

Nov. 30, 1965

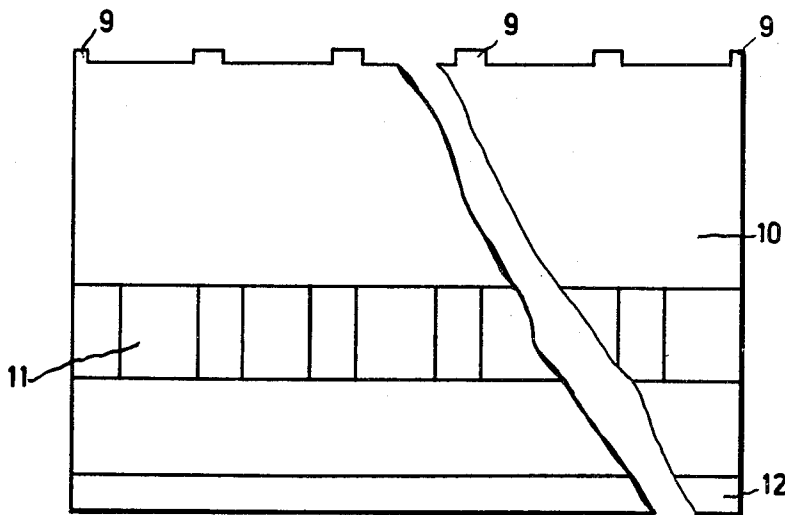
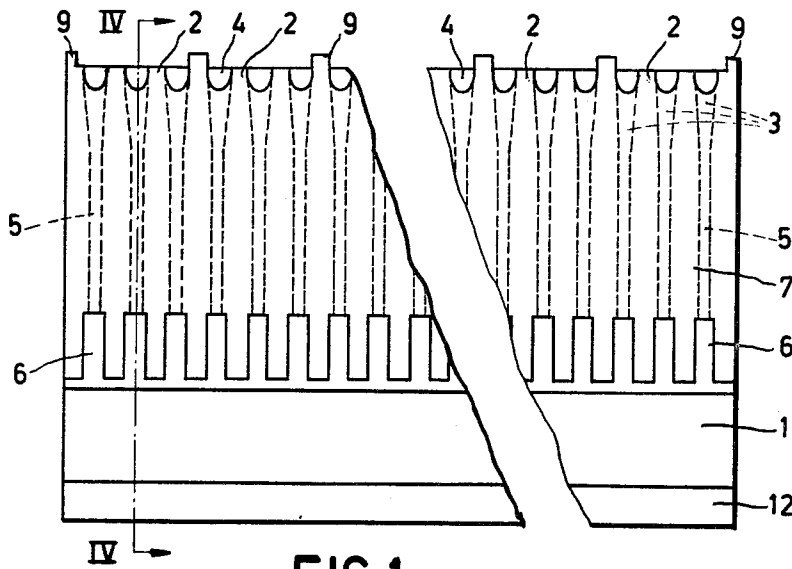
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3,220,722

HOLDER FOR MASS PRODUCED ELECTRICAL DEVICES

Filed Aug. 24, 1961

3 Sheets-Sheet 1



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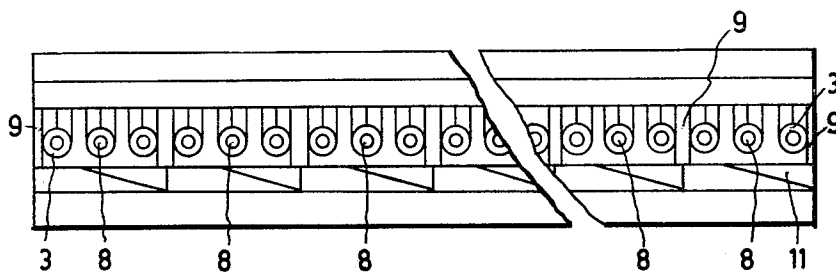


FIG. 3

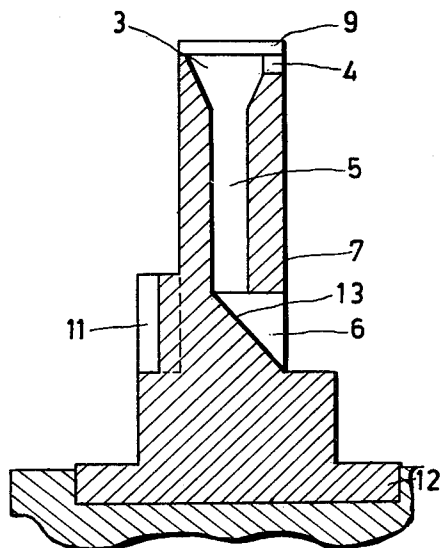


FIG. 4

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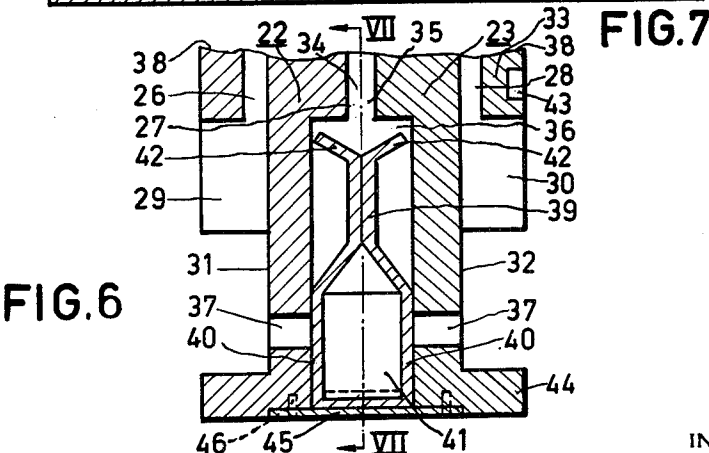
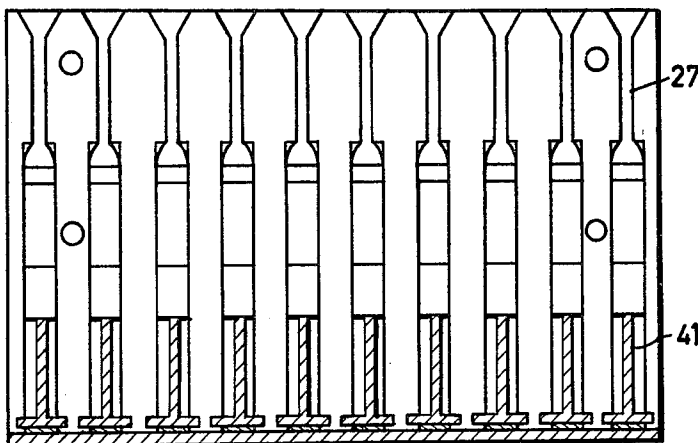
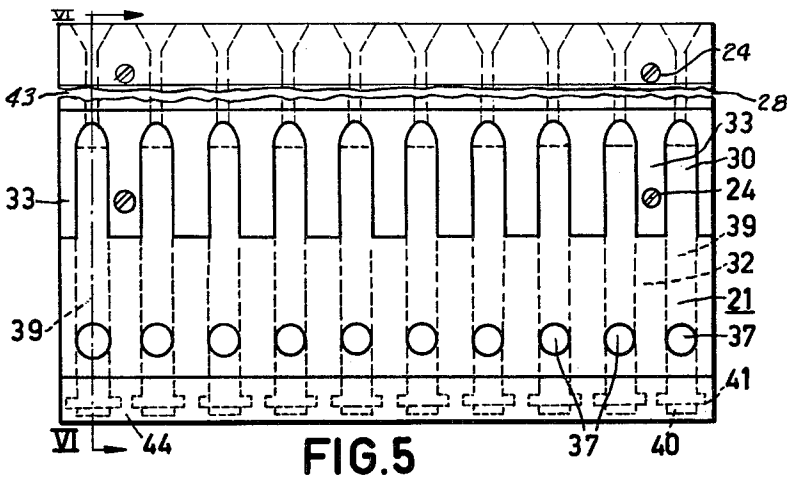
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## 3,220,722 HOLDER FOR MASS PRODUCED ELECTRICAL DEVICES

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Claims priority, application Great Britain, Sept. 27, 1960, 33,156/60

2 Claims. (Cl. 269—287)

The present invention relates to object holders, for use in a mass production process, for holding a plurality of objects in a row, for example current supply wires in the mass manufacture of transistors, crystal diodes or other semi-conductive devices.

In the manufacture of semi-conductive devices it is frequently required to subject the ends of a plurality of wires to a number of succeeding operations, wires being initially inserted into a holder and the semi-conductive devices each comprising a plurality of the wires removed therefrom after the last operation has been carried out.

During the sequence of operations it may be necessary to make separate electrical contact with each of the objects held in a holder for the purpose of testing during, and at the completion of, manufacture. For this purpose a holder is required in which separate electrical contact can be made to each object held in the holder.

In U.S. Patent No. 3,091,452 a holder for a plurality of objects for use in a mass production process is described in which the distances between the adjacent centres of the holding means for the objects in the direction of length of the holder is unit spacing, the sum of the distances between the centres of the end holding means and the adjacent ends of the holder in the direction of length of the holder is also unit spacing, and indexing means are provided on the holder with unit spacing between adjacent indexing positions.

It is an object of the invention to provide a holder which fulfills these requirements.

According to the invention there is provided a holder for a plurality of objects and for use in a mass production process having a plurality of holding units arranged along the length of the holder, each unit comprising a plurality of first apertures extending from one surface of the holder in a direction perpendicular to the longitudinal direction of the holder and adapted each to house an object, and second apertures extending from other surfaces of the body for providing communication for electrical contact with each object separately, the distance between centres of adjacent holding units in the longitudinal direction of the holder being unit spacing and the sum of the distances between the centres of the end holding units and the adjacent ends of the holder in the longitudinal direction of the holder also being unit spacing.

The distances between the centres of the end holding units and the adjacent ends of the holder in the longitudinal direction of the holder may be each one half unit spacing.

Indexing means may be provided on the holder laterally of the position of the holding unit, the distance between adjacent indexing positions being unit spacing.

The longitudinal axes of the first apertures may lie in a common plane parallel to the longitudinal direction of the holder.

Alternatively the longitudinal axes of the first apertures of each holding unit may lie in a plane perpendicular to the longitudinal direction of the holder.

Each first aperture may be in open communication with a second aperture.

Each holding unit may comprise three first apertures lying in a plane perpendicular to the longitudinal direction of the holder, the two first apertures adjacent the sides of the holder each being in open communication with a second aperture and the central first aperture communicating with a second aperture through a groove extending along the longitudinal axis of the holder.

Means may be provided for retaining objects inserted in each holding unit.

Objects inserted into each first aperture may be retained by elastic deformation on further insertion into a second aperture.

Electrically-conductive resilient means may be provided in the groove to retain an object inserted into each central first aperture and to provide communication for electrical contact with the object from the second aperture.

Two embodiments of the invention will now be described by way of example, with reference to the accompanying diagrammatic drawings in which:

FIGURES 1 and 2 are side elevations of a first embodiment,

FIGURE 3 is a plan view of the holder shown in FIGURES 1 and 2,

FIGURE 4 is a cross-section taken along the line IV—IV of FIGURE 1,

FIGURE 5 is a side elevation of a second embodiment,

FIGURE 6 is a cross-section taken along the line VI—VI of FIGURE 5, and

FIGURE 7 is a cross-section taken along the line VII—VII of FIGURE 6.

Referring to FIGURES 1 to 4, the object holder 1 comprises ten adjacent holding units 2 extending in the longitudinal direction of the holder. Each holding unit 2 comprises three first apertures 3 of circular section extending from the upper surface into the body of the holder, the longitudinal axes of the apertures lying in a common plane parallel to the longitudinal direction of the holder, each aperture constituting holding means for an object to be held. The apertures are shown in dotted outline in FIGURE 1 and are omitted from FIGURE 2 for the sake of clarity. Each first aperture 3 comprises a flared upper portion 4 open on one side of the holder (FIGURE 1), which permits insertion of an object, tapering into a cylindrical portion 5 which is in open communication with a second aperture 6 extending from the surface 7 of the holder.

The centres 8 of each holding unit in this embodiment are located on the longitudinal axes of the central apertures of each unit, the distance between adjacent centres in the longitudinal direction of the holder being unit spacing.

The upper surface of the holder is provided with rectangular projections 9 which are located between adjacent holding units 2 and at the ends of the holder. The end projections are flush with the end surfaces of the holder and the dimension of these projections in the longitudinal direction of the holder is one half that of the remaining projections. Hence the centres of the end holding units are separated from the adjacent ends by one half unit spacing.

Indexing means are provided on the side 10 (FIGURE 2) of the holder laterally of the position of each holding unit and are adapted to co-operate with a pawl for moving the holder in steps in its longitudinal direction, the pitch of the indexing means 11 being unit spacing. The indexing means 11 have a triangular horizontal section (FIGURE 3). The lower part of the holder 1 comprises a base portion 12.

On insertion of an object into a first aperture 3, the object may be retained by further insertion when the end

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passes into a second aperture 6, the inclination of the wall 13 of which causes the object to be deformed.

The holder described is intended for use in the manufacture of semi-conductive devices, for example transistors, metal conductors being inserted into the first apertures 3 and held by elastic deformation on further insertion into the second apertures 6, a semi-conductive crystalline body later to be attached to the conductors above the upper surface of the holder. For testing a device held in the holder during manufacture, separate electrical contacts are made to the metal conductors projecting from the second apertures 6.

The holder may be readily cast in a mould and may be made of synthetic plastic material.

Referring to FIGURES 5 to 7, a holder 21 comprises two halves 22 and 23 secured together by screws 24. Ten holding units are provided along the longitudinal direction of the holder, each holding unit comprising three first apertures 26, 27 and 28, the longitudinal axes of which lie in a plane perpendicular to the longitudinal direction of the holder and in which the centre of the holding unit is located. The distance between adjacent centres in the longitudinal direction of the holder is unit spacing and the distance between the centre of an end holding unit and the adjacent end of the holder in the same direction is one-half unit spacing.

The two outer first apertures 26 and 28 have a circular cross-section and communicate with second apertures 29 and 30 respectively which extend over the surfaces 31 and 32 of the holder respectively and are spaced between raised portions 33 on these surfaces. The central first aperture 27 has a circular cross section and comprises two parts 34 and 35 each of semi-circular cross section and located in the halves 22 and 23 respectively. The apertures 27 communicate with a groove 36 which extends throughout the longitudinal axis of the holder and communicates with second apertures 37. The first apertures have flared upper portions 38 in order to facilitate insertion of objects.

Resilient members 39 shown in dotted outline in FIGURE 5 of Phosphor bronze strip are provided in the groove 36, each located directly below a central first aperture and comprising a lower part 40 surrounding an inverted T-shaped brass member 41 and two upper parts 42 which are adapted to locate and retain an object when inserted by way of a central first aperture 27. Electrical contact is made to the object by way of the lower parts 40 of the resilient member 39 from the second apertures 37.

Electrical contact to objects in the first apertures 26 and 27 can be made directly from the second apertures 29 and 30 respectively.

The holder is particularly suitable for use in the manufacture of semi-conductor devices, for example transistors. The first apertures each accommodate a metal conductor, a semi-conductive crystalline body which is attached thereto during a stage of manufacture being located above the upper surface of the holder. Electrical contact, for the purpose of testing a device during a stage, and at the completion of manufacture, is made directly to the conductors inserted into the outer first apertures 26 and 28 and to the conductors inserted in the

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central first apertures by means of a probe placed in a second aperture 37 urged against the member 39.

A channel 43 extends throughout the raised portion 33 on the surface 32 of the holder and can be adapted to accommodate indexing means.

A recess is provided in the base 44 of the holder to permit insertion of the brass members 41 surrounded by the resilient members 39 and is closed by a plate 45 secured to the base by screws 46.

The two halves of the holder may be moulded from synthetic material for example, nylon.

What is claimed is:

1. A holder for a plurality of semi-conductor devices comprising a plurality of holding units, each of said holding units being adapted to hold the conductor wires of the semi-conductor devices, the holder being elongated in a longitudinal direction, the distance between the centers of adjacent holding units being unit spaced and the sum of the distances between the centers of the end holding units and the adjacent ends of the holder in the longitudinal direction of the holder being unit spaced, each of said holding units having a plurality of first apertures extending from one surface thereof perpendicular to the longitudinal axis of said holder, a plurality of second apertures extending from another surface of said holder, the ends of said conducting wires protruding out of said second apertures after said conducting wires are inserted in said first apertures whereby the conductive wires are accessible for electrical testing of each of said semi-conductor devices.

2. A holder for a plurality of semi-conductor devices comprising a plurality of holding units, each of said holding units being adapted to hold the conductor wires of the semi-conductor devices, the holder being elongated in a longitudinal direction, the distance between the centers of adjacent holding units being unit spaced and the sum of the distances between the centers of the end holding units and the adjacent ends of the holder in the longitudinal direction of the holder being unit spaced, each of said holding units having a plurality of first apertures extending from one surface thereof perpendicular to the longitudinal axis of said holder, a plurality of second apertures extending from another surface of said holder and in communication with each of the corresponding first apertures, said conducting wires being inserted through said first apertures and into said second apertures whereby the ends thereof are accessible for electrical testing, and said second apertures being so constructed that said wires inserted therein are resiliently bent and held in that condition.

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THOMAS J. HICKEY, *Examiner*.

**UNITED STATES PATENT OFFICE**  
**CERTIFICATE OF CORRECTION**

Patent No. 3,220,722

November 30, 1965

Raymond Clarence Chance Wadey

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 4, lines 15 and 33, for "conductor", each occurrence, read -- conductive --.

Signed and sealed this 25th day of October 1966.

(SEAL)

Attest:

**ERNEST W. SWIDER**

Attesting Officer

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Commissioner of Patents