

E. BIVERT.

MUFFLER.

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1,045,936.

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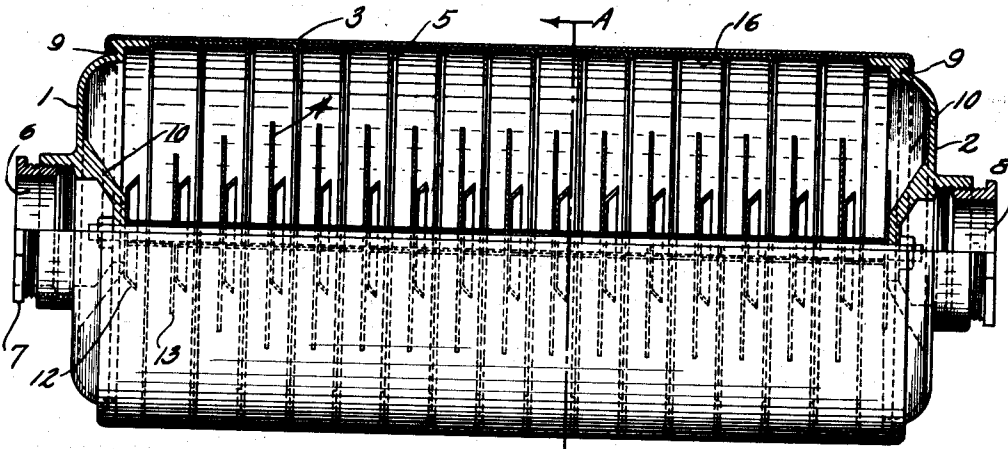


Fig. 1.

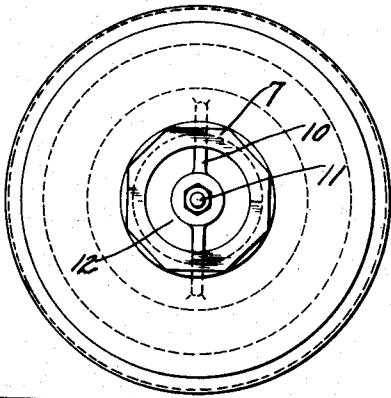


Fig. 2.

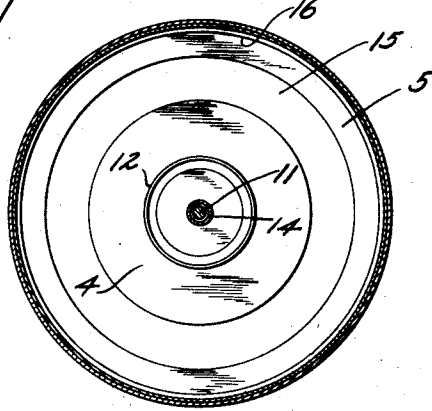


Fig. 3.
(A-A).

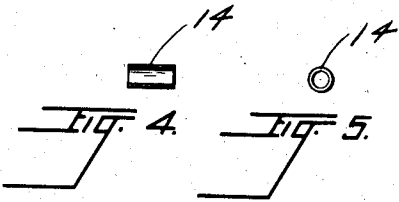


Fig. 4.

Fig. 5.

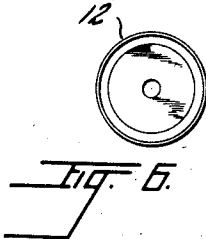


Fig. 6.

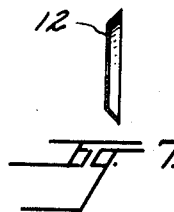


Fig. 7.

WITNESSES:

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MUFFLER.

1,045,936.

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To all whom it may concern:

Be it known that I, EUGENE RIVERT, a citizen of France, and a resident of Chicago, county of Cook, State of Illinois, have invented certain new and useful Improvements in Mufflers, of which the following is a specification.

The main objects of this invention are to provide an improved form of muffler of the type which is suitable for use in connection with internal combustion or other engines which exhaust with explosive violence; to provide an improved construction and arrangement whereby the temperature of the exhaust gases will be dissipated during the passage of the gases through the muffler so as to obviate all noise, without, however, obstructing the free flow of the gases through the muffler; and to provide an improved construction of the various parts of the structure.

A specific embodiment of this invention is illustrated in the accompanying drawings in which—

Figure 1 is a side elevation partly in section. Fig. 2 is an end elevation. Fig. 3 is a transverse section on the lines A—A of Fig. 1. Figs. 4 and 5 are details of the inner baffle spacers. Figs. 6 and 7 are details of the dished members which form part of the inner baffles.

In the construction shown in the drawings the muffler comprises a pair of heads 1 and 2 connected by a tubular casing 3, and having arranged therein a series of inner baffle disks 4 to which are opposed a series of outer baffle rings or flanges 5.

In the specific construction shown the head 1 has an inlet opening 6 provided with a stuffing box gland 7 whereby it may have a slip joint with the pipe to which it is connected. The head 2 has outlet opening 8, similarly provided with a slip joint for connection with a pipe in case it is desired to conduct the exhaust gases beyond the muffler. The peripheries of the heads 1 and 2 are of a diameter to fit the interior of the cylindrical shell 3 and the heads are grooved at 9 on the outer faces so that the ends of the shell 3 may be rolled inwardly to form a tight joint as will hereinafter appear. In the form shown, the central openings in the heads are spanned by spiders 10 provided with central apertures through which a rod 11 is passed. This rod is threaded at

its ends and is secured in place by means of nuts. The inner baffles are made up of dished plates 12 and flat plates 4, each perforated to receive the rod 11, and these are spaced apart in pairs as shown in Fig. 1 by means of tubular spacers 14. At each end of the device the plates 4 are gradually reduced in diameter so as to provide for the free flow of gases from the opening 6 through the annular space 15 between the two sets of baffles and then to the outlet opening 8.

The outer baffles 5 are shown in the form of rings having a large central opening of a diameter greater than the outer diameter of the baffles 4 to provide for the annular space 15 between the two sets of baffles. The rings 5 are of angle section so as to provide an inwardly extending flange in the plane of the ring and a peripheral flange 16, which spaces the ring from the next adjacent one. In the form shown the rings are cupped metal stampings but it will be readily seen that they may be varied in form, the essential characteristic being the inwardly extending baffle walls and some means for spacing them apart. Incidentally these spacer rings add strength to the outer casing.

In assembling the construction shown, the rod 11 with a nut at one end is passed through the central opening in the spider of one of the heads and then the inner set of baffles is assembled thereon in the manner shown in Fig. 1. The outer set of baffle rings is then slid one upon another on top of the inner face of the first head and into the shell 3. Then the other head is placed on top of the pile with the rod 11 passing through the spider of said head and the other nut is screwed upon the rod 11 to clamp the assembled parts together. Finally the ends of the shell 3 are curled back so as to form gas tight joints at the grooves 9.

In operation the device offers little or no obstruction to the flow of gases through it since the clear passage 15 between the baffles is larger in area than the inlet opening 6 and the outlet opening 8, so as to admit of a free and unrestricted flow of gases through the mufflers, but on account of expansion and the diffusion of the exhaust gases with the air or gases already contained in the spaces in the interior of the muffler, the hot gases from the inlet

opening 6 eddy into the spaces between the baffle walls, coming in contact with said baffle walls which are relatively cool on account of the radiation of heat from the exterior of the muffler. The exhaust gases are therefore gradually reduced in temperature and consequently in volume and pressure as they pass through the muffler so that, prior to passing out of the delivery outlet 8, their pressure will have been reduced to such an extent that discharge at the outlet 8 will be silent.

By reason of the fact that the outer baffles are all of the same internal diameter, whereas the external diameter of the inner baffles increases successively from the inlet opening toward the middle of the muffler, it might be said that the free passage is gradually reduced by a plurality of successive stages. The number of such stages, and the amount of reduction of the area of the passage at successive stages to give the best results, depends upon the volume, pressure, and heat of the exhaust gases delivered to the muffler from the engine and must accordingly be designed to suit the engine as the gases flow through the muffler. The pressure and volume of the gases are reduced by reason of the heat, which is absorbed by the baffles and radiated from the casing.

Although but one specific embodiment of this invention is herein shown and described it will be understood that numerous details of the construction shown may be altered or omitted without departing from the spirit of this invention as defined by the following claims.

I claim:—

1. A muffler comprising a casing having inlet and outlet openings at opposite ends thereof, a series of inner baffles arranged in axial alinement in the interior of said casing, a plurality of outer baffles arranged outside of said inner baffles and having their inner edges spaced outwardly from the outer edges of said inner baffles; to provide an unobstructed substantially straight passage extending between them from end to end of said series of baffles.

2. A muffler comprising a casing, a series of inner baffles arranged in axial alinement in the interior of said casing, and a plurality of outer baffles arranged outside of said inner baffles in concentric relation thereto, said inner and outer baffles being spaced apart and shaped to provide an unobstructed, substantially straight passage extending between them from end to end of said series of baffles, and said passage being successively reduced in transverse area in the direction of the flow of gases through the muffler.

3. A muffler comprising a casing, a series of inner baffles arranged in axial alinement in the interior of said casing, and a plu-

rality of outer baffles arranged outside of said inner baffles and spaced therefrom to provide an unobstructed substantially straight passage between them, the individual inner and outer baffles being located in staggered relation to each other.

4. A muffler comprising a casing, a series of inner baffles arranged in axial alinement in the interior of said casing, and a plurality of outer baffles arranged outside of said inner baffles, the inner edges of said outer baffles being spaced radially away from the outer edges of said baffles to provide a substantially straight annular passage for gases between them.

5. A muffler comprising a casing, a series of inner baffles arranged in axial alinement in the interior of said casing, and a plurality of outer baffles arranged outside of said inner baffles, inlet and outlet openings at respectively opposite ends of said casing, and the adjacent edges of said baffles being spaced apart radially to provide between them an unobstructed substantially straight passage having a transverse area not less than that of said inlet opening.

6. In a muffler, the combination of a casing having inlet and outlet openings at opposite ends, baffles arranged to impart an eddying movement to gases flowing between said inlet and outlet openings and shaped to provide openings for the direct flow of gases past said series of baffles, said openings being of an area not less than substantially that of said inlet opening.

7. A muffler comprising a pair of heads spaced apart and respectively provided with inlet and outlet openings, a shell connecting said heads to form therewith a closed casing, a series of inner baffles arranged axially within said casing between said heads, said baffles being smaller than the transverse area of said shell, and outer baffles spaced away from said inner baffles and co-acting therewith to cool the gases passing through said casing, said inner baffles being successively increased in external diameter toward said outlet opening to provide successive stages of reduction of the transverse area of the passage between said inner and outer baffles.

8. A muffler comprising a pair of heads spaced apart and respectively provided with inlet and outlet openings, a shell connecting said heads to form therewith a closed casing, a series of inner baffles arranged axially within said casing between said heads, said baffles being smaller than the transverse area of said shell, and outer baffles spaced away from said inner baffles and co-acting therewith to cool the gases passing through said casing, said inner baffles comprising a series of alternately arranged flat and dished plates.

9. A muffler comprising a pair of heads

spaced apart and respectively provided with inlet and outlet openings, a shell connecting said heads to form therewith a closed casing, a series of inner baffles arranged axially within said casing between said heads, said baffles being smaller than the transverse area of said shell, and outer baffles spaced away from said inner baffles and co-acting therewith to cool the gases passing through said casing, and said outer baffles comprising a series of flanges extending inwardly from said shell and spaced apart in an axial direction.

10. A muffler comprising a pair of heads spaced apart and respectively provided with inlet and outlet openings, a shell connecting said heads to form therewith a closed casing, a series of inner baffles arranged axially within said casing between said heads, said baffles being smaller than the transverse area of said shell, and outer baffles spaced away from said inner baffles and co-acting therewith to cool the gases passing through said casing, said outer baffles being of substantially L-shaped cross-section, one leg extending radially inward and serving as a baffle, and the other leg extending along said shell and serving as a spacer between adjacent inwardly extending legs.

11. A muffler comprising a pair of circular heads spaced apart and having central openings adapted to serve respectively as inlet and outlet openings, spiders bridging said openings, a rod extending between said spiders, a series of baffle disks and tubular spacers arranged along said rod, and a series of rings mounted in axial alinement between said heads and having annular flanges adapted to space them apart.

12. A muffler comprising a pair of circular heads spaced apart and having central openings adapted to serve respectively as inlet and outlet openings, spiders bridging said openings, a rod extending between said spiders, a series of baffle disks and tubular spacers arranged along said rod, and a series of rings mounted in axial alinement between said heads and having annular flanges

adapted to space them apart, and an outer tubular shell surrounding said baffle rings and having its ends secured to said heads.

13. A muffler comprising a pair of circular heads spaced apart and having central openings adapted to serve respectively as inlet and outlet openings, spiders bridging said openings, a rod extending between said spiders, a series of baffle disks and tubular spacers arranged along said rod, and a series of rings mounted in axial alinement between said heads and having annular flanges adapted to space them apart, and an outer tubular shell surrounding said baffle rings and having its ends curled inward to engage said heads.

14. A muffler comprising a pair of circular heads spaced apart and having central openings adapted to serve respectively as inlet and outlet openings, spiders bridging said openings, a rod extending between said spiders, a series of baffles comprising spaced flat and dished plates arranged alternately along said rod.

15. A muffler comprising a pair of circular heads spaced apart and having central openings adapted to serve respectively as inlet and outlet openings, spiders bridging said openings, a rod extending between said spiders, a series of baffles comprising flat and dished plates arranged alternately along said rod and spaced apart in pairs.

16. A muffler comprising a casing having inlet and outlet openings, a series of baffles arranged along the path of the gases flowing between said inlet and outlet openings, and adapted to provide between them an unobstructed passage having successive stages of reduction, the transverse area of the passage at each of said stages being less than at the preceding stage.

Signed at Chicago this 18th day of January, 1912.

EUGENE BIVERT.

Witnesses:

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EDWIN PHELPS.