March 22, 1966 J. F. M. TIMMERMANS 3,241,222

APPARATUS FOR SIMULTANEOUSLY FILLING RECESSES IN A MATRIX OR THE LIKE WITH A NUMBER OF ELONGATED ARTICLES

Filed Sept. 16, 1964 2 Sheets-Sheet 1

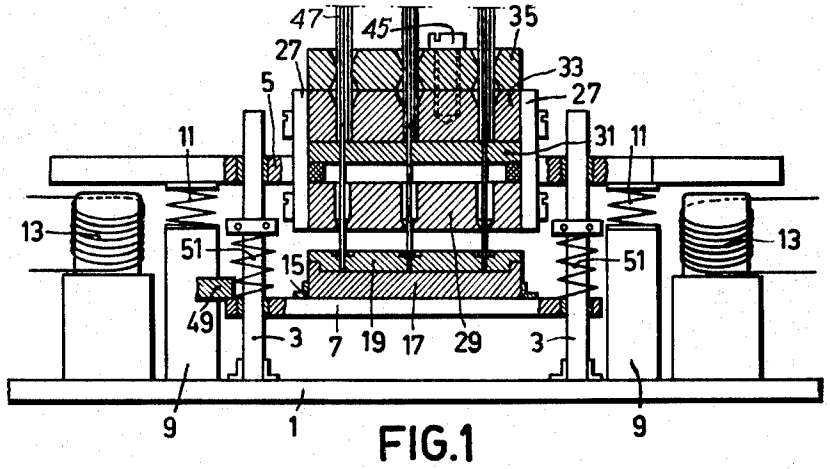

FIG.1

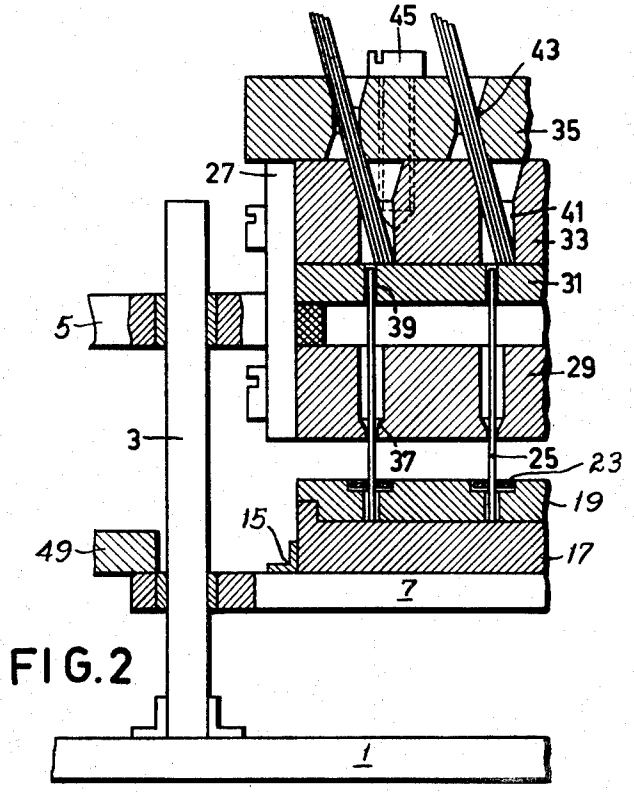

FIG.2

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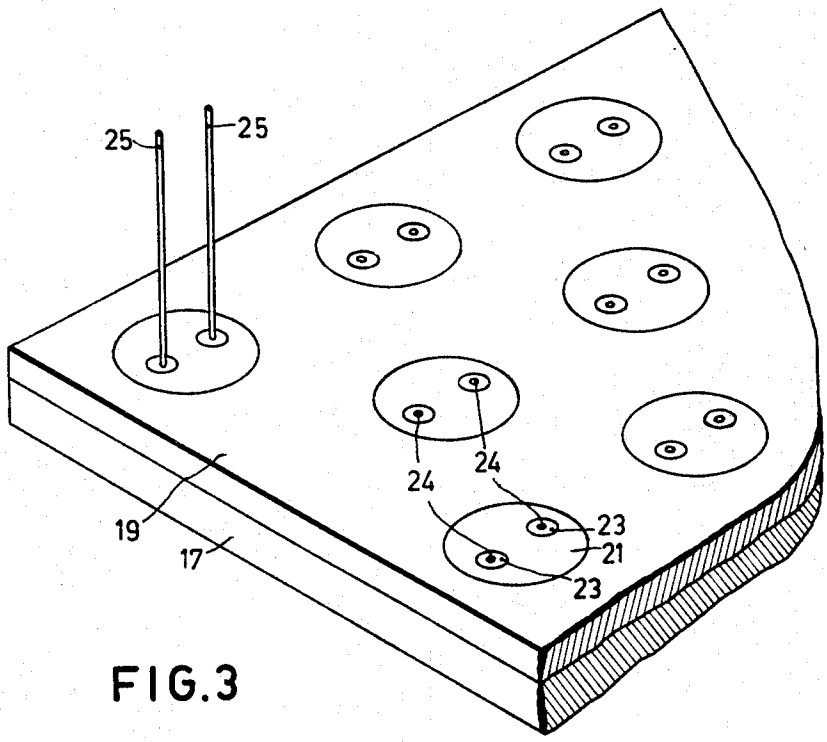

FIG.3

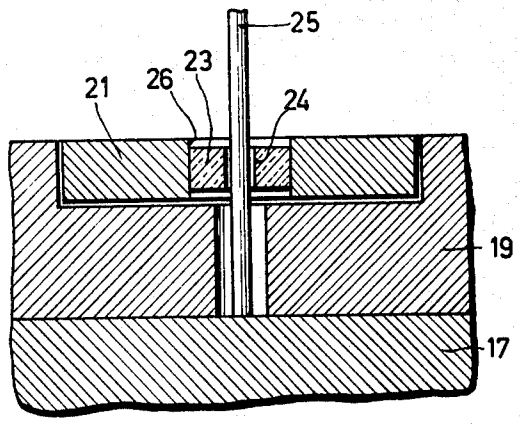

FIG.4

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APPARATUS FOR SIMULTANEOUSLY FILLING RECESSES IN A MATRIX OR THE LIKE WITH A NUMBER OF ELONGATED ARTICLES

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4 Claims. (Cl. 29—203)

In the mass production of products for electrotechnical uses it is often necessary to insert an elongated conductor-wire through a bore in one of a large number of small objects such as transistor components and the like. This is a very time consuming job when done manually and particularly when the openings to be filled are quite small.

The object of the invention is to provide apparatus for simultaneously filling each bore or recess with an elongated conductor in a large number of objects.

The apparatus according to the invention is characterized by a vibrating container having a number of storage chambers each of which contain an upright bundle of elongated conductors, said chambers having one channel or a group of channels through each of which a conductor can leave the associated bundle and arrive in an opening of an object located in a holder mounted below the chambers and which is movable in a reciprocating manner with respect to the said chambers. The holder in one of its positions forming a depth limit for the conductors located in the opening and the holder so that the rear ends of those conductors cannot leave the channels until the remaining bundles in their chambers are localized. Then the holder with the inserted conductor is moved with respect to the chambers. Each time the apparatus is vibrated one conductor of a bundle is separated per channel. By causing the holder to serve as an abutment member in one of its positions for the elongated article in question (conductor), in a manner such that the rear end of that article has not yet left its channel, thus prevents, during the vibrating movement, more than one conductor leaving the associated bundle. After the conductors have left the bundles as a result of the vibrating motion, every remaining conductor of a bundle is localized in its chamber.

The remaining conductors of a bundle may be localized in their associated chambers by clamping means. However, according to the nature of the articles or conductors this might give rise to damage. In such cases use may be made of a further construction according to the invention in which the position of the object holder in which it forms a depth limit for the articles passing into the holder is chosen so that the ends of the articles do not extend the full length of the relative channels. The container having a startified construction for localising the remaining bundles, wherein the container comprises a sliding part resulting in the remaining bundles being given a prescribed oblique angular position.

In this case, preferably, the chambers in the vibrating container are defined by two parts, one part consisting of an apertured lower plate, the other part of the chamber being located in another apertured plate movable above the said lower plate as an egg timer. This offers the advantage of a very simple construction.

In order that the invention may readily be carried into effect, an embodiment thereof will now be described more fully, by way of example, with reference to the accompanying drawings, in which:

FIG. 1 diagrammatically shows a cross-sectional view

of the device according to the invention in which bundles of elongated articles are upright.

FIG. 2 shows, on an enlarged scale, part of the device of FIG. 1 in which, however, the bundles of elongated articles assume an oblique position.

FIG. 3 shows a perspective view of part of a holder to be used during the manufacture of transistor component parts and

FIG. 4 is a cross-sectional view of part of the holder shown in FIG. 3.

The device shown in FIGS. 1 and 2 comprises a base plate 1 with columns 3 for for guiding a stand 5 and a plate 7. Supports 9 are mounted on the base plate; between the stand 5 and the support 9 pressure springs 11 are provided. Magnets 13 are provided outside the supports 9. By the intermitten energisation of these magnets, the stand 5 may be vibrated.

Angles 15 are connected to the plate 7 between which a holder consisting of the plates 17 and 19 can be inserted. In this embodiment this holder is a composite mould manufactured from graphite to be used in the manufacture of transistor component parts. These components comprise a metal disc 21 (FIGS. 3 and 4) in which one or several insulating members 23 are provided. Circular recesses 24 are provided in these members 23 in which a wire-shaped current conductor 25 is located. With this mould of graphite such component parts are assembled. First the discs 21 and then the members 23 are provided. Finally the conductors 25 must be threaded through the members 23. Then by a suitable thermal treatment, the member 23 is united both with the associated disc 21 and with the conductor 25. The device according to FIGS. 1 and 2 serves for the simultaneous introduction of conductors 25 into the recesses 24. Beforehand, the mould was already provided with discs 21 and members 23.

Stanchions 27 were welded to the stand 5 between which the plates 29, 31, 33, are provided (see FIG. 2). In these plates are provided funnel-shaped aperture 37 (plate 29), 39 (plate 31), upwardly widening bores 41 (plate 33) and egg timer-shaped bores 43 (plate 35). The plate 35 can be moved between two extreme positions with respect to the plate 33 by any suitable means (not shown). For that purpose the plate 35 is connected to the plate 33 by a few screws 45. Slot-shaped apertures are provided in the plate 35 in which the screws 45 can slide. The bores 41 and 43 form storage chambers in each of which a bundle of current conductors 25 can be stored. In FIG. 1 this bundle is shown in an upright position 47. All the chambers together form as it were a vibrating container for many bundles of conductors. These chambers communicate with channels 39 at the bottoms. The pattern of the channels 39 corresponds to that of the apertures 24 in the members 23 in the holders 17, 19. In this embodiment two channels 39 are available per chamber each having diameter somewhat larger than the diameter of a current conductor of the bundle 47. By sliding the plate 35 each bundle can be given an oblique position (FIG. 2).

The plate 7 can be moved up and down between two extreme positions by any suitable means (not shown). The upper position is determined by an abutment member 49 mounted on the support 9. Pressure springs 51 normally hold the plate 7 in a lower position remote from the stand 5. Upward movement of the holder 7 takes place through a system of levers not shown.

The simultaneous introduction of a number of associated current conductors 25 into the recesses 24 of all the members 23 takes place as follows:

First the holder (17, 19) which beforehand is provided with discs 21 and members 23, is arranged between the angles 15 of the plate 7. The bundles of conductors assume the inclined position shown in FIG. 2. The plate 7 is then moved upwards against the action of the springs

51; in its top position the plate 7 engages the abutment member 49. Then the plate 35 is moved towards the position shown in FIG. 1 and the magnets 13 are energized. The stand 5 will start vibrating. As a result of this a group of two conductors 25 from each bundle of conductors will pass into the channels 39 and, guided by the funnel-shaped apertures 37, vibrate exactly into the recesses 24 of the members 23. The height of the abutment member 49 is chosen so that the upper end of conductors 25 vibrated into the member 23 in this manner have not left the channels 39 (FIG. 2). Then the magnets 13 are switched off and the plate 35 is moved again so that the bundle of conductors is again given an oblique angular position. Then the plate 7 with the graphite mould is moved downward so that the conductors vibrated into this mould entirely leave the channels 39. Finally the mould 17, 19 is removed from the holder 7.

In the embodiment described the thickness of the plate 31 is chosen so that in the angular position of the bundle of conductors obtained by skewing the plate 35 and when channels 39 are empty no conductors can leave their bundles and pass through channels 39.

What is claimed is:

1. Apparatus for inserting one or more elongated conductors into an apertured component comprising a frame member including a movable holder for supporting at least one said component, said frame member having columns for movably guiding a stand means in spaced aligned relation with said holder, a mechanism for vibrating said stand means; said stand means comprising a series of plates having cooperable and coaxial apertures aligned with said component aperture, one of said plates being adjacent said holder and having at least one funnel-shaped aperture therethrough, a second plate of said series of plates having at least one cylindrical aperture therethrough, a third plate of said series of plates having at least one aperture having a widening bore converging toward the cylindrical apertures of said second plate, and a fourth plate juxtaposed relative to said third plate having at least one egg-timer-shaped bore, said egg-timer-shaped bore and said widening bore defining a storage chamber adapted to contain a plurality of said conductors which are substantially coaxial with said apertures in the aligned position of the apertures of the third and fourth plates; said fourth plate being slideably mounted for offset movement relative to said third plate for obliquely positioning said conductors in the offset position of said third and fourth plates.

2. Apparatus according to claim 1 with the addition of movable stop means for adjusting the spaced relation between said holder and said first plate of the stand means whereby conductors inserted in the aperture of said component remains in both said funnel-shaped and cylindrical-shaped apertures during vibration of said stand means.

3. Apparatus according to claim 2 wherein said holder consists of the material to be incorporated in said component.

4. Apparatus for inserting one or more elongated rods into an aperture comprising a frame member, a holder means having an aperture for receiving a rod, means for securing said holder on said frame member, a stand means movably secured on said frame member in spaced, generally aligned relation with said holder, and means for vibrating said stand means; said stand means comprising a plurality of stacked plates having normally aligned apertures therethrough, at least two of said plates being juxtaposed and slideable relative to one another for misaligning the apertures of said two plates, one of said two plates having an egg-timer-shaped aperture therein, the other of said two plates having its aperture widening toward said egg-timer-shaped aperture whereby a storage chamber is defined by the apertures of said two plates for a plurality of rods introduced through said egg-timer aperture into said widening aperture, said plurality of rods being inclined relative to said two plates in the misaligned position of said two plates and in the aligned position of said plate, said rods being held in a generally aligned position with the apertures of said stacked plates.

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