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(54) A SET OF COMPONENTS FOR USE IN THE MANUFACTURE OF VACUUM NON-RETURN VALVES

(71) We, WALTER ALFMEIER GmbH & CO., a German Body Corporate of Industriestr. 5, 8830 Treuchtlingen, Germany, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:

The invention relates to a set of components of plastics material for use in the manufacture of vacuum non-return valves, each such valve comprising a casing part, a valve insert and a cap part, the casing part and cap part each being fitted with at least one connection branch and being welded to one another about the insert.

Such vacuum non-return valves, consisting of plastics material have been described in German Auslegeschrift No. 2,315,870. It is also evident from this Auslegeschrift that valves of this type are used especially in car maufacture and are employed there for connecting servo units, operated under reduced pressure, to the intake side of the internal combustion engine.

The problem in the manufacture of valves of this type is that, depending on the particular application and the size, differing constructional shapes are required. This has the consequence that the valve manufacturer must make a large range of valve shapes available, which frequently differ from one another only slightly, for example in the shape and size of the connection branch, but frequently also differ considerably from one another. In every case, it is necessary to manufacture each of these valves separately, and this naturally entails a considerable increase in costs, since a corresponding range of injection moulds, measuring gauges and also testing and assembly devices must be available.

It is the object of the invention to make the fabrication of valves of this type more efficient and cheaper without at the same time having to narrow the range of valves offered.

According to the invention there is provided a set of components of plastics material for use in the manufacture of vacuum non-return valves, the set comprising a plurality of casing parts, valve inserts and a plurality of cap parts, each of the casing parts and each of the cap parts being of a different construction but each comprising at least one connection branch, all the casing parts having engaging faces of identical configuration and all the cap parts also having engaging faces of identical configuration, the engaging face of any casing part being adapted for welded connection to the engaging face of any cap part with a valve insert enclosed therebetween to form a vacuum non-return valve. Thus, a system of casing parts and cap parts is provided, which system, in spite of the manifold shapes, types and dimensions, is in every case identical in the contact faces, and this makes it possible, for example by combining five casing parts and eight cap parts in a production of $5 + 8 = 13$ individual parts, to manufacture a total of $5 \times 8 = 40$ types of valve. By matching the components mentioned in an optimum manner to the known applications, it is already possible to manage with the quoted number of individual components and thus to meet the entire diversity of the market demand with a distinctly reduced quantity of individual parts.

To ensure that the mutually matched contact faces of the casing part and cap part can be assembled without difficulty into the finished valve, it is necessary to provide reliable and precise seating. It is therefore proposed, also within the scope of the system indicated, to use contact faces of the casing part and cap part, which extend in the shape of a V to have frusto conical mating surfaces, and additionally to ensure that, in one of the two parts in the immediate

vicinity of the front edge of the other part to be inserted and at a sufficient distance from the valve inserts, an annular groove is provided to receive plastics squeezed out during the welding process. This ensures that plastics droplets or particles, the formation and detachment of which cannot be avoided during correct welding, can be taken up and deposited in a zone where the functioning of the valve is not impaired.

Both the casing part and the cap part of the valve each have connection branches for the requisite hoses. These connection branches are provided with several annular collars or ribs which are located behind one another and have the purpose of firmly holdng the hoses after they have been pushed on, even without using hose clips. Preferably, the collars are designed so that they decrease in diameter in each case from the component body towards the front edge of the branch. This makes it possible to push even relatively inelastic, thickwalled hoses securely onto the branch, the collars digging successively into the inner wall of the hose and firmly adhering therein.

Within the proposed system, it is possible to fit individual cap parts and/or casing parts in the region of their component bodies or their connection branches with further branch connections to which further branch hose pipes can be joined. When components of this type are used, combined valves and distributor pieces are formed, which make the use of additional special distributors superfluous. The proposed system of components can be applied in manifold ways and can be extended or restricted, as desired, depending on the particular requirements. It assists in raising the profitability of valve production and, at the same time, in ensuring increased safety by standardising the individual elements.

The invention is explained by way of example in more detail with reference to the accompanying drawings in which:

Figure 1 shows a summary table of an advantageous system of components in accordance with the invention: and

Figure 2 shows a longitudinal section through a vacuum non-return valve which has been assembled using components mutually matched according to the invention.

The system reproduced in Figure 1 consists of a total of five embodiments of casing parts 1 which are entered in the top horizontal row, and a total of eight cap parts 2 which are entered in the left-hand vertical column. It can be seen that the casing parts and the cap parts are in each case equipped with connection branches 3 of different thickness and with component bodies 4 of different shapes and dimensions. It is essential that the contact faces 5 always correspond to one another so that any casing part 1 can be combined and welded with any cap part 2. If this is the case, the result is the multiplicity of combination valves, which can be seen in Figure 1 and with which virtually every actual demand can be met.

Figure 2 shows in more detail the construction of a combination valve of this type. In the illustrative embodiment chosen, a casing part 1 is combined with a cap part 2, which latter additionally also has two branch connections 6; 6'. The branch connection 6 is here fitted directly to the component body 2 (cap part) and the branch connection 6' is fitted to the connection branch 3. Both the branch connections serve for the connection of further hose lines to the body 2 and obviate the need to provide an additional branch adaptor if a connection of a plurality of hoses to the cap part 2 is to be achieved.

In the illustrative embodiment shown, the contact faces 5 of the casing part and cap part are arranged in the shape of a V so that a secure joint can be obtained with simultaneous centering of the two parts 1 and 2 relative to each other. One of the two parts, the casng part 1 in the illustrative embodiment shown, additionally has an annular groove 7 which is located in the immediate vicinity of the front edge 8 of the cap part 2 and is spaced from a valve insert 9. If on welding the two parts 1 and 2 together a small amount of plastics is squeezed out of the welding gap, this can be taken up by the annular groove 7 and retained (by baking on) so that these particles of plastics, which in themselves are undesirable, are retained in a zone of the valve where they do not interfere with its proper operation.

It can also be seen in Figure 2 that the connection branches 3 of the casing part and cap part each have collar-like ribs 10 the individual ones of which have sharp peripheral edges with outer surfaces which taper towards the free end of the branch. The diameters of the peripheral edges of the successive ribs reduce towards the free end of the branch so that the ribbed portion of the branch has an overall taper towards the free end of the branch. To demonstrate the receding taper arrangement, the sharp edges of these collars are shown joined by envelope lines 11 which slightly converge towards one another.

WHAT WE CLAIM IS:-

1. A set of components of plastics material for use in the manufacture of vacuum non-return valves, the set comprising a plurality of casing parts, valve inserts and a plurality of cap parts, each of the casing parts and each of the cap parts being of a different construction but each comprising at least one connection branch, all the casing parts having engaging faces of identical configuration and all the cap parts also

having engaging faces of identical configuration, the engaging face of any casing part being adapted for welded connection to the engaging face of any cap part with a valve insert enclosed therebetween to form a vacuum non-return valve.

2. A set of components according to claim 1, wherein the mutually matched engaging faces of the casing part and cap part have frusto-conical engaging surfaces.

3. A set of components according to claim 2, wherein for each assembled non-return valve an annular groove is provided in one of the parts in the immediate vicinity of the front edge of the engaging face of the other part spaced from the valve insert, such groove receiving plastics material squeezed out from the engaging surfaces during welding together of the casing and cap parts.

4. A set of components according to any preceding claim, wherein each of the connection branches is provided with a plurality of collar-like ribs the peripheral edges of the successive ribs being of reducing diameters towards the free end of the branch.

5. A set of components according to any preceding claim, wherein one or more of the cap parts and/or casing parts each have one or more further branch connections from the body of the component part and/or from the connection branch of that component part.

6. A set of components of plastics material for use in the maufacture of vacuum non-return valves and constructed and arranged substantially as herein described with reference to or as illustrated in the accompanying drawings.

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2 SHEETS *This drawing is a reproduction of the Original on a reduced scale*

Sheet 1

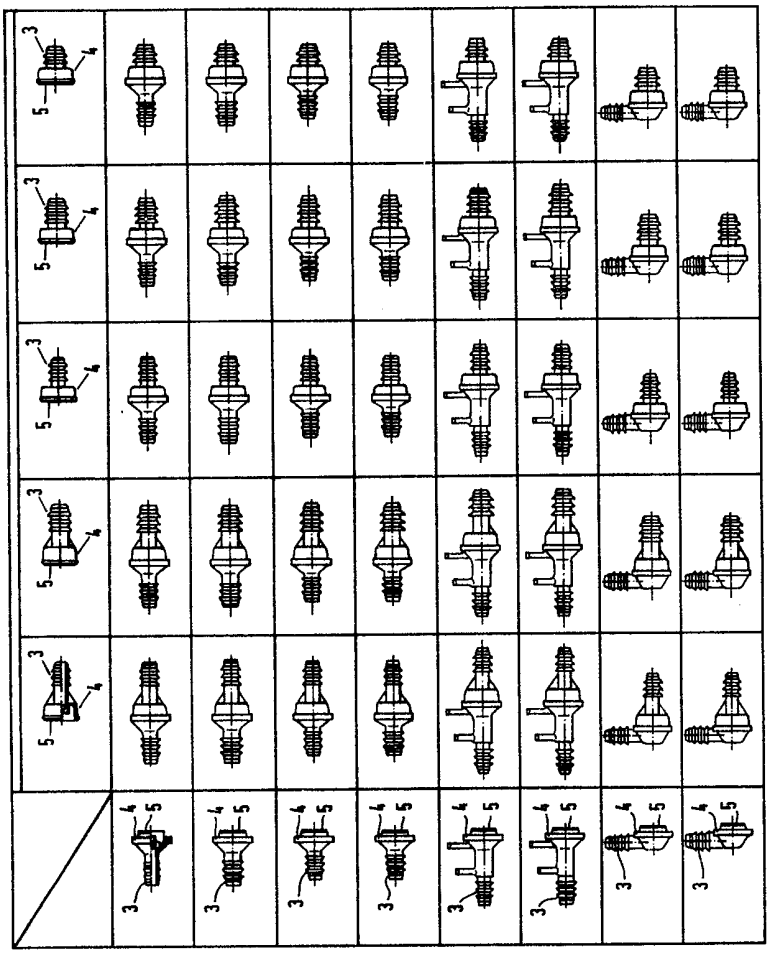

Fig. 1

1567432 COMPLETE SPECIFICATION
2 SHEETS This drawing is a reproduction of the Original on a reduced scale
Sheet 2

Fig. 2