Sept. 15, 1936. C. HOLLERITH 2,054,324

MUFFLER

Filed Sept. 18, 1933 2 Sheets-Sheet 1

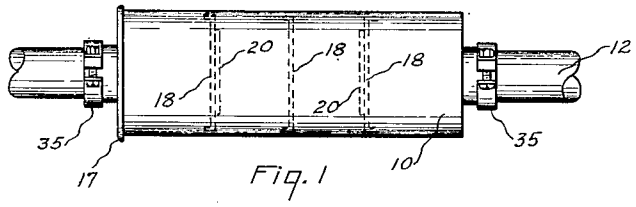


Fig. 1

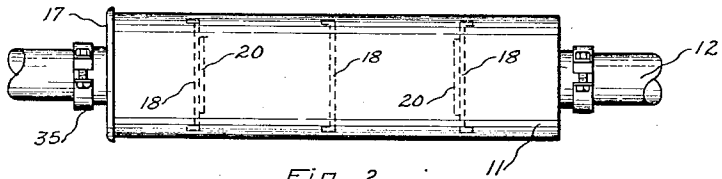


Fig. 2

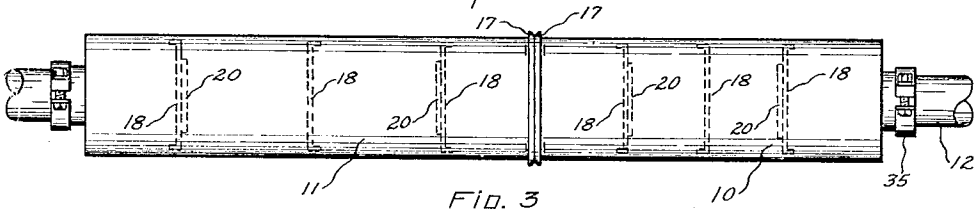


Fig. 3

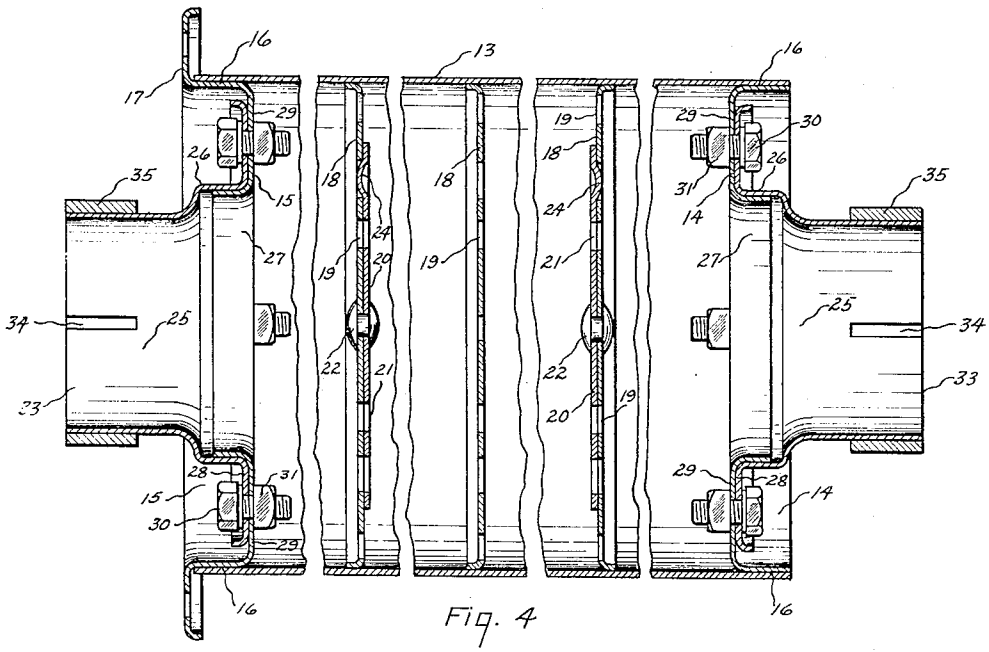


Fig. 4

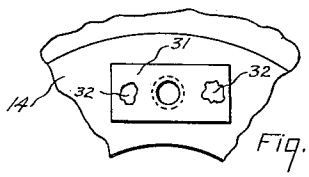


Fig. 9

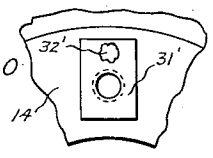


Fig. 10

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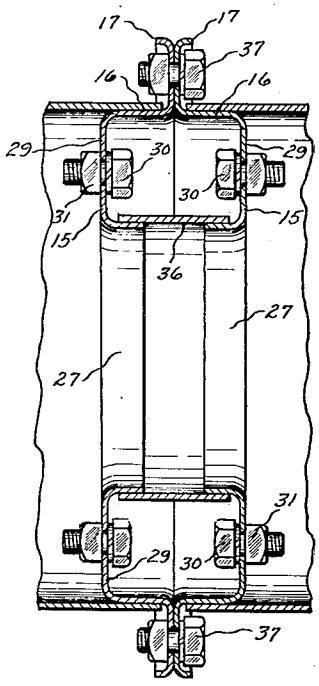


Fig. 5

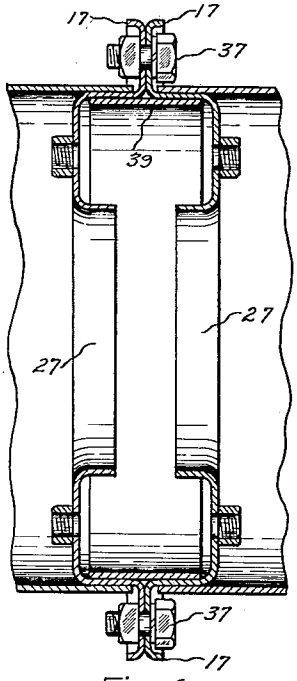


Fig. 6

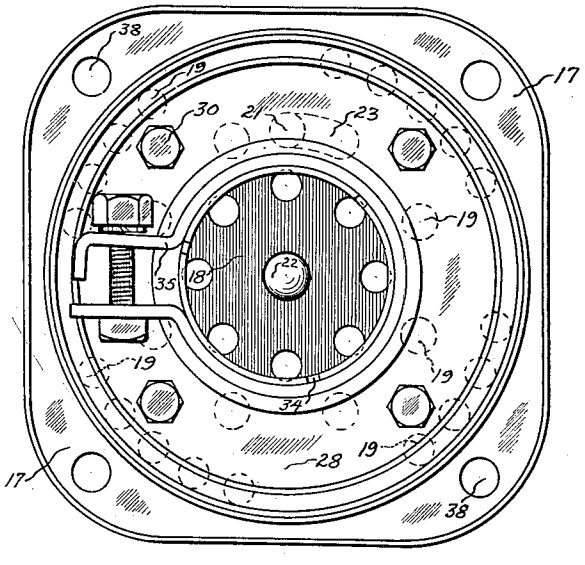


Fig. 7

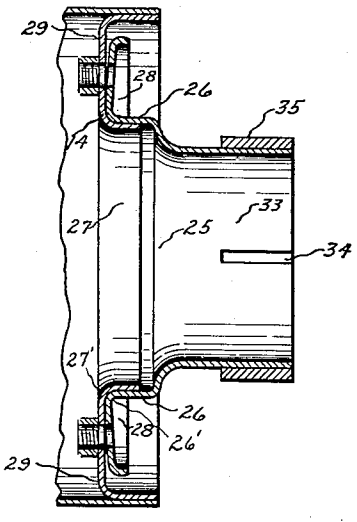


Fig. 8

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UNITED STATES PATENT OFFICE

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MUFFLER

Charles Hollerith, Jackson, Mich., assignor to Hayes Industries, Inc., Jackson, Mich., a corporation of Michigan

Application September 18, 1933, Serial No. 689,811

11 Claims. (Cl. 181—49)

The present invention relates to muffler constructions for internal combustion engines and has particular reference to mufflers of the replacement type as distinguished from mufflers designed for a particular engine.

Because of the corrosive action of the gases and the excessive heat thereof during normal use, the life of the factory equipped muffler frequently is somewhat less than that of the prolonged life of the present motor vehicles. In view of the numerous makes of vehicles upon the market, the annual change in models, and the wide variation in requirements and dimensions of exhaust conduits, it is not practical for a service station to carry a replacement muffler for each make and model of vehicle.

Thus it becomes the object of my invention to provide a service assembled replacement muffler which may be fabricated from a limited stock meeting satisfactorily the muffling requirement of a large number of entirely different engines and adaptable to a wide range of variations in exhaust conduits.

Another object is to provide a muffler construction which may be readily and efficiently assembled in service in single or multiple units.

A further object resides in the provision of a novel adapter head which may be conveniently stocked in variable sizes and readily attached upon opposite ends of the muffler to adapt the same to installation in an exhaust conduit of any given diameter.

Other objects and advantages reside in the combination and arrangement and construction of parts as will be more fully set forth in the detailed description to follow. The invention is clearly pointed out in the appended claims.

In the accompanying drawings, wherein a preferred embodiment of my invention is illustrated,

Figs. 1 and 2 are side elevations of installations of single muffler units of graduated size.

Fig. 3 is a side elevation of an installation of the units shown in Figs. 1 and 2, coupled into a single muffler of increased capacity.

Fig. 4 is a broken cross sectional view of my improved muffler unit with the adapter heads in the assembled state.

Fig. 5 is a fragmentary cross sectional view of the central coupling between multiple units.

Fig. 6 is a view similar to Fig. 5 of a modified type of coupling.

Fig. 7 is an end view of Fig. 4.

Fig. 8 is a fragmentary cross sectional view of an adapter head in position prior to drawing up the cap screw.

Figs. 9 and 10 are detailed elevations showing the manner of welding the nuts upon the rear side of the muffler heads.

Generally considered, the present invention contemplates the manufacture of muffler units of varying lengths and/or muffling capacity. Each unit is complete in itself yet is designed to be readily coupled to a similar unit of the same or different length and/or capacity. Preferably adjustment means in the form of regulable baffles are provided in each unit to provide adequate muffling effect when a single unit is employed and to avoid excess back pressure when the units are employed in multiplication.

Opposite ends of the muffler in either single or multiple units are provided with head flanges to which an adapter head is secured at the time of installation having a neck of a diameter corresponding to the diameter of the exhaust conduit in connection with which the muffler is to be employed. The adapter head preferably takes the form of an inexpensive stamping which may be carried in stock in a wide variation of sizes at little cost.

Having specific reference to the accompanying drawings, muffler units 10—11 of different lengths and capacity are shown in Figs. 1–2 inserted in the exhaust conduit 12 of an internal combustion engine. In Fig. 3, the units 10—11 are shown coupled into a single unit giving the aggregated capacity of each single unit. For the purpose of illustration only two units of different length are shown. Obviously, any number of different length units may be provided although as a practical matter with two or three units of different length, when used singly or in the various possible combinations of multiplied units, muffling requirement for practically all makes and models of engines can be satisfied.

In Fig. 4 one of the units is shown in cross section with the adapter heads in position. It is to be understood that each unit is a complete muffler in itself yet because of its construction it can be coupled with another unit of corresponding or different length to produce a muffler of increased capacity. As illustrated, the unit consists of an outer shell 13 with head flanges 14—15 located at opposite ends of the shell 13. These flanges may be secured in position in any suitable manner but are preferably welded circumferentially at 16 to provide a gas tight seam. An outer coupling flange 17 is located at one end of the shell 13 and may be constituted in any suitable manner. One satisfactory way is to fabricate both the head flange 15 and the outer

flange 17 from an integral sheet metal stamping. In some cases it may be an advantage to have outer coupling flanges at both ends of the shell 13 when more than two units are to be coupled in multiple; however, in practice two units have proven to be adequate and for this reason a single outer coupling flange is all that will usually be required. Aside from acting as a means of coupling together two units, the flange 17 may serve as a point of attachment in the installation of the muffler.

The interior muffler construction may take innumerable shapes and forms and for the most part forms no particular part of the present invention. Any well known arrangement of baffles, concentric tubing absorption chambers, and similar construction may be employed within the scope of the present invention. One highly satisfactory and inexpensive construction is illustrated in which a plurality of circular baffles 18 having spaced apertures 19 are arranged transversely of the casing 13. As illustrated, the end baffles 18 are provided with dampers 20 which may take the form of sheet metal discs having apertures 21 which in one position of the damper coincide and in another close a portion of the apertures 19. Suitable means such as rivets 22 hold the parts in assembled relationship and act as an axis about which the damper may be rotated. As more clearly shown in Fig. 7, the end baffles 18 are provided with slots 23 permitting an instrument to be engaged with one of the apertures 21 which coincide with the slots 23 in both the open and closed position of the damper. With this construction, the damper may be adjusted from the ends of the muffler to increase or decrease the muffling capacity depending upon the requirement. To assume fixation of adjustment, a portion of the damper may be cupped as at 24 and adapted to snap into an aperture or similar cupped portion in the baffle 18 in both positions of adjustment of the damper. In practice it has been found that when only a single unit is employed, proper muffling effect is accomplished with both the dampers in the end baffles in closed position. However, with the units coupled in multiplication, one or both of the dampers may be opened to avoid excessive back pressure. Obviously, the adjustment of the damper will depend entirely upon the muffling requirement whether the units are used singly or in multiple.

The adapter head 25 has a sleeve portion 26 which is held to a standard diameter and which is adapted to be snugly fitted upon a pilot flange 27 of the head flanges 14—15; this pilot flange is likewise held to a standard diameter. Contiguous with the sleeve portion 26 is a bolting flange 28 which is adapted to be drawn up to a gas tight seat with the transverse portion 29 of the head flanges 14—15 by cap screws 30. To facilitate assembly, nuts 31 are welded to the back of the head flange. Preferably, the nuts 31 are of elongated construction to permit welding at points 32 removed from the threaded portion of the nut. In Fig. 10 is shown a modified form of nut 31' welded at 32' at a point outside of the bolt circle to avoid any roughness or burs between the adapter head and the head flanges. As shown in Fig. 8, the bolting flange 28 is slightly angularly disposed to the transverse portion 29 of the head flange prior to the drawing up action of the cap screws 30. This is accomplished by having the smaller radius 26' located within the larger radius 27' and is desirable for the reason that it is difficult to hold the sleeve 26 and flange 27 to the same diameter. When the cap screws are drawn up a gas tight fit is assured in the locality of the superimposed radii 26'—27'.

The neck portion 33 of the adapter head 25 will be of varying diameter corresponding to the range of diameters of exhaust conduits to which the muffler is to be coupled. The neck is preferably split at 34 to increase its contractibility and the usual form of clamp 35 may be employed to maintain a tight connection between the adapted head and the exhaust conduit.

In Figs. 5 and 6, two satisfactory ways for effecting a gas tight joint between units in multiple are illustrated. Referring to Fig. 5, two units have been arranged with the flanges 17 in abutting relation. Prior to the bolting of these flanges together, a sleeve 36 is snugly fitted over the pilot flanges 27 of the head flanges 15 to provide a gas tight joint between the two units; the cap screws 30 are employed to seal the aperture in the transverse portion 29 of the head flanges. Suitable bolts 37 are passed through aperture 38 in the flanges 17 to secure the same together to retain the units in an assembled state. In Fig. 6 a sleeve 39 is shown sealing the joint between the flanges 17. With this arrangement the cap screws 30 need not be inserted in the head flanges. The flanges 17 are bolted together as heretofore described.

At the present time it is the practice to support the engine in an automobile chassis upon rubber and spring mountings. With this type of engine mounting, the use of conventional clamps for coupling the muffler into the exhaust conduit has not proven satisfactory and it has become the practice to weld the muffler into the exhaust unit forming a single integral assembly which is exceedingly bulky and cumbrous to stock or install. The present invention meets the foregoing situation in a very satisfactory manner as it is possible to weld the adapter heads to the sections of the exhaust conduit and to bolt the adapter heads with the conduit sections attached at the time of installation. From this angle it should appear that the invention has application to both factory equipped and replacement mufflers.

It should be apparent from the foregoing description that I have provided a service assembled muffler of the replacement type which may be inexpensively stocked by the service station yet is of such flexible design as to be capable of meeting the muffling requirement of innumerable sizes of engines and installed upon innumerable sizes of exhaust conduits. The units 10—11, sleeves 36—39, and cap screws 30 are all of standard size; it being only necessary to stock in quantities the inexpensive adapter heads 25 with different diameter necks.

Having described my invention, what I claim as new and desire to protect by Letters Patent is:

1. A muffler coupling head for attachment to a muffler body comprising an inner radially extending annular head, an annular pilot flange associated with said head and an adaptor head associated with said head, said adaptor head comprising an annular portion engageable with said inner head but normally disposed at an angle thereto, an annular portion receiving the pilot flange and a portion adapted to receive a sleeve.

2. A connection for joining together two muffler sections, comprising an annular radially extending flange on an end of each section, said flanges being in abutting relationship, means connecting said flanges, and a sleeve connecting the muffler sections.

3. A connection for joining together two muffler sections, comprising an annular radially extending flange on an end of each section, said flanges being in abutting relationship, an annular pilot flange axially and outwardly extending from the named ends of each muffler section, and a concentric sleeve telescopically engaging said pilot flanges and connecting the muffler sections.

4. A connection for joining together two muffler sections, comprising a head for each muffler section, each head being inwardly disposed from the ends of the respective muffler sections, an integral radially extending flange for each head, said flanges being in abutting relationship and in respective planes spaced from the planes of the muffler heads, and integral axially and outwardly extending pilot flanges, means connecting said abutting radially extending flanges, and a sleeve telescopically connecting the muffler sections.

5. A connection for joining together two muffler sections, comprising a head for each muffler section, each head being inwardly disposed from the ends of the respective muffler sections, an integral radially extending flange for each head, said flanges being in abutting relationship and in respective planes spaced from the planes of the muffler heads, and integral axially and outwardly extending pilot flanges, means connecting said abutting radially extending flanges, and a sleeve telescopically engaging the pilot flanges.

6. An adaptor for mufflers, comprising a body, an annular substantially outwardly extending flange defining a frustum of a cone for connection to the muffler, and a neck portion being adapted to receive a conduit.

7. An adaptor for mufflers, comprising a cylindrical body adapted to receive a concentric part of a muffler head, an outwardly extending flange defining a frustum of a cone connected to one side of said body adapted to be placed in abutting relationship with a muffler head and connected thereto, and a neck connected to the other side of said body for receiving a conduit.

8. A muffler unit coupling head for attachment to a muffler body, comprising an outer securing flange for connection to a like flange on another muffler unit similarly equipped, an inner muffler head, and a pilot flange connected to said inner muffler head adapted to concentrically receive a sleeve.

9. A muffler unit, being a muffler complete in itself, comprising an elongated casing, muffling means therein, a head in each end, openings into the interior of the casing defined by said heads, and at one end a connecting flange extending radially outwardly from said casing for connecting a similarly equipped muffler unit.

10. A muffler unit, being a muffler complete in itself, comprising an elongated casing, muffling means therein, a head in each end, and in at least one end an annular pilot flange extending axially of said casing defining an opening into the interior of the casing and being adapted to receive a sleeve, and at the same end a connecting flange extending radially outwardly from said casing for connecting a similarly equipped muffler unit.

11. A muffler unit, being a muffler complete in itself, said unit comprising an elongated casing, muffling means therein, and an adaptor head located in at least one end of said casing, said head having a head portion, an integral annular pilot flange therein extending axially of said casing defining an opening into the interior of said casing and being adapted to receive a sleeve, and an integral connecting flange extending radially outwardly from said end of said casing for connecting a similarly equipped muffler unit.

CHARLES HOLLERITH.