

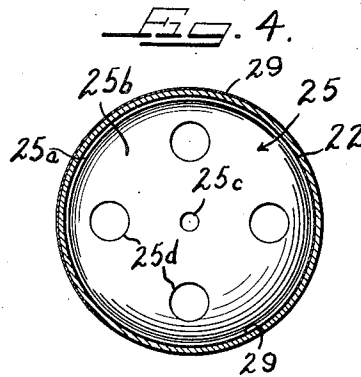
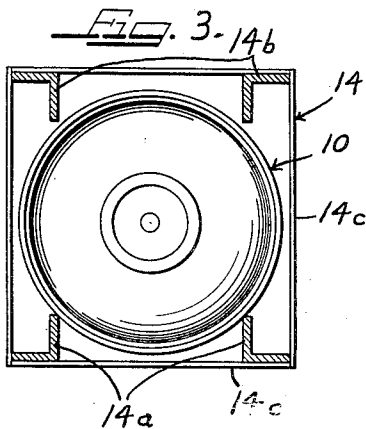
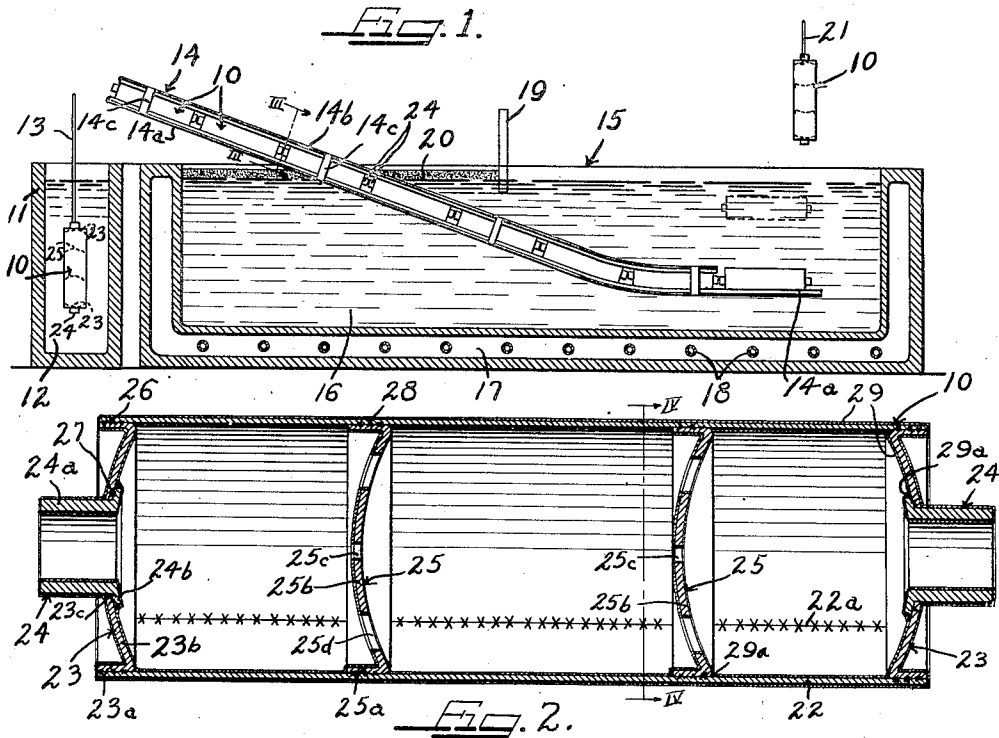
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F. C. BRIGHTLY, JR., ET AL

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GALVANIZED MUFFLER WITH CONCAVO-CONVEX BAFFLES

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Inventors
 FREDERICK C. BRIGHTLY JR.
 JOHN F. HERBERT.

The Firm of Charles H. Hill

Hill

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GALVANIZED MUFFLER WITH CONCAVO-CONVEX BAFFLES

Frederick C. Brightly, Jr., Chicago, and
John F. Herbert, La Grange, Ill.

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1 Claim. (Cl. 181—49)

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This invention relates to corrosion-resisting silencers such as exhaust mufflers for internal combustion engines, and specifically the invention deals with a galvanized muffler so constructed and arranged as to accommodate easy drainage of molten zinc therefrom as the muffler is removed from a zinc bath.

The invention will hereinafter be specifically described as embodied in a muffler for the exhaust gases of an automobile internal combustion engine, but it should be understood that the principles of this invention are generally applicable to silencers and methods of making same.

Automobile mufflers are conventionally made of inexpensive mild steel which quickly rusts. The rust particles soon clog the muffler, thereby increasing the resistance to gas flow and decreasing the efficiency of the engine. In addition the rusted mufflers frequently blow open, permitting the toxic exhaust gases to enter the passenger space of the automobile with attendant ill effects on the occupants.

According to this invention, the same inexpensive mild steels heretofore used in the production of automobile mufflers are rendered corrosion resistant by a protective metal coating, such as zinc. The muffler construction of this invention is so arranged that the interior of the muffler is self draining to accommodate ready elimination of the protective coating metal before it becomes solidified in the interior of the muffler. Thus the mufflers of this invention have concavo-convex end heads and baffles in place of heretofore-used flat end heads and tubes. These concavo-convex units are centrally apertured to be self draining when one end of the muffler is lower than the other end. The body of the muffler is preferably an inexpensively formed seam-welded mild steel tube. The end heads and baffles are inexpensively formed on identical stamping dies. The assembly is inexpensively made by spot-welding or the like. The protective metal coating is applied by dipping the welded-together assembly in a bath of molten metal such as zinc, and excess metal is drained from the assembly as it is lifted out of the molten bath with the apexes of the dish-shaped baffles facing downwardly.

It is, then, an object of this invention to provide a galvanized silencer for exhaust gases and the like.

Another object of this invention is to provide a mild steel silencer composed of a tubular body and concavo-convex end heads and baffles so arranged that the body can be immersed in galvanizing metal and excess metal readily drained

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therefrom before it becomes solidified in the interior of the silencer.

A still further object of the invention is to provide an inexpensive method of rapidly coating automobile mufflers with a non-corrosive metal film.

A still further object of this invention is to provide a process for galvanizing open-ended baffled containers whereby all excess zinc is removed through gravity drainage.

A still further object of the invention is to provide an automobile muffler having a mild steel seam-welded tubular body, convex end heads welded in the ends of the tubular body, and concavo-convex baffles traversing the interior of the body at spaced intervals and being apertured so that complete gravity drainage out of one end of the body is facilitated.

Other and further objects of the invention will be apparent to those skilled in the art from the following detailed description of the annexed sheet of drawings which, by way of a preferred example only, illustrates one embodiment of the invention.

On the drawings:

Figure 1 is a somewhat diagrammatic side elevational view, with parts in vertical cross section, illustrating apparatus for carrying out the process of hot dip galvanizing automobile mufflers in accordance with this invention.

Figure 2 is a longitudinal cross-sectional view of an automobile muffler according to this invention.

Figure 3 is a cross-sectional view taken along the III—III of Figure 1 and illustrating the manner in which the mufflers of this invention are supported in a feeder chute, during the hot dip galvanizing process.

Figure 4 is a transverse cross-sectional view taken along the line IV—IV of Figure 2.

As shown on the drawings:

Mufflers 10 of this invention are galvanized as illustrated in Figure 1 by first immersing the same in a pickling tank 11 containing an acid bath 12 such as a 10% solution of sulphuric acid, a hydrochloric acid solution, or the like. The completely degreased and cleaned mufflers are then removed from the pickling tank 11 by means of a hook 13 and are rinsed in water (not shown). The rinsed cleaned mufflers, while still suspended on hook 13, are then dipped in a 30° Bé. zinc ammonium chloride flux solution (not shown) with the baffles in the same positions as shown in the pickling tank of Figure 1. Next the fluxed mufflers are fed into the upper end of a chute 14

which slopes downwardly into a tank 15. The tank 15 contains a bath 16 of molten zinc. The zinc is kept in a heated condition by heat from a combustion chamber 17 surrounding the tank. Gas or oil-fed nozzles 18 extend into the combustion chamber to heat the tank. A baffle 19 extends across the tank above the chute 14 and dams off a pond of flux 20 floating on top of the molten zinc 16 so that the mufflers 10 in the chute 14 must first pass through the flux bath before reaching the zinc bath.

The chute 14, as best shown in Figure 3, is composed of a pair of bottom angle strips 14a and a pair of top angle strips 14b. The strips are welded to straps 14c which hold them apart to define a central passageway sized for receiving the mufflers 10. The mufflers ride on the end edges only of the inwardly projecting legs of the strips. The lower end of the chute, as shown in Figure 1, is substantially horizontal and the bottom strips 14a project beyond the top strips, so that, as a muffler emerges from under the top strips 14b it is free to float upwardly in the bath 16 as illustrated in dotted lines. A hook 21 is provided for lifting the muffler 10 out of the bath 16.

As best shown in Figure 2, the muffler 10 is composed of a tubular body 22, end heads 23 carrying nipples 24, and baffles 25 at spaced intervals in the tube between the end heads. The tubular body 22 is composed of mild steel and is held in tubular form by a seam weld 22a. The end heads 23 are in the form of circular disks with cylindrical flanges or collars 23a around the periphery thereof snugly fitting in the ends of the tube and welded thereto as by spot welds 26. These disks have concavo-convex main body portions 23b and are positioned so that the convex sides face the outside of the tube. The apexes of the body portions 23b are centrally apertured to provide relatively large holes 23c therethrough. The nipples 24 have tubular main body portions 24a snugly fitting through the holes 23c together with upturned flange portions 24b underlying the concave faces of the main body portions 23b around the holes 23c and secured thereto as by a welded bond 27.

The baffles 25 are of the same identical shape and size as the end heads 23 and have cylindrical flanges or collars 25a snugly fitting inside the tube 22 together with concavo-convex main body portions 25b. These body portions 25b, as well as the body portions 23b, extend inwardly of the surrounding flanges or collars, but preferably do not project beyond the flanges or collars.

Each baffle has a central aperture 25c at the apex of the body portion 25b. This aperture is surrounded by a plurality of larger diameter holes 25d, four such holes being shown in Figure 4. The collars or flanges 25a of the baffles are welded to the tube 22 as by spot welds 28.

It will be noted from Figure 2 that the concavo-convex main bodies 25b of the baffles 25 all extend in the same direction so that the holes 25c therein will accommodate gravity drainage to the left-hand end head 23 whenever the baffle is inclined to lower this end. Conversely, these holes 25c will be uppermost whenever the muffler is inclined in the other direction. This feature is important in the process of galvanizing the mufflers as is shown in Figure 1.

When the muffler 10 is immersed in the pickling bath 12, the holes 25c of the baffles are uppermost so that hydrogen gas eliminated during the pickling operation can readily rise out of

the top end of the muffler, thereby eliminating heretofore-encountered gas pockets when pickling hollow articles. The escape of the gas insures complete filling of the interior of the muffler with the pickling liquid so that all parts of the muffler will be cleaned. To remove the muffler from the pickling bath it is merely lifted by the hook 13 which is inserted through the top nipple 24 and engaged against the body 23b of the end head.

The pickled muffler, after being rinsed in water and fluxed in zinc ammonium chloride, is then shoved into the upper end of the chute 14 with the holes 25c in the baffles still in an uppermost position. The nipple 24 on the leading end of one muffler engages the nipple 24 on the trailing end of the previous muffler, and, as each muffler is forced into the upper end of the chute 14, filled with the mufflers, the mufflers are advanced down through the flux bath into the zinc bath and out of the bottom end of the chute. As they are thus advanced, all surfaces, both interior and exterior, are first coated with flux material such as salts like zinc chloride, and are then coated with zinc. The zinc flows through the entire muffler as well as around the muffler, since the angle strips of the chute only have line contact on the body 22 of the muffler. Thus zinc flows through the nipple at 24 on the leading end of the muffler into the interior of the tube 22 and then flows through the apertures in the baffles 25 and finally out of the nipple in the trailing end of the muffler. This flow is not trapped by air in the muffler since the air will rise out of the nipple at the trailing end of the muffler.

As a result of this treatment in the zinc bath, a complete zinc coating 29 is deposited on all surfaces, both interior and exterior, of the tubular body 22, the end heads 23, the nipples 24, and the baffles 25. The zinc films will form fillets 29a sealing off any welded areas in metal to metal contact.

When the muffler emerges from under the top strips 14b of the chute, it will float to the top of the zinc bath 16 whereupon the leading nipple 24 receives a hook 21 therein to raise the zinc-coated muffler above the bath 16. The muffler will then assume the vertical position shown in Figure 1 with the apexes of the baffles assuming the lowermost position so that the holes 25c will drain out all excess molten zinc for flow through the bottom nipple. As a result, no excess zinc beyond that necessary for the coating 29 is retained in the muffler.

The zinc bath is preferably maintained at temperatures around 850° F. so that the zinc will remain sufficiently molten when it is raised above the bath to permit drainage of excess zinc. The galvanized muffler, although completely coated on all surfaces, is free from zinc pellets or slugs which are conventionally trapped in hollow articles that do not have the self-draining feature of the muffler of this invention.

From the above descriptions it will be understood, therefore, that this invention provides an all-welded silencer composed of the same type of inexpensive mild steel heretofore used, but coated with a corrosion-resistant material such as zinc and having apertured self-draining baffles replacing the heretofore-necessary muffler tubes. The silencer is free from heretofore-used lock-seams which might unlock or rupture from expansion due to the heat conditions incidental to galvanizing. It will also be understood that the end heads and baffles of the muffler of this invention can

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be made on the same stamping equipment, since they are identically shaped.

It will be further understood that the mufflers of this invention automatically release gases through one open end thereof, and automatically drain excess coating material through this same open end without the possibility of trapping any of the gases or liquids.

It will, of course, be understood that various details of construction may be varied through a wide range without departing from the principles of this invention and it is, therefore, not the purpose to limit the patent granted hereon otherwise than necessitated by the scope of the appended claim.

We claim as our invention:

A muffler of simplified design adapted to be uniformly and completely coated by means of a galvanizing process carried out at the completion of fabrication and assembly thereof, comprising a metal tube, a plurality of identically dished metal disks each having a peripheral collar sized for snugly fitting said tube and a uniformly curved concavo-convex segmental spherical main body extending from the collar to a central apertured apex, two of said disks having enlarged central apertures and flanged nipples extending through the apertures thereof with the flanges bottomed on and welded to the concave faces around the apertures, said two disks having the collars thereof seated in and welded to opposite ends of the tube to form end heads for the tube with the concave faces of the disks inside the tube and the nipples extending outwardly from the ends of the tube, the other of said disks being disposed in the tube at spaced intervals between said end heads

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and having the collars thereof welded to the tube, said other of said disks having additional relatively larger gas-flow apertures surrounding the smaller central drainage aperture thereof and all of the thus apertured main bodies having their apexes extending in the same direction whereby gravity drainage through the tube is insured when the axis of said tube is displaced from the horizontal, and a zinc coating on all exposed surfaces of the tube, the disks, and the nipples.

FREDERICK C. BRIGHTLY, JR.

JOHN F. HERBERT.

REFERENCES CITED

- 15 The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
20 689,797	Erwin	Dec. 24, 1901
1,081,348	Unke et al.	Dec. 16, 1913
1,155,317	Mark	Sept. 28, 1915
1,756,916	Stranahan	Apr. 29, 1930
1,810,252	Noonan	June 16, 1931
25 1,867,273	Lemmerman	July 12, 1932
1,990,837	Morgenstern	Feb. 12, 1935
2,150,768	Hedrick	Mar. 14, 1939
2,345,058	Matteson	Mar. 28, 1944
2,348,696	Schabacker	May 9, 1944
30 2,365,846	Seaborne	Dec. 26, 1944
2,373,038	Lindsay	Apr. 3, 1945
2,416,452	Marx	Feb. 25, 1947

FOREIGN PATENTS

Number	Country	Date
35 364,222	Great Britain	Jan. 7, 1932