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WORK TABLES

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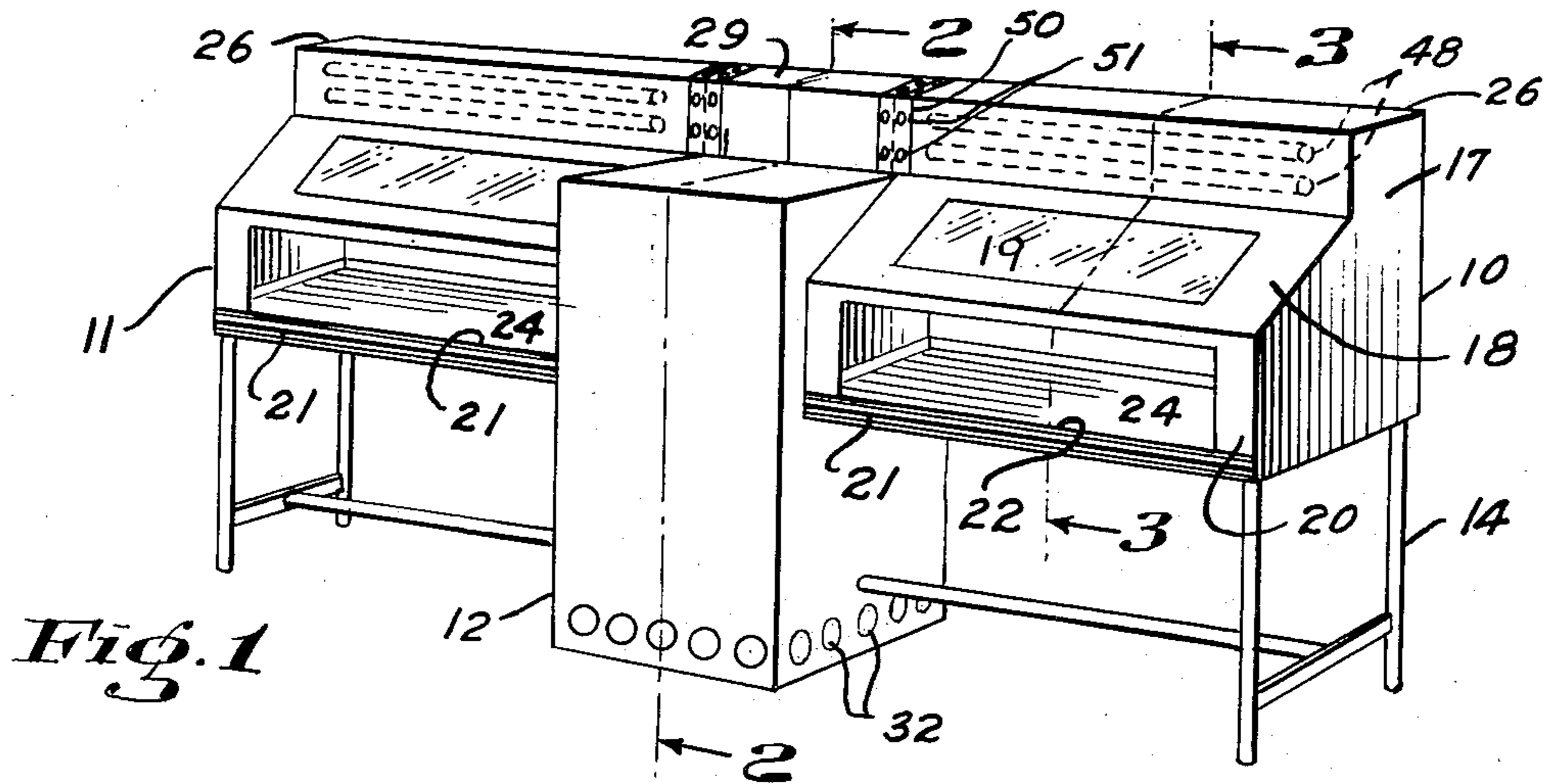


Fig. 1

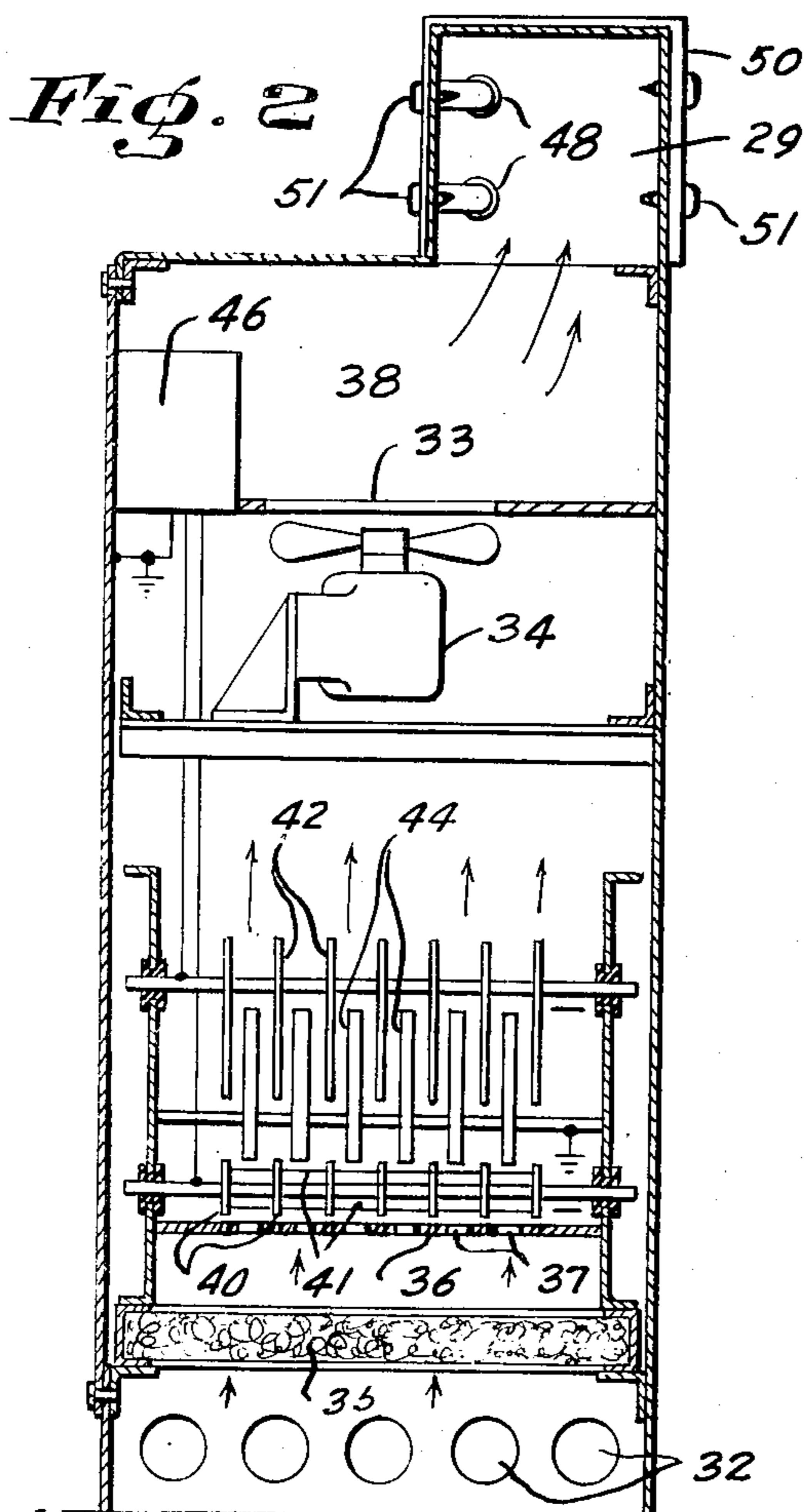


Fig. 2

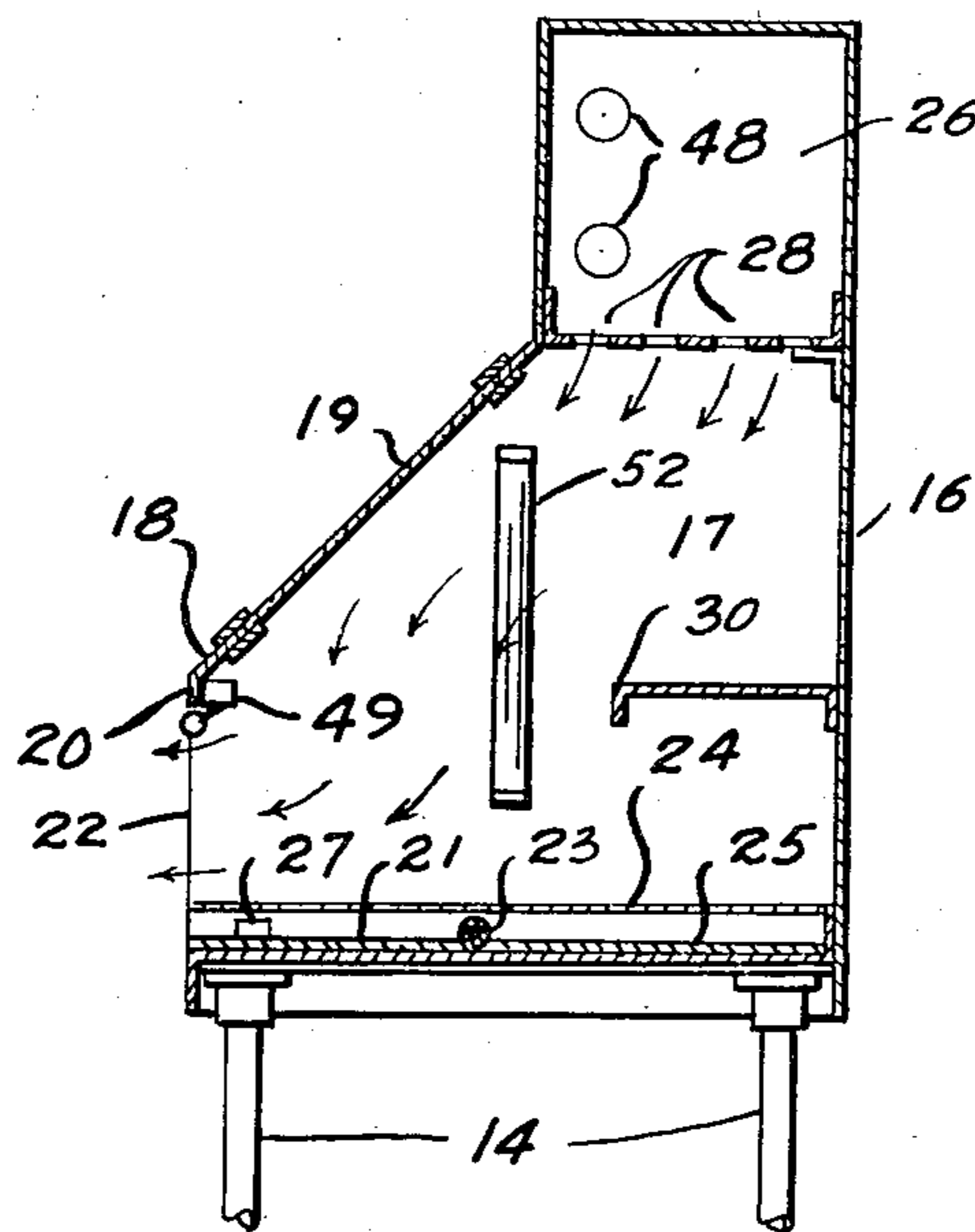


Fig. 3

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2,709,954

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This invention relates to work tables and more particularly to a contamination free work table especially adapted for the handling of delicate or sterile materials.

Many types of materials cannot be handled by conventional methods without contaminating or damaging them, and, as a result, elaborate techniques have been devised in order to minimize such damage. For example, special tools are commonly used in order to avoid the necessity of touching the material to be handled and such tools themselves are cleaned and otherwise maintained in a manner to prevent their contaminating the material.

Another and more serious source of contamination arises from atmospheric air. However, since materials frequently must be exposed to the atmosphere in order to pack them or assemble them with other elements it has been thought that a certain amount of contamination by atmospheric air was to some extent unavoidable, since the complicated apparatus necessary to handle materials within conventional enclosed sterilized compartments made their use impractical in most instances. For example, in the use of so-called micro ball bearings, in which the completed bearing is frequently of the order of but  $\frac{1}{8}$  of an inch, it is essential to keep small particles of dust out of the bearing elements to avoid damaging them. Since it is necessary, as a practical matter, to expose the bearing to the air in order to assemble it with other machine elements there is danger that dust particles may be carried into the bearing and so damage it that it must be replaced. Although this situation has been accepted for a number of years, the necessity of convenient handling of the bearings outweighed the loss from damaged bearings and such loss was considered a necessary evil.

Similarly, in the packing of pharmaceuticals in ampules it has been found essential to carry out the operation in enclosed compartments by automatic machinery if the essential sterility is to be maintained. However, such an operation adds greatly to the expense of packing such ampules particularly when relatively small quantities are to be handled.

Accordingly, it is an object of the present invention to provide a contamination free work table in which the materials are readily handled while maintaining them under contamination free conditions.

It is a particular feature of my invention that the work table so provided is simple and effective and requires no complicated mechanism for handling the materials.

For the purpose of more fully explaining a preferred embodiment of my invention, reference is made to the following drawings in which:

Fig. 1 is an isometric view of the contamination free work table of my invention;

Fig. 2 is a vertical cross sectional view taken on the line 2—2 of Fig. 1;

Fig. 3 is a vertical cross sectional view taken on the line 3—3 of Fig. 1.

The work table of my invention includes one or more

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work compartments 10 and 11, and a ventilation compartment 12 therebetween, such compartments being separate units as hereinafter more fully explained. The work compartments are supported at one end on suitable legs 14 and at the other end by ventilation compartment 12. The work compartments have a generally vertical rear wall 16 and a front wall having a sloping upper portion 18 and a generally vertical lower portion 20 as well as suitable ends 17, one of which may be formed by the side of the ventilation compartment 12. Preferably, the front wall upper portion 18 has a transparent panel 19 therein and ends 17 are provided with lights 52 arranged to provide additional illumination to bottom surface 24.

The lower portion 20 of said front wall has an access opening 22 extending substantially along the entire length of the work compartment which is thus completely enclosed except for said access opening. Beneath the bottom 24 of the work compartment is provided a sliding door structure having a door portion 21 hinged by a suitable hinge 23 to a sliding door support member 25. Thus, when the work table is not in use, access opening 22 may be closed by sliding said door structure forward and covering said access opening with door portion 21, a suitable friction catch 27 being provided to releasably maintain said door 21 in closed position.

In order to maintain the work compartment and its work surface 24 in uncontaminated condition, I supply a flow of air outwardly entirely throughout access opening 22, such air having been suitably decontaminated in accordance with the particular service to which the work table is to be put. Such decontamination includes air treatment means for filtering the air, precipitating fine dust therefrom, and additional means, if necessary, for sterilizing it as hereinafter explained.

In order to provide a suitable uniform continuous flow of air outwardly entirely throughout access opening 22, I provide a duct 26 disposed preferably along the upper surface of the work compartment 10, said duct having, in its lower surface, openings 28 communicating with the interior of said compartment. A baffle 30 comprising a shelf mounted in generally horizontal position on the rear wall 16 of said work compartment is arranged to cooperate with the sloping front wall portion 18 to direct air smoothly outwardly throughout the entire extent of access opening 22.

The air treatment means for filtering air and supplying such filtered air to the work compartments is provided in ventilation compartment 12, such compartment having a plurality of openings 32 around the bottom portion thereof. A blower 34 is mounted therein to force air from said openings 32 through port 33 to plenum chamber 38 communicating with ventilator compartment duct 29 extending along the top of said compartment, said air passing through filter elements between said opening 32 and said blower. Said filter elements comprise a mechanical filter element 35 consisting of a layer of fiber glass which is effective to remove relatively large dust particles from the air passing through it, and an electrical dust precipitator for removing small dust particles.

The electrical dust precipitator includes a series of oppositely charged plates adapted to remove fine dust particles electrostatically. Such precipitator operates by a high voltage on ionizer wires 41 mounted on supports 40 to charge the dust particles and a second high voltage to a first group dust collector plates 42, the second group of dust collector plates 44 being grounded as is one side of the high voltage power unit 46 which supplies said voltages. A diffusing element comprising a flat plate 36 with perforations 37 therein arranged to insure that air goes evenly through the dust precipitator is preferably provided between fiber glass filter 35 and the precipitator.

Such electrical dust precipitators are well known and need not herein be further described.

The filtered and dust-free air thus passes from filtering compartment 12 to the plenum chamber 38, and then into duct 29 overlying said compartment. From the ventilation compartment duct 29 it passes into work compartment ducts 26 adjoining said duct 29 and finally through openings 28 into the work compartments 10 and 11, at a pressure greater than atmospheric pressure, so as to flow outwardly through access openings 22 therein.

In order to provide sterilized as well as dust free air to said work compartments, suitable irradiation means such as ultra-violet lights 48 may be provided, for example, in duct 26, such means being effective to kill air borne bacteria before it reaches work compartments 10 and 11 to provide a sterile as well as a dust free work table. The various decontaminating means and the illuminating means 52 may be connected with a switch 49, such switch preferably being mounted above access opening 22 in position to be actuated by door 21 so that said means will be started as soon as said door is opened to prevent contamination of the work compartment.

In order to provide flexible unit construction, I prefer to construct the work compartments separate from the ventilating compartment. For example, in Fig. 1, two work compartments are provided with a single ventilating compartment. The work compartment duct 26 is terminated at the end of said work compartment adjacent ventilating compartment duct 29, a plate 50, gasketing material and suitable sheet metal screws 51 being provided for attaching said work compartment duct 26 to ventilating compartment duct 29. A similar arrangement is provided to connect the opposite work compartment 11 to said ventilating compartment. Thus either one or more work compartments may be used with a single ventilating compartment and the attaching plates 50 may be quickly and easily removed to release one from the other. If desired for convenience in installation, one or more work compartments may be arranged on either side of the ventilating compartment. For example, a single ventilating compartment can supply four work spaces on the left or four on the right or one and three or two and two. A suitable plate, not shown, may be placed in the unused end of ventilating compartment duct 29.

To use my novel work table, an operator seated in front of said work table reaches through access opening 22 in order to handle the materials therein by suitable tools. While the necessary handling is being performed the operator's hands and arms together with the materials to be handled will continually be bathed in decontaminated air, which air is then moved outwardly through access opening 22 forming an air shield to prevent contamination by matter either picked up from the operator or from the normal atmospheric air outside of the work compartment.

Thus it will be seen that I have provided a novel contamination free work table which at the same time permits convenient and direct handling of materials therein. Various changes within the spirit of my invention and the scope of the appended claims will be apparent to those skilled in the art.

I claim:

1. A dust free work table comprising an enclosed work compartment having a bottom providing a work surface and an access opening in said compartment adjacent said work surface for access thereto, means for removing dust from atmospheric air, duct means communicating with said dust removing means and said table for receiving dust free air from said dust removing means and supplying the dust free air to said table, and means for flowing air through said dust removing means and providing a flow of dust free air through said duct means and into said enclosed work compartment at a pressure greater than atmospheric pressure, and means for directing the dust free air outwardly entirely throughout said access opening to form an air shield entirely across said access opening to prevent movement of atmospheric air inwardly through said access opening to said work surface.

2. A dust free work table as claimed in claim 1, further including door means operable to close said access opening and switch means actuated by said door means arranged and connected to operate said dust removing means when said door means is in open position.

3. A dust free work table as claimed in claim 1 in which said air treatment means includes irradiation means constructed and arranged to sterilize air in said compartment.

4. A dust free work table as claimed in claim 1 in which said dust removing means includes an electrical dust precipitating means.

5. A dust free work table as claimed in claim 1, further characterized in that said work compartment has a front wall with a sloping upper portion and wherein said access opening is positioned between the lower portion of said sloping front wall and said bottom.

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