

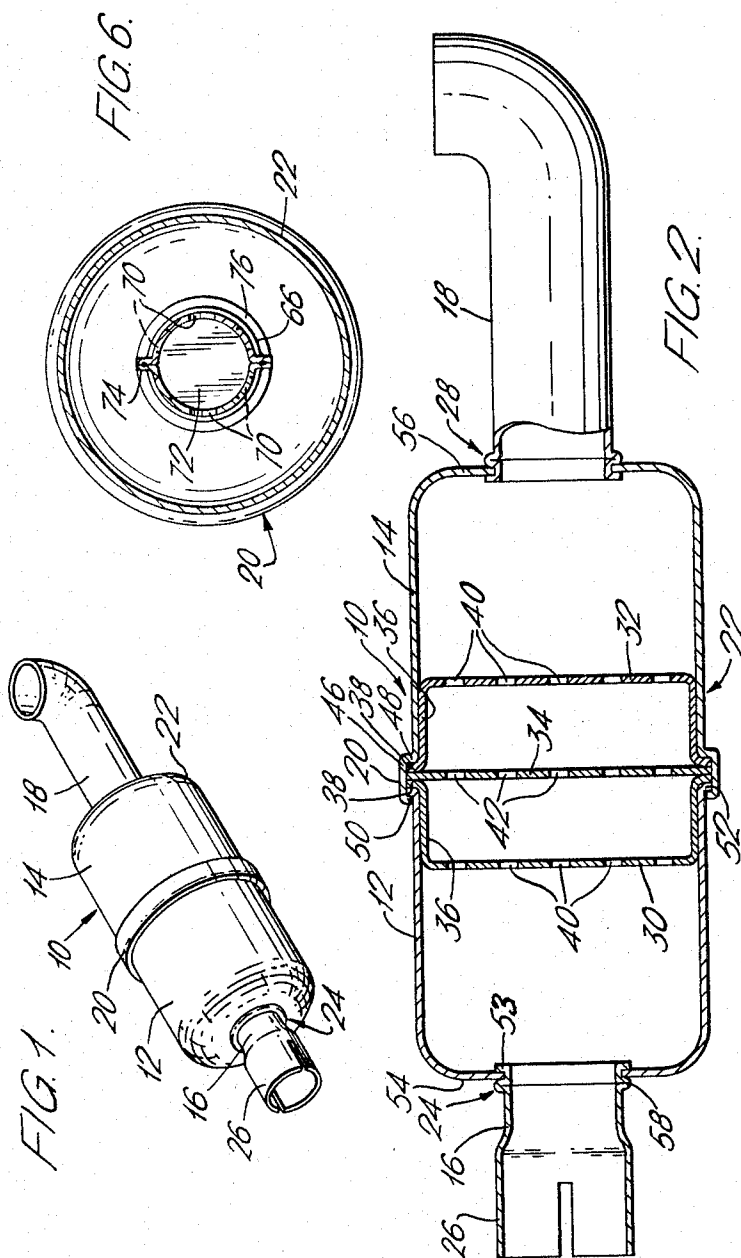
May 7, 1968

B. STADE ET AL
MUFFLER WITH INTERCONNECTED END BELLS
AND TELESKOPED INNER PIPE

3,381,774

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3 Sheets-Sheet 1



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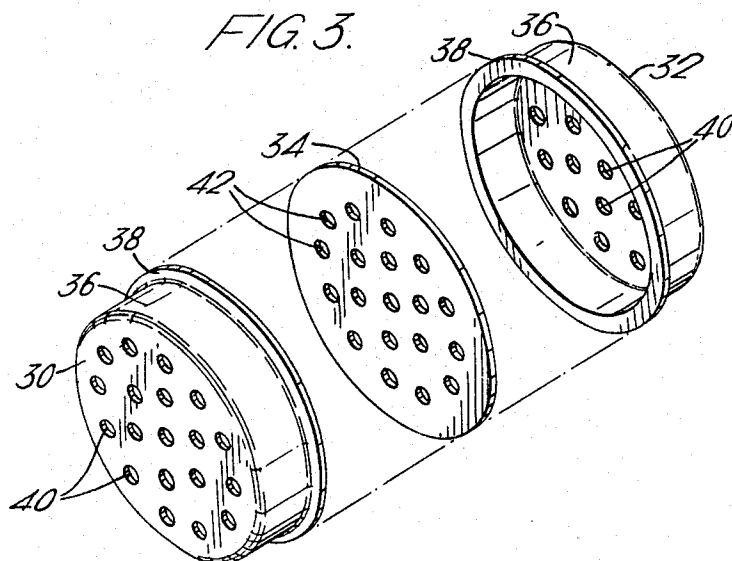
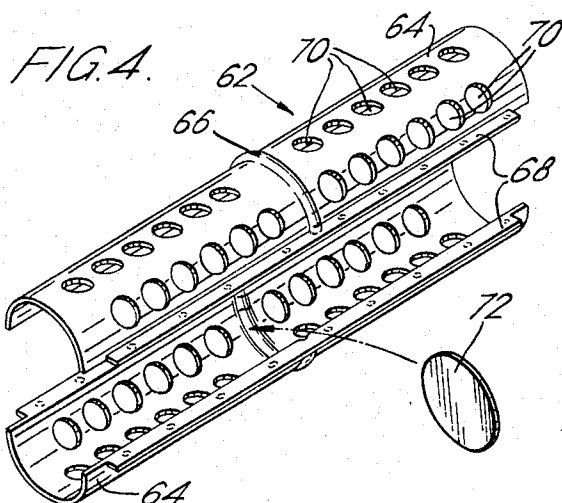
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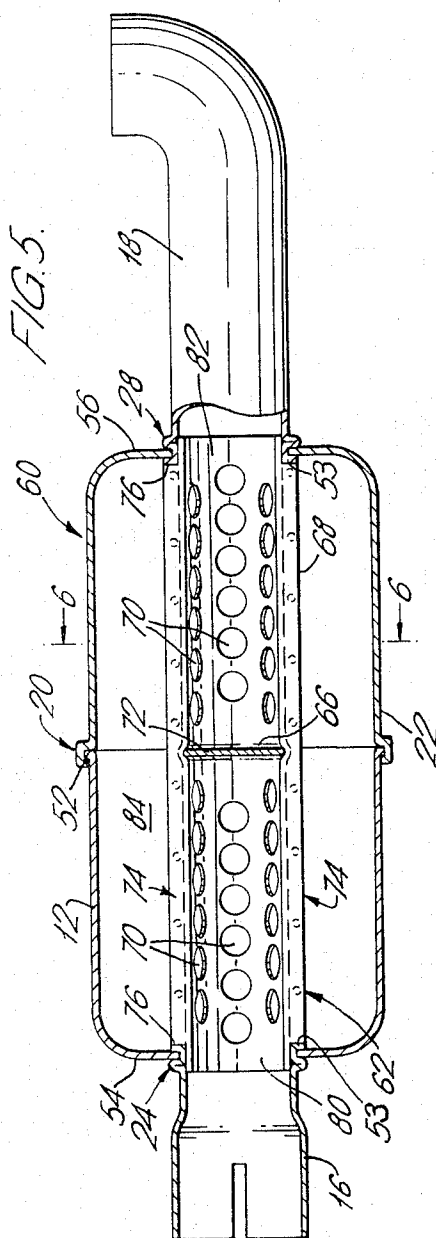
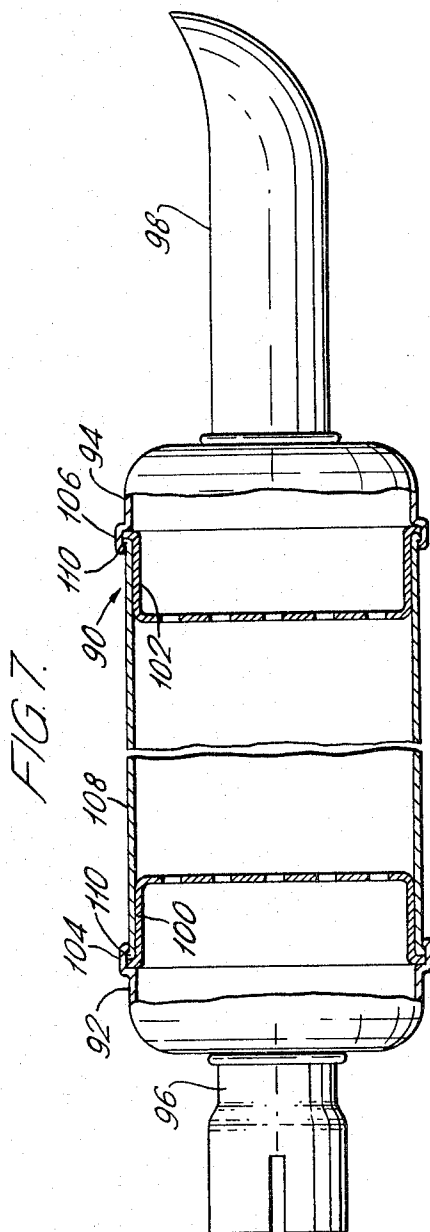
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MUFFLER WITH INTERCONNECTED END BELLS AND TELESCOPED INNER PIPE

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5 Claims. (Cl. 181—59)

ABSTRACT OF THE DISCLOSURE

An engine muffler which is assembled by use of a plurality of circumferential crimps. The muffler comprises a pair of bells or cylindrical end caps which may have disposed therebetween a cylindrical section. The cylindrical end caps and the cylindrical section have annular lands and lips suitable for crimping. Each cylindrical end cap has a pipe which is telescoped into its end portion and crimped thereto. A plurality of baffles may be inserted between the end bells or end bells and cylindrical section. The muffler is assembled and the baffles are secured therein by circumferential crimping of the end bells, or by the circumferential crimping of the end bells to the respective ends of the cylindrical section. The same crimp that holds the end bells together, or the end bells and the cylindrical section also secures the baffles within the muffler. The parts are constructed to enable a wide variety of types and sizes of mufflers to be made from the same parts.

Background of invention

This invention relates to mufflers for silencing the exhaust of internal combustion engines and especially is directed to the construction of such mufflers for low horsepower engines.

A particular type of exhaust muffler is one in which there is a central chamber, usually somewhat cylindrical in configuration, having an inlet pipe coaxial with one end and adapted to be telescopically engaged with the engine exhaust manifold or a pipe from the exhaust manifold, and having an exhaust pipe at the other end, usually bent or having some means for directing the exhaust gases away from the engine.

The primary problem intended to be solved by a muffler is elimination of noise. As a general statement, a baffling or breaking of the stream of exhaust gases, by perforations, tortuous passageways and the like results in a decrease in noise. Resistance to free flow of gasses from the exhaust of an engine creates a back pressure which, if substantial, prevents maximum scavenging of burnt gasses from the cylinders of the engine and hence decreases the power and efficiency of the engine.

Exhaust mufflers are, therefore, required to provide a compromise between maximum noise abatement and minimum back pressure. The types of mufflers designed for this purpose are legion, but the more complex the muffler, the more expensive; hence, this is another factor which must be considered in the construction of an exhaust muffler.

The primary characteristics of the muffler of the invention are: its fabrication from parts readily shaped in conventional sheet metal forming machines; its fabrication from parts adaptable to the construction of mufflers of many different sizes and capacities without the need for special tooling; and fabrication from parts readily assembled on a production basis at a minimum of cost. All of this is added to the provision of mufflers which are simple, rugged, compact, and economical.

The principal aspect of the muffler of the invention is the use of bells or end caps drawn in conventional sheet

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metal forming machines into a cylindrical configuration, these bells being joined by circumferential crimping and having end parts crimped in suitable holes coaxially of the bells. This basic structure may have either of two forms of interior baffling devices. In one case, such baffling device consists of flat or dished headers which are perforated to break up the stream of gases. In another aspect, the interior consists of a central axial pipe which is perforated, and has an orthogonal baffle provided therein. This latter pipe is formed of longitudinally flanged halves stamped in conventional stamping machines and is assembled along the flanged edges which are welded face to face with the disc baffle in a suitable ridge formed in the center.

With respect to the prior art, small mufflers are known in which the cylindrical shell is formed by crimping several parts together. For example, end caps have been crimped to a cylindrical member to form a shell. To the best of our knowledge, the cylindrical portion of a muffler shell is normally formed of seamed tubing and not drawn as independent bell members.

Novelty also lies in the simultaneous clamping of the bells and of the dished or disc type headers within the shell; so that with one crimping operation, the entire muffler may be assembled. Additionally there is believed to be an invention in the fastening of the pipes to the ends of the muffler shell by crimping operation. The configurations of the interrelated parts also is believed to be of patentable merit.

According to the invention, a muffler may be constructed without a single weld in it. Even the modified form of the invention, using an interior tube which is independently assembled by simple spot welding, afterwards is associated with the muffler during its construction by being locked in place by the crimping operation.

Summary of invention

It is an important object of this invention to provide a muffler which will substantially eliminate the disadvantages mentioned above.

It is another object of this invention to provide a muffler in which the baffling means and muffler shell are assembled by a crimping operation or operations.

It is a further object of this invention to provide a method for assembling a muffler which can be readily fabricated from stocked parts by telescoping and crimping the parts together.

It is a further object of this invention to provide a muffler having its respective bells joined by circumferential crimping as well as having the intake and exhaust pipes crimped into the respective ends of the muffler.

It is yet a further object to provide a muffler structure in which the muffler parts are crimped together in a manner which also secures the baffles or headers within the muffler.

Many other objects will occur to those skilled in this art, including economy of manufacture and simplicity of assembly, as a detailed specification of a preferred embodiment of the invention is set forth in connection with the accompanying drawings.

Brief description of the drawings

In the drawings:

FIG. 1 is a perspective view of the exterior of a muffler constructed in accordance with the invention.

FIG. 2 is a median sectional view through a muffler constructed in accordance with the invention and showing one arrangement of the interior of the muffler.

FIG. 3 is an exploded perspective view of three headers or baffles as used, for example, in FIG. 2 on the interior of the muffler shell, being shown arranged in a suggested alignment.

FIG. 4 is an exploded view illustrating how a central baffle pipe which is adapted to be secured on its axial ends, is fabricated for use in the muffler shell of FIG. 2, for example.

FIG. 5 is a sectional view similar to that of FIG. 2 illustrating the use of the pipe of FIG. 4 in the construction of a muffler.

FIG. 6 is a sectional view taken through the muffler of FIG. 5 along the line 6—6 in the indicated direction.

FIG. 7 is a fragmentary sectional view, with portions shown in elevation, showing a muffler of modified form in which the shell is formed of three instead of two parts as in FIGS. 2 and 5.

Description of the preferred embodiment

The invention is characterized by the provision of drawn bells having end pipes, these bells being crimped together, such crimping in each case being a single operation to produce the shell of the muffler, such crimping operation serving to lock baffle means into proper position within the muffler. The invention is further characterized by novel means for securing end pipes to the muffler shell and novel types of baffles cooperating with the particular configuration of bells to enable the crimping operation to occur.

A muffler 10 of FIG. 1 is shown to comprise, at least from a view of the exterior, four parts. There are two cylindrical bells 12 and 14, which are drawn by conventional methods, an inlet pipe 16, and an exhaust pipe 18. The two bells 12 and 14 are joined in a permanent and substantially gas-tight connection by a reverse-bent crimp 20 to form what has been referred to as a shell 22, the shell having the crimp 20 either in the center or at any other convenient location. The inlet pipe 16 is suitably crimped in place by means of a joint generally designated 24 and it has a split and flared end 26 of any suitable construction to enable the muffler 10 to be connected to an engine exhaust manifold or pipe. The exhaust pipe 18 is also of any suitable design and it is secured to muffler shell 22 by a joint 28 which is substantially the same as the joint 24.

Looking now at FIG. 2, it will be seen that there are three headers or baffle means secured within the shell 22, these being the dished baffles 30 and 32 and the disc baffle 34. The baffles 30 and 32 preferably are identical, each having an annular side wall 36 terminating in an outwardly flared flange 38. These same reference characters are applied to both of the baffles 30 and 32.

Each of the baffles 30 and 32 is provided with a plurality of holes 40 whose purpose is to break up the stream of exhaust gases and produce a tortuous passageway for the same through the muffler 10. The central baffle or header 34 is likewise provided with similar holes 42. The number of holes and their size is a matter of design and depends upon the capacity of the engine the desired noise decrease, back pressure, etc. As in the case of substantially all mufflers sold today, the number of holes and their size may be ascertained by experiment and indeed the unique construction of the muffler 10 is such that it is a very simple matter to prepare a great many different baffles such as 30, 32, and 34 and install them quickly.

As seen, the crimp 20 is in the form of an annular land 46, which is formed integral with the bell 14 and is connected to the body of the bell by a flared portion 48. When the bell 14 is fabricated a return lip 50 is not formed bent, as illustrated; hence, it is a linear extension of the land 46. The outer diameters of the flanges 38, the disc baffle 34, as well as a flared lip 52 formed on the end of the bell 12 are all substantially the same as the inner diameter of the land 46 so that all four of these members may be telescoped into the interior of the land 46. The configuration of the sidewalls 36 and their flanges 38 is such that they will closely nest within their respective ends of the bells 12 and 14. The length of the land 20 before crimping is such that when the crimping occurs the

free end of the land 46 may be turned inwardly to provide the lip 50 thereby forming the tight crimp 20 as shown.

Looking now at the two joints 24 and 28, each of these joints is formed by crimping using suitable dies. Each joint comprises an inner annular flange 53 and a spaced fold 58 between which seats the shell's end walls 54 and 56 respectively. The pipe 16 or 18 is crimped to the end wall of the respective bells 12 and 14 prior to assembling the bells to form the shell 22. These crimps are gas tight, are made quickly, are quite durable, and when properly made do not require gaskets.

It will be seen from the above discussion that the muffler 10 has no welds, rivets or other fastening means to keep it in assembly. There are three joints 20 and 24 and 28, each of which is formed by crimping and each of which is durable and gas-tight. Because of the fact that there are no rivets or welds, precoated or preplated metal may be used to fabricate the parts and such coating will not be burnt or abraded in any way during the fabrication, thereby eliminating possible sources of corrosion. All of the parts are readily formed. Pipes 16 and 18 may be made out of commercially obtainable seamless tubing. The headers or baffles 30, 32, and 34 may be stamped using tools and dies of conventional construction. Bells 12 and 14 are readily drawn using suitable dies and the crimps are made in every case by using crimping dies operating in a conventional manner.

In FIG. 5, there is illustrated, in modified form, a muffler 60 the outer construction of which is substantially the same as that of the muffler 10 except for the fact that there are no central baffles equivalent to the baffles 30, 32 and 34. Accordingly, only the flared flange 52 of the left-hand bell 12 is engaged by the crimp 20. In place of the baffles of the muffler 10, there is a central tubular unit 62, which is prefabricated before assembly within the muffler 60. Parts of this unit 62 are best shown in FIG. 4. There are two identical halves 64, each of which is semi-cylindrical. Each half 64 has an annular ridge 66 of increased diameter formed between its ends and integral, radially outwardly extending fins 68 extending along the length thereof, but stopping short of such ends by a distance sufficient to enable the unit 62 to be locked in place as will be explained. After the two halves are formed, or before forming, they are provided with a plurality of holes, such as shown at 70, of any suitable size, amount, and disposition along the length of the unit. An imperforate disc shaped baffle 72 is then placed in the groove formed on the inside of the ridge 66 of one of the halves, the other half is brought into position directly opposite its mate, and the two halves are welded together along the fins 68, thereby to provide strengthening ribs 74 on diametrically opposite sides of the unit. In place of such welding one may crimp the ribs together, mechanically. The length of the ribs 74 is chosen with respect to the shell 22 so that rib ends 76 tightly engage the inner annular flanges 53 formed in the joints 24 and 28, respectively, of the muffler 60. The diameter of the resulting tubular portion of the unit 62 is substantially the same or slightly less than the inner diameter of the pipes 16 and 18 at the location where said pipes emerge from the walls 54 and 56 respectively, so that short end sections 80 and 82, extending beyond the ribs 74, telescope within the interior of the said pipes. By virtue of the construction described, when the crimp 20 is formed, the unit 62 is firmly locked in place. Gases enter from the left via the pipe 16, emerge from the holes 70 to the left of the baffle 72, pass into a muffler chamber 84, enter into the holes 70 to the right of the baffle 72, and finally exit through the exhaust pipe 18.

In FIG. 7, there is illustrated a form of the invention in which a muffler 90 is intended for an engine larger than the size intended for use of either of the mufflers 10 or 60. Instead of making a completely different muffler, the same basic components as used in said mufflers 10

and 60 are employed. Thus, there are end bells 92 and 94, pipes 96 and 98, baffles 100 and 102, and the crimps 104 and 106 all of which find equivalents in the previously described structure. In the muffler 90, however, there is a cylindrical middle section 108 of any desirable length, which has its ends flared outwardly to form lips 110, which serve the same purpose as the flared lip 52 shown in FIG. 2. Other baffle arrangements are of course feasible for use in the muffler 90.

It is believed that the invention has been described in such detail as to enable those skilled in the art to understand the same, and it will be obvious that variations or modifications may be made without departing from the spirit or scope of the invention as defined in the appended claims.

What is desired to be secured by Letters Patent in the United States is:

1. An engine muffler comprising two cylindrical end bells, an inlet pipe, a first crimped connection securely joining one end of one of said end bells to said inlet pipe, an exhaust pipe, a second crimped connection securely joining said exhaust pipe to one end of the second of said end bells, interconnecting means integral with said end bells and spaced from said first and second crimped connections, a lipped extension on said interconnecting means, on at least one of said end bells, a third crimped connection defined by the coaction of said lipped extension and at least one other portion of said interconnecting means, baffling means in the form of a perforated pipe of significantly smaller diameter than said end bells and having opposite end portions which telescope with said inlet and exhaust pipes respectively, an imperforate disc orthogonally disposed in said perforated pipe intermediate its end portions, and positioning means proximate said end portions and adapted to coact with said end bells adjacent said first and second crimped connection, said third crimped connection being positioned remote from said perforated pipe and yet immobilizing that pipe within the muffler shell.
2. An engine muffler as defined in claim 1 in which said positioning means comprises outwardly extending rib means running along most of the length of said perforated pipe and terminating just short of said opposite end portions.
3. An engine muffler comprising two cylindrical end bells, an inlet pipe, a first connection securely joining one end of one of said end bells to said inlet pipe, an exhaust pipe, a second connection securely joining said exhaust pipe to one end of the second of said end bells, interconnecting means integral with said end bells and spaced from said first and second connections,

a lipped extension on said interconnecting means, on at least one of said end bells, a third connection defined by the coaction of said lipped extension and at least one other portion of said interconnecting means,

tubular baffling means having opposite end portions secured within the muffler,

an imperforate disc orthogonally disposed in said baffling means intermediate its end portions,

and positioning means proximate said end portions and adapted to coact with said end bells adjacent said first and second connection, said positioning means comprising outwardly extending rib portions running along most of the length of said baffling means and terminating just short of said opposite end portions.

4. An engine muffler as defined in claim 3 wherein said baffling means is in the form of a perforated pipe of significantly smaller diameter than said end bells, said perforated pipe having opposite end portions which telescope with said inlet and exhaust pipe respectively.

5. A method for assembling a muffler for an internal combustion engine having two end bells, an inlet pipe, an exhaust pipe, and two-piece, tubular baffling means having an imperforate disc orthogonally disposed in said baffling means intermediate its end portions, one end of each of said end bells defining connecting means, comprising the steps of telescoping said pipes within the other end of each of said end bells respectively,

securing said inlet pipe to its associated end bell by crimping it thereto,

securing said exhaust pipe to its associated end bell by crimping it thereto,

assembling said baffling means about said disc, telescoping said baffling means into said end bells, and connecting said end bells together by crimping said connecting means,

said last mentioned crimping securing said baffling means within said muffler and forming a permanent gas-tight enclosure.

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