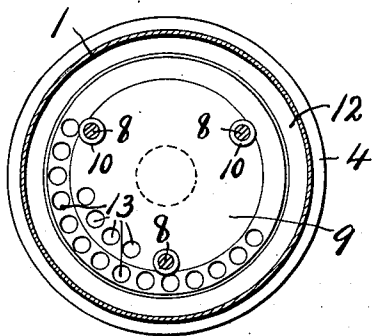
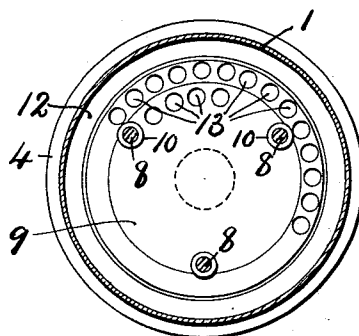


Fig. 3.



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MUFFLER.

No. 825,010.

Specification of Letters Patent.

Patented July 3, 1906.

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To all whom it may concern:

Be it known that I, BENJAMIN W. SNOW, of Syracuse, in the county of Onondaga, in the State of New York, have invented new and useful Improvements in Mufflers, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

This invention relates to improvements in mufflers for receiving the exhaust from gas and steam engines for the purpose of reducing the noise incidental to the discharge of the exhaust to atmosphere. This is particularly objectionable in self-propelled vehicles using an explosive mixture or steam as the propelling power not only by the reason of the noise of the intermitting explosions, but also from the large volumes of spent gases or steam which may issue directly from the exhaust-ports of the engine to atmosphere.

I am aware that many forms of mufflers have been used to overcome these objectionable features, many of which consist of a cylinder or hollow casing having transverse partitions through or around which the exhaust gases or vapor is caused to travel in more or less tortuous paths to atmosphere.

The essential purpose of my invention is to provide a cylinder-shell with a series of transverse partitions or disks which may be readily removed from or assembled within the shell.

A further object is to space the disks or partitions progressively-increasing distances apart from the inlet toward the outlet of the muffler-casing by means of the spacing-sleeves of gradually-increasing lengths and to clamp the end heads of the muffler-casing and disks together by the same clamping-bolts passing through the spacing-sleeves.

I am also aware that it is not new to provide a muffler-casing with transverse disks spaced apart by spacing-sleeves gradually-increasing distances apart, as such a device is shown in Patent No. 213,348 to F. W. Richardson, March 18, 1879; but in this patent the alternate disks are of unequal diameters, nor is the muffler-casing provided with end heads to which the disks and their spacing-sleeves may be clamped by the clamping-bolts.

One of the essential objects, therefore, of my present invention is to make all of the disks or transverse partitions not only separate from but also of the same diameter as the inner diameter of the shell, so as to fit

snugly therein and to deflect the marginal edge of each disk laterally from the plane of its central body, which is substantially flat, the margins of said disks being preferably deflected toward the inlet, so as to prevent buckling or bending under the pressure of the exhaust from the engine.

Another object is to provide the disks with eccentric openings, those in alternate disks being preferably diametrically opposite each other or rather at opposite sides of the center or axis of the muffler-casing.

Other objects and uses will appear in the following description.

In the drawings, Figure 1 is a longitudinal sectional view of my improved muffler. Figs. 2 and 3 are transverse sectional views taken, respectively, on lines 2-2 and 3-3, Fig. 1.

In carrying out the objects stated I provide a cylindrical muffler-casing 1, of sheet metal, with opposite end heads 2 and 3, each of which is provided with a marginal inward turned flange 4, encircling the adjacent end of the casing 1 to stiffen and protect the same, the end head 2 being provided with an inlet-opening or conduit 5, and the head 3 is formed with a similar exhaust or outlet conduit 6, both conduits being arranged centrally or in line with the axis of the casing and are somewhat smaller than the interior diameter of said casing. Each of the heads 2 and 3 is provided with a series of, in this instance three, apertures 7, spaced equidistant apart around their central openings 5 and 6, for receiving the adjacent ends of suitable tie-bolts 8. Within the casing 1 are arranged a series of transverse circular disks 9, all of which are of the same diameter as the interior diameter of the cylindrical casing 1, in which they snugly fit. These disks are all made of sheet metal stamped by the same die, so as to be interchangeable, and are spaced progressively-increasing distances apart from the inlet 5 toward the outlet 6 by spacing-sleeves 10, which are also of gradually-increasing lengths from the inlet toward the outlet, corresponding to the distances between the disks. Each of these disks is provided with a series of, in this instance three, bolt-openings spaced uniform distances apart around their respective axes for receiving the clamping-bolts 8, and the sleeves 10 are alined with the apertures 11 and also receive the bolts 8. The central portions or main body of each disk 9 is flat and disposed at substantially right angles to the axes of the cas-

ing 1, and its marginal edge is deflected toward the inlet 5 at an angle less than a right angle with the central flat portion, thus forming flanges 12, which not only serve to reinforce or stiffen the disks and allow said disks to expand under the heat of the exhaust without undue buckling or bending, but also serve to deflect the inflowing exhaust products toward the center of the casing.

In order that the exhaust gases or vapor may be retarded to a limited extent without creating undue back pressure upon the engine, I provide each disk with one or more openings 13 at one side of its center and preferably just inside of the flanges 12 for permitting the exhaust gases or vapor to pass successively through the disks or partitions from the inlet 5 to the outlet 6, the openings 13 of alternate disks being arranged at diametrically opposite sides of the center, whereby the exhaust gases or vapor is caused to travel in tortuous paths through the successive disks.

I preferably provide each disk with a series of apertures 13, arranged in one or more concentric rows around its center, as best seen in Figs. 2 and 3, and the portion of the disk having the outer row of apertures is preferably deflected toward the inlet 5 at an angle with the central flat portion, so as to facilitate the escape of the gases and steam therethrough. It is now apparent that each disk is practically dish-shaped, having an imperforate flat bottom and its marginal edge deflected toward the inlet, so that the inflowing gases or steam from the exhaust of the engine impinge directly against the imperforate flat bottom and then expand through the apertures 13 from one disk to the other successively until they reach and escape through the outlet 6, which is purposely constricted to less than the diameter of the muffler-casing 1 to further retard the sudden escape of the gases or steam, and in order to make this arrangement practicable a considerable space (about one-third of the space within the casing 1 nearest the outlet 6) is free from disks or transverse partitions to allow the gases and steam to collect therein and gradually discharge through the outlet 6.

In the operation of my invention the heads 2 and 3 are somewhat loosely fitted upon the ends of the cylindrical casing 1, so as to be easily removable therefrom; but before this is done, however, the bolts 8 are usually clamped to the head 2 by suitable nuts 14, after which the sleeves 10 and disks 9 are successively placed upon the other end of the bolts, whereupon the head 2 with the bolts 8, sleeves 10, and disks 9 thereon are inserted as a unit within the casing 1, after which the head 3 is placed in operative position, so that the bolts 8 project through their respective apertures, and the whole device is then drawn together by suitable nuts 15, Fig. 1. If it is desired to remove the disks for any reason, it

is simply necessary to remove the nuts 15, whereupon the head 2 of the bolts 8 with all of the spacing-sleeves and disks thereon may be withdrawn from the casing 1 and the disks and sleeves removed from the free ends of the bolts 8. When the various parts of the muffler are assembled in operative position, the conduit 5 is connected to the exhaust-port of the engine in any suitable manner, (not necessary to herein illustrate or describe,) whereupon the exhaust gases or vapor pass through the inlet 5 into the casing 1, where they are caused to pass through the apertures 13 of successive disks and finally escape through the outlet 6 to atmosphere.

What I claim is—

1. A muffler for gas or steam engines comprising a cylindrical casing having removable end heads, each provided with a substantially central opening, one being the inlet and the other the outlet and the outlet being of less diameter than the interior diameter of the casing, a series of circular disks spaced gradually-increasing distances apart from the inlet toward the outlet and of substantially the same diameter as the interior diameter of the case, clamping-bolts passed through the disks and engaged with the end heads of the casing, and spacing-sleeves on said bolts holding the disks apart.

2. A muffler for gas or steam engines comprising a cylindrical casing having removable end heads, each provided with a substantially central opening, one being the inlet and the other the outlet and the outlet being of less diameter than the interior diameter of the casing, and a series of circular disks spaced gradually-increasing distances apart from the inlet toward the outlet and of substantially the same diameter as the interior diameter of the case, clamping-bolts passed through the disks and engaged with the end heads of the casing, spacing-sleeves on said bolts holding said disks apart, each disk having a substantially flat central portion and its marginal edge deflected at an angle less than a right angle with the central portion and engaged with the inner face of the casing.

3. In a muffler for gas and steam engines, a cylindrical casing having an inlet in one end and an outlet in the opposite end, separate transverse disks or partitions fitting snugly within the casing and arranged at progressively-increasing distances apart from the inlet toward the outlet, each disk having an opening therethrough at one side of its center diametrically opposite to that in the next adjacent disk whereby the exhaust gases or vapor is caused to travel in tortuous paths through successive disks from the inlet toward the outlet.

4. In a muffler for the purpose described, a cylindrical casing and a series of transverse disks or partitions fitted within the casing and spaced gradually-increasing distances

apart from the inlet toward the outlet, the space between the last disk of the series and the outlet being greater than any of the other spaces between the disks.

5 5. A muffler for the purpose described, comprising a cylindrical casing and a series of transverse disks of substantially the same diameter as the interior diameter of the casing and arranged at progressively-increasing distances apart from the inlet toward the outlet, each disk having a substantially flat central portion disposed at right angles to the axis of the casing and having its marginal edge deflected toward the inlet at an angle less than
10 a right angle with the central portion of said disk.
15

6. A muffler for the purpose described, comprising a single tubular casing and a series of transverse partitions each separate
20 therefrom, but of substantially the same cross-sectional area as the cross-sectional area of the interior of the casing and having a circular row of apertures at one side of its center.

25 7. A muffler comprising a single tubular casing and a series of transverse disks or partitions therein each of substantially the same

area as the cross-sectional area of the interior of the casing and having a substantially flat central portion and a marginal flange deflected laterally at an angle with the central portion, said disks having an opening between the flange and its center, the opening in one disk being out of alinement with the opening in the next adjacent disk. 30

8. A muffler for the purpose described, comprising a single tubular cylindrical casing and separate transverse disks therein spaced gradually-increasing distances apart, end heads for the casing, one head having an inlet and the other an outlet, bolts passed through the disks and heads, and spacing-sleeves interposed between the disks and also between the heads and adjacent disks and encircling the bolts and nuts engaging the bolts and heads for clamping the latter to the ends of the casing. 35 40 45

In witness whereof I have hereunto set my hand this 14th day of December, 1905.

BENJAMIN W. SNOW.

Witnesses:

H. E. CHASE,
M. M. NOTT.