April 2, 1968 H. S. BEST ETAL 3,375,834

ARTICLE HANDLING AND CLEANING APPARATUS

Filed March 19, 1965

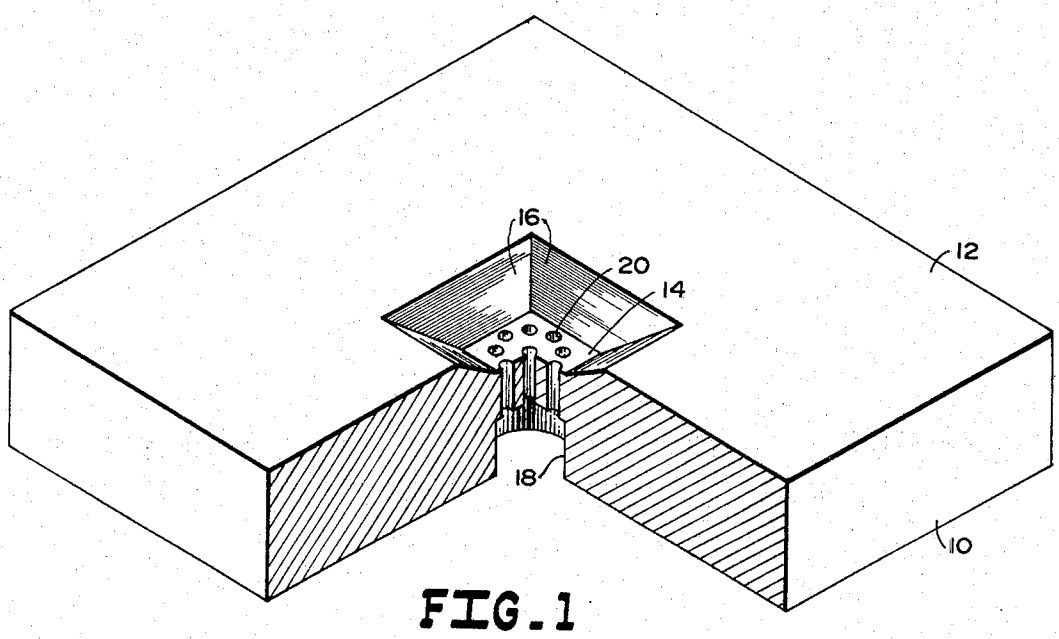



FIG. 1

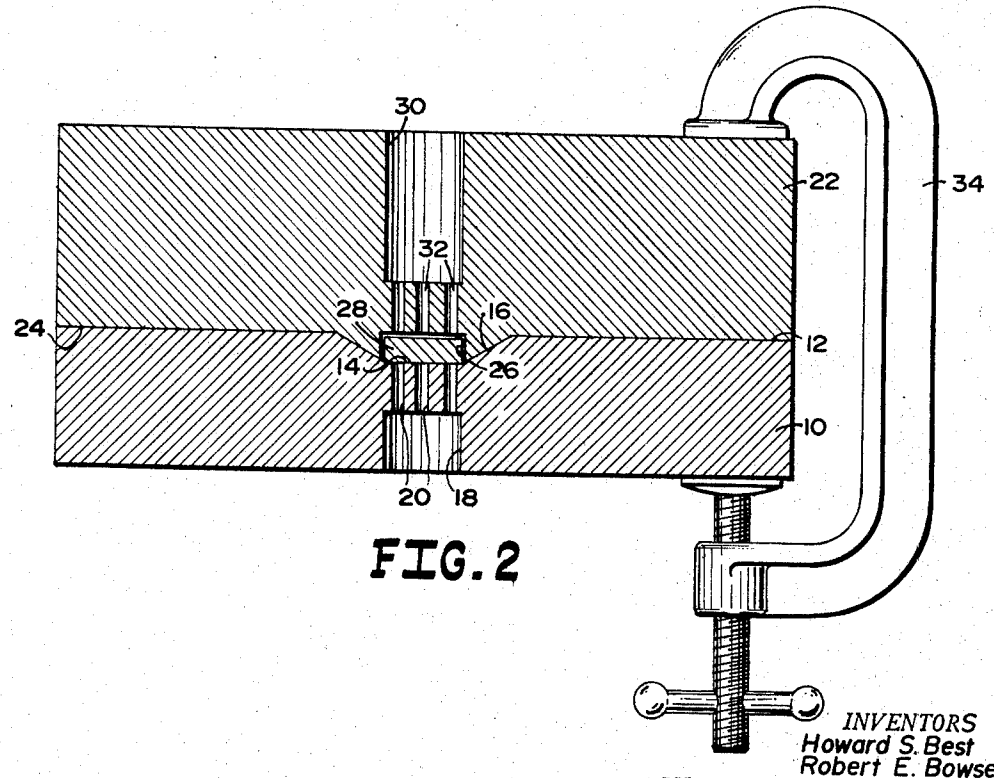



FIG. 2

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United States Patent Office 3,375,834 Patented Apr. 2, 1968



3,375,834

# ARTICLE HANDLING AND CLEANING APPARATUS

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Filed Mar. 19, 1965, Ser. No. 441,277
5 Claims. (Cl. 134—94)

This invention relates to an article handling and cleaning apparatus and more particularly to a tray for handling and cleaning semiconductor devices, but is in no way limited thereto.

This invention applies to small articles generally, but for the purposes of simplicity it will be described in connection with transistor chips.

It is an object of this invention to provide a tray for handling and cleaning semiconductor devices whereby a device may be cleaned and turned over without loss of device orientation or position reference.

Broadly, according to this invention an apparatus for handling articles comprises first and second blocks. The first block has an article receiving cavity in one surface, a first opening in the surface opposite said one surface in register with said cavity, and at least one aperture connecting said cavity and said first opening. The article receiving cavity defining walls are sloped towards the bottom surface thereof. The bottom surface is of a size and shape to accommodate said article. The second block has a surface to mate with said one surface of the first block and has in said mating surface a second cavity, the defining walls of which are adapted to closely surround a portion of said article. The second block also has a second opening in the surface opposite said mating surface in register with said second cavity, and has at least one aperture connecting said second cavity and said second opening. When the first and second blocks are assembled, the article receiving cavity opposes the second cavity to form a chamber to accommodate said article therewithin.

Additional objects, features, and advantages of the present invention will become apparent to those skilled in the art from the following detailed description and the attached drawing on which, by way of example, only the preferred embodiment of this invention is illustrated.

FIGURE 1 is an oblique sectional view of the article receiving portion of the apparatus of this invention.

FIGURE 2 is a cross sectional view of the apparatus of this invention.

Referring to FIGURE 1, the lower or article receiving block **10** is illustrated. In surface **12** of block **10** an article receiving cavity **14** is formed having sloped cavity defining walls **16**. Walls **16** are sloped towards the bottom surface of cavity **14**. An opening **18** is formed in the surface opposite surface **12** in register with cavity **14**. A plurality of apertures **20** connect cavity **14** and opening **18**.

Referring now to FIGURE 2, cover block **22** is shown assembled with block **10**. Cover block **22** has surface **24** to mate with surface **12** of block **10**. Surface **24** has cavity **26** formed therein of a size and shape to closely surround a portion of article **28**. When blocks **10** and **22** are assembled cavity **14** opposes cavity **26** to accommodate article **28** therewithin. An opening **30** is formed in the surface opposite surface **24** in register with cavity **26**. A plurality of apertures **32** connect cavity **26** and opening **30**. Blocks **10** and **22** are maintained in the described mating relationship by any means well known in the art, such for example, as clamp **34**.

When the described apparatus is utilized for handling and cleaning transistor chips, cavity **26** is formed having a clearance around the transistor chip. The preferred clearance is of about 0.003 to 0.004 inch.



In operation a transistor chip may be placed in the article receiving cavity of the first lower block and oriented in a desired position. To maintain the chip in this position, vacuum may be applied to the opening opposite said cavity. The cover block is then placed in mating relationship with the first block and the two blocks are clamped together.

When it is desired to cleanse the transistor chip the vacuum is disconnected and a suitable source of cleaning solution, such for example as acetone, xylene, or the like, is connected to the outer opening of one block. Such cleaning solution passes around the transistor chip and flows out through the outer opening in the opposing block. The outer opening in said opposing block may be connected to a suitable collection means for recirculation or salvage of the solution. Thereafter, air, nitrogen or some other drying medium may be flowed in the same manner as the cleaning solution to dry the chip.

Vacuum may be applied again to maintain the chip in place when the apparatus is further handled or when the cover block is removed. Additional operations may be performed upon the transistor chip when the cover block is removed and vacuum is applied.

It is readily seen by one familiar with the art that, when desired, the vacuum holding, cleaning, and drying operations may also be performed in reverse by making suitable connections to the cover block. Likewise, the transistor chip may be held by vacuum in one block while some operations are performed and then held by vacuum in the other block for further operations. When the blocks are mated between such operations and the vacuum changed from one block to another, the chip may be thusly turned over without loss or orientation or position reference.

Although the present invention has been described with respect to specific details of certain embodiments thereof, it is not intended that such details be limitations upon the scope of the invention except insofar as set forth in the following claims.

We claim:

1. An apparatus for handling articles comprising a first block having an article receiving cavity in one surface thereof, a first opening in the surface opposite said one surface in register with said cavity, and at least one aperture connecting said article receiving cavity and said first opening, the article receiving cavity defining walls being sloped towards the bottom surface of said cavity, said bottom surface having a size and shape corresponding to that of said article to accommodate said article thereon, and a second block having a mating surface to said one surface, said mating surface having a second cavity the defining walls of which are adapted to closely surround said article, a second opening in the surface opposite said mating surface in register with said second cavity, and at least one aperture connecting said second cavity and said second opening, said article receiving cavity opposing said second cavity to closely accommodate said article therewithin while maintaining a small clearance thereabout when said first and second blocks are assembled whereby said article orientation and position reference is maintained.

2. An apparatus for handling articles comprising a first block having an article receiving cavity in one surface thereof, the article receiving cavity defining walls being sloped towards the bottom surface of said cavity, said bottom surface having a size and shape corresponding to that of said article to accommodate said article thereon, a second block having a mating surface to said one surface, said mating surface having a second cavity the defining walls of which are adapted to closely surround said

article, said article receiving cavity opposing said second cavity to closely accommodate said article therebetween while maintaining a small clearance thereabout when said first and second blocks are assembled whereby said article orientation and position reference is maintained, and means for flowing a fluid medium to and from said opposing cavities.

3. An apparatus for handling articles comprising a first block having an article receiving cavity in one surface thereof, the bottom surface of said cavity having a size and shape corresponding to that of said article to accommodate said article thereon, a second block having a mating surface to said one surface, said mating surface having a second cavity the defining walls of which are adapted to closely surround said article, said article receiving cavity opposing said second cavity to closely accommodate said article therebetween while maintaining a small clearance thereabout when said first and second blocks are assembled whereby said article orientation and position reference is maintained, and means for flowing a fluid medium to and from said opposing cavities.

4. An apparatus for cleaning and handling transistor chips comprising a first block having a transistor chip receiving cavity in one surface thereof, said cavity defining walls being sloped towards the bottom surface of said cavity, said bottom surface having a size and shape corresponding to that of said transistor chip to accommodate such chip thereon, a second block having a mating surface to said one surface, said mating surface having a second cavity the defining walls of which are adapted to closely surround said transistor chip, said chip receiving cavity opposing said second cavity to closely accommodate said chip therebetween while maintaining a small clearance thereabout when said first and second blocks are assembled whereby said chip orientation and position reference is maintained, and means for flowing a fluid medium to and from said opposing cavities whereby said transistor chip may be cleansed.



5. The apparatus of claim 4 wherein said clearance is about 0.004 inch.


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