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Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number:

0 067 246
A2

(12)

EUROPEAN PATENT APPLICATION

(21) Application number: 81109380.6

(51) Int. Cl.³: F 01 N 7/18

(22) Date of filing: 30.10.81

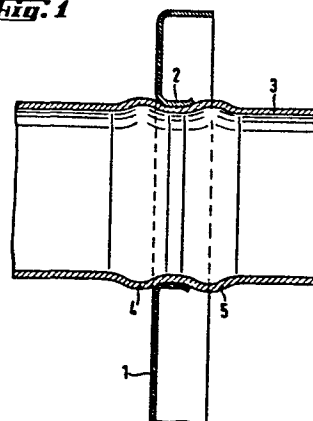
(30) Priority: 15.06.81 IT 2208381 U

(43) Date of publication of application:
22.12.82 Bulletin 82/51(84) Designated Contracting States:
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(54) Improved silencer and process for its manufacture.

(57) An improved silencer has its baffles (1) joined to the pipes (3) by means of seaming and possible heading of them against the edges (2) of the baffle holes, this process removing the necessity of any welding operation on the silencer with great reduction of manufacturing costs and possibility of using unskilled labor for making the silencer.

Fig. 1



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"IMPROVED SILENCER AND PROCESS FOR ITS MANUFACTURE"

The present invention relates to silencer for motor vehicles, as well as the corresponding process of manufacture, which has a considerable utility, particularly for the considerable simplification obtained in the process of making the silencer, with a relevant drastic reduction of its manufacturing cost.

The internal components of the silencers for motor vehicles, i.e. the transversal baffles and the longitudinal pipes, are presently joined each other by welding, and this working process has a number of drawbacks of considerable relevance.

A first drawback consists of the high costs of the welding process; in order to join the baffles to the pipes, there are two factors which can neither be removed nor be decreased, namely the cost of metal, namely welding rod or wire and the slowness of the process, dependent on the melting speed.

A second drawback consist of the geometric progression by which manufacturing time and cost are increasing, according to the number of

pipes and baffles which are present in the silencer; in fact, if one has a silencer with four pipes and four baffles, the time to carry out its welding will be about sixteen times greater than that required for a silencer with one pipe and one diaphragm, as well as its manufacturing cost.

A third drawback consists in the necessity of employing personnel skilled and specialized in welding, which is always a dirty, heavy and non hygienic work, for which one can find less and less operators available, where the quality of work widely depends on the skillfulness and willingness of the operator.

Another drawback is at last represented by thermal stresses induced in the material by melting, said stresses generating cracks, failures, flaws and other drawbacks (such as local temper brittleness) which are detrimental to the uniformity of quality.

The present invention solves all these problems and removes all the above mentioned drawbacks, providing for joining the baffles to the pipes by a process of internal seaming and heading of the pipes around the holes for passage of the baffles, avoiding any internal welding and giving a considerable number of advantages, of which the principal ones are indicated hereinafter.

A first advantage is the low manufacturing cost, as there is no thermal treatment and therefore no fixed cost dependent on the operation; the speed is maximum: deformation of the internal pipes fastens the baffles in the their relevant positions, all at the same time and in few seconds (2-3 seconds).

A second advantage is that seaming of all baffles occurs at the same

time on all the pipes, so that the time for seaming a silencer with one baffle and one pipe is the same as for a silencer with four baffles and four pipes; thus in the latter case the manufacturing cost is about 3% of the cost of the welding operation.

A third advantage is that any operator may be able to carry out this operation, as he has only to load and unload the workpieces, i.e. a light work in an environment free of smoke, heat and reverberation, with an operation which is ten times quicker than welding, in which the quality is automatically warranted by the machine and does not depend in any way on the operator.

A further advantage is finally represented by that the internal seaming takes place with a mechanical process of cold deformation, gradually induced by the hydraulic pushing means, so as to obtain the best compromise possible between blocking force and possibility of deformation of the sheet plate, thus with a number of rejects which is practically reduced to null.

These and other advantages, objects and features of the present invention will be more apparent and clear from the following detailed description, when taken together with the illustrative showing of the accompanying drawing, in which:

Fig. 1 is a sectional view of a baffle provided with holes having an inner edge, seamed on a pipe; and

Fig. 2 is a similar sectional view of a baffle provided with holes having a sharp edge, seamed on a pipe which is headed around the hole of said baffle.

Referring now to the accompanying drawing, Fig. 1 shows a portion of a baffle 1 on which one or more holes are made, whose rim is bent so as to make an inner edge 2. Pipe 3, inserted into the hole, undergoes a process of gradual cold deformation by means of a suitable tool, so as to make two waves or dimples 4 and 5 between which the hole edge 2 is clamped and blocked against the sheet plate of the pipe 3 so as to effect the stable, safe and resistant connection of the two elements, by means of pressure and deformation of the two matching surfaces. Clearly with a powered equipment all the baffles can be seamed at the same time on all the pipes of a silencer.

Fig. 2 shows a similar portion of baffle 10 whose hole is clean cut with a sharp corner. In this case after the waves 12 and 13 are formed on the pipe 11 with the above mentioned process, the waves are headed against the baffle edge with a second operation of squashing deformation so as to obtain a stable clamping of elements between each other.

It is to be understood that the materials used, the equipment employed for carrying out the connection of the elements, the number and size of the baffles and pipes may be changed in a very wide and complete way, without departing however from spirit and scope of the invention as well as from principles and structures hereinbefore described and illustrated in the accompanying drawing, as defined in the appended claims.

CLAIMS

1) Improved silencer, characterized by the fact that its baffles (1) are joined to the pipes (3) by means of internal seaming so as to form an area of mutual blocking between the surfaces of said elements.

2) Improved silencer, according to Claims 1, characterized by the fact that the pipes receive by cold deformation two waves or dimples (4,5) between which the edge (2) of the baffle holes is blocked.

3) Improved silencer, according to Claim 2, characterized by the fact that when the baffle holes have a sharp cut edge, the first deformation is followed by heading, by which the waves (12, 13) are squashed against the edge of the baffle holes.

4) Improved silencer, according to one or more of the preceding Claims, characterized by the fact that seaming of all the baffles (1, 10) is carried out on all the pipes (3, 11) at the same time.

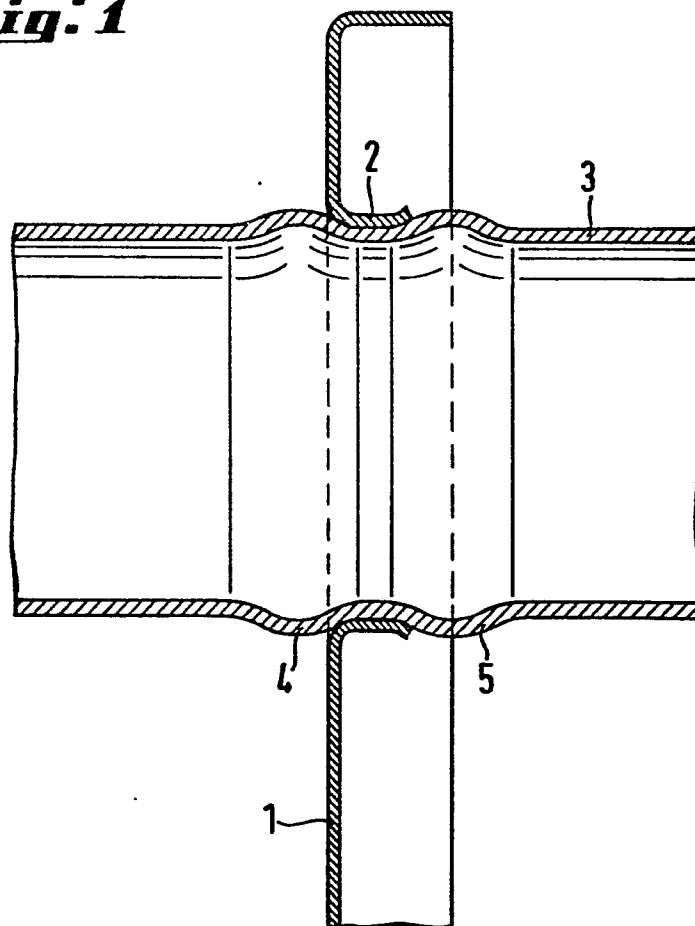
5) Process for manufacturing an improved silencer without welding, characterized by the step of joining the silencer baffles (1) to the pipes (3) by means of internal seaming so as to form an area of mutual blocking between the surfaces of said elements.

6) Process according to Claim 5, characterized by the fact that the pipes receive by cold deformation two waves or dimples (4,5) between which the edge (2) of the baffle holes is blocked.

7) Process according to Claim 6, characterized by the fact that when the baffle holes have a sharp cut edge, the first deformation is followed by heading, by which the waves (12, 13) are squashed against the edge of the baffle holes.

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8) Process according to one or more of Claims 5-7, characterized by the fact that seaming of all the baffles (1, 10) is carried out on all the pipes (3,11) at the same time.

Fig. 1**Fig. 2**