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(54) **MOUNTING BRACKET FOR A FUEL INJECTION ASSEMBLY AND FUEL INJECTION ASSEMBLY**

(57) A mounting bracket (14) for use with an internal combustion engine is provided. The mounting bracket (14) comprises a shaped body which is in particular formed from a sheet metal material by stamping, pressing or deep drawing. Selected parts of the body are shaped to be juxtaposed and to be secured together. The bracket is specifically for securing a common rail (2) of a fuel injection assembly to a direct injection internal combustion engine.

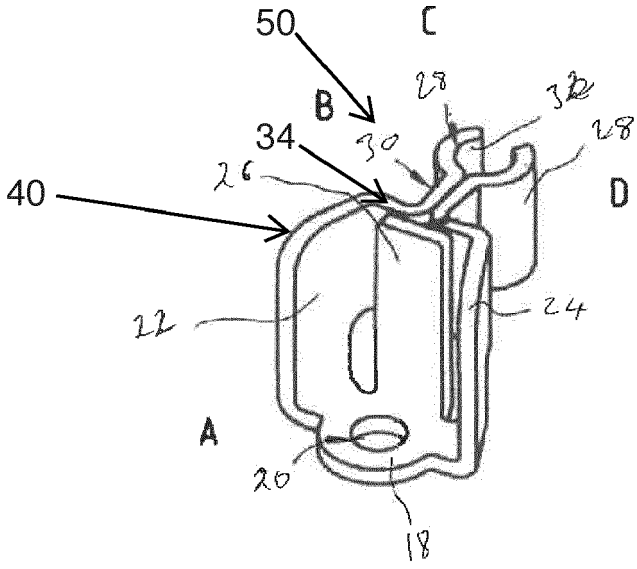

FIG 2

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Description

[0001] The present disclosure relates to a mounting bracket, specifically but not exclusively, for a fuel injection assembly for a direct injection internal combustion engine and to a fuel injection assembly.

[0002] Fuel injection assemblies are widely used for injecting fuel into an internal combustion engine, particularly of the type having an injector for each cylinder of a multi-cylinder engine, in which the fuel is supplied from a reservoir in the form of a common rail to which each of the injectors is connected. The assembly is also suitable for use in a single cylinder engine. In known systems, the fuel injectors are secured directly to the cylinder head of the engine to project into the combustion chamber and are connected to the common rail hydraulically and mechanically by means of a supply pipe. The common rail is connected to the engine and supported by means of at least one mounting bracket secured to the engine and to the supply pipe. In a typical installation a mounting bracket is provided for each supply pipe in order to locate the common rail securely to the engine.

[0003] In use the mounting bracket is subjected to loads and vibration which, over a prolonged time, can lead to premature mechanical failure of the bracket. Known solutions to this problem use a substantial bracket which is typically, machined from solid, cast or cold formed, but this has a significant cost and weight penalty. Such an arrangement is shown in the published US patent application US 2017/0022951A. Low cost solutions to this problem have utilised a bracket formed of sheet material pressed or stamped into the appropriate shape but this solution has its limitations caused by the relative thinness of the sheet material which must be used in such techniques. Such a solution is disclosed in published patent application WO 2017/050850.

[0004] The present disclosure seeks to improve on the known solutions by forming the mounting bracket out of sheet material in such a way that its strength and durability is significantly increased.

[0005] According to the present disclosure there is shown a mounting bracket for a fuel injection assembly. The fuel injection assembly is in particular a fuel injection assembly for a direct injection internal combustion engine.

[0006] The assembly as a plurality of fuel injectors. For example, it has a fuel injector for each cylinder of the engine. It also has a common rail fuel reservoir. Each fuel injector is hydraulically and mechanically connected to the common rail by an associated supply pipe.

[0007] The mounting bracket is shaped and arrangeable to secure the common rail and each associated supply pipe to the engine, The mounting bracket comprising a base through which the bracket is securable to the engine by a fixing element, the fixing element being a bolt or a screw, for example.

[0008] The mounting bracket comprises a rear wall extending generally perpendicular to the base and two spaced side wings extending generally perpendicular to the base. Each side wing has a first portion extending at generally right angles to the rear wall. Each side wing has a second portion extending away from the base on the side of the rear wall facing away from the first portion, the second portions each shaped to comprise a freee end section and a joining section, the joining sections lying close together or contacting one another. The free end sections of the of the second portions of the side wings are shaped and arrangeable to be secured to the supply pipe, the rear wall and the side wings being secured together so that loads applied to the bracket are distributed through the sidewalls and the rear wall.

[0009] In a preferred embodiment, the mounting bracket is formed of a sheet material by a stamping or pressing operation. In particular, the mounting bracket is a one-pieced part, i.e. it is formed from a single work piece by stamping or pressing. In another embodiment, the joining sections are secured together by brazing or welding. By means of forming the mounting bracket as a stamped and/or pressed part and joining the joining sections of the wings of the bracket by welding, the bracket may at the same time easily and cost-efficiently manufacturable and mechanically robust.

[0010] Preferably, the second portions of the side wings have connection sections. The connection sections extend from the first portions to the joining sections. They are shaped to abut the rear wall on the side of the rear wall facing away from the first portions. The connection sections are preferably secured to the rear wall by brazing or welding. They may also be secured together by brazing or welding.

[0011] This arrangement has the advantages that loads applied to any one part of bracket are distributed through the sidewalls and the rear wall to spread the applied loads, thus increasing the reliability of the bracket during extensive use.

[0012] In a preferred embodiment, the free end sections of the second portions of the side wings are shaped in an arcuate curve to define therebetween a substantially circular opening through which the bracket is securable to the supply pipe. Preferably, the bracket is securable to the supply pipe by forming a brazed or welded connection between the free end sections and the supply pipe.

[0013] According to another aspect of the present disclosure there is formed a mounting bracket for use with an internal combustion engine, comprising a shaped body formed from a sheet material by stamping, pressing or deep drawing, in which selected parts of the body are formed to be juxtaposed and to be secured together, preferably by brazing or welding. Alternatively, it is possible for the juxtaposed parts of the bracket be by spot welding. The bracket is in particular the bracket according to one of the embodiments described above.

[0014] The disclosure also includes a fuel injection assembly for a direct injection internal combustion engine, the assembly having a fuel injector for each cylinder of

the engine and having a common rail fuel reservoir, each fuel injector being hydraulically and mechanically connected to the common rail by an associated supply pipe, the common rail and each associated supply pipe being adapted to be secured to the engine by an associated mounting bracket in accordance with the aforementioned aspects.

[0015] A preferred embodiment of the present disclosure will now be described by way of example with reference to the accompanying drawings, in which:

Figure 1 discloses schematic part of a common rail fuel injection system with a mounting bracket in accordance with the present disclosure,

Figure 2 discloses a schematic perspective view of the mounting bracket.

[0016] Referring now to Figure 1, there is shown part of a common rail fuel reservoir for a direct injection internal combustion engine, the common rail 2 comprising a generally tubular elongate body having at one end a hydraulic connection 4 by which the common rail 2 is connected to a source of fuel. Spaced along the common rail 2 there is a fuel outlet 6 to which supply pipe 8 is secured. Only one supply pipe is shown but it will be understood that in a multicylinder internal combustion engine a supply pipe for each cylinder is provided, the pipes being spaced along the common rail with the objective that the pipes are all of the same length and as short as practicable. The pipes also may have different lengths depending on the engine geometry. At its end remote from the common rail, the supply pipe 8 has a fuel injector connection 10 by which the supply pipe is connected hydraulically and mechanically to a fuel injector (not shown) secured to the combustion chamber concerned.

[0017] The common rail 2 is connected to the engine, shown schematically as reference 12, by a mounting bracket 14 which is secured to the engine 12 by means of a bolt as a fixing element 16.

[0018] Referring now also to Figure 2, the mounting bracket 14 is formed from a single integral piece of material from a sheet metal material and shaped typically by being stamped or pressed or drawn into the appropriate shape. The bracket 14 has a base 18 containing an orifice 20 through which the bolt passes to secure the bracket to the engine 12. Extending upwardly substantially perpendicular to the base 18 on opposite sides of the orifice 20 are first portions 40 of two side wings 22, 24. A rear wall 26 extends substantially perpendicularly upwardly from the base generally at right angles to the first portions 40 of the two side wings 22, 24.

[0019] Each side wing 22, 24 comprises a second portion 50 on the side of the rear wall 26 facing away from the first portions 40. The second portions 50 each comprise a free end section 28, a joining section 30 and a connection section 34, following one another in this order in direction towards the first portion 40. Each of the side wings 22, 24 is shaped to extend inwardly towards each other in the region of the connection sections 34 so as to abut the rear face of the rear wall 26, and then to extend outwardly juxtaposed and essentially in contact in these joining sections 30. At their free ends 28 the second portions 50 of the side wings 22, 24 are each shaped to provide an inwardly facing arcuate form to provide a part circular enclosure 32 adapted to engage the supply pipe 8.

[0020] To complete the mounting bracket, brazing paste is inserted between the rear wall 26 and the juxtaposedparts - the connection sections 34 - of the side wings 22, 24 and also in the region between the juxtaposed joining sections 30 of the side wings 22, 24. Further brazing paste is inserted in the part circular enclosure 32 to enable the bracket to be secured by brazing to the supply pipe 8.

[0021] By this means, the mounting bracket 14 is much stronger and more durable than a simply pressed bracket because the loads applied to the bracket are distributed through the several parts of bracket which are all reinforced by the other parts of the bracket. Thus, the loading on the individual parts of the bracket is distributed throughout the bracket with the subsequent reduction in stress on the individual parts. Although it would be possible to secure the component elements together by alternative techniques such as spot welding, it is advantageous to use a brazing technique with a brazing paste since this technique is already used on other parts of the common rail and associated components.

Claims

1. A mounting bracket (14) for a fuel injection assembly, the assembly having a plurality of fuel injectors and having a common rail fuel reservoir, each fuel injector being hydraulically and mechanically connected to the common rail (2) by an associated supply pipe (8), the mounting bracket (14) being shaped and arrangeable to secure the common rail (2) and each associated supply pipe (8) to the engine, the mounting bracket (14) comprising a base (18) through which the bracket (14) is securable to the engine by a fixing element, a rear wall (26) extending generally perpendicular to the base (18) and two side wings (22, 24) extending generally perpendicular to the base (18), each side wing (22, 24) having a first portion (40) extending at generally right angles to the rear wall (26), and a second portion (50) extending away from the base (18) on the side of the rear wall (26) facing away from the first portion (40), the second portions (50) each being shaped to comprise a free end section (28) and a joining section (30), the joining sections (30) lying close together or contacting one another, the free end sections (28) being shaped and arrangeable to be secured to the supply

pipe (8), the rear wall (26) and the side wings (22, 24) being secured together so that loads applied to the bracket (14) are distributed through the sidewalls (22, 24) and the rear wall (26).

2. A mounting bracket (14) according to the preceding claim, wherein the bracket (14) is formed of a sheet material by a stamping or pressing operation.

3. A mounting bracket (14) according to any one of the preceding claims, wherein the joining sections (30) are secured together by brazing or welding.

4. A mounting bracket (14) according to one of the preceding claims wherein, the second portions (50) of the side wings (22, 24) have connection sections (34) extending from the first portions (40) to the joining sections (30), the connection sections (34) being shaped to abut the rear wall (26) on the side of the rear wall (26) facing away from the first portions (40).

5. A mounting bracket (14) according to any one of the preceding claims, wherein the connection sections (34) are secured to the rear wall (26) by brazing or welding.

6. A mounting bracket (14) according to any one of the preceding claims, wherein the free end sections (28) of the second portions (50) of the side wings (22, 24) are shaped in an arcuate curve to define therebetween a substantially circular opening through which the bracket (14) is securable to the supply pipe (8).

7. A mounting bracket (14) according to the preceding claim, wherein the bracket (14) is securable to the supply pipe (8) by forming a brazed or welded connection between the free end sections (28) and the supply pipe (8).

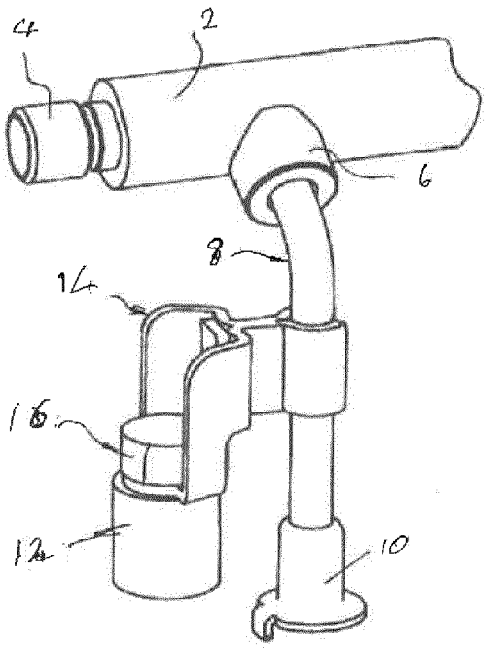
8. A mounting bracket (14) for use with an internal combustion engine, comprising a shaped body formed from a sheet metal material by stamping, pressing or deep drawing, in which selected parts of the body are shaped to be juxtaposed and to be secured together.

9. A mounting bracket (14) according to the preceding claim, wherein the selected parts of the body are secured together by spot welding, brazing or welding.

10. A mounting bracket (14) according to one of the preceding claims 8 and 9, wherein the body is formed from a single integral piece of material.

11. A fuel injection assembly for a direct injection internal combustion engine, the assembly having a fuel injector for each cylinder of the engine and having a common rail fuel reservoir, each fuel injector being hydraulically and mechanically connected to the common rail (2) by an associated supply pipe (8), the common rail (2) and each associated supply pipe (8) being securable to the engine by an associated mounting bracket (14) according to any one of the preceding claims.

Fig. 1



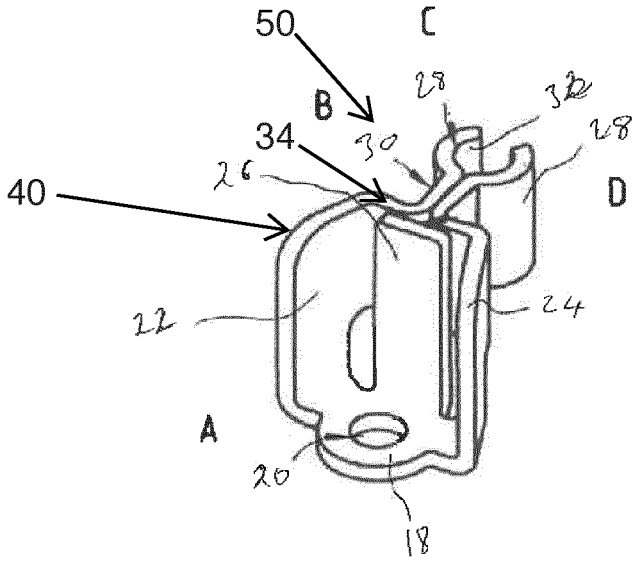


FIG 2

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EUROPEAN SEARCH REPORT

Application Number
EP 17 19 4950

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	WO 2016/079004 A1 (CONTINENTAL AUTOMOTIVE GMBH [DE]) 26 May 2016 (2016-05-26) * page 10, line 8 - page 17, line 26; figures 1-4 * * abstract * -----	1-9,11	INV. F02M55/02 F02M61/14
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TECHNICAL FIELDS SEARCHED (IPC)

F02M

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	14 February 2018	Hermens, Sjoerd

CATEGORY OF CITED DOCUMENTS

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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