

E. D. SIZER.

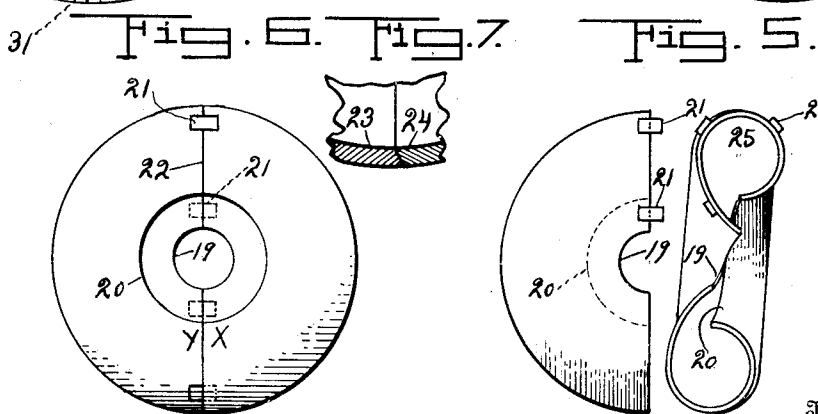
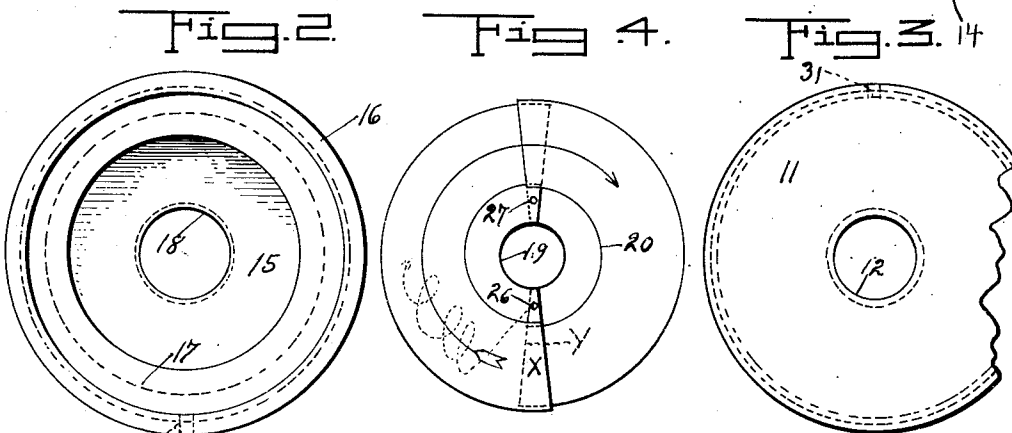
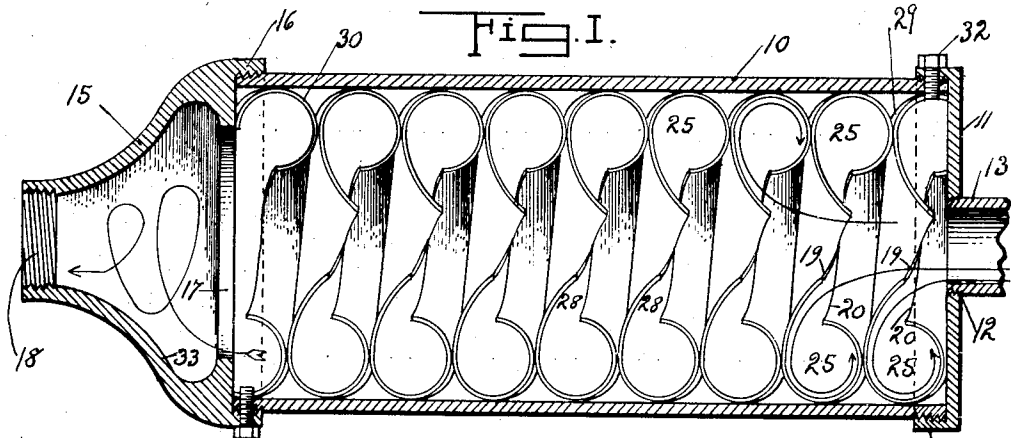
MUFFLER.

APPLICATION FILED JAN. 24, 1910.

956,906.

Patented May 3, 1910.

2 SHEETS—SHEET 1.



Witnesses

E. Cloud Newman.

A. M. Wilson

Inventor

E. D. Sizer.

By

T. R. Bryant.

Attorney.

E. D. SIZER.
MUFFLER.

APPLICATION FILED JAN. 24, 1910.

956,906.

Patented May 3, 1910.

2 SHEETS—SHEET 2.

FIG. 8.

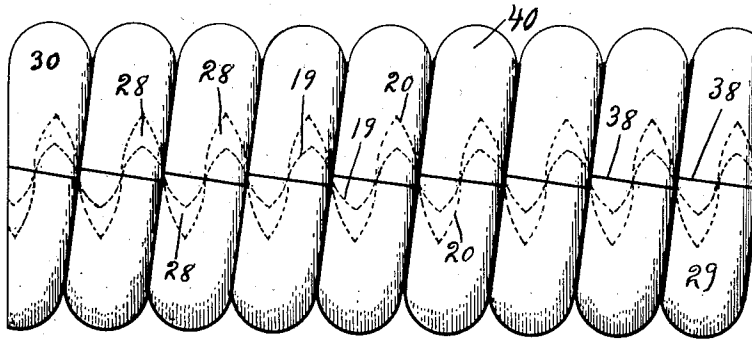
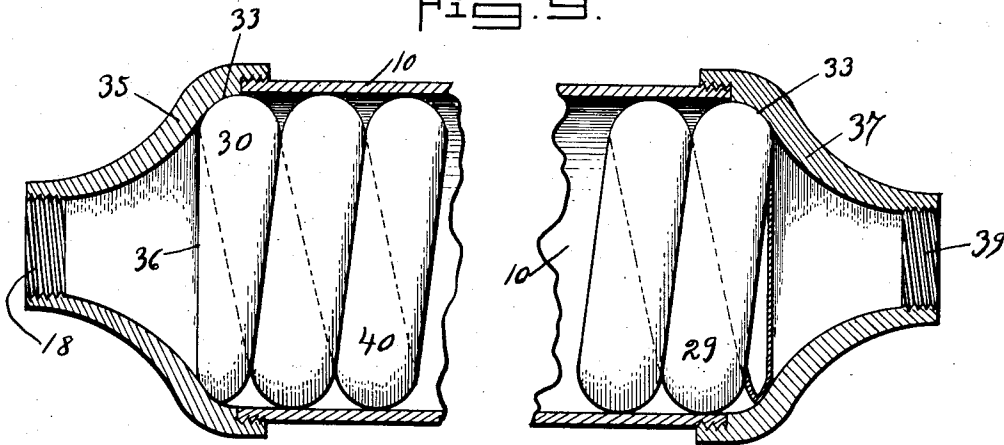


FIG. 9.



Witnesses

E. Cloud Newman.
A. M. Wilson

Inventor

E. D. Sizer
by *T. A. Ryan* Attorney.

UNITED STATES PATENT OFFICE.

EDWARD D. SIZER, OF SIZERVILLE, PENNSYLVANIA.

MUFFLER.

956,906.

Specification of Letters Patent.

Patented May 3, 1910.

Application filed January 24, 1910. Serial No. 539,737.

To all whom it may concern:

Be it known that I, EDWARD D. SIZER, a citizen of the United States, residing at Sizerville, in the county of Cameron and State of Pennsylvania, have invented certain new and useful Improvements in Mufflers, of which the following is a specification.

This invention relates to improvements in mufflers and although its various forms are readily applicable to any devices in which sound silencers or mufflers are desirable, it is more especially designed for use in connection with internal combustion and steam engines.

Among the objections well known to exist in the mufflers now in use, is the tendency to create a back pressure by retarding the free exit of the products of combustion from the engine exhaust and consequently decreasing the efficiency of the engine at the expense of decreasing the noise of operation of the same. A device is now constructed upon an entirely new principle which while acting as a complete silencer reduces the back pressure upon the motor to a minimum. The principle relied upon is the path of travel given to the exhaust fluid and this assumes what may be termed a compound helix or coil; in other words, if a wire helical spring was wound about a cylinder of uniform diameter, the wire composing the spring would assume from one end to the other a line which would represent the general course required to be traveled by the exhaust fluid in passing through my device. The provision also is made of an opening of uniform size at the axis of tubular coils, which make up the muffler body proper, and which opening allows free entrance to the interior of the coil at all points of the axis thereof and throughout the length of the muffler.

The device disclosed is also exceedingly simple and is easy and cheap to manufacture, and as this peculiar form affords a perfect operation when constructed of a comparatively small size and further being of extremely light weight, its value and applicability to aeroplane work will be evident.

My device is also built up of semi-circular sections so that the entire length of the muffler may be regulated as desired for the particular use to which it is to be employed.

With these general objects in view and others that will appear as the nature of the invention is better understood, my invention

consists in the novel construction, combination and arrangement of parts as will be hereinafter fully described, illustrated in the accompanying drawings and pointed out in the claims.

In the drawings forming a part of this application like designating numerals represent similar parts throughout the several views and in which:

Figure 1 is a longitudinal sectional view of the device showing the half coils in position, Fig. 2 is an inside view of the outlet end or cap, Fig. 3 is an exterior elevation of the inlet end of the muffler, Fig. 4 shows two sheet metal sections assembled, Fig. 5 is two views of a cast metal section, Fig. 6 shows two cast metal sections assembled, Fig. 7 shows a modified form of joining two cast metal sections together, Fig. 8 is a plan view of the assembled sections, and, Fig. 9 shows a modified form of arranging the sections within the casing.

Referring more specifically to the drawings, it will be noted that the usual exterior casing of cylindrical form 10 is employed which at one end is provided with a cap closure 11 having a central screw-threaded perforation 12 for the reception of the externally screw-threaded end 13 of the engine exhaust pipe, said closure having a flange 14 slipping over and screw-threaded to the end of the casing 10. A conical nozzle 15 is provided at the opposite or outlet end of the casing, the same having a flange 16 corresponding to the flange 14 of the closure cap 11, and which fits over and is screw-threaded to the end of said casing. This outlet nozzle 15 is provided at its larger and inner end with an annular inner shoulder 17, designed for a purpose hereinafter fully set forth, while at its outer end the same is screw-threaded as at 18, to accommodate a lead-off pipe.

Accommodated within the cylindrical casing 10 is a continuous hollow coil, preferably formed of metal, and closely fitting within the cylinder and completely filling the same for its entire length. The outer periphery of this coil for its entire length contacts the inner periphery of the casing, while the end convolutions of the coil are seated respectively upon the closure cap 11 and the shoulders 17 of the nozzle 15.

The essential elements of my invention are the peculiar construction of this coil and the improved advantages and functions de-

rived thereby. Although this is so, the formation of a single section 40 of the coil which is herein represented as forming but a half of a single convolution of the coil, is of the essential essence of the invention.

A single section is shown in Fig. 5 and as there shown is constructed of cast iron or metal of an appreciable thickness. The formation is what might be termed tubular and bent in the form of a semi-circle as shown at the left of the view, while at the inner edge or smaller diameter of the circle the same is slitted circumferentially, one edge 19 being contracted and extending partly over although in regular spaced relation from the opposite edge 20 thereof. Such a construction produces a form that in cross-section from the center to the circumference would roughly represent a figure 6, it being noted that one end of each coil is given a torsional sidewise impulse substantially equal in distance to one-half of the diameter of the coil interior and permanently retaining such position, enables the section to assume a portion of the composite coil body. As constructed of cast metal, the sections are assembled together with abutting edges as shown in Fig. 6, and are provided with projecting lugs 21, upon one end only of each section, and which lugs fit over and engage the outside surface of the end portion of the contiguous section. In viewing Fig. 5, it will be noted that one section is shown and two views thereof, while Fig. 6 shows two sections properly assembled with their edges abutting at 22 while their opposite ends are arranged upon different but contiguous planes so as to be joined in a similar manner to other sections and thus make up a composite and regular coil. In place of the overlapping lugs 21, one end of each section may be provided with an external beveled edge while the other will have an internal beveled edge and a joint will be formed as shown by the fragmentary view numbered 7, the inner beveled face being designated 23 while the outer beveled edge is designated 24. The use of both of said joints will provide an assemblage of sections that will insure a perfectly uniform bore or open passage-way 25 through the entire composite coil and from one end to the other of the muffler.

In Fig. 4 the sections are formed of sheet metal, preferably sheet steel, and being of unappreciable thickness, the contiguous ends of the sections when assembled, are made to telescope one with the other, by crowding the ends of the one within the contiguous end of the other, as will be evident from said view, and to provide such outer and inner lapping each section is slightly greater than a true semi-circle, being provided at each end with a lapping portion. In this construction each lapping portion is provided

with one or more perforations 26 for receiving the rivets 27 to hold the sections properly assembled together. In both Figs. 4 and 6 a complete convolution of the composite coil structure is shown and in each the respective superposed or outer end which is disengaged is represented by the letter X, while in each of said views the corresponding under end of the other section or in other words, the free and disengaged end of the other section, which is farther away from the point of vision, is noted by the letter Y.

From this it will be seen that the contiguous and contracted edge 19 of the assembled sections forms a spiral edge extending substantially from end to end of the casing 10 and forming a central, continuous, unobstructed bore or passage-way therethrough of a diameter slightly less than the inner diameter of the inlet exhaust pipe 13, as best shown in Fig. 1. Outside thereof, the adjacent edges 20 also form a continuous spiral edge from one end to the other of the casing and between said edges 19 and 20 is provided the spiral slot 28.

It will be evident that any products of combustion received through the pipe 13 and entering the coil spaces 25 will receive a helical impulse and will continue in the spiral path until they are finally exhausted through the nozzle 15. The provision also of the bore 19 is of less diameter than the inlet 13 while the bore 20 is greater than the same, the exhaust fluid will be free to enter the spiral passage 25 by passing under the spiral edge 19 at any point thereof. A portion of the fluid, all of which enters in pulsations, will be caught under the edge 19, almost immediately at its entrance within the casing, while other portions of such fluid may pass farther through or nearly completely through the same before they are received under the edge 19 and within the passage 25. The fluid turns into the passage 25 by the edge 19 as shown by the arrows in Fig. 1, is given a rotary motion therein as also shown by said arrows, while the forward pressure of the repeated impulses, insures a continual spiral forward motion within the said passage, both motions being represented by the arrows in Fig. 4.

The end convolutions 29 and 30 are cut-away as shown in Fig. 1 to allow the section 29 to seat itself upon the end plate 11 and to provide a similar seating of the coil 30 upon the annular seat 17 of the nozzle. To secure the sections within the casing, and also to provide for the locking of the end members upon their screw-threads, the aperture 31 is provided through the flange 16 and also through the flange 14 and the hold-fast devices 32 are provided therethrough and fitting through the casing and into the end convolutions 30 and 29.

The exit nozzle 15 may be slightly modified in form as shown in Fig. 9 as 35 and in this structure it will be noted that the annular shoulder 17 is dispensed with while the end coil 30 seats itself upon the adjacent inner face of said nozzle as at 33, and the form of the remaining features may be substantially identical except that said coil 30 will be suitably cut-away as at 36 to facilitate the egress of the combustion fluids. In lieu of the end cap 11 a nozzle 37 may be employed at the inlet end of the muffler, which nozzle is shown in Fig. 9 as identical in form with the outlet nozzle of the device while the end coil 29 fitting therein is broken away to accommodate its entrance in the nozzle and the reception of the initial entrance of the gases therein. Said nozzle 37 is provided with a screw-threaded opening 20 39 for the reception of the end of the said pipe 13.

It will be noted that in the plan view of the assembled sections shown in Fig. 8 that the relative arrangement of such sections is clearly brought out together with the meeting edges 38 between the adjacent sections, in this instance the sections being joined together by the form of joint shown in Fig. 7. Moreover in said view 8 is more clearly brought out the edges 19 and 20 shown in dotted lines and which by the assemblage of the several sections are co-extensive with the united length of the sections, as shown in dotted lines. Moreover the spiral slot 28 35 formed between said edges is also clearly seen.

Although the forms of my invention herein shown and described are believed to be what are preferably embodiments thereof, it is nevertheless to be understood, that minor changes may be made in the form, size, and arrangement and proportion of parts, which however, will not depart from the spirit and scope of my invention as herein specifically 45 claimed.

Having thus fully described my invention and in what manner the same is designed for use, what I claim and desire to secure by Letters Patent of the United States is:—

1. A device of the class described comprising a spiral casing and said casing having a spiral slot co-extensive with the length of said casing.
2. A device of the class described comprising a spiral casing having a spiral slot co-extensive with the length of said casing, and said casing formed of separable sections.
3. A device of the class described comprising a spiral casing, said casing provided with a spiral slot co-extensive with the length of said casing, said casing formed

of separable sections, and each of said sections having its greatest dimension semi-circular. 85

4. A device of the class described comprising a spiral casing, said casing being provided with a spiral slot co-extensive with the length of said casing, said casing formed of separable sections, each of said sections having its greatest dimension semi-circular, and the cross-section of a said section being in the form of a figure 6. 70

5. A device of the class described comprising a spiral casing, said casing having a spiral slot co-extensive with the length of said casing, said passage formed of separable sections, each of said sections having its greatest dimension semi-circular, and the cross-section of a said section being in the form of a figure 6, said sections provided within a cylindrical casing, and a conical nozzle upon one end thereof and a closure cap upon the other. 75

6. A muffler comprising a plurality of semi-circular sections, said sections being tubular and adapted to form a continuous spiral passage when a plurality of said sections are assembled. 80

7. A muffler comprising a plurality of semi-circular sections, said sections having a continuous spiral bore therethrough provided with a continuous spiral slot entering said spiral bore and of equal length therewith. 85

8. In combination with the exhaust pipe of an engine, a muffler, and means for imparting both spiral and rotary movement therethrough. 100

9. In a muffler section, a substantially semi-circular unit, one side thereof provided with a slot and extending lugs provided on one end thereof.

10. In a muffler, a cylindrical casing, a head secured to one end of said casing, a nozzle secured to the opposite end of said casing, a plurality of semi-circular sections provided within said casing and furnishing a continuous spiral passage therethrough, said sections provided with a continuous spiral slot, and hold-fast means for securing the head and nozzle upon said cylinder and the sections therewithin. 105

11. In a separable section for a muffler, a metallic member of substantially semi-circular dimensions and adapted to telescope with a similar section to form one complete convolution of a coil. 115

In testimony whereof I affix my signature in presence of two witnesses. 120

EDWARD D. SIZER.

Witnesses:

HAROLD M. WADDINGTON,
RILE PRONSER.