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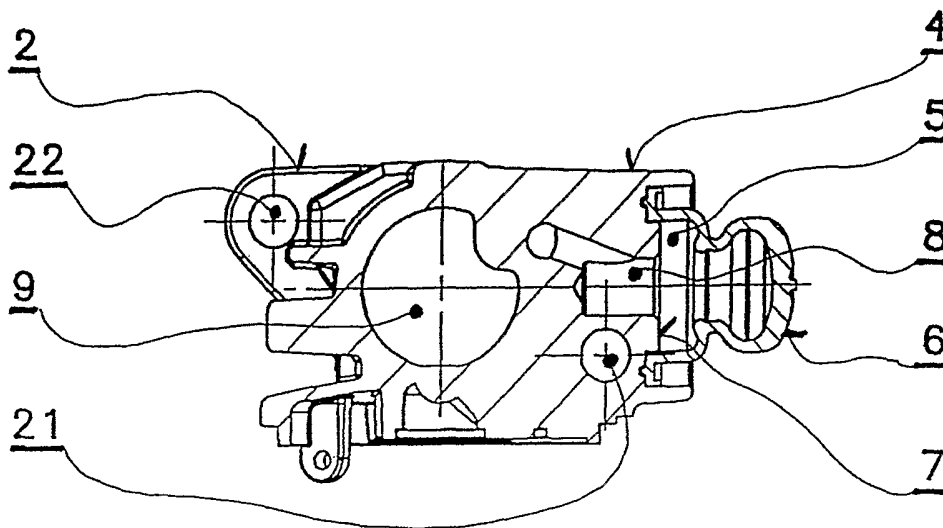
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**Published:**

- with international search report
- with amended claims and statement

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: CARBURETOR WITH A FUEL INJECTION SYSTEM FOR STARTING ENGINES



(57) Abstract: A carburetor is provided with a fuel injection system for starting engines. This injection system has an ejecting room (5) with a balloon (6) located in a lateral cylindrical boss (4) of the carburetor body (1). The carburetor body (1) is provided with end flanges (2,3). In the first end flange (2) two holes (21,22) are made which are disposed coaxially to holes (31,32) in the second end flange (3). The holes (21,22,31 and 32) are designated to receive through bolts by means of which the carburetor is fixed together with an inlet air filter to a suction piping. The lateral cylindrical boss (4) engages directly the first end flange (2). The first hole (21) in the first end flange (2) passes through the lateral cylindrical boss (4) in the area below a bottom (7) of the ejecting room (5) besides a mouth (8) of the ejecting room (5). The end flanges (2,3) and the lateral cylindrical boss (4) are made as an integral part of the body (1) which is a casting.

WO 2006/069552 A1

## **Carburetor with a fuel injection system for starting engines**

### Background and summary of the invention

The invention relates to the field of carburetors, more specifically to a carburetor with a fuel injection system for starting engines.

Carburetors of small combustions engines used for driving small agricultural machinery or hand-tools such as chain saws are usually attached to a suction piping together with inlet air filters as a rule by means of two through bolts. The carburetor body is provided by holes to enable passing said bolts through the body. The holes are formed either in end flanges of the carburetor body or pass through the carburetor body material along its entire length.

Said carburetors are often provided with a fuel injection system to ease the starting of engines. An ejecting chamber and a respective balloon pertaining to such a system are located laterally on the sides of the carburetor body and consequently they projects into the area where the through bolts pass to fix the carburetor body together with the inlet air filter to the suction piping. Therefore, either two independent fixing systems are used i.e. the carburetor is fixed to the suction piping and the inlet air filter to the carburetor or the holes for the through bolts are formed at other places. The first type of fixing includes a greater number of fixing elements - bolts and therefore it difficulties may be faced during the assembling and disassembling process, specifically this type is more time-consuming. The second type of fixing requires modifications to the carburetor body. Such modifications result in greater carburetor size and weight and as the carburetor body is a casting the carburetor is more complicated and expensive as to its manufacture. The increased size is accompanied by the requirement for a greater built-in space. The distribution of the holes for the through bolts over other places of the carburetor body may result in the necessity to make appropriate changes to the inlet air filter structure and to the suction piping.

The object of the invention is to preserve the possibility to fix a carburetor with a fuel injection for starting engines to a suction piping together with an inlet air filter by means of through bolts without causing a complication arising in connection with the construction of carburetor body casting and without noticeably increasing its built-in dimensions.

-2-

The said object of invention is achieved by a carburetor with fuel injection for starting engines which injection system comprises an ejecting room with a balloon located at a lateral cylindrical boss made on the carburetor body which body is provided with end flanges having holes for fixing bolts according to the invention wherein the substantial features of the invention are that the first end flange which engages directly the lateral cylindrical boss is provided with two holes which are disposed coaxial to the holes in the second end flange whereby the first hole of the first end flange passes through the lateral cylindrical boss in the area below the ejecting room and besides the mouth thereof.

As to the manufacturing aspects the most advantageous configuration is obtained when the end flanges and the lateral cylindrical boss are made as an integral part of the body which is a casting.

#### Brief description of the drawings

One of potential examples of the embodiment of a carburetor with a fuel injection system for starting engines according to the invention is shown on the accompanying drawings where:

Fig. 1 is a side view of a carburetor;

Fig. 2 is a plane view of a carburetor;

Fig. 3 is a view of a carburetor from below;

Fig. 4 is a sectional view along the line A-A of Fig. 1; and

Fig. 5 is a sectional view along the line B-B of Fig. 1.

#### Detailed description of the preferred embodiments

A carburetor appearing in Fig. 1 to Fig. 3, including a fuel injection system for starting engines comprises a body 1 provided with end flanges 2 and 3 and a lateral cylindrical boss 4. The lateral cylindrical boss 4 engages directly the first flange 2. In its longitudinal direction, the body 1 includes a venturi 9. The carburetor body 1 is a casting the integral parts of which are the end flanges 2 and 3 as well as the lateral cylindrical boss 4.

-3-

In the lateral cylindrical boss 4 an ejecting room 5 is formed and closed by a balloon 6 (Fig. 4). The ejecting room 5 together with the balloon 6 is a part of a conventional fuel injection system for starting engines. The ejecting room 5 has a bottom 7 in which a hole 8 is formed which hole connects the ejecting room 5 to further parts of the fuel injection system.

The first end flange 2 is provided by two holes 21 and 22 on the opposite lateral sides which holes are disposed coaxially to the holes 31 and 32 in the second flange 3. In addition, the second end flange 3 is provided with technological holes 33. The first hole 21 of the first end flange 2 passes through the lateral cylindrical boss 4 in the area below the bottom 7 of the ejecting room 5 and besides the mouth 8 of the ejecting room 5.

The fixing of the carburetor to a suction piping (not shown) is performed together with the inlet air filter (also not shown) by means of two through bolts. Such bolts go through the holes 21 and 22 in the first end flange 2, through the holes 31 and 32 in the second end flange 3 and through the respective coaxial holes in the suction piping.

The carburetor according to the invention is applicable to small combustion engines preferably used for driving small agricultural machines or hand tools, such as chain saws. Subject to an appropriate adaptation it may be applied also to combustion engines used for other purposes.

-4-

## C L A I M S

1. A carburetor with a fuel injection system for starting engines which injection system comprises an ejecting room with a balloon located in a lateral cylindrical boss on the carburetor body, which body is provided with end flanges having holes for fixing bolts characterized in that the first end flange (2) which engages directly the lateral cylindrical boss (4) is provided with two holes (21,22) which are coaxial with respect to the holes (31,32) in the second flange (3) whereby the first hole (21) in the first end flange (2) passes through the lateral cylindrical boss (4) in the area below a bottom (7) of the ejecting room (5) and besides the mouth (8) of the ejecting room (5)
2. A carburetor according to claim 1 characterized in that the end flanges (2,3) and the lateral cylindrical boss (4) are made as a part of the body (1) which is a casting.

**AMENDED CLAIMS****received by the International Bureau on 07 June 2006 (07.06.2006)**

1. A carburetor with a fuel injection system for starting engines, having the carburetor body (1) with the upside (11) located above the horizontal axis (10) and with the downside (12) located below the horizontal axis (10), while the above body (1) is equipped with two end flanges (2, 3) arranged against each other on the horizontal axis (10) of the body (1), where the first end flange (2) is provided with first holes (21, 22) for attachment to the sucking piping, and the second end flange (3) is provided with second holes (31, 32) for attachment to the air filter, while the first holes (21, 22) and the second holes (31, 32) form two coaxial pairs (21, 31), (22, 32), one of which is located above the horizontal axis (10) and the other one is located below the horizontal axis (10), and where the carburetor injection system is provided with a balloon (6) connected with the ejecting room (5) which is formed in a lateral cylindrical boss (4) at the side (13) of the body (1) perpendicular to the horizontal axis (10), while the bottom (7) of the ejecting room (5) is provided with a hole (8) passing through to the downside (12) of the body (1), comprising by that a part of the first end flange (2) with the first hole (21) is integrated into a single unit with the lateral cylindrical boss (4), the axis (14) linking the first hole (21) and the second hole (31) at the side (13) of the body (1) occurs in a plane located below the horizontal axis (10) and passes through the lateral cylindrical boss (4), while the first hole (21) of the first end flange (2) also passes on through the lateral cylindrical boss (4) in the area behind the bottom (7) of the ejecting room (5) and outside the hole (8).
2. A carburetor according to claim 1, comprising by that the parts of the first end flange (2) and the second end flange (3) including the first hole (22) and the second hole (32), arranged at the side of the body (1) opposite to the lateral cylindrical boss (4), do not go beyond the plane of the upside (11) of the body (1), and the pair of opposite coaxial holes (22, 32) are arranged in the plane located above the horizontal axis (10).
3. A carburetor according to claim 1, comprising by that the parts of the first end flange (2) and the second end flange (3) including the first hole (22) and the second hole (32), arranged at the side of the body (1) opposite to the lateral cylindrical boss (4) are linked with a reinforcement (15).

**Statement under Article 19 (1)**

The Claim 1 in the original version as filed is not clear in the sense of Article 6 PCT, as it does not define the carburetor upside (top) and downside (bottom), which causes consequent confusion in the claim, in the description as well as in the drawings.

To remove the drawback we define the following positions in the revised Claim 1:

- 16 horizontal axis of the body (1)
- 17 upside of the body (1)
- 18 downside of the body (1)
- 19 side of the body (1)
- 20 the axis linking the first hole (21) and the second hole (31)
- 21 reinforcement

The "up" and "down" directions have thus been defined in Claim 1, so the confusion has been removed. Corresponding modifications will have to be done in the description and in the drawings, namely in their position and identification so as the figures correspond with the description, i.e. new reference marks have to be added and some identification errors removed (e.g. position 8 in Fig. 4 describes an inappropriate hole). These modifications will be performed either in the amendments made according to Article 34 or in the national phase.

Furthermore, the cited document US 2003/0062633 classified as "Y" represents a known state of prior art and is described in the introductory part of Claim 1 amended now according to Article 19.

The disadvantages of the solution according to US 2003/0062633 are particularly based in the fact that it is a relatively large carburetor, which is not suitable to be built in small devices. It is necessary to achieve minimum space dimensions at all sides of the carburetor if the carburetor is to be built in small devices.

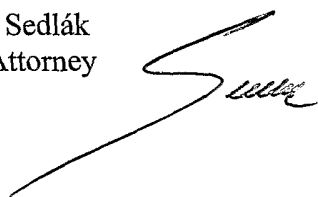
The new solution according to the above Claim 1 PCT/CZ2005/000096 removes this drawback and reduces the built-in dimensions of the top of the carburetor body (1) in a new and inventive solution.

The combination of features in the first (independent) claim as it was amended according to Article 19 meets the conditions of inventiveness and does not obviously result from the present state of prior art for a skilled person. It moreover brings a (surprising) technical effect that it reduces the building-in dimensions of a carburetor, reduces its weight, simplifies the casting form, and the arrangement of the holes in the flanges facilitates assembly by means of two easily accessible through going bolts.

The other newly formulated claims 2 and 3 are dependent on Claim 1 and are only valid in relation to it. These claims also meet the criteria of novelty and inventiveness.

Yours sincerely

Ing. Jiří Sedlák  
Patent Attorney

A handwritten signature in black ink, appearing to be 'J. Sedlák', written over a stylized, elongated horizontal line.

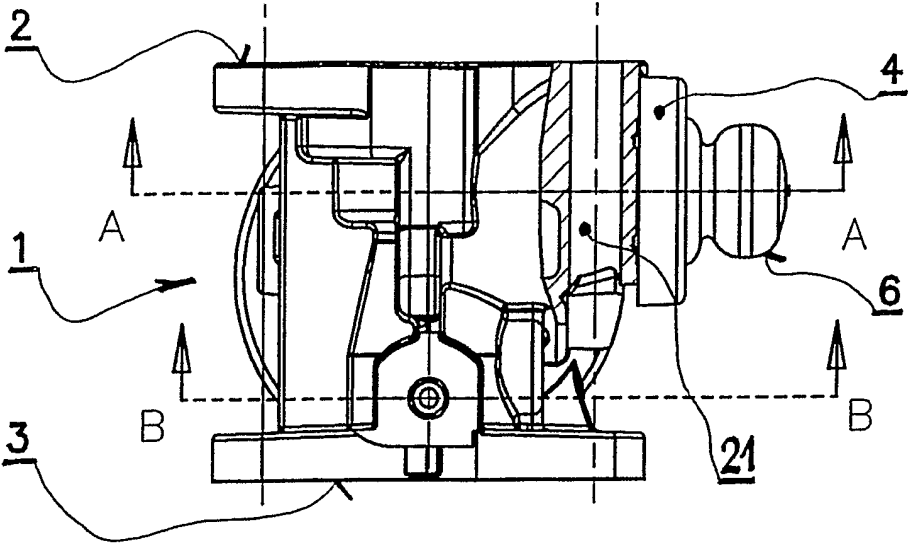


FIG. 1

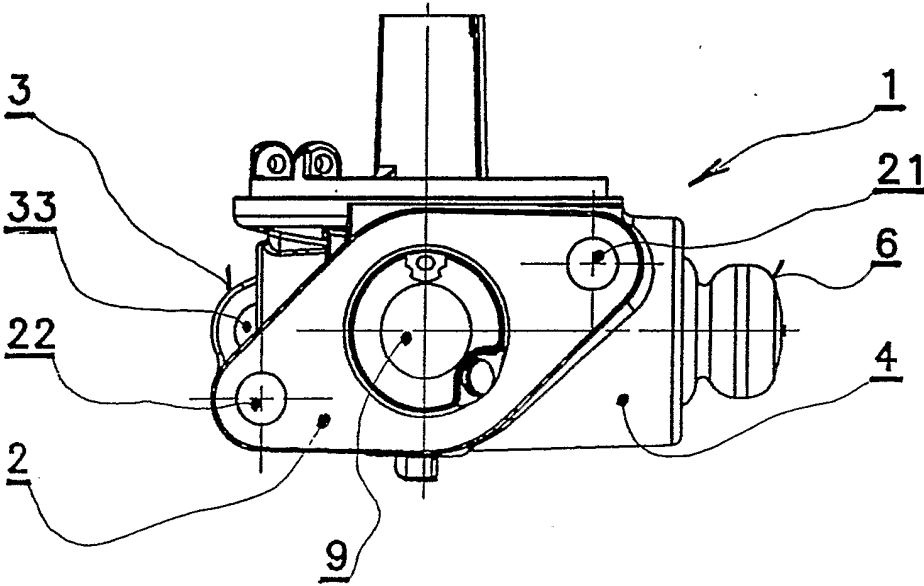


FIG. 2

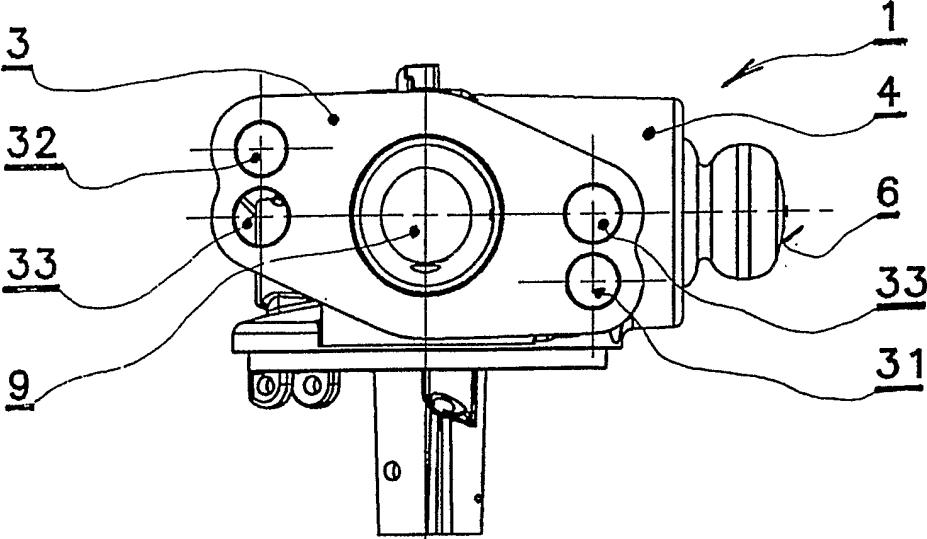


FIG. 3

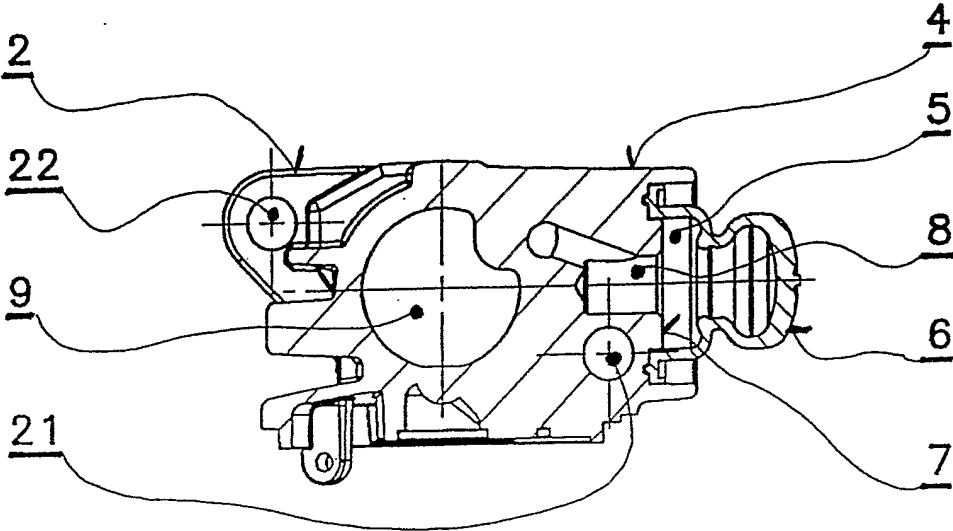


FIG. 4

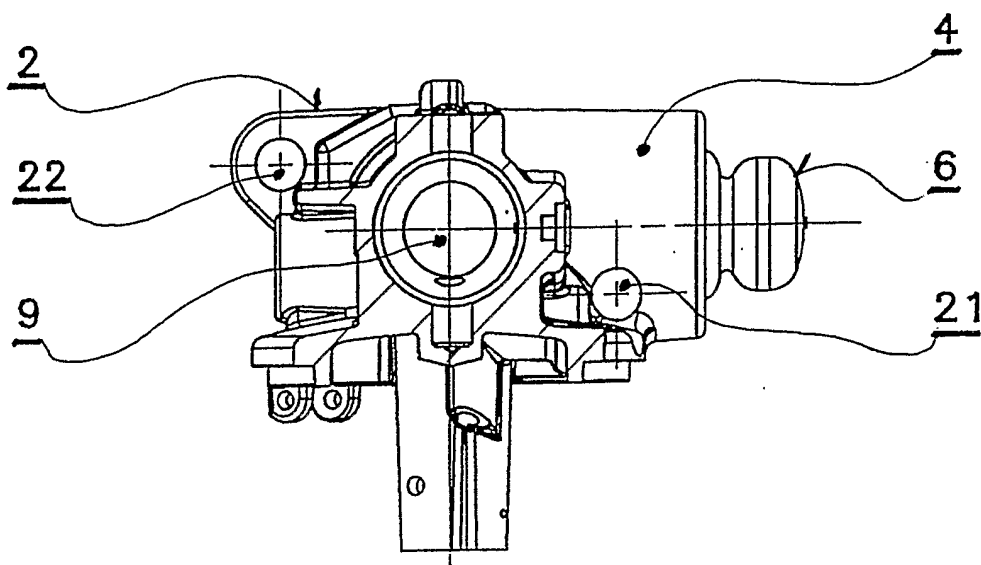


FIG. 5

## INTERNATIONAL SEARCH REPORT

International application No

PCT/CZ2005/000096

A. CLASSIFICATION OF SUBJECT MATTER  
 INV. F02M1/16 F02B63/02

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
 F02M F02B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages                              | Relevant to claim No. |
|-----------|-----------------------------------------------------------------------------------------------------------------|-----------------------|
| X         | US 2003/062633 A1 (WOODY JOHN C)<br>3 April 2003 (2003-04-03)<br>paragraphs [0022] - [0027]; figures<br>1,3,4,8 | 1,2                   |
| A         | -----<br>US 4 197 825 A (ALTENBACH, ALAN B)<br>15 April 1980 (1980-04-15)<br>abstract; figure 1                 | 1,2                   |
| A         | -----<br>US 2004/178520 A1 (KRLIN PAVEL ET AL)<br>16 September 2004 (2004-09-16)<br>abstract; figure 4          | 1,2                   |
| A         | -----<br>EP 1 243 784 A (WALBRO CORPORATION)<br>25 September 2002 (2002-09-25)<br>abstract; figure 1            | 1,2                   |
|           | -----                                                                                                           |                       |



Further documents are listed in the continuation of Box C.



See patent family annex.

## \* Special categories of cited documents :

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Date of the actual completion of the international search

31 March 2006

Date of mailing of the international search report

11/04/2006

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# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/CZ2005/000096

| Patent document<br>cited in search report |    | Publication<br>date | Patent family<br>member(s) | Publication<br>date |
|-------------------------------------------|----|---------------------|----------------------------|---------------------|
| US 2003062633                             | A1 | 03-04-2003          | NONE                       |                     |
| US 4197825                                | A  | 15-04-1980          | CA 1091519 A1              | 16-12-1980          |
| US 2004178520                             | A1 | 16-09-2004          | US 2004178519 A1           | 16-09-2004          |
| EP 1243784                                | A  | 25-09-2002          | JP 2002276471 A            | 25-09-2002          |