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Leventhal

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[54] **SUSPENSION MEANS FOR AUTOMOBILE MUFFLERS**

[76] Inventor: **Jack Leventhal,** 2816 W. Arthur Ave., Chicago, Ill. 60645

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[52] **U.S. Cl.** **181/72**

[51] **Int. Cl.** **F01n 7/00**

[58] **Field of Search** ..... 181/72, 35 B, 36 D, 181/33 A

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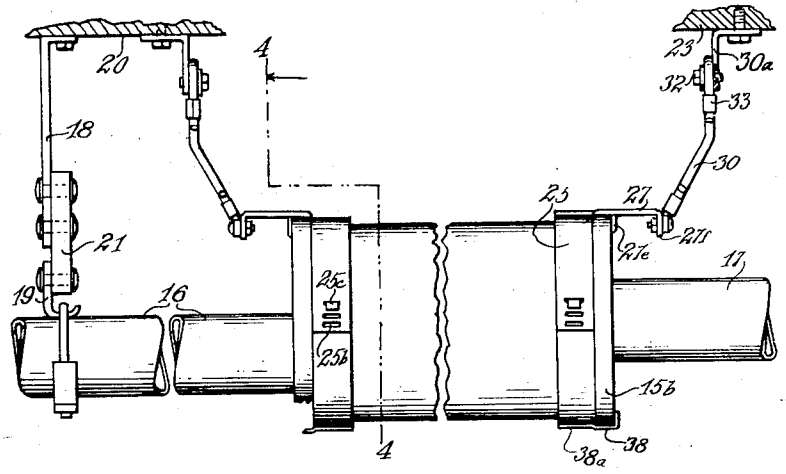
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Primary Examiner—Richard B. Wilkinson
Assistant Examiner—John F. Gonzales
Attorney—S. J. Lehrer

[57] **ABSTRACT**

Means to suspend a muffler from an automobile frame. Band clamps are secured around the ends of the muffler next inwardly of the terminal marginal beads thereof. A bracket extends from each band clamp and terminates with a downbend; and cables depend from the automobile frame and are secured to the downbends. Each bracket also has an intermediate downbend applied to the end of the muffler to lock the same against endwise shifting.

4 Claims, 8 Drawing Figures



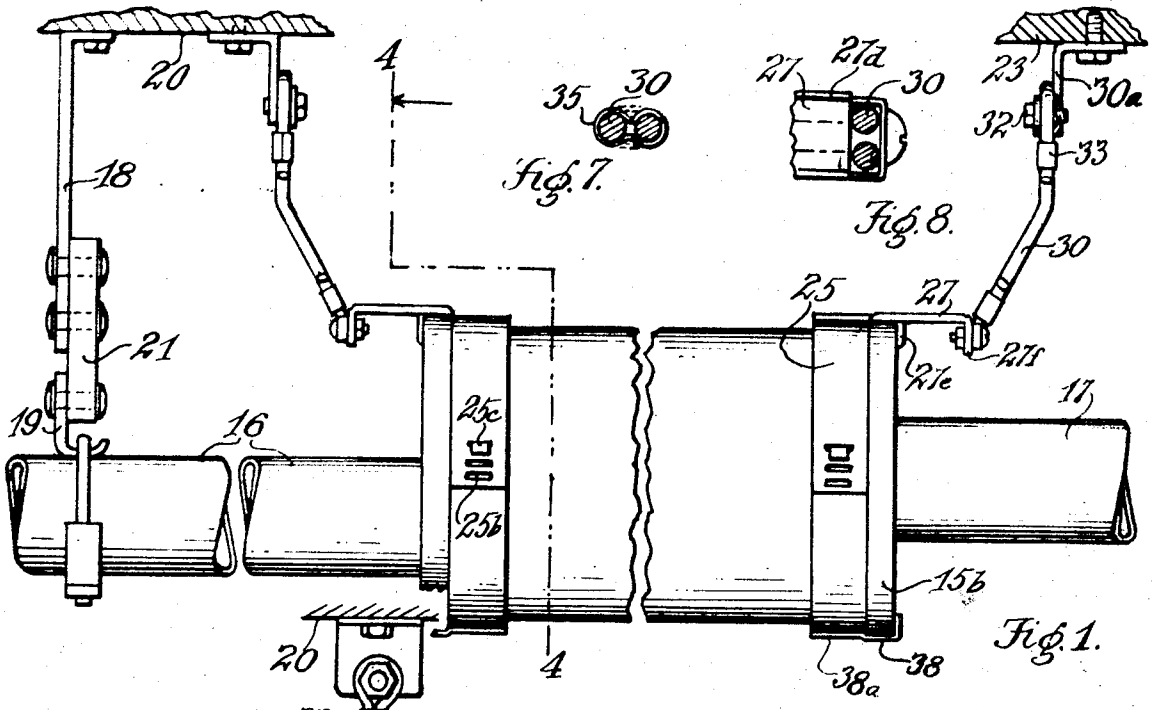


Fig. 1.

Fig. 8.

Fig. 7.

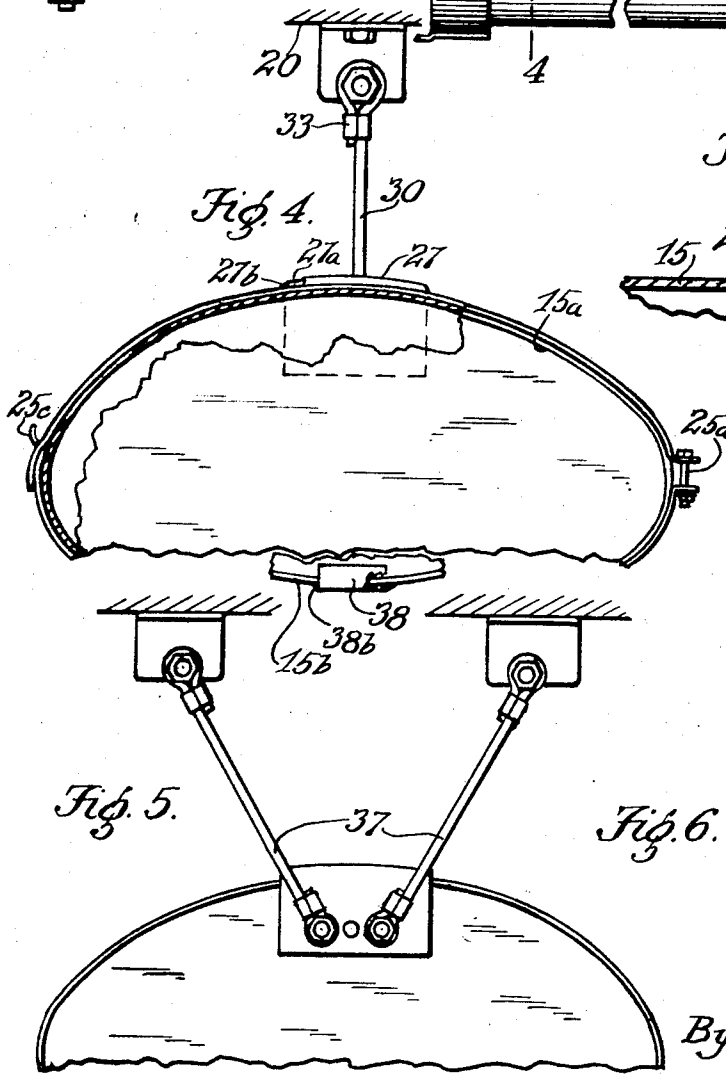


Fig. 4.

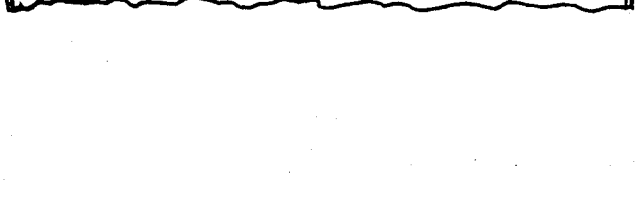


Fig. 5.

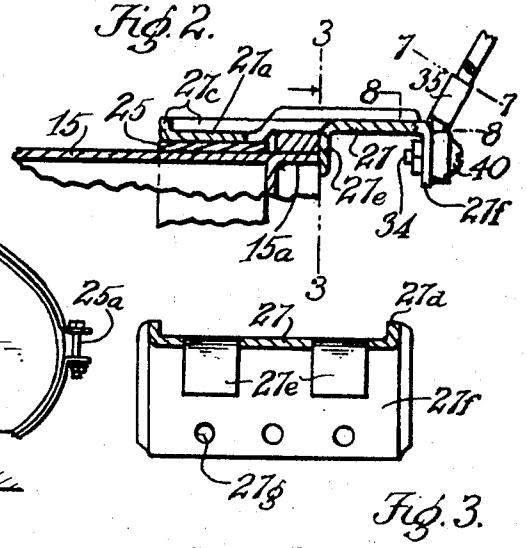


Fig. 2.

Fig. 3.

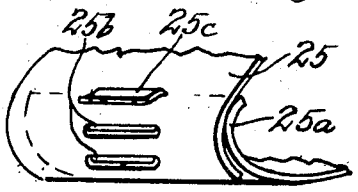


Fig. 6.

Inventor:
Jack Leventhal
By S. J. Lehrer
Attorney.

SUSPENSION MEANS FOR AUTOMOBILE MUFFLERS

My invention relates to suspension means for automobile mufflers. These receive an exhaust pipe at the front end and a tail pipe at the rear end; and the usual means for suspending the muffler from the frame of the automobile is directed to the pipes mentioned rather than to the muffler itself. The advantage of this suspension is that by making no connection with the muffler itself the suspension is suitable for mufflers of any size, contour or length. However, corrosion or vibration of the pipes and the muffler during the travel of the automobile often cause the connections between the pipes and the end-portions of the muffler to weaken and even come apart at one end or the other. In such event the muffler loses its proper support and drops from the zone of the break, dragging on the pavement or becoming lost during travel. The support of mufflers by hangers connecting with the exhaust and tail pipes is therefore insecure, and one object of the present invention is to provide an added support connecting directly with the muffler for supporting the same in case one or the other hangers directed to the attached pipes becomes loose or comes apart.

A further object is to provide direct muffler suspension means which are both flexible and very strong, so that they serve not only as additional supports while the regular hangers are in use, but take over as complete, strong and permanent hangers for the muffler in case one or the other regular hangers fails as stated before.

Another object is to design the novel suspension means with clamps which engage the end portions of the muffler and connect with strong and flexible means suspending the muffler from frame members of the automobile.

An additional object is to construct the muffler suspending means in the form of units which are readily adaptable to mufflers of various sizes, contours or lengths.

A better understanding of the invention may be gained by reference to the accompanying drawing, in which:

FIG. 1 is a side elevation of a typical automobile muffler installation, broken away in places, and showing hangers of regular and improved types;

FIG. 2 is an enlarged duplication of the lower part of the improved suspension means illustrated in the right-hand portion of FIG. 1, mostly in section;

FIG. 3 is an enlarged section on the line 3—3 of FIG.2;

FIG. 4 is a section on the line 4—4 of FIG.1, broken away at the bottom;

FIG. 5 is a view similar to FIG. 4 showing a dual form of the improved suspension means;

FIG. 6 is a detail in perspective, viewed from the left-hand end of FIG. 4; and

FIGS. 7 and 8 are, respectively, sections on the lines 7—7 and 8—8 of FIG. 2.

Referring specifically to the drawing, 15 denotes the body, 15*a* the flanged ends, and 15*b* the marginal reinforcing beads of a typical automobile muffler. The pipes connecting endwise with the muffler are shown at 16 and 17. FIG. 1 shows a standard muffler hanger at the left which connects with the pipe 16, the hanger employing upper and lower metal straps 18 and 19 suspended from a frame member 20 and connected by a rubber insert 21. As long as the muffler and pipes are rigidly connected the hanger just described is considered a sufficient support for the muffler.

The novel suspension means comprise the pair of units seen applied to the end portions of the muffler in FIG. 1 and also secured at the top to frame portions 20 and 23 of the automobile. The main connections of the suspension means with the muffler are a pair of band-type clamps applied inwardly of the terminal beads 15*b*. Each clamp is composed of a pair of bowed metal straps, one marked 25 engaging the top of the muffler, and the other marked 25*a* engaging the bottom. At one end the strap 25 is formed with a series of vertically-spaced slots 25*b*, while the same end of the strap 25*a* has a tongue 25*c*. FIGS. 4 and 6 show that the straps are linked together at the left-hand end by means of the tongue 25*c* and the top slot 25*b* for a muffler of maximum girth. Thus, the straps 25 and 25*a* will fit smaller mufflers by selecting the proper lower slot 25*b* for the tongue 25*c*. At the right-hand end the straps are connected and clamped tight by means of a bolt 25*d*.

The clamp at each end of the muffler constitutes a base for extending a bracket 27. The bracket originates with a plate 27*a* which is welded on the sides at 27*b* — as seen in FIG. 4 — to the crown of the clamping strap 25; and the plate is stiffened by side and terminal bends 27*c* as seen in the center of FIG. 2. The plate is also raised over the muffler bead 15*b* to form the bracket 27. The latter has side bends 27*d* to stiffen it, and is struck down with lugs 27*e* which fit against the end of the muffler as seen in FIG. 2. The outer end of the bracket has a downbend 27*f* in which three laterally spaced holes 27*g* are made.

A suspension cord 30 is attached to the outer end of each bracket 27. The cord is made of maximum strength material, such as nylon; or it may be a cable with a braided wire core. An angle plate 30*a* bolted to the frame portion 23 forms the connection for the upper end-portion of the cord 30. Such end-portion is wrapped around a cross-bolt 32 driven into the angle plate. The doubled end of the cord is then clamped in a band clip 33. The lower end-portion of the cord is similarly applied to a bolt 34 driven into the bracket downbend 27*f*, and receives a band clip 35. FIG. 7 is a detail of one of the band clips. Dotted lines in this figure indicate that the band has flat sides when first applied. It is then pinched in the middle by a suitable tool to bind the end-portions of the cord tightly together and make the end-connections of the cord secure.

While the bracket 27 could be made considerably shorter and still allow the bolt 34 to be secured, it is made as shown in order to separate the lower portion of the cord 30 from the end of the muffler and save the cord from blistering or cracking from the heat of the muffler. In this respect there might still be sufficient heat to soften the bottom loops of the cords from the tightening pressure of the bolts 34. To eliminate this possibility, C-shaped spacers 40 are applied to straddle the loops where the bolts pass, as seen in FIGS. 2 and 8. The spacers will thus relieve the loops from bolt pressure. The cords suspending the muffler may be straight, curved or angular as shown in FIG. 1, according to the positions the muffler may assume from oscillation as the automobile turns or follows road irregularities. Ordinarily, the bottom cord fastening is applied by way of the central hole of the bracket downbend 27*f*. However, the muffler would receive less sidesway if suspended from dual cords 37 as seen in FIG. 5, in

which event the bottom fastenings would apply by way of the side holes in the bracket **27***f*.

It is important that the angular stresses of the muffler in the clamp **25–25***a* be checked. The bracket lugs **27***c* serve this purpose at the top; and the bottom strap **25***a* receives a hook **38** against the end of the muffler as shown in FIGS. **1** and **4**, the shank **38***a* of the hook being welded to the strap as indicated at **38***b*.

As shown, the novel suspension means come as a set of two units, each applicable to an end of the muffler. To do this the clamp **25–25***a* is taken apart and set with the lug **27***c* and the hook **38** against the related ends of the muffler as seen in FIG. **1**. The components of the clamp **25–25***a* are then linked together on one side and bolted together on the other, as previously described.

It is now apparent that the novel muffler suspension means are not only a muffler support in conjunction with the regular hangers, but definitely a safeguard against failure of the hangers due to strain, corrosion or looseness in the connections of the muffler with the end pipes, causing the connections to weaken or break loose. At the same time, the improved suspension means are simple and suitable for application with ordinary skill at automobile repair or service stations.

I claim:

1. In an exhaust assembly for an internal combustion engine in a vehicle, a suspension assembly for each end of a muffler in said exhaust assembly, said suspension assembly comprising one pair of arcuate, flexible bands to be fitted around one end of said muffler in conformance with the cross-section thereof, one end portion of each band having means to link said end portions together, clamping means on the opposite end portions of each band to secure said linked bands around said muffler end, means cooperating with said clamping means to bring said bands into a clamped relationship around said muffler end, means secured to the outer surface of each of the said bands and extending laterally from said bands as a restraint against axial movement of said muffler, and at least one flexible suspension element interconnecting the muffler restraining means secured to the band clamped around the upper surface of the muffler and the vehicle frame.

2. The suspension assembly according to claim **1**, wherein said one end portion of each band has means to adjustablely link said end portions together in accordance with the size and cross-section of said muffler, the adjustably linking means comprising a plurality of axially spaced openings in the end portion of one band and an outwardly entending tongue on the end portion of the other band to engage one of said openings.

3. The suspension assembly according to claim **1** wherein said restraining means secured to the band to be clamped around the upper surface of the muffler comprises a plate secured to the outer surface of said band, lugs extending downwardly from said plate and spaced from the edge of said band to form a recess for the bead portion of the muffler end, a downwardly bent portion of the end of said plate outwardly spaced from said lugs to form a heat dissipating zone, said bent portion having at least one opening to receive said flexible suspension element.

4. The suspension assembly according to claim **1**, wherein said restraining means secured to the band clamped around the underside of the muffler comprises a hook-shaped element spacedly secured from the edge of said band to form a recess for the bead portion of the muffler end.

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