United States Patent

Penfold, Jr.

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[54] ENGINE EXHAUST HEADER CONSTRUCTION

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[52] **U.S. Cl.**.....**181/40**, 181/56, 181/68, 181/63, 181/72, 137/602, 60/29

[51] **Int. Cl.**.....**F01n 1/08**, F01n 7/10, F16l 55/04

[58] **Field of Search**.....181/35 R, 36 R, 36 B, 40, 46, 181/56, 60, 63, 68–70, 72; 137/602; 60/29

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[57] **ABSTRACT**

An exhaust header assembly comprises;

a. a multiplicity of exhaust pipes having terminals,

b. a collector tube having an entrance end receiving said terminals in side-by-side relation,

c. said terminals having out-of-round side walls retained in interengagement to block escape of exhaust gas therebetween.

10 Claims, 5 Drawing Figures

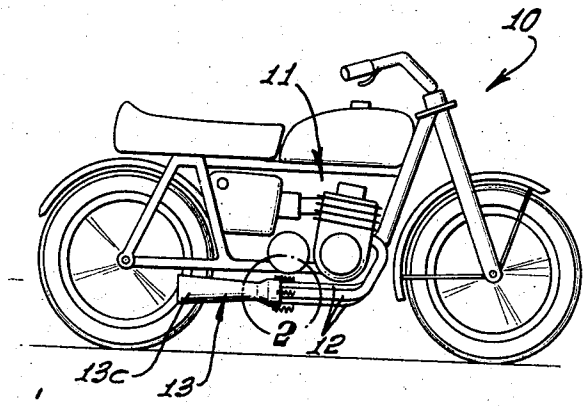


FIG. 1.

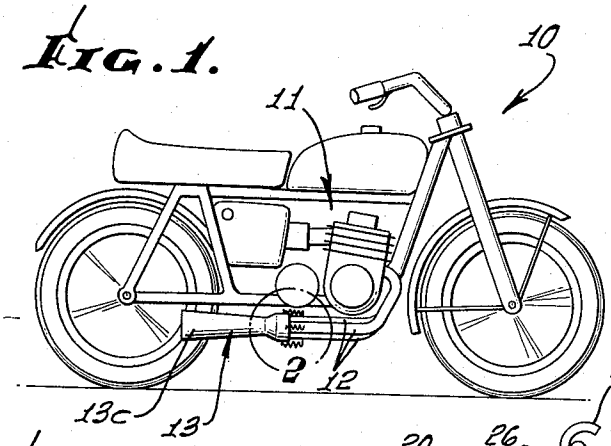


FIG. 4.

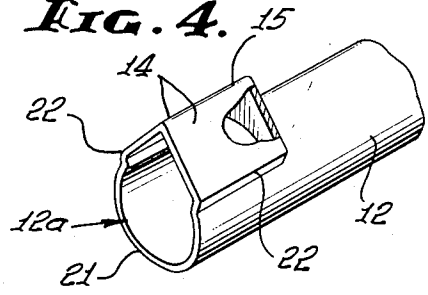


FIG. 2.

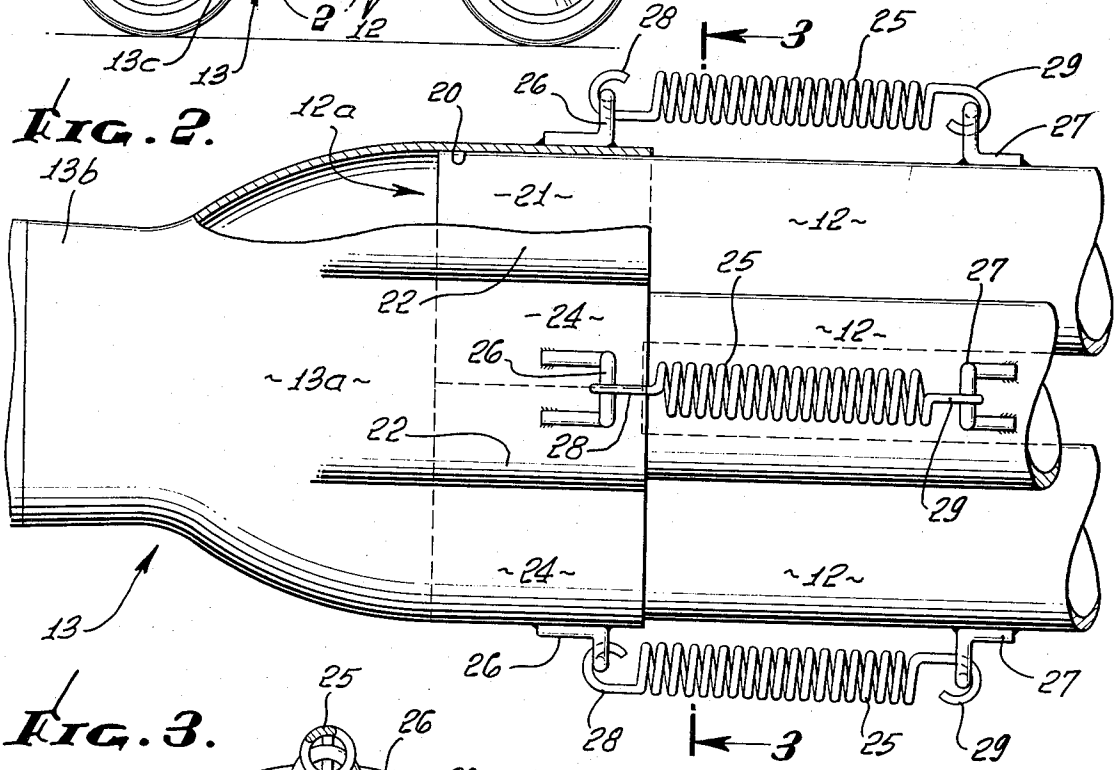


FIG. 3.

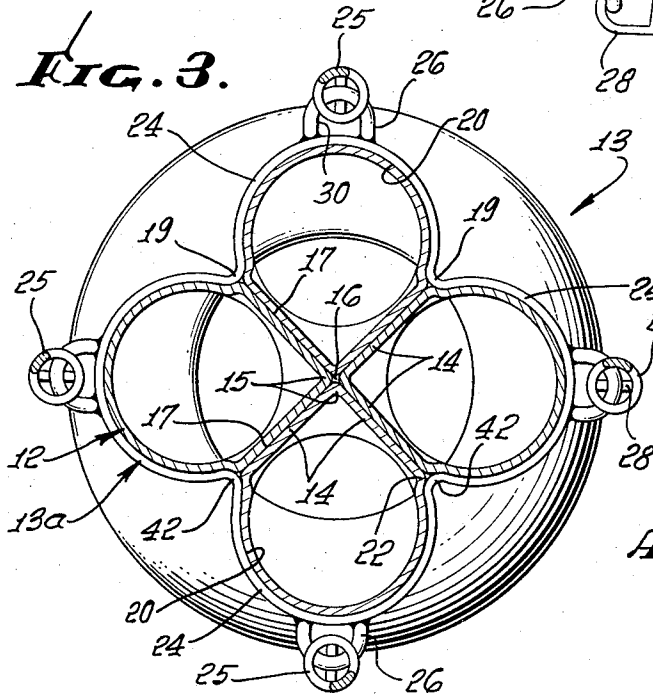
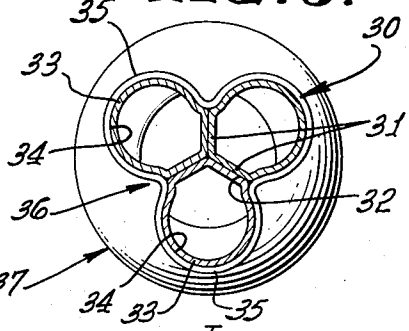


FIG. 5.



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ENGINE EXHAUST HEADER CONSTRUCTION

BACKGROUND OF THE INVENTION

This invention relates generally to engine exhaust headers, and more particularly concerns the assembly of an exhaust collector tube to multiple exhaust pipes.

In vehicles such as motorcycles, it is desirable that the exhaust pipes leading from multiple cylinders have their exit ends discharging into a common collector tube. The latter may for example act to quiet the sharp reporting of the exhaust gases by inducing interference of acoustic waves, without unduly increasing back pressure. Also, the exhaust gases are desirably collected for discharge at a common point determined by the location of the collector tube. A problem arises by virtue of the fact that clustering of the circular cross-section pipes leaves a substantial gap or opening between them, requiring the addition of an insert shaped to fit the pipes at their inwardly facing sides, and the welding or brazing of the insert to the pipes. A further complication then arises due to the difficulty of fitting the then rigidly interconnected pipes to the collector tube in such a way as to seal off therebetween. These problems are aggravated in the course of mass production due to dimensional imperfections, and the cumulative expense of the undesired steps as referred to.

SUMMARY OF THE INVENTION

It is a major object of the invention to provide an exhaust header construction characterized as overcoming the above problems and disadvantages.

Basically, the assembly comprises, in combination, a multiplicity of exhaust pipes having terminals with out-of-round (as for example flat) side walls retained in interengagement to block escape exhaust gas between the pipe ends, and a collector tube having an entrance end receiving the terminals in side-by-side relation. As will be seen, the collector tube may then be of one piece construction with a bell-shaped entrance portion receiving the exhaust pipe terminals and an elongated tapered portion extending away from the bell-shaped entrance portion. Further, the collector tube may have concave sockets opening toward the tube axis and closely receiving convex wall portions of the exhaust pipe terminals, the fit of these and the interfit of the pipe out-of-round side walls adjusting upon assembly to provide the desired closing-off of exhaust gas escape, whereby the effects of manufacturing imperfections are minimized.

Further, such simultaneous interfitting adjustment of all the elements upon assembly may be enhanced and promoted by the provision of releasable means urging the exhaust pipe terminals into the collector tube. Such means may for example include tension spring structure operatively connected between the tube and at least one of the pipes.

Finally, the invention is applicable to exhaust pipes in different multiples, as for example two, three, four, etc., as will be seen.

These and other objects and advantages of the invention, as well as the details of illustrative embodiments, will be more fully understood from the following description and drawings, in which:

DRAWING DESCRIPTION

FIG. 1 is an elevation;

FIG. 2 is an enlarged side elevation showing an exhaust header assembly;

FIG. 3 is a section taken on line 3—3 of FIG. 2;

FIG. 4 is a perspective showing of an exhaust pipe terminal, and

FIG. 5 is a view like FIG. 3, showing a modification.

DETAILED DESCRIPTION

In FIG. 1, a motorcycle **10** has an internal combustion engine **11**, for example with four cylinders from which four exhaust pipes **12** lead to a collector tube **13**. The latter extends generally rearwardly and has a bell-shaped entrance section **13*a***; a reduced diameter mid-section **13*b***, and an elongated and flared exit section **13*c***. The tube may, with unusual advantage, have one piece construction, as shown.

Extending the description to FIGS. 2–4, the multiple exhaust pipes **12** will be understood as having exit terminals **12*a*** received in side-by-side relation in the entrance end or section **13*a*** of tube **13**. Further, the terminals generally speaking have out-of-round side walls retained in interengagement to block escape of exhaust gas therebetween. As a result, the construction of the assembly is substantially simplified in that no additional intermediate plate or other element and associated welding or brazing is required between the clustered pipe terminals to seal off therebetween.

More specifically, the out-of-round side walls of the exhaust pipe terminals may be flat at the interengagement locations; and as shown in FIGS. 3 and 4 each terminal **12*a*** has two like, flat non-parallel side walls **14** which are angled to meet at an apex **15** proximate the axis **16** of the tube **13**. For the four pipe case, the walls **14** of each tube are angled at close to 90°, as shown; and in general, the internal angle formed by the flat walls **14** equals 350° divided by the number of clustered exhaust pipe terminals, which are alike. Note that the walls **14** of adjacent pipe terminals are interengaged along radial planes **17** to seal off escape of exhaust gas between the pipes. Planes **17** extend from the axis **16** to the inward loci **19** defined by sockets **20**. The latter are formed by the tube entrance end lobes **24**.

Sockets **20** are seen to be concave toward axis **16**, and to closely receive the convex wall portions **21** of the tube terminals **12*a***. Wall portions **21** merge with the flat walls **14** at outward bulges **22** shaped for grouping in pairs to closely fit the sharply inwardly curved portions **42** of the tube entrance end wall **13*a***, proximate loci **19**. Accordingly, the fit of the pipes to one another and to the tube wall is sufficiently close as to block escape of exhaust gas therebetween, whereby all such gas passes to and through the discharge end of that tube. The latter may have a quieting effect upon the pulsating escaping gases.

A further feature of the invention concerns the provision of releasable means urging the exhaust pipe terminals into the collector tube entrance end. The illustrated structure accomplishing this function comprises tension spring structure, as for example one spring **25** for each pipe, operatively connected between the tube **13** and the pipes. Lugs **26** are connected with the lobes **24** at outward locations; lugs **27** are connected with the pipe convex wall portions; and the springs **25** are releasably connected with the lugs as by spring tangs **28** and **29** interfitting the lugs through openings **30** formed therein. Accordingly, the pipe terminal flat walls **14** are yieldably held in interengaged relation, and the pipe terminal convex walls **21** are yieldably held in interengagement with the sockets **20**. Also, the assembly may be rapidly disassembled for cleaning or other adjustment.

FIG. 5 shows a modification in which three exhaust pipe terminals, instead of four, are retained in clustered, interengaged relation. Pipes **30** have flat walls **31** interengaged along three radial planes **32**; and the pipe terminal convex wall portions **33** fit in sockets **34** formed by three lobes **35** of the end portion **36** of the collector tube **37**.

The invention is also applicable to vehicles other than motorcycles, as for example automobiles, tractors, etc.

I claim:

1. In an exhaust header assembly, the combination comprising

a. a multiplicity of exhaust pipes having terminals,

b. a collector tube having an entrance end receiving said terminals in side-by-side relation,

c. said terminals having out-of-round side walls retained in interengagement to block escape of exhaust gas therebetween.

2. The combination of claim **1** wherein said interengaged side walls are flat.

3. The combination of claim 1 wherein four of said terminals are clustered in said collector tube, each terminal having two flat non-parallel side walls respectively engaging flat non-parallel side walls of two other terminals.

4. The combination of claim 1 wherein three of said terminals are clustered in said collector tube, each terminal having two flat non-parallel side walls respectively engaging flat non-parallel side walls of two other terminals.

5. The combination of claim 1 including releasable means urging said terminals endwise into said collector tube.

6. The combination of claim 5 wherein said last named means includes tension spring structure operatively connected between said tube and at least one of said pipes.

7. The combination of claim 2 wherein said collector tube has an axis and defines concave sockets opening toward said axis, the sockets closely receiving convex wall portions of said terminals, said terminal convex wall portions merging with said flat side walls between said sockets and said axis.

8. The combination of claim 1 wherein said collector tube has one-piece construction, with a bell portion receiving said terminals and an elongated tapered portion extending away from said bell portion.

9. For use in an exhaust header assembly including a collector tube having an entrance end to receive multiple exhaust pipe terminals in a cluster, the improvement comprising:

a. elongated piping to pass exhaust gas from the engine to said tube,

b. said piping having a terminal one side wall of which is flattened to engage the similarly flattened side of another elongated pipe terminal, thereby to block escape of exhaust gas between said interengaged flattened side walls.

10. The improved pipe of claim 9 wherein said piping has an axis and said terminal has two flat non-parallel side walls tapering away from the axis.

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