United States Patent

[11] 3,570,733

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[21] Appl. No. **776,526**
[22] Filed **Nov. 18, 1968**
[45] Patented **Mar. 16, 1971**

[54] **POWER-ACTUATED PLATE GLASS CUTTER'S TABLE**
3 Claims, 7 Drawing Figs.

[52] **U.S. Cl.** **225/104,** 225/96.5
[51] **Int. Cl.** **B26f 3/00**
[50] **Field of Search** 225/96.5, 104, 2, 96, 103; 33/32

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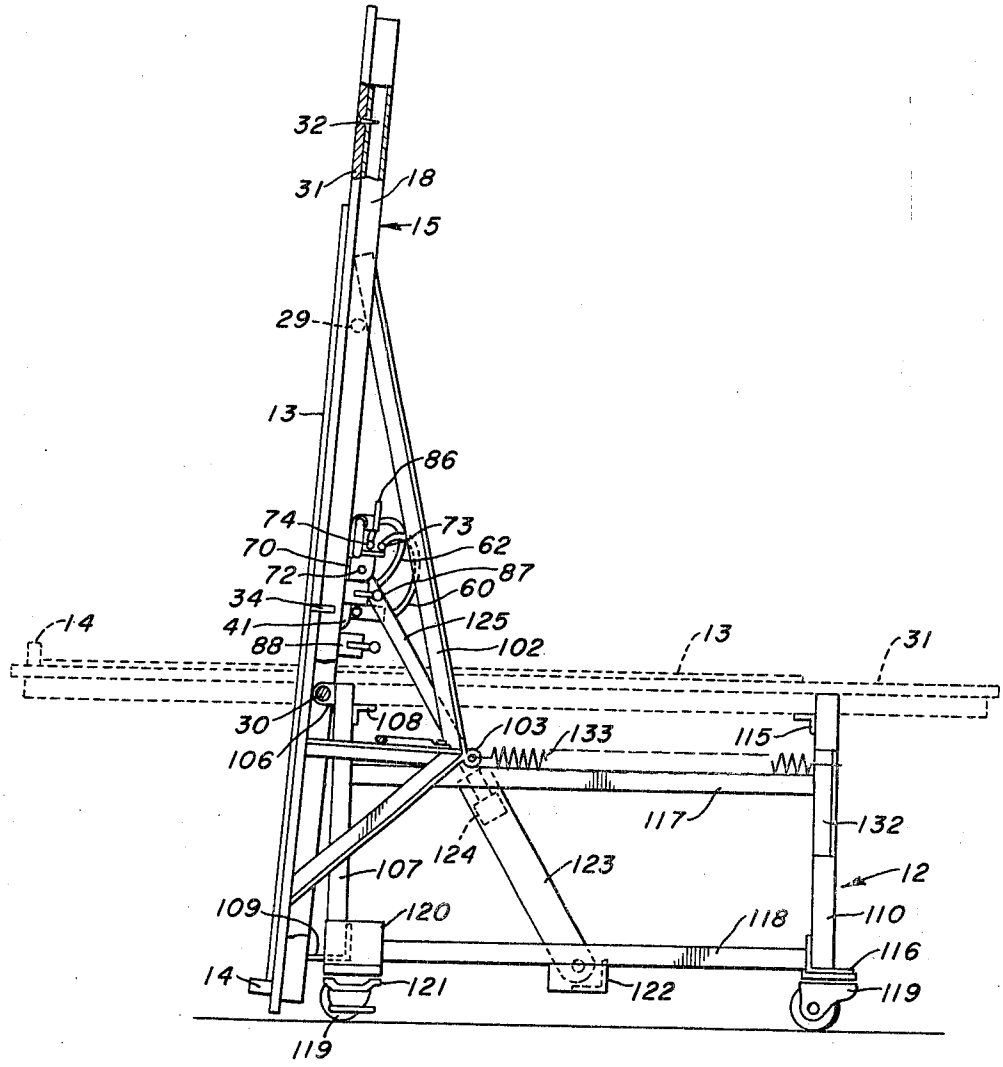
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ABSTRACT: A 12 foot by 9 foot flat carpeted table pivotally mounted on a caster-supported chassis about a horizontal axis located at a height of about 3 feet from the ground and tiltable by compressed air from a position in which the table inclines slightly towards said chassis to a position in which the table is horizontally supported by said chassis. Pegs extending from the table near the lower edge thereof support a sheet of plate glass inclined against the table, said sheet rocking with the table into horizontal position for a glass cutting operation. A glass breaking bar extends lengthwise of the table, said bar lying in a slot formed in the table and being air powered to be rapidly ejected from below the glass supporting surface of the table to a position substantially above said surface when a glass sheet has been scored along a given line and then the sheet shifted so that the line of said score overlies said bar whereby the upward power shifting of said bar breaks said sheet along the line of said score.

The table is provided with a series of air jets delivering compressed air simultaneously between the table and a heavy sheet of plate glass resting thereon, with the table disposed horizontally, to greatly facilitate the manual shifting of said sheet from one position to another on said table as required in the performance of a cutting operation on said sheet.



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SHEET 1 OF 3

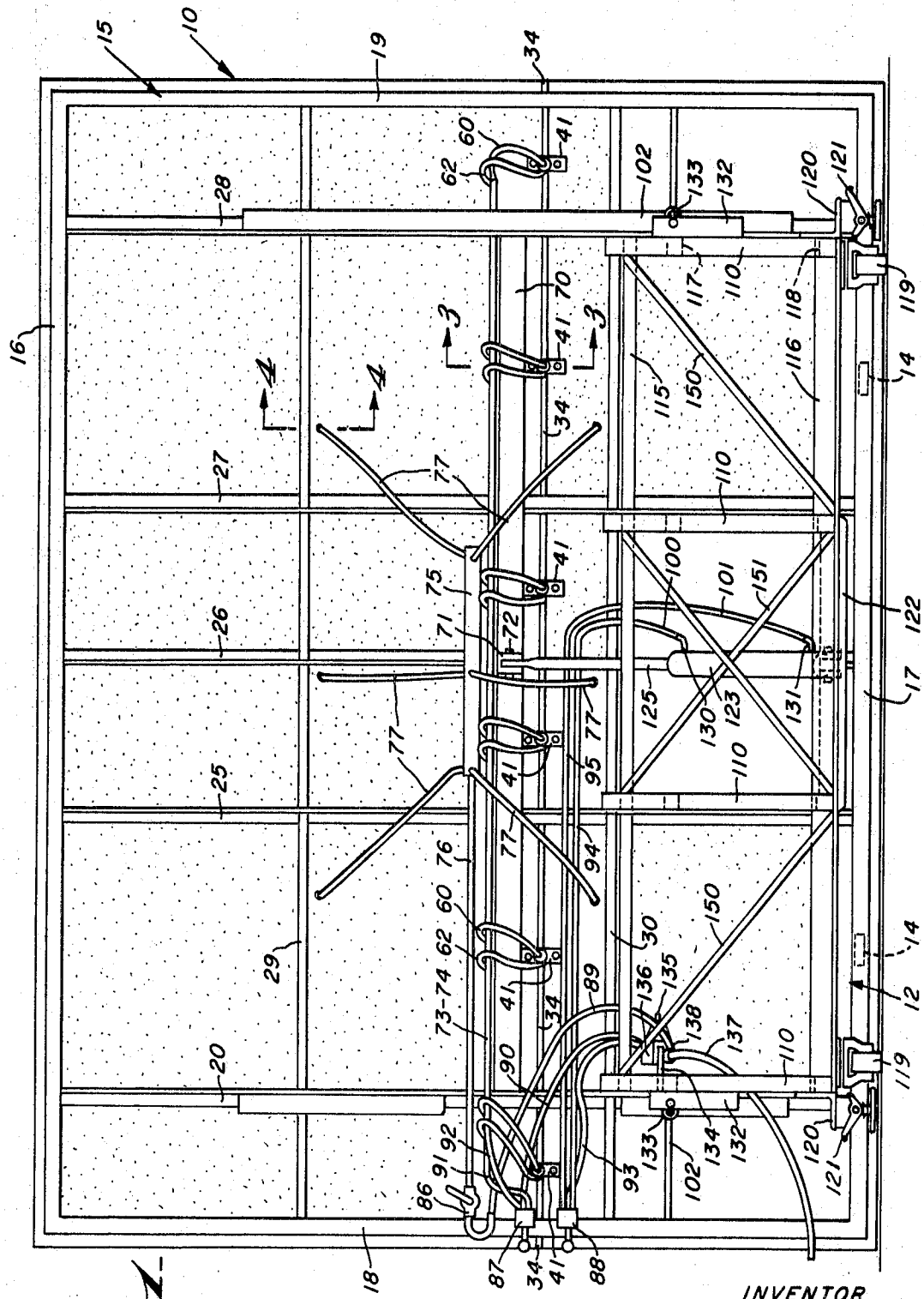


FIG. 1

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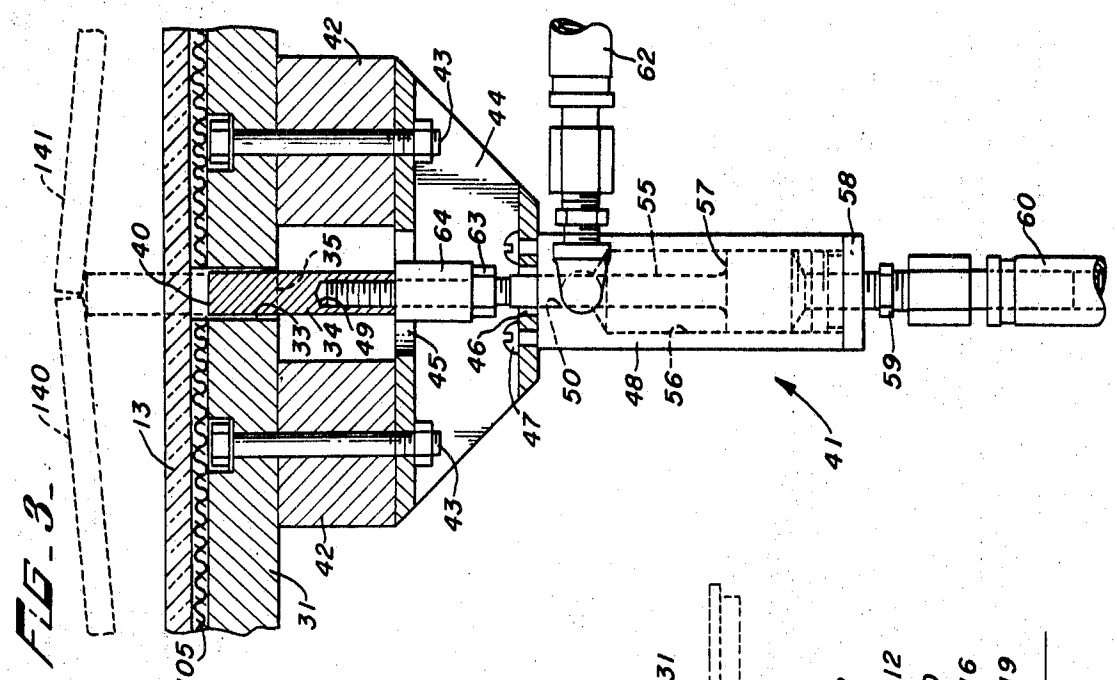


FIG. 3

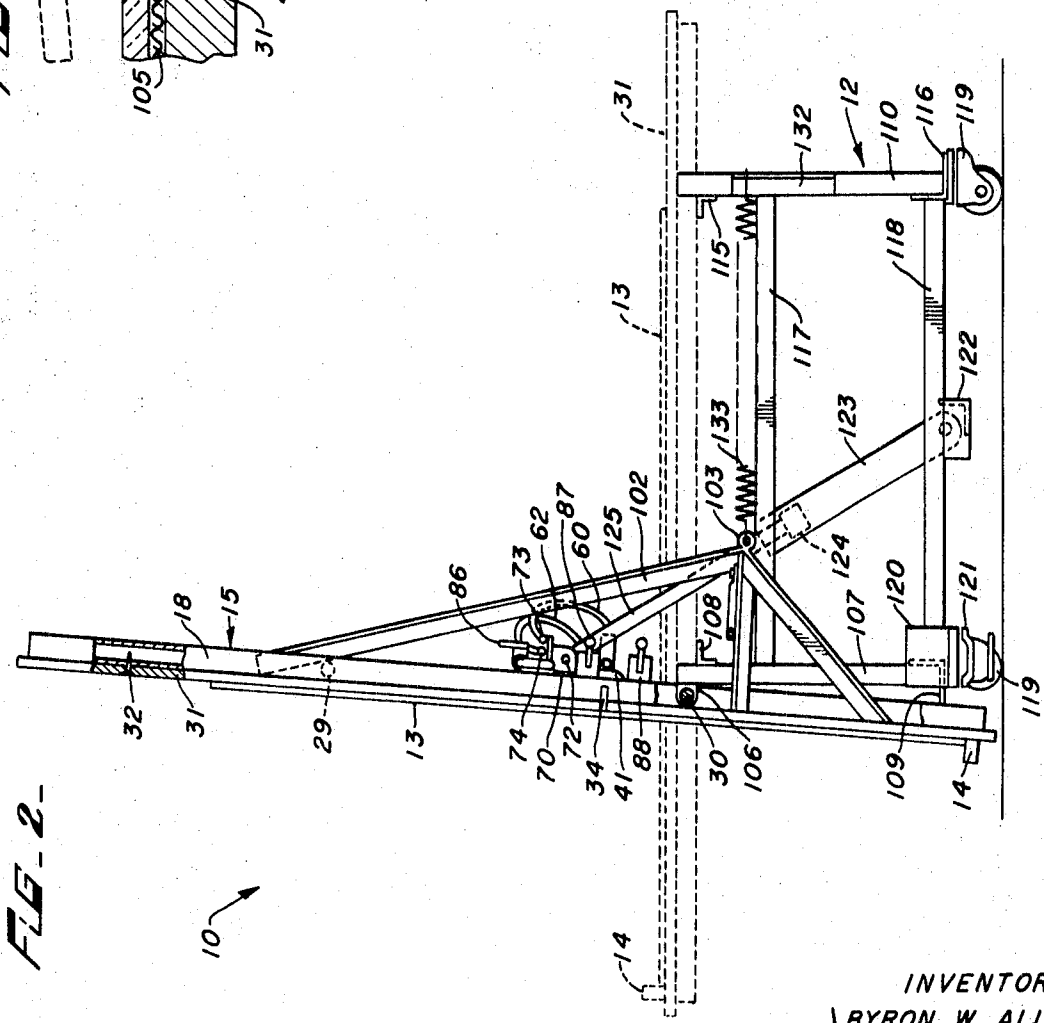


FIG. 2

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FIG. 5

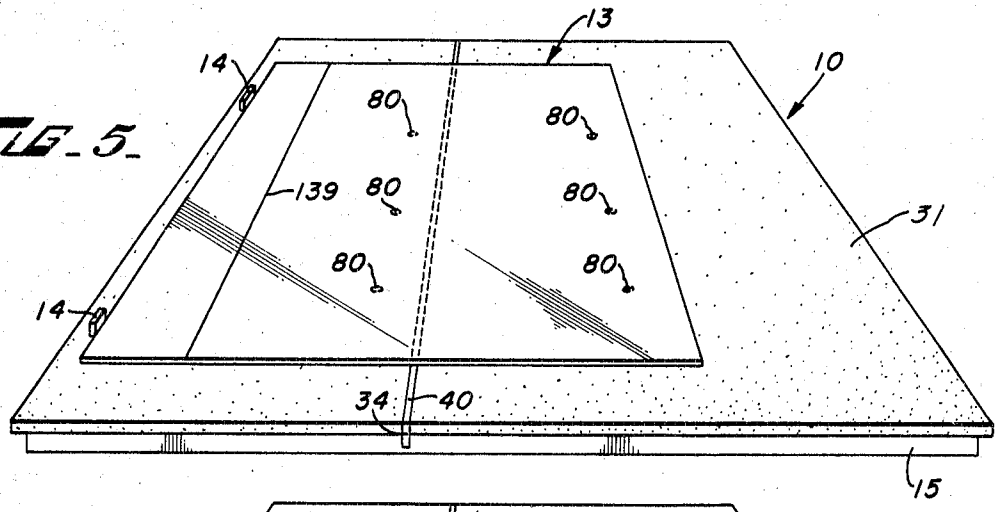


FIG. 6

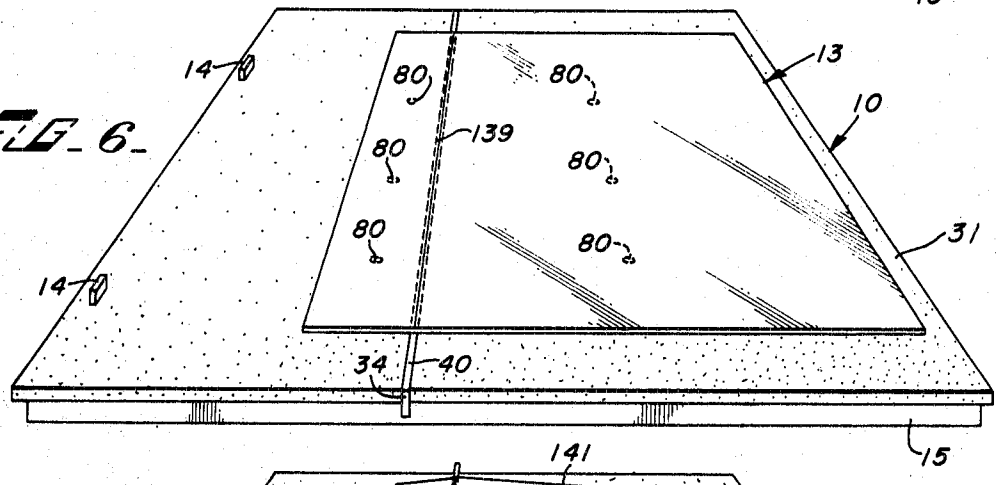


FIG. 7

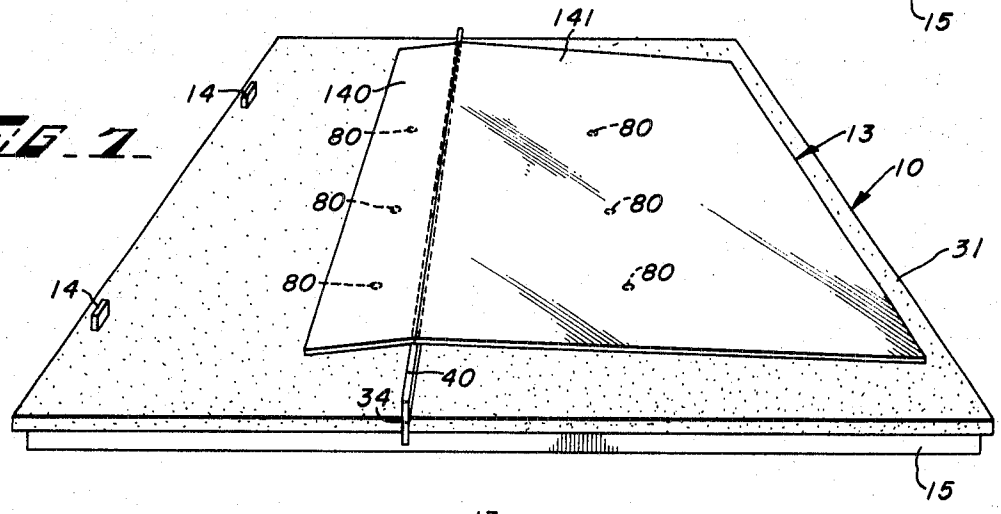
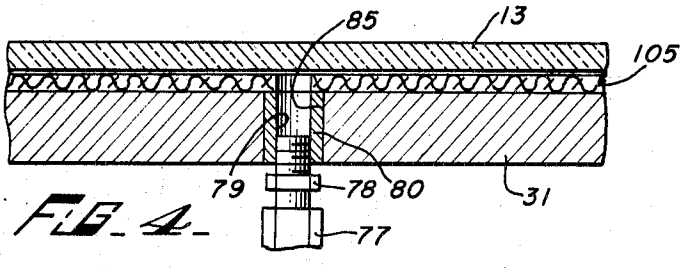


FIG. 4



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POWER-ACTUATED PLATE GLASS CUTTER'S TABLE

BACKGROUND OF THE INVENTION

Rockable tables for tilting a large sheet of plate glass from a position in which the sheet is tilted slightly from vertical to a position in which the sheet rests horizontally on the table, have for long been provided for use by plate glass cutters to assist them in handling such sheets incidental to cutting these into rectangular pieces of various sizes. The present invention is designed to increase the productivity of this type of plate glass cutter's table by reducing the amount of labor required in moving large, heavy glass sheets while resting horizontally on the table and for greatly facilitating the operation of breaking such a sheet of glass along a given score line after it has been thus prepared for separating the sheet into two pieces.

SUMMARY OF THE INVENTION

It has heretofore been the custom to provide the glass sheet supporting surface of the plate glass cutter's table with a material which will not scratch the surface of the plate supported thereon and one which will offer a minimum of friction in resistance to the shifting of the sheet horizontally while resting on said table. A carpet with a soft pile has been commonly used as the sheet supporting surface on glass cutter's tables. Difficulty has been experienced in using a glass supporting surface of this type in keeping the table clean enough so that it will not become loaded with powdered glass or fragments produced in the cutting of the glass on the table so that eventually shifting a heavy glass sheet while supported horizontally on such a piled surface tends to produce an objectionable scratching of the surface of the glass.

It is an object of the present invention to provide such a plate glass cutter's table having a piled surface for supporting a sheet of glass resting horizontally on the table in which the weight of the glass plate will be largely supported by another medium than the carpet forming said pile whereby there will be a minimum amount of scratching take place when the sheet is moved horizontally over said carpet. The present invention relieves the carpeted surface of a glass cutter's table of the entire burden of supporting a large heavy sheet of glass resting thereon by equipping said table with a dispersed series of compressed air jets which simultaneously deliver jets of compressed air at dispersed points between said carpeted table surface and said sheet of glass so that in order for said compressed air to escape from the points at which said jets are located said air must lift said sheet of glass so it will only lightly rest upon said carpeted surface. This permits a great reduction in the labor formerly required in the practice of using such plate glass handling tables in the custom cutting of plate glass. Not only does this invention greatly decrease the force need to be applied to a sheet of glass resting on a plate glass cutting table in order to shift the same from one position to another in performing the various steps of scoring and breaking the glass sheet along a desired line, it reduces the pressure between the glass sheet and the piled carpet on the table and thus greatly decreases the amount of scratching suffered by sheets of glass handled on such tables in the prior art.

The invention also embodies in such a plate glass cutter's table a device which is power actuated by means of compressed air for breaking a sheet of plate glass resting on said table along a scored line made by the plate glass cutter operating the device. This feature includes a bar which normally is disposed in a slot formed longitudinally in the platform comprising the glass supporting element of the table, the bar being withdrawn below the glass supporting surface of the carpet covering the table. This bar is located in said table to one side of the middle of the table whereby minimum amount of movement of a sheet of plate glass will be required from the time it is placed on the table, the latter rocked into horizontal position and a score line drawn across the sheet, and the positioning of the sheet with said score line in alignment with said breaking bar. When a sheet of plate glass has been so placed with reference to said breaker bar the operator need only

throw an air valve which causes said bar to be rapidly ejected from the slot in which it is mounted to a uniform height along its full length above the surface of the table thereby lifting said sheet of glass a distance of approximately an inch in areas located on both sides of the score line made in the upper surface of said sheet thereby utilizing the age old principle of the glass cutter's art and producing a clean fracture along said score line which divides such sheet into two pieces on opposite sides of said line.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an elevational view of the table of this invention with the latter tilted into its slightly inclining position towards the castered supporting chassis on the table.

FIG. 2 is an end elevational view of FIG. 1 with a portion of the structure of the table broken away to illustrate certain parts which would otherwise be hidden, and particularly the shaft about which said table is pivoted on said chassis. This view also shows, in broken lines, the position of said table when it is tilted to rest horizontally on said chassis.

FIG. 3 is an enlarged sectional view taken on line 3–3 of FIG. 1 but with the structure shown therein positioned as when said table is located horizontally as shown in broken lines in FIG. 2. This view illustrates one of the air cylinders provided for the glass sheet breaking bar of the invention with said bar withdrawn into the table slot in which it is mounted and showing in broken lines, how the power actuation of this bar results in breaking into two pieces a sheet of plate glass resting on the table of the invention.

FIG. 4 is an enlarged sectional view taken on the line 4–4 of FIG. 1 and is turned to illustrate the structure shown therein as this appears when the table of the invention is disposed in horizontal position as shown in broken lines in FIG. 2. This structure comprises the means for introducing jets of compressed air at a series of spaced points through the carpet with which the upper surface of said table is upholstered, so as to produce bodies of compressed air between said carpet and a sheet of plate glass resting horizontally thereon whereby said sheet will be maintained only very lightly in contact with said carpet so as to greatly facilitate the shifting of said sheet horizontally through the various steps which are required in the performance of a sheet cutting operation on said table.

FIG. 5 is a diagrammatic perspective view of the table of the invention in horizontal position illustrating the use of said table in cutting a large sheet of plate glass into two pieces, this figure illustrating the table after it has received a sheet of plate glass, while the table is slightly inclined from vertical, and has been rocked into horizontal position and after a score line has been applied along which it is desired to divide said sheet into two pieces of plate glass.

FIG. 6 is a view similar to FIG. 5 and illustrates the position into which it has been necessary for the operator to shift said sheet from the position in which it is shown in FIG. 5, whereby the score line provided in the upper surface of said sheet now overlies and is symmetrically related to the upper edge of the plate breaking bar of the invention which in this view is still shown retracted in the table slot in which it is mounted.

FIG. 7 is a view similar to FIG. 6 and illustrates the breaking of said sheet of plate glass into two pieces by the rapid ejection of the breaker bar from its slot by air power applied at a multiple of points along the length of the bar, the retraction of said bar into its slot following immediately by the operator reversing the valve controlling the ejection of said bar.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring specifically to the drawings, the invention is seen to reside in an air-power-actuated plate glass cutter's table 10 which is rockably mounted on a caster supported chassis 12 and counterbalanced by springs 133 which, in the absence of the application of power to the table 10, rock said table into an almost upright position in which it is shown in FIG. 2 but in which the table is inclined at an angle of about 4° from vertical

in the direction of said chassis so that a heavy sheet of plate glass 13 placed on said table to rest on pegs 14 provided along the lower edge of said table will lean against said table pending the rocking of said table into horizontal position as shown in broken lines in FIG. 2.

While the table 10 may be built in different sizes, it is commonly constructed for ordinary use with a length of 12 feet and a width of 9 feet. It is shown in the operational views of FIGS. 5, 6 and 7 as being used to handle and perform a cutting operation on a sheet of plate glass 5/16th inch thick and about 10 feet long and 6 feet wide. The weight of such a sheet of glass is 241 pounds.

The table 10 includes a perimetric rectangular frame 15 which is preferably made of 2 inch-square steel tubing welded at the corners, this frame including upper and lower longitudinal members 16 and 17 and end transverse members 18 and 19. Lying in the plane of the frame 15 parallel with the end members 18 and 19 and with their ends welded respectively to the longitudinal frame members 16 and 17 are angle iron members 20, 25, 26, 27 and 28. Extending through aligned holes in said angle iron members, on axis disposed about 33 inches inwardly from the longitudinal frame members 16 and 17, are shafts 29 and 30, opposite ends of which are welded to transverse members 18 and 19, said shafts also being welded to said angle iron members where they pass through these. Overlying the perimetric frame 15 and extending outwardly therefrom about 1 inch is rectangular table top 31 which preferably comprises a composite sheet of plywood or masonite or other board formed of impacted wood fiber. The table top 31 is preferably about ¾ inch thick and is secured to the perimetric frame 15 by screws 32. It also has formed therein a slot 33 which runs lengthwise of the table a distance of approximately 9 inches inwardly from the axis of shaft 30. Slidably resting in slot 33 is a breaker bar 34 which is preferably about ⅝ inch thick and 2 inches wide and is coextensive in length with the table top 31. This bar has notches 1¼inches deep which freely receive transverse end frame members 18 and 19 and angle iron members 20—28 inclusive, so that said breaker bar may be readily withdrawn into slot 33 with the outer edge 40 of said bar flush with the outer surface of the table top 31.

Mounted on the bottom face of table top 31 as clearly shown in FIG. 3 so as to be distributed uniformly throughout the length of bar 34 are 6 compressed air cylinder units 41 which are provided to act simultaneously under the control of the operator to eject the breaker bar 34 from its fully withdrawn position as shown in FIG. 3 to its broken line position shown in this view and then withdraw said bar again to its retracted position. The units 41 are respectively located at midpoints between adjacent perimetric frame members 18—28 inclusive.

Each unit 41 includes a pair of wood or pressed fiber blocks 42 which are secured by bolts 43 to table top 31 with said blocks spanning the slot 33 and spaced therefrom as shown in FIG. 3. Mounted on said blocks by said bolts is an air cylinder mounting base 44 which is fabricated from a section of 2 inch-square tubing, this base having aligned holes 45 and 46 and having secured thereto as by screws 47 a compressed-air cylinder 48 so that said cylinder is in alignment with said holes and with the breaker bar 34. The breaker bar is provided with a series of tapped holes 49 each of which is in alignment with one of the air cylinders 48. Each of the cylinders 48 has a bore 50 which slidably receives a piston rod 55 and a counterbore 56 which slidably receives a piston 57 provided on said rod, the outer end of said cylinder being closed by a screw plug 58 having a tapped central aperture for receiving a threaded nipple 59 on the end of an air hose 60. Each cylinder 48 also has a connection 61 for connecting an air hose 62 with the inner end of the counter bore 56 of the cylinder.

The outer end of the piston rod 55 is threaded and receives a lock nut 63 and a spacer 64, the balance of the threaded end portion of said piston rod screwing into the adjacent tapped hole 49 in the breaker bar 34.

Secured as by welding to the angle iron members 20, 25, 26, 27 and 28 is a relatively heavy horizontal angle iron 70 one flange of which is disposed flat against said members and the other flange of which extends outwardly from the upper edge of said first flange. Welded centrally to angle iron 70 within the angle thereof is a pair of spaced webs 71 which have aligned holes for receiving a pin 72 for a purpose to be made clear hereinafter. Resting on the top of angle iron 70 and secured thereto is a pair of air pipes 73 and 74. The air pipe 73 is provided with a series of connections to which are respectively connected the free ends of air hoses 60 while the air pipe 74 is provided with a series of connections to which the free ends of air hoses 62 connect respectively. A manifold 75 preferably formed of a section of 2 inch-square steel tubing closed at opposite ends is supported on angle iron 70 just above air pipes 73 and 74 and has, connecting to one end thereof, an air pipe 76. The manifold 75 has suitable connections provided therein for connecting said manifold to six air hoses 77, the opposite ends of said hoses having threaded nipples 78 which are screwed into tapped holes 79 provided by metal sleeves 80 which are cemented in holes 85 provided at six selected points in the table top 31 as shown in FIG. 4. The manifold 75 and air hoses 77 are provided for delivering streams of compressed air to the six selected positions aforementioned on the upper surface of the table 10.

Mounted on the end frame member 18 of the table 10 are three valves 86, 87 and 88, the first of these valves connecting to and controlling the admission of compressed air to air pipe 76 leading to manifold 75. Valve 86 receives a supply of compressed air through an air hose 89. Valve 87 is a three-way valve and it receives compressed air through an air hose 90 and delivers this compressed air selectively through air hoses 91 and 92 to air pipes 73 and 74 with a result to be explained later.

Air valve 88 is a three-way valve receiving compressed air from an air hose 93 and delivering said compressed air selectively to two air pipes 94 and 95 which are mounted on the table 10 and extend from the air valve 88 to a point near the middle of the table where they connect with air hoses 100 and 101.

Three way valve 87, when not delivering compressed air to one of the air hoses 91 or 92, connects the other of said air hoses to the atmosphere. In a like manner, air valve 88 when delivering compressed air to one of the air pipes 94 and 95, connects the other of said air pipes to the atmosphere.

The perimetric frame 15 is also provided with a pair of counter balance spring attaching masts 102 which are secured respectively to angle iron members 20 and 28 and end members 18 and 19 and terminate at their apices in eyes 103. Provided on the table top 31 and located near the lower edge thereof when the table is in upwardly inclined position is the pair of wooden pegs 14 previously mentioned. The top face and edge portions of the table top 31 are covered by a layer of carpet 105 which is tightly secured to the table top so as to completely upholster the same and provide a soft upper surface to the table which will facilitate the handling of large heavy sheets of plate glass thereon such as the sheet 13 aforementioned.

The lower shaft 30 of the table 10 is provided with a series of bearings 106 by which said table is mounted on said caster supported chassis 12. Said chassis comprises a framework including a back set of four posts 107 made of 2 inch-square tube which are secured together near their upper ends by being welded to an angle iron 108 and at their lower ends by being welded to a relatively heavy angle iron 109, said posts having welded to their outer faces at the upper ends of said posts said bearings 106 in which shaft 30 journals. Chassis 12 also includes a front set of four posts 110 which are preferably made of 2 inch-square tubing and are secured together near their upper ends by being welded to an upper angle iron 115 and at their lower ends by being welded to a relatively heavy angle iron 116. The back and front sets of posts 107 and 110 are secured in parallel rigidly spaced relation with each other

by being welded to opposite ends of upper horizontal spacer members 117 and lower horizontal spacer members 118 which members are also preferably formed of 2 inch-square steel tubing.

Mounted on bottom surfaces of the heavy angle iron members 109 and 116 near their opposite ends are heavy industrial caster wheels 119. Welded to opposite ends of heavy angle irons 109 are angle brackets 120 upon lower faces of which are mounted conventional kick jacks 121 which are adapted to be actuated by selective downward pressure thereagainst by applying the foot thereto to jack up the back corners of the chassis 12 so as to lift from the floor the adjacent caster wheels 119 and thus immobilize the chassis 12 for the time being. The kick jacks 121 are adapted to be released at will by foot pressure thereagainst.

Welded at its ends to the two middle lower spacer members 118 is a heavy angle iron 122 having means formed centrally thereon for pivotally supporting the lower end of a table rocking compressed air cylinder 123. This cylinder has a piston 124 which is connected to a piston rod 125 the upper end of which pivots on pin 72. The cylinder 123 has air connections 130 and 131 at its upper and lower ends which connect respectively with air hoses 100 and 101.

Welded to corner posts 110 are angle irons 132 which are apertured for the purpose of anchoring thereto the front ends of heavy coiled springs 133 the back ends of which are hooked into eyes 103 of spring attaching masts 102. Resting on and secured to an upper spacer member 117 adjacent valves 87 and 88 is a plate 134 on which is mounted a pressure regulating valve 135 and a air filter 136 through which compressed air delivered through an incoming hose 137 passes in sequence to connect with air hoses 90 and 93 leading to valves 87 and 88. Air hose 89 which leads to valve 86 connects through a fitting 138 directly with incoming compressed air hose 137.

OPERATION

The plate glass cutter's table 10 of the present invention is operated entirely by compressed air and the latter is controlled by manipulation of the three valves 86, 87 and 88. The valve 88 controls the introduction of compressed air into the upper or lower end of table-rocking air cylinder 123 which determines whether the table will remain in its slightly inclined position shown in full lines in FIG. 2 or be swung from this position to the horizontal position shown in broken lines in this view. When valve 88 is in neutral position, coil springs 133 return the table to its full line inclined position shown in FIG. 2. The table is normally in this position when it receives a large sheet of plate glass such as the sheet 13 shown in this view. Delivery of the sheet onto the table is accomplished with the sheet in practically vertical position by the lifting of said sheet to a level slightly above the pegs 14 and the movement of the sheet into contact with the carpet of the table just above said pegs and then allowing the sheet to come to rest on said pegs after which the sheet is tilted into conformity with the table so as to rest thereagainst by gravity.

The next step in the operation is to swing the table from its inclined position to its horizontal position with the sheet 13 of plate glass resting thereon. This is accomplished by manipulation of the air valve 88. After the table has been thus placed in horizontal position in which it rests solidly on the castered chassis 12, the kick jacks 121 may be set against the floor so as to lift the adjacent casters 119 from the floor and thus immobilize the entire table 10 for the time being. This is to assure that the table will be steady during the glass cutting operation. The plate glass cutter operating the invention now places a straight edge on top of glass sheet 13 and inscribes a score line 139 on said sheet as shown in FIG. 5. It now becomes necessary to shift sheet 13 horizontally to bring said score line directly over the breaker bar 34 as show in FIG. 6. The present invention greatly facilitates the moving of the plate glass sheet 13 from the position in which it is shown in FIG. 5 to the position in which it is shown in FIG. 6. The invention does this by providing for the delivery of jets of compressed air through the carpet 105 and into the space between said carpet and said glass sheet 13 so that said glass sheet practically floats on compressed air which fills the space between the carpet and said sheet and greatly decreases the friction which takes place between said sheet and said carpet when said glass is moved. Furthermore, this layer of compressed air greatly reduces the force necessary to horizontally move the sheet over said carpet thus cutting in half the manpower required to operate the table 10.

The delivery of compressed air in this manner between the carpet and the sheet 13 is accomplished by actuation of the valve 86. After this valve has been opened the sheet 13 is readily shifted by a single man from the position in which it is shown in FIG. 5 to its position shown in FIG. 6 whereas, prior to this invention, two men were needed to do this. Having accomplished the shifting of the sheet 13 of plate glass in this manner, the operator may leave the valve 86 open or temporarily close this if he chooses during the glass breaking operation which follows.

The latter operation is effected, with the score line 139 located in precise alignment with the breaker bar 34, by operating the valve 87, to direct compressed air through the air hoses 60 into the outer ends of cylinders 48. Inasmuch as this operation of valve 87 connects air hoses 62 with the atmosphere, it results in a sudden ejection of the breaker bar 34 upwardly from the slot 33 in which said bar is mounted to an extended position indicated by broken lines in FIG. 3. This results in the immediate fracture of the glass sheet 13 along the score line 139 as shown in broken lines in FIG. 3 so as to divide said sheet into two pieces 140 and 141. The operator then reverses valve 87 causing the air hoses 60 to be connected with the atmosphere and compressed air to be delivered simultaneously to the hoses 62 so as to rapidly return the breaker bar 34 to its retracted position within slot 33.

Following the breaking of plate glass sheet into two pieces 140 and 141 as shown in FIG. 7, and the retraction of breaker bar 34 to its concealed position in the table, the air jets produced by compressed air escaping from the various air hoses 77 are seen to be well located to given support to each of the pieces 140 and 141 into which sheet 13 was divided so that one or both of these pieces may be readily removed from the table 10 or the smaller of these pieces may be removed and further cuts may be accomplished on the larger of said pieces. In any event, the locations of the several air jets are designed for forming an air cushion in the various areas between the table 10 and the several pieces of glass which are formed by the division of a large sheet of glass as abOve described so that movement of each of said pieces is facilitated by said air cushions.

If it is desired to break a sheet of glass to divide therefrom only a small piece as shown in FIG. 7, the air jets located under the small piece thus separated from the large sheet facilitate the endwise movement of said small piece of glass so that it may be removed from the table while the latter is still horizontal, following which further sectioning may be effected of the larger remaining piece of sheet glass or the latter may be shifted, with the aid of said air jets, back into contact with the pegs 14 after which the table may be readily rocked by operation of the air valve 89 back to its inclined position shown in FIG. 2 where the remainder of the sheet resting on said pegs may be readily removed therefrom and placed in storage.

The three structural rectangles formed in the chassis 12 by the welding together of the back set of posts 107 and upper and lower angle irons 108 and 109, as well as the corresponding three rectangles formed by front posts 110 and angle irons 115 and 116, are braced, the end rectangles in each instance, by single diagonal tension rods 150, and the middle rectangle in each instance by crossed straps 151.

I claim:

1. A power actuated plate glass cutter's table comprising:

a relatively large rectangular flat table having a relatively nonabrasive upper surface;

means for rocking said table while a sheet of glass is resting by gravity flat against said table, between a glass-sheet-receiving position in which said table is inclined slightly away from vertical, and a horizontal position for the performance of a glass-sheet-cutting operation with said table and sheet disposed horizontally;

means for delivering compressed air upwardly through said table within the area occupied by said glass sheet, whereby the confined air forms an air cushion substantially reducing the frictional contact between said table surface and said sheet and correspondingly facilitating the shifting of said glass sheet manually horizontally over said table with said glass sheet principally supported by said air cushion; and

means confined within said table and ejectable upwardly for suddenly lifting a sheet of glass resting on said table, by an application of force upward against said glass within a narrow straight area extending entirely across said sheet.

2. A table as recited in Claim 1 wherein said lifting means comprises a breaker bar vertically slidably mounted in a slot formed in said table; and power means for quickly elevating said bar upwardly a short distance from said slot.

3. A table as recited in claim 2 wherein said means for elevating said bar comprises:

a series of air cylinders connected with said bar at spaced intervals; and

valve means for simultaneously actuating said cylinders by the delivery of compressed air thereto to shift said bar suddenly upwardly from said slot and then retract said bar into said slot.