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(54) OUTSERT-MOULDED METAL BASE PLATE ASSEMBLY

(71) We, POLYPLASTICS COMPANY LIMITED, a Japanese Company of 2-30 Azuchi-machi, Higashi-Ku, Osaka, Japan, 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:—

This invention relates to an outsert moulded metal base plate assembly for watches, measuring meters, communication equipment, recorders, optical equipment, toys, etc., which base plate is provided with a plurality of features of configuration, which for instance provide functional parts, composed of a synthetic plastics material integrally bonded thereto. Such functional parts may for example be poles, bearings, areas of differing thickness, and the like, bonded and fixed onto the base plate. Such base plates have heretofore been prepared by attaching functional parts composed of a metal to holes formed on a metal base plate by caulking or the like, or by integrally forming an entire base plate device from a synthetic plastics material. However the former technique is complicated and a high precision cannot be attained, and base plates formed by the latter technique suffer from an insufficient rigidity and again a high precision cannot be attained because of the strain and shrinkage effects in the material used.

Recently base plate assemblies have been developed comprising a metal base plate and features of configuration composed of a synthetic plastics material. In these base plate assemblies the metal base plate component avoids the disadvantages of insufficient rigidity and shrinkage occurring at the moulding step. Further such base plate assemblies can be prepared in one moulding operation by the so-called outsert moulding process, with attendant advantages of reduced manufacturing costs and consistency of the final product.

Outsert moulding is a known method of moulding plastics material onto base plates, and differs from insert moulding in which the

base plate is introduced into the resin. In outsert moulding the base plate is anchored to the plastics material by injecting the plastics resin into bonding apertures in the base plate, e.g. anchoring slots or holes in the base plate.

In outsert moulding for forming base plate assemblies, runners are normally used consisting of bands or strips of synthetic plastics material extending between functional parts to connect or fix such parts. The functional part or parts may themselves consist of an extended mass of plastics material extending along the base plate assembly.

However in a base plate assembly including a single synthetic plastics runner fixed to a base plate at two or more bonding apertures, distortion can arise so that such base plate device cannot be used as a part of equipment in which high precision is required, and possibly breakage of the runner takes place. Such an effect is shown in Figures 1 and 3 of the accompanying drawings, of which Figure 1 is a top view showing a base plate assembly in which synthetic plastics functional parts 2 and 2¹ are affixed to a metal base plate 1 and are connected to each other by a linear runner 3, which may itself be a functional part, and may be produced for example by the moulding of resins from another runner or gate. During moulding tension is generated in the member 3 by moulding shrinkage of the moulded synthetic plastics material, and as shown in the side view of Figure 2, the base plate 1 is consequently deformed as indicated by the broken lines 1¹, and the tension generated may be sufficiently large to result in fracture of the runner as shown in Figure 3.

It has previously been proposed that such defects may be mitigated by the provision of a curved runner (see published Japanese Patent specification 87568/76). Such a construction is shown in Figure 4, wherein on the base plate 1 a curved runner extends arcuately between functional parts 2, 2¹. However such an expedient still results in some distortion, which although small, results in a turning

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force being exerted on the functional parts. Thus referring to Figure 5, the curved runner assumes the shape shown in broken outline at 3¹¹, resulting in turning forces exerted on functional parts 2, 2¹, as shown by the arrows.

Such effects are avoided by the present invention, which provides a base plate assembly comprising an outsert-moulded metal base plate having synthetic plastics material moulded thereon and bonded thereto through a plurality of bonding apertures in the said metal base, the said synthetic plastics material including features of configuration each located over one of the said bonding holes, characterized in that the said features of configuration are connected to each other by a pair of curved runners substantially symmetrically disposed to each other with respect to a straight line connecting two of said bonding holes, whereby the resulting flexural stress and turning forces generated on the associated features of configuration by shrinkage of the runners during moulding, are balanced.

While the curved runners may be completely symmetrical about the straight line joining the bonding apertures, the symmetry may be incomplete to some extent, provided that any forces generated in the runners does not result in flexural stress and turning forces being transmitted to the associated functional parts to the base plate component.

The curved runners may be present on the same face of the base plate assembly, but preferably are on opposite faces. The runners may be of any curved configuration e.g. arcuate or S-shaped.

The invention is hereinafter particularly described and illustrated in Figures 6 and 7 of the accompanying drawings, of which

Figure 6 is a plan view of a base plate assembly according to the present invention, and

Figure 7 is a sectional side view of Figure 6. Referring to Figures 6 and 7, the base plate assembly has two functional parts 2, 2¹ moulded onto and extending through the base

plate. On one surface the said parts are joined by a curved runner 4, and on the other surface are joined by a further curved runner 6, the curvature of the said runners being symmetrical about a straight line joining the parts 2, 2¹. As a result any forces generated on the runners after forming e.g. during cooling, cancel each other out, and no resultant forces are applied to the parts 2, 2¹.

The invention may be applied to groups of more than two functional parts forming the features of configuration, each part being connected to at least one other. Functional parts may themselves be made of the said synthetic plastics material, or of metal.

WHAT WE CLAIM IS:—

1. A base plate assembly comprising an outsert-moulded metal base plate having synthetic plastics material moulded thereon and bonded thereto through a plurality of bonding apertures in the said metal base, the said synthetic plastics material including features of configuration each located over one of the said bonding holes, characterized in that the said features of configuration are connected to each other by a pair of curved runners substantially symmetrically disposed to each other with respect to a straight line connecting two of said bonding holes, whereby the resulting flexural stress and turning forces generated on the associated features of configuration by shrinkage of the runners during moulding, are balanced.

2. An assembly as claimed in Claim 1, wherein the said pair of curved runners are on opposite sides of the assembly.

3. An assembly as claimed in Claim 1, substantially as hereinbefore described, with particular reference to Figures 6 and 7 of the accompanying drawings.

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