

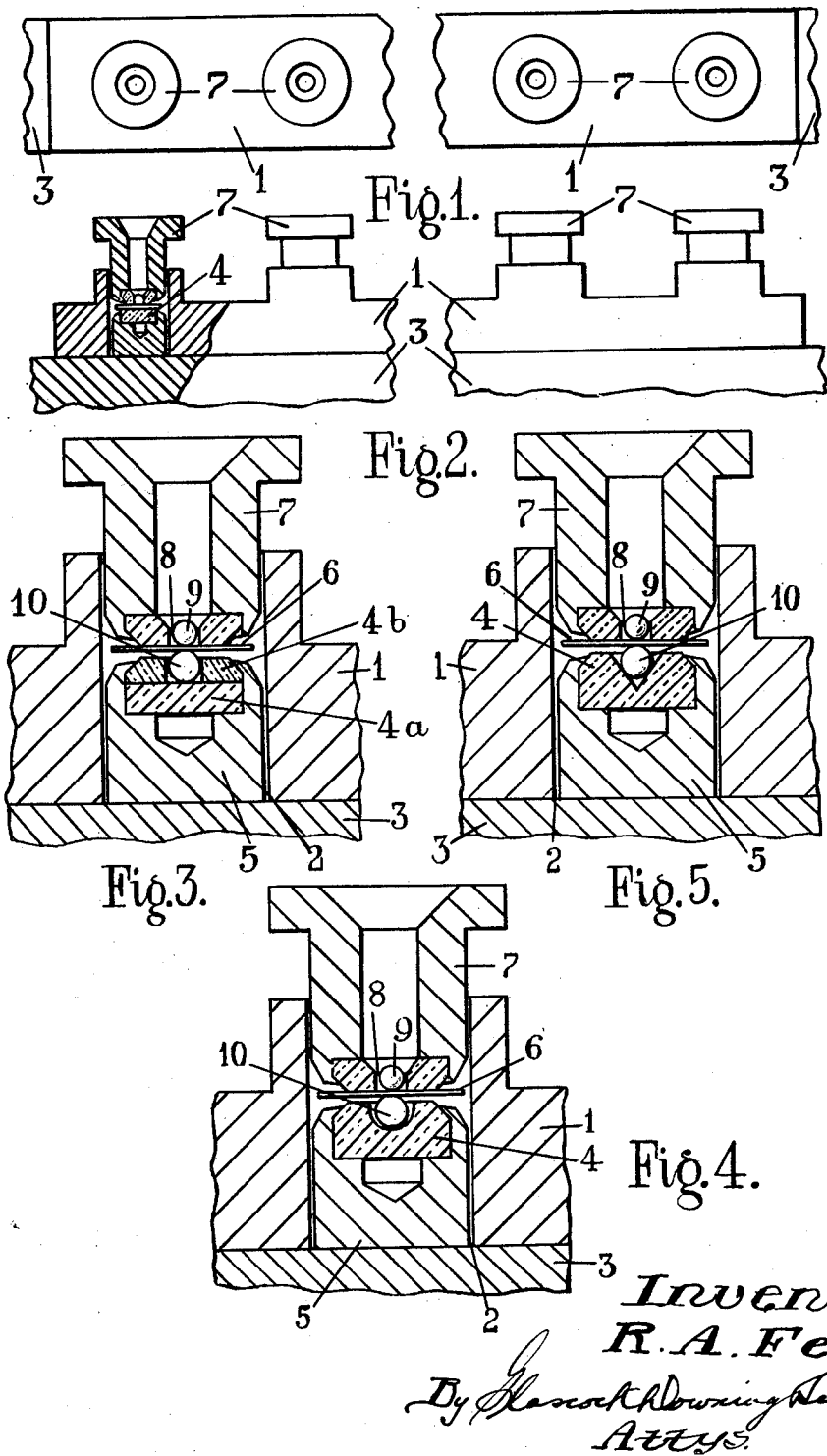
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MANUFACTURE OF TRANSISTORS, RECTIFIERS AND THE LIKE

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MANUFACTURE OF TRANSISTORS, RECTIFIERS AND THE LIKE

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1 Claim. (Cl. 113-99)

This invention relates to the manufacture of transistors, rectifiers and the like.

In one form of transistor manufacture of a plate or wafer of germanium is alloyed at one point with indium. Thus an indium pellet is located on the surface of the germanium wafer and the assembly is passed through an oven to melt the indium and cause alloying with the germanium.

The accuracy of location and control of spread of the molten indium is of great importance in determining the uniformity of the finished product.

The invention consists of a method of making transistors, rectifiers and the like in which a pellet of alloying material is located and held in contact with a plate of material with which it is to be alloyed by means of an element of a natural or synthetic jewel, such as ruby, sapphire or spinel, zircon or rutile.

Synthetic ruby and sapphire elements are monocrystalline forms of fused alumina and may be drilled, ground and polished to provide apertures and flat polished surfaces of extreme accuracy (0.0001 inch hole diameter tolerance and within optical limits as regards surface flatness). In this respect these are superior to previous locating elements which have been tried, such as stainless steel or graphite. Elements of synthetic spinel may be made up in a similar way.

The invention will be further described with reference to the accompanying drawings.

FIGURE 1 is a plan view and

FIGURE 2 is a longitudinal section of an arrangement for carrying out the invention.

FIGURE 3 shows part of FIGURE 2 in an alternative arrangement.

FIGURE 4 is a similar view to FIGURE 3 showing a further modification.

FIGURE 5 is a similar view showing a still further modification.

The drawings show a jig fixture 1 of steel or graphite comprising a plate drilled with a plurality of spaced holes 2 for locating the transistor or rectifier elements. This fixture 1 rests on a base 3 and in the lower half of each hole 2 is fitted an accurately cylindrical element 4 of synthetic jewel which is itself mounted in a stainless steel shank 5. Over this is placed the germanium wafer 6 and on top is placed a steel shank or collar 7 having a tapered lower end which is recessed to receive a synthetic ruby jewel hole 8 with a lead-in cup of conical or spherical form. The jewel is secured by spinning over the tapered

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edge on to a bevelled edge of the jewel, the jewel rests on the germanium wafer and an indium pellet 9 is dropped into the hole of the cup to rest on the wafer.

The assembly is passed through an oven to cause melting of the indium and the accurate dimensions of the hole and accurately polished flat face of the jewel in contact with the wafer, with a clean edge between the hole and flat, ensures an accurate control of spread of the liquid indium.

After a pass through the oven the wafers can be inverted and the process repeated on the other side.

Alternatively, in a single pass operation the cylindrical lower jewel element 4 is replaced by a jewel plate 4a with a jewel ring 4b on top, and an indium pellet 10 in the ring projects to contact the under surface of the wafer 6.

The jewel plate and ring are held in a tapered steel shank or collar, the thin edge being spun over on to a 45° bevel on the jewel ring as before.

In an alternative method for dealing with the underside, a pellet of indium is located in a cup (FIGURE 4) or conical recess (FIGURE 5) in a jewel element, again projecting so as to be in contact with the wafer.

Various other modifications may be made in accordance with the invention. Thus, for example, the wafer may be a rectangular parallelepiped instead of a cylindrical disc. Also, the wafer might be a silicon wafer and the alloying element aluminium.

I claim:

In a jig for making transistors or rectifiers comprising a jig fixture formed with a hole for locating a transistor or rectifier element and containing a cylindrical jig element recessed to receive the alloying material and hold it in contact with the transistor or rectifier element, the cylindrical jig element comprising a stainless steel shank having a tapered end with a cylindrical recess, the improvement in combination therewith comprising a bevelled accurately polished flat-faced monocrystalline jewel of the group consisting of ruby, sapphire, spinel, zircon or rutile fitting closely in the recess and secured by part of the tapered edge of the shank engaging over the bevel, said jewel having an accurately dimensioned hole, to receive the alloying material, with a clean edge between the hole and the flat face of the jewel.

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