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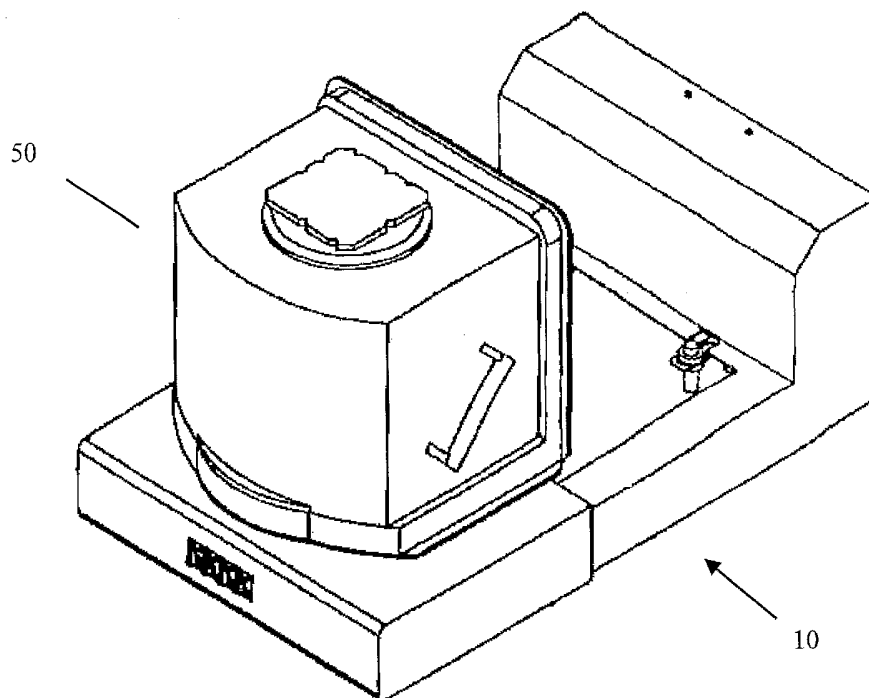
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(54) Title: SUPPORTING SHELF FOR FRONT OPENING UNIFIED POD



(57) Abstract: A shelf and a method for a Front Opening Unified Pod (FOUP) wafer container, the shelf can host plurality of Front Opening Unified Pod for large diameter wafers such as 300 mm wafer. The shelf provides for a quick load and unload of a Front Opening Unified Pod and control over ambient conditions inside the pod.

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## **SUPPORTING SHELF FOR FRONT OPENING UNIFIED POD**

### **BACKGROUND OF THE INVENTION**

[001] Silicon wafers in the electronic chip industry typically need to be kept in specific environmental conditions. The move of the industry to large scale wafers such as 300 mm wafers created new demand and needs in this field.

### **BRIEF DESCRIPTION OF THE DRAWINGS**

[002] The subject matter regarded as the invention is particularly pointed out and distinctly claimed in the concluding portion of the specification. The invention, however, both as to organization and method of operation, together with objects, features and advantages thereof, may best be understood by reference to the following detailed description when read with the accompanied drawings in which:

[003] FIG. 1 is a simplified three dimension illustration of a supporting shelf according to some embodiments of the present invention;

[004] FIGS. 2 and 3 are schematic three dimensional illustration of a supporting shelf with wafers container according to some embodiments of the present invention;

[005] FIG. 4 is a schematic illustration of a valve in a supporting shelf according to some embodiments of the present invention;

[006] Fig. 5 is a schematic partial side view of a supporting self and a wafer container according some embodiments of the present invention; and

[007] Figs. 6A-6C are schematic illustration of a rack of supporting shelves according to some embodiments of the present invention.

[008] It will be appreciated that for simplicity and clarity of illustration, elements shown in the figures have not necessarily been drawn to scale. For example, the dimensions of some of the elements may be exaggerated relative to other elements for clarity. Further, where considered appropriate, reference numerals may be repeated among the figures to indicate corresponding or analogous elements.

## DETAILED DESCRIPTION OF THE INVENTION

- [0009] In the following detailed description, numerous specific details are set forth in order to provide a thorough understanding of the invention. However it will be understood by those of ordinary skill in the art that the present invention may be practiced without these specific details. In other instances, well-known methods, procedures, components and circuits have not been described in detail so as not to obscure the present invention.
- [0010] It should be understood that the present invention may be used in a variety of applications. Although the present invention is not limited in this respect, the apparatus disclosed herein may be used in many systems such as in the individual installation wall mounted intended to be included within the scope of the present invention include, by way of example only, free standing or in a stocking unit manual or robotic. and the like.
- [0011] A supporting shelf for wafer containers (hereinafter "supporting shelf") is presented, capable of hosting large scale wafers container and of controllably providing said large scale wafers container with ambient controlling material, such as nitrogen.
- [0012] Reference is made now to Fig. 1, which is a simplified three dimension illustration of a supporting shelf system 10 according to some embodiments of the present invention. Supporting shelf 10 may comprise a fixed part 14 and a extending part 12, slidably connected to each other. Extending part 12 may extend to an extended position (as presented in Fig. 1) and may retract to a stowed position. Supporting shelf 10 may further comprise proximity switch 16. Extending part 12 may comprise docking pins 18, ambient controlling material valve 20 and user interface panel 22. Docking pins 18 may be positioned so as to fit into corresponding docking cavities in a wafer container (not shown). Ambient controlling material valves 20 may be positioned so as to fit to ambient controlling material inlet / outlet holes in a wafer container, when it is positioned onto docking pins 18. Ambient controlling material valves 20 may be connected to an ambient controlling material supply system (not shown).
- [0013] Supporting shelf 10 may have at least two basic working positions. The first position, namely when extending part 12 is in its stowed position, may be used for ambient control in a wafer container. The second position, namely when extending

part 12 is extended, may be used for service of wafer container. The presence of supporting shelf 10 in its stowed position may be detected by proximity switch 16.

[0014] Reference is made now also to Figs. 2 and 3, which are schematic three dimensional illustration of a supporting shelf 10 with wafer container 50 according to some embodiments of the present invention. Fig. 2 is a schematic illustration of supporting shelf 10 and wafer container 50 in an extended position. Wafer container 50 is called sometimes Front Opening Unified Pod (FOUP). Fig. 3 is a schematic illustration of supporting shelf 10 and wafer container 50 in stowed position. Wafer container 50 may be removed or placed on supporting shelf 10 when supporting shelf 10 is either in stowed position or in extended position. When supporting shelf is in its extended position wafer container 50 may more easily be removed from it or placed on it and this may be helpful when the placement or removal of wafer container 50 is done by a robotic handler. Placement of wafer container 50 on supporting shelf 10 so that docking pins 18 fit into their corresponding holes in wafer container 50 may position the bottom of wafer container 50 substantially parallel to the upper face of extending part 12. Additionally, in this situation the bottom of wafer container 50 may firmly press the upper end of ambient controlling material valves 20. In case extending of extending part 12 is needed for the removal or placement of wafer container 50, once removal or placement of a wafer container has completed, extending part 12 may be retracted to its stowed position.

[0015] When extending part 12 is in its stowed position, ambient conditions such as temperature and humidity may be controlled by means of circulation of ambient controlling material, such as nitrogen, through wafer container 50. In order to prevent untimely circulation of the ambient controlling material when extending part 12 is not fully stowed, a readout from proximity switch 16 may be used by a control system (not shown).

[0016] Reference is made now also to Fig. 4, which is a schematic illustration of an ambient controlling material valve 20 and to Fig. 5 which is a schematic partial side view of a supporting shelf 10 and a wafer container 50 according to some embodiments of the present invention. Valve 20 may comprise a main body 62, a contact seal 64 and an activation trigger 66. Supporting shelf 10 may comprise at least one valve 20, which may be installed so that its upper end slightly protrudes from the upper face of extending part 12 (Fig. 1). When wafer container 50 is placed onto supporting shelf

10 (Fig. 5) so that docking pins 18 properly enter their corresponding docking cavities in wafer container 50, ambient control material inlets in wafer container 50 are fitly placed on contact seals 64 and depress activation triggers 66. The depression of activation trigger 66 may enable flow of ambient control material, such as nitrogen into or from wafer container 50, while contact seal 64 prevent that material from leaking outside of supporting shelf 10.

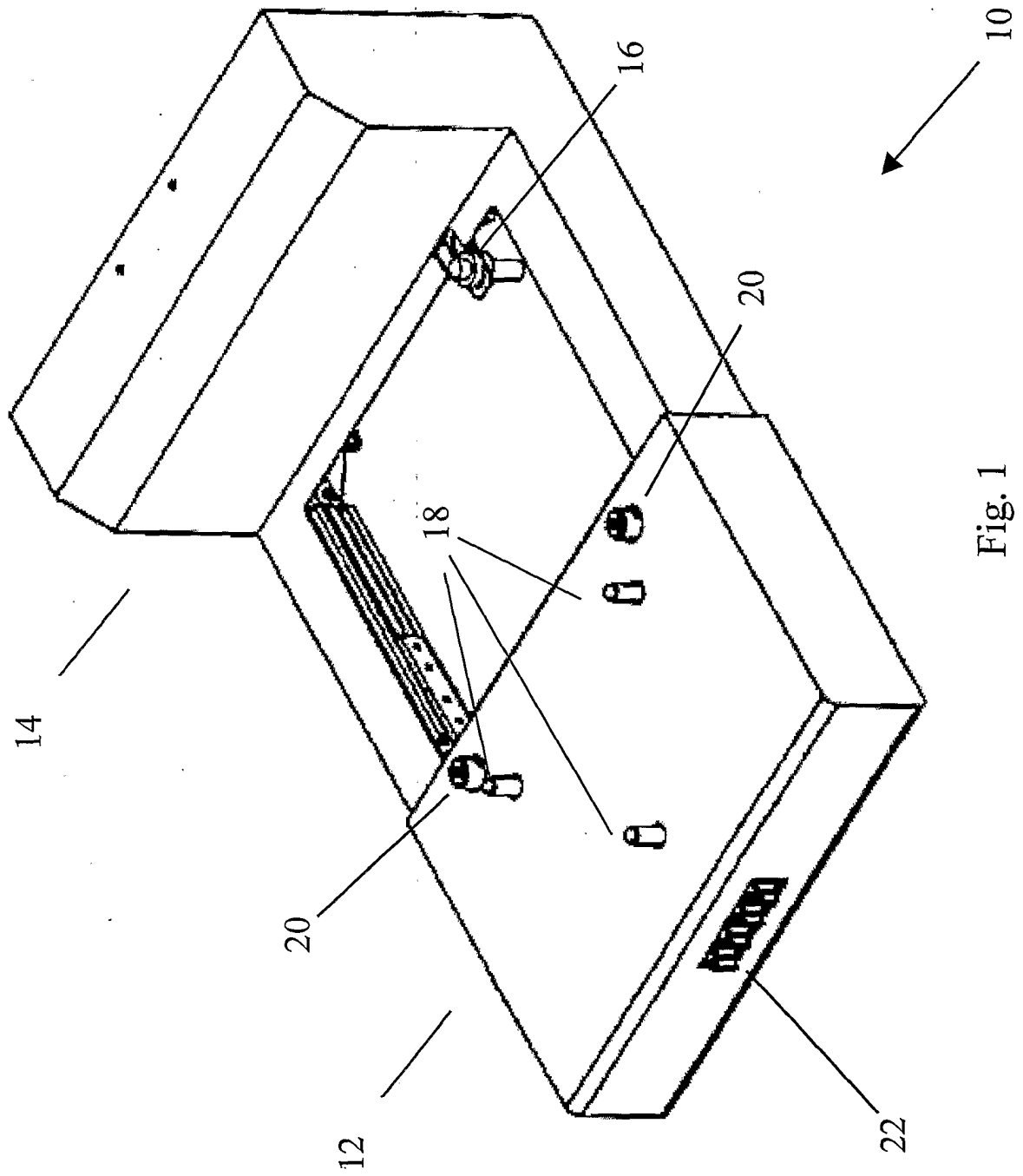
[0017] Supporting shelf 10 may be in active connection with a control system (not shown) that may control the ambient parameters inside wafer container 50 (such as temperature, humidity, etc.) by means of control of the flow of ambient control material into / from wafer container 50. A user may control the operation of such control system via user interface panel 22 (Fig. 1) which may comprise indicators (such as operation indicators, humidity / temperature gauges, etc.) and input means (such as keyboard, switches, etc.). When supporting shelf 10 is in its extended position proximity switch 16 may indicate to the control system of the situation and thus prevent connection of ambient controlling material to valve 20, and vice versa.

[0018] Reference is made now to Figs. 6A, 6B and 6C, which are schematic illustrations of a rack 80 of supporting shelves 10 according to some embodiments of the present invention. Fig. 6A illustrates a rack 80 where all its supporting selves are in stowed position. Fig. 6B illustrates a rack 80 where one of its supporting selves is in extended position. Fig. 6C illustrates a rack 80 where one of its supporting selves is in extended position and its wafer container 50 is slightly departed from said supporting shelf 10. Pulling supporting shelf 10 to its extended position may allow pulling container 50 from supporting shelf 10 or placing wafer container 50 to its place. Once handling of container 50 is completed, supporting shelf 10 may be placed back to its stowed position and operation of control system for that supporting shelf may be resumed.

[0019] While certain features of the present invention have been illustrated and described herein, many modifications, substitutions, changes, and equivalents will now occur to those of ordinary skill in the art. It is, therefore, to be understood that the appended claims are intended to cover all such modifications and changes as fall within the true spirit of the invention.

[0020] What is claimed:

1. An ambient control system comprising:
  - an extendible shelf;
  - at least one docking pin; and
  - at least one support valve.
2. An ambient control method comprising:
  - providing ambient control material to a container;
  - monitoring the humidity of said ambient control material when it leaves said container; and
  - changing the rate of flow of said ambient control material so as to match said monitored humidity to a pre-selected value.



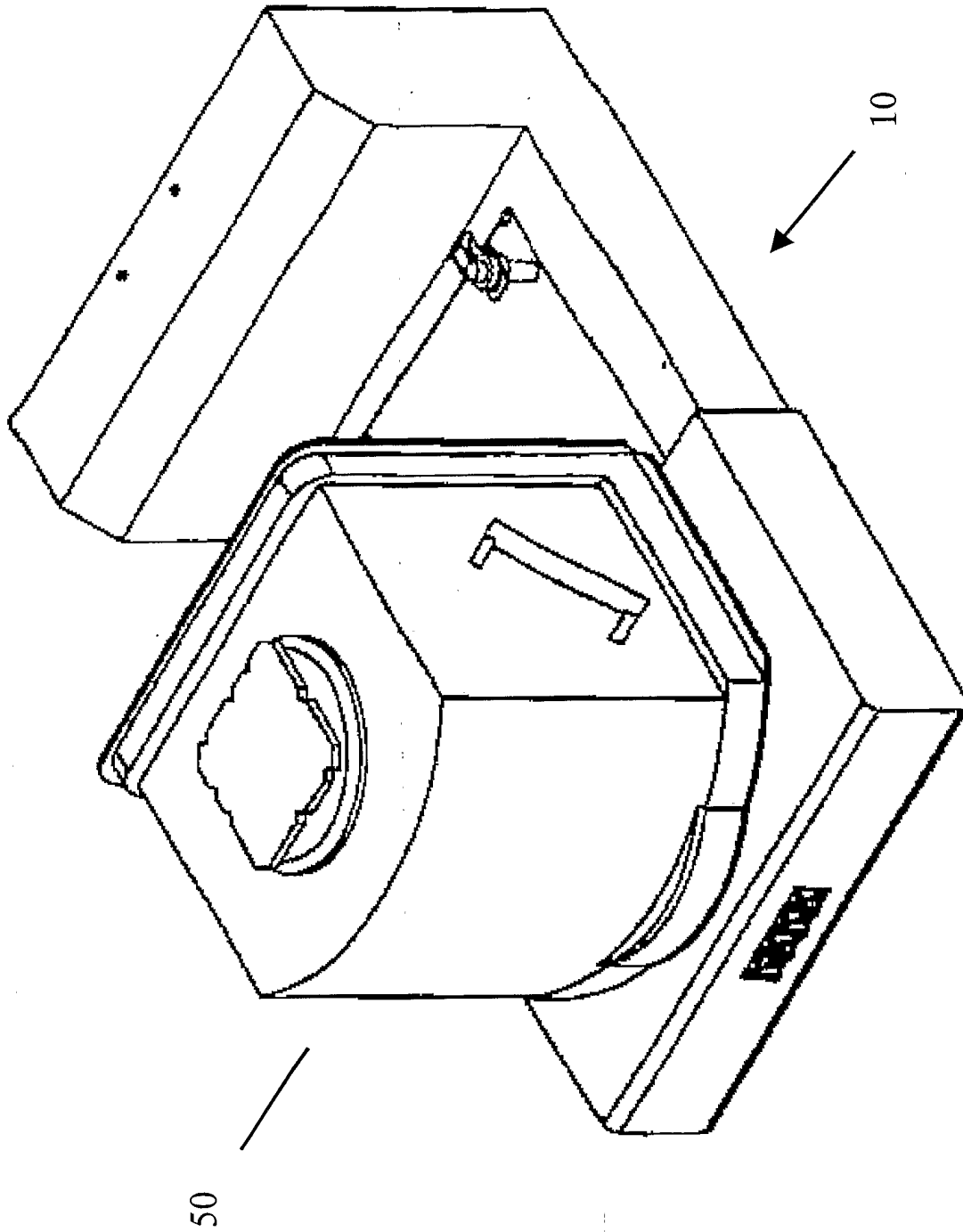


Fig. 2

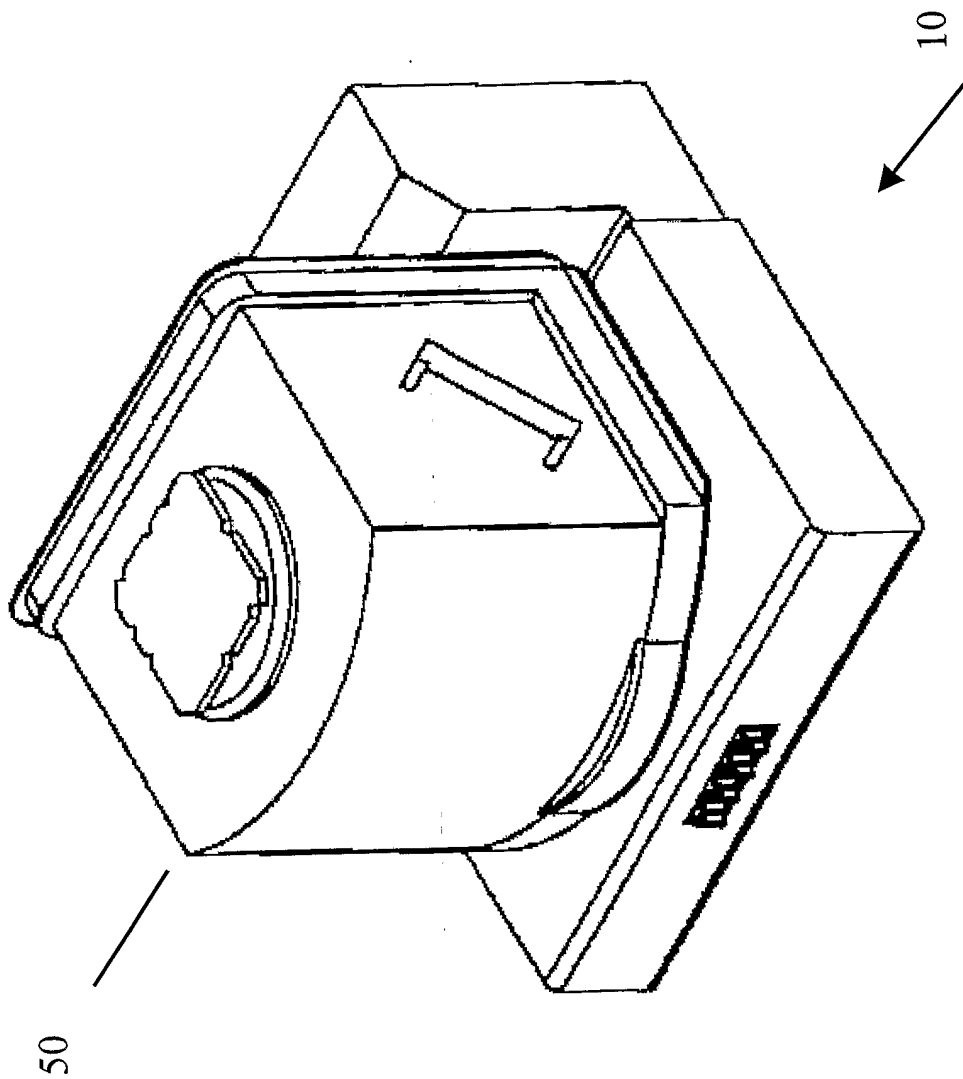


Fig. 3

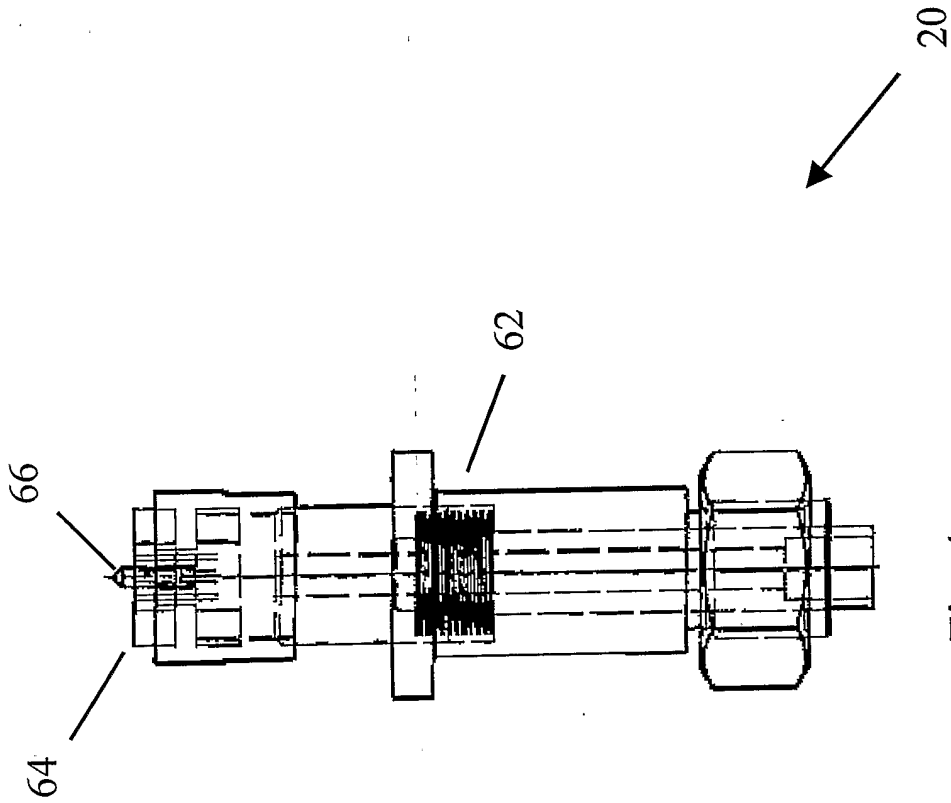


Fig. 4

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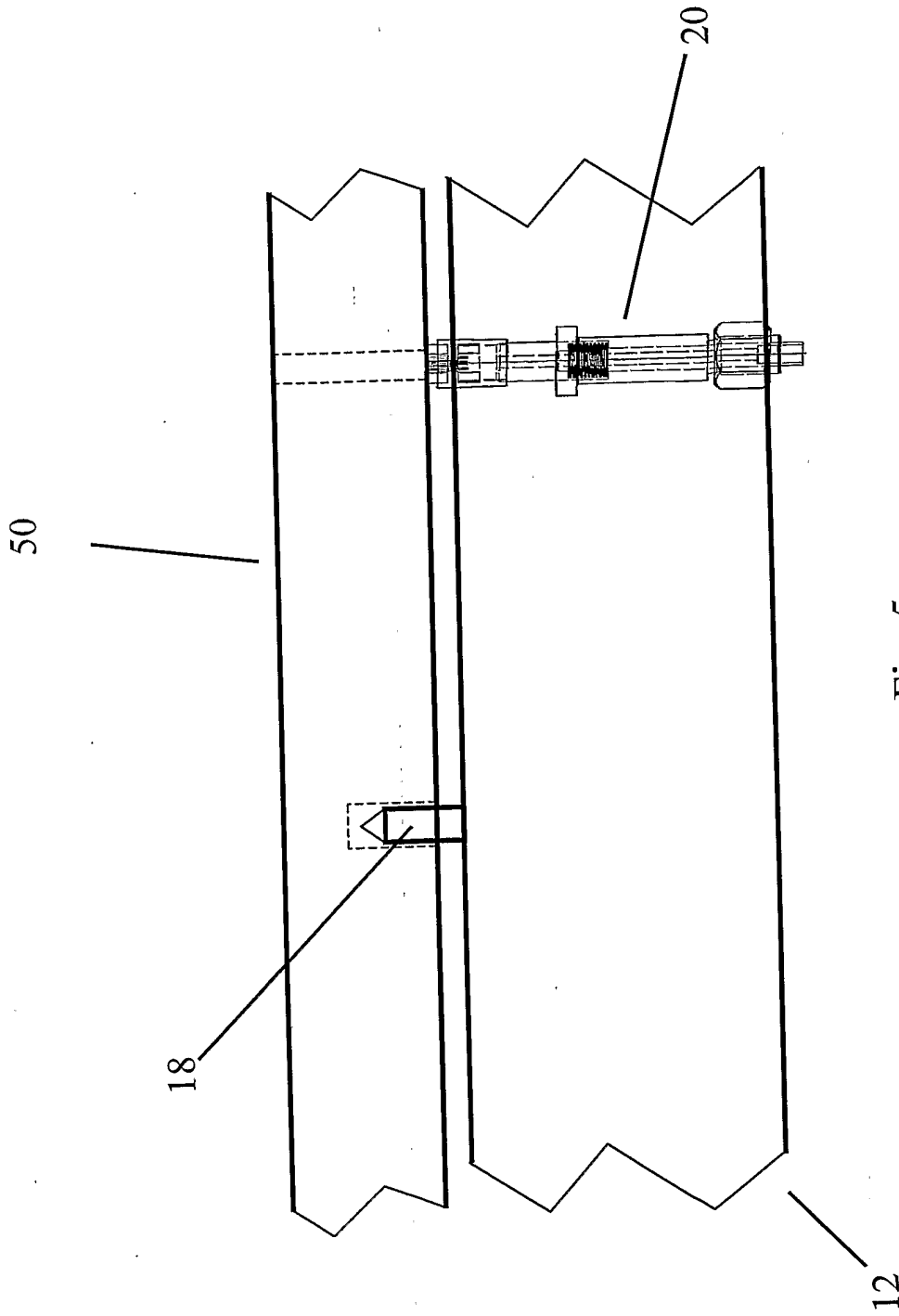


Fig. 5

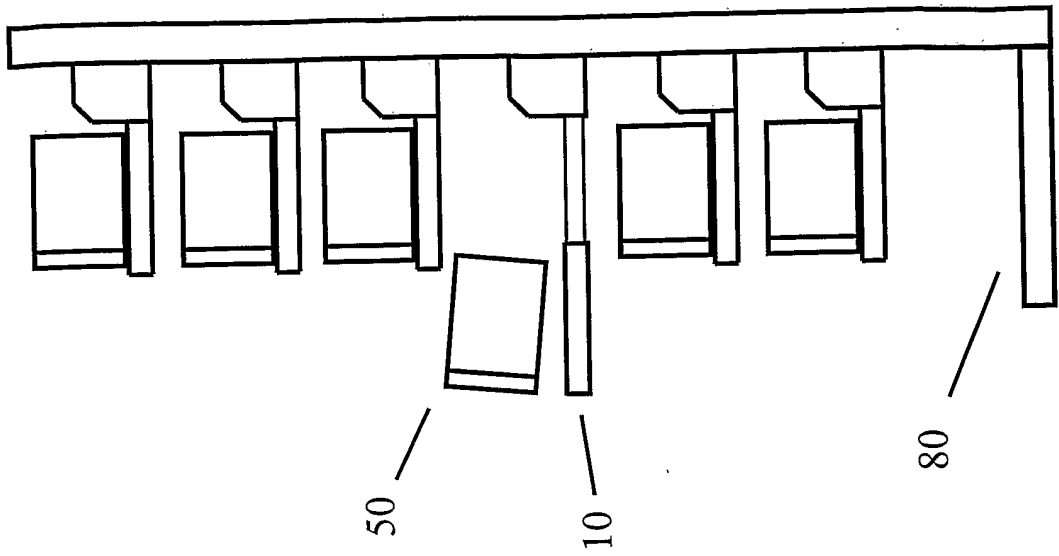


Fig. 6C

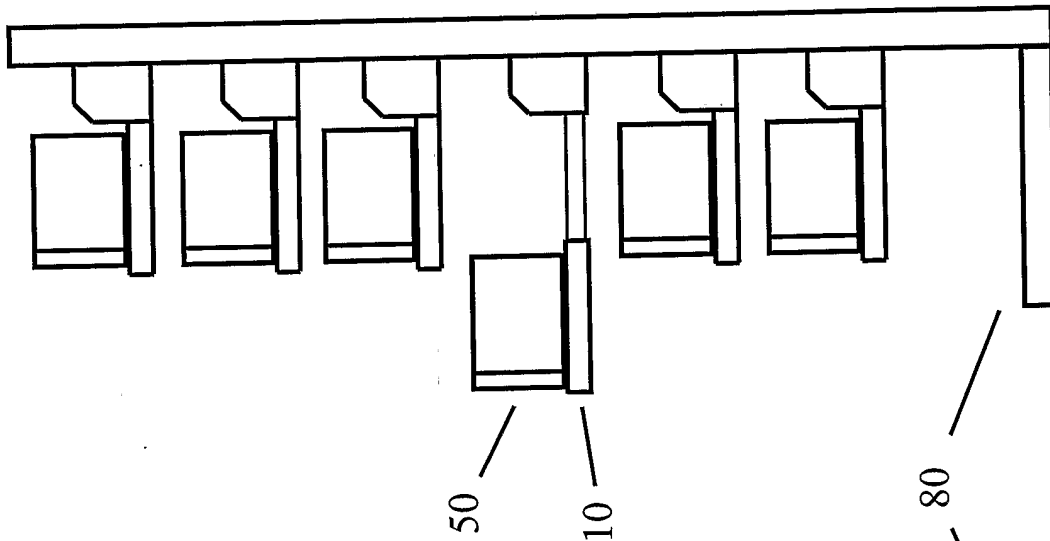


Fig. 6B

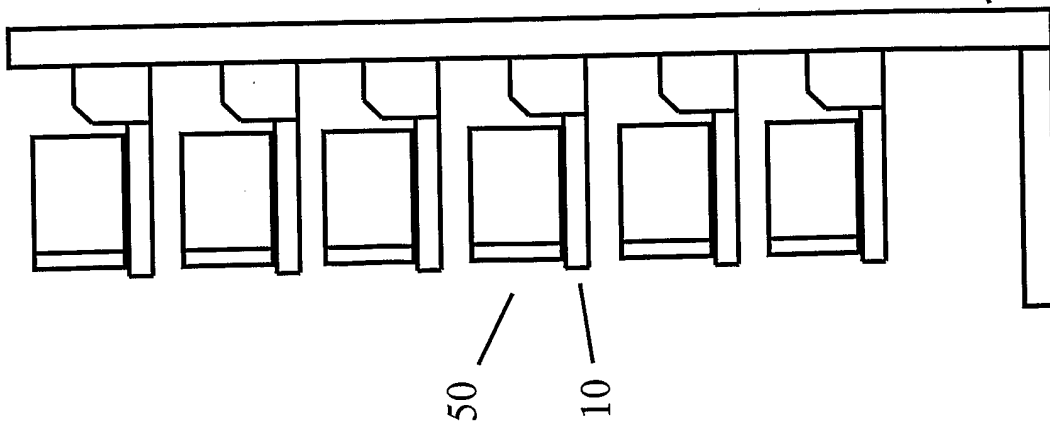


Fig. 6A