Sept. 4, 1928. 1,683,250

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APPARATUS FOR HOLDING GLASS PLATES UPON GRINDING AND POLISHING TABLES

Filed May 1, 1925 3 Sheets-Sheet 1

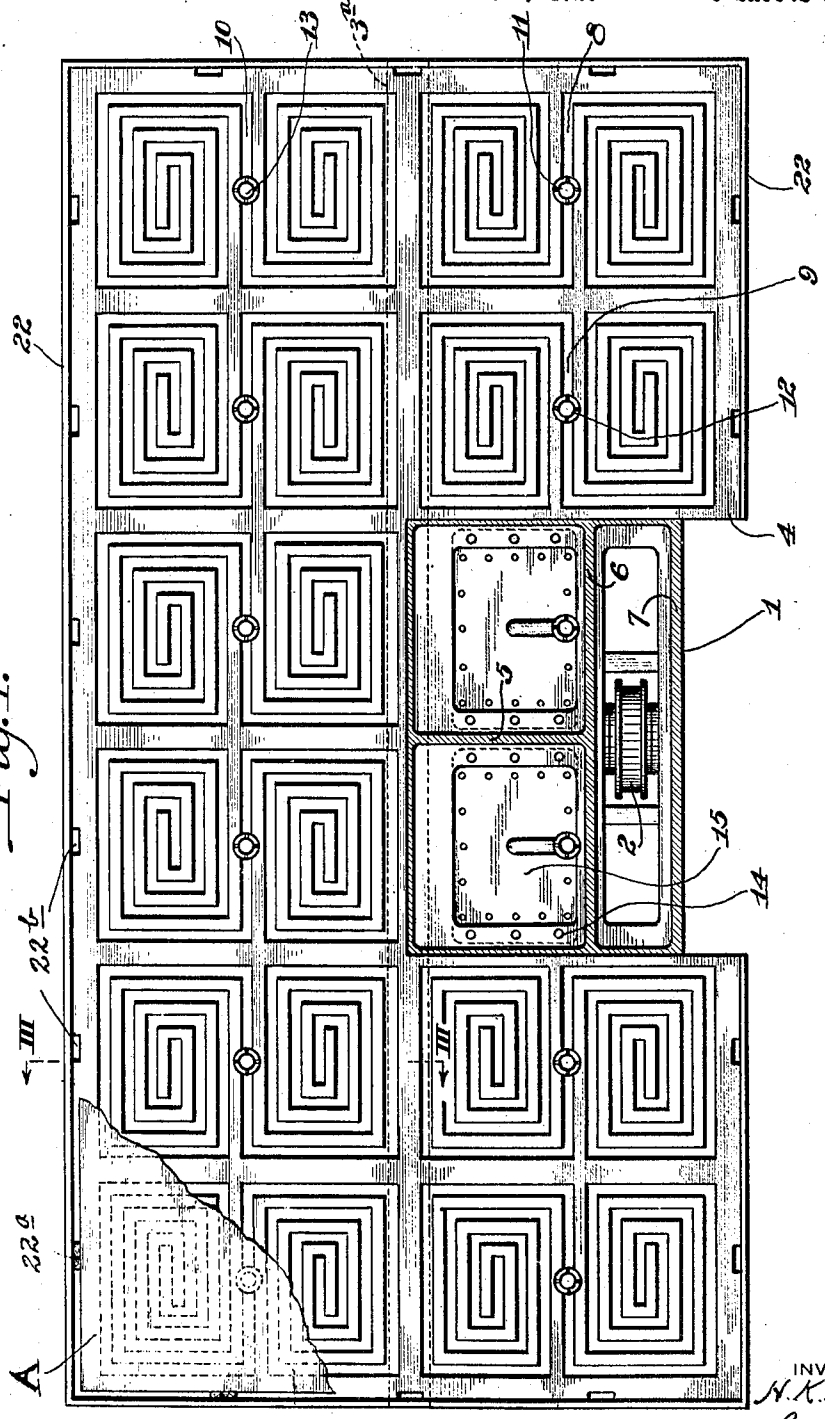

Fig. 1.

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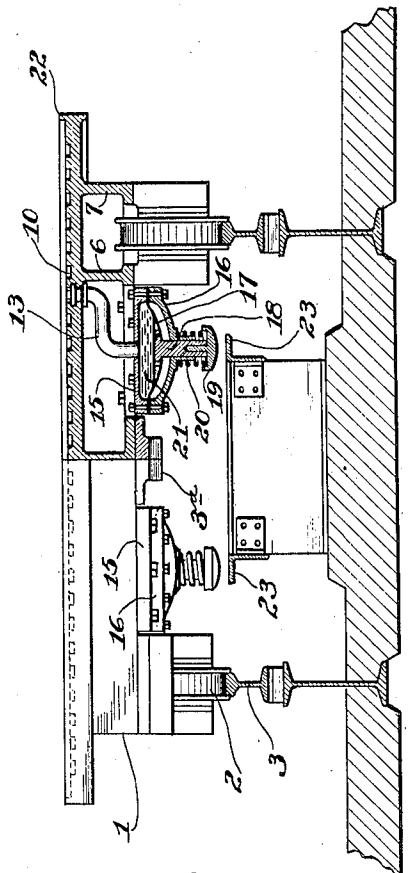

Fig. 3.

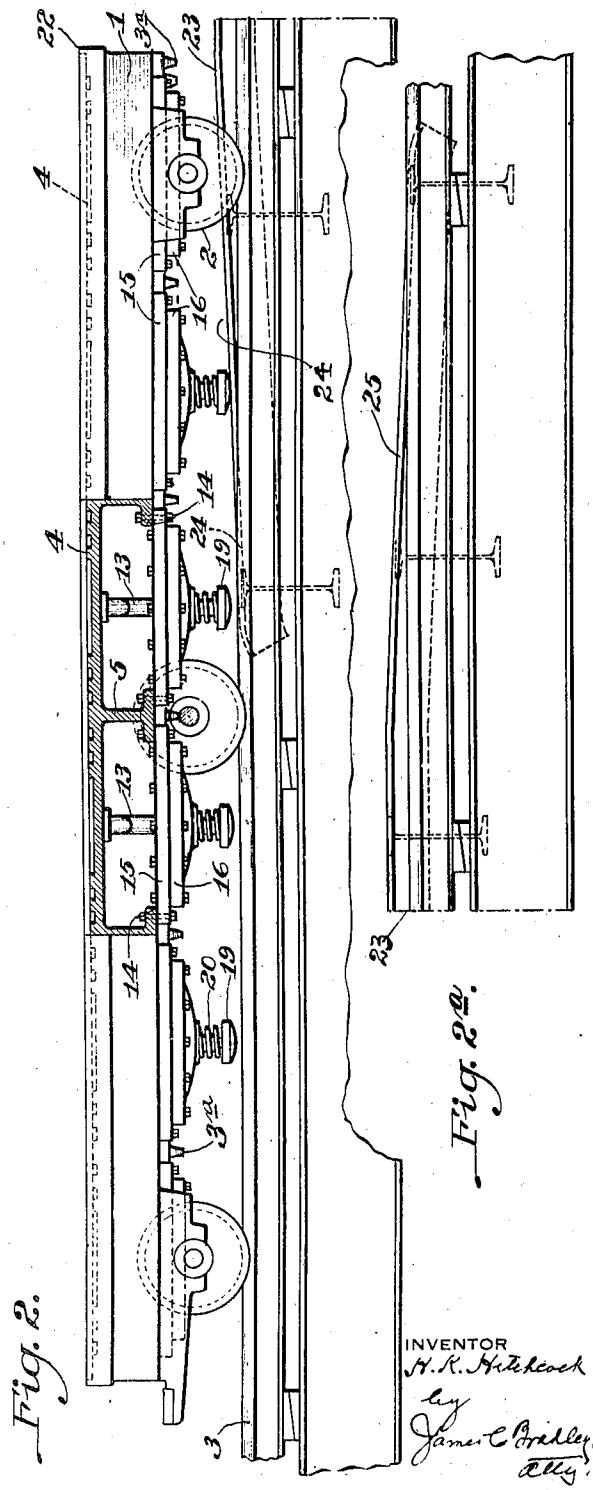

Fig. 2.

Fig. 2a.

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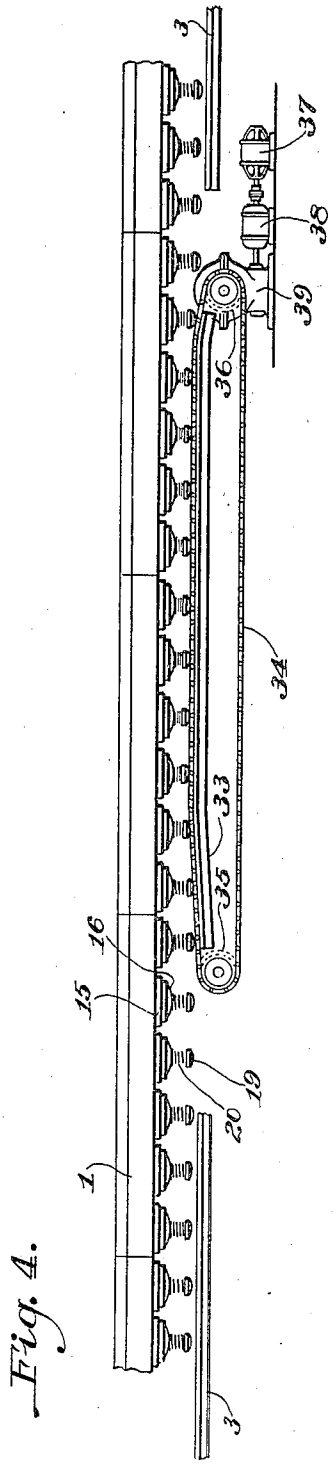

Fig. 4.

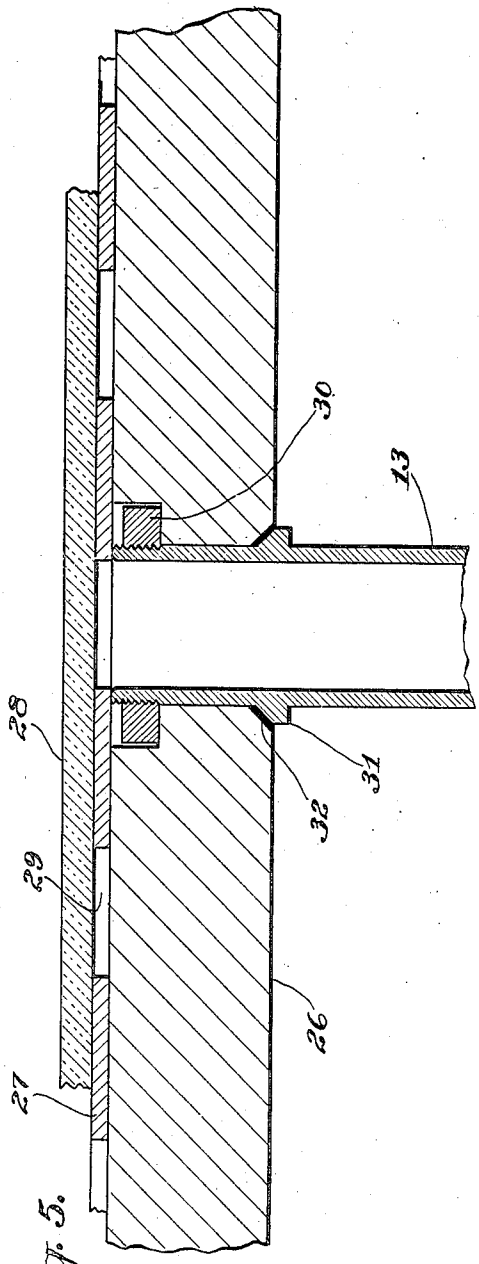

Fig. 5.

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UNITED STATES PATENT OFFICE.

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APPARATUS FOR HOLDING GLASS PLATES UPON GRINDING AND POLISHING TABLES.

Application filed May 1, 1925. Serial No. 27,170.

The invention relates to apparatus for holding glass plates or sheets upon grinding and polishing tables, and is particularly designed for use upon the tables employed in a straight away grinding and polishing system, certain features of the invention, however, being applicable to service in connection with rotating tables, such as have heretofore been most commonly employed in the art. The invention is designed to provide a practical solution to the problem of doing away with the requirement for securing the glass to the tables by means of plaster of Paris, and thus eliminating the expense and labor incident to applying the glass by such method, and incident to releasing the glass, and scraping away the hard layer of plaster preparatory to using the tables again.

The invention has for its primary objects; the provision of a simple arrangement for holding the glass securely by suction; and the provision of an arrangement in which the making of the vacuum, for securing the plates, is accomplished automatically by the movement of the tables or cars, and whereby the vacuum is automatically released by the movement of the tables after the completion of the surfacing operation. Certain embodiments of the invention are illustrated in the accompanying drawings wherein:

Figure 1 is a plan view of one form of table or car with a portion of the top broken away to show the construction therebeneath. Fig. 2 is a side elevation of the car also with a portion broken away to more clearly disclose the parts. Fig. 2ª is an extension of the right hand end of Fig. 2. Fig. 3 is a partial end elevation and partial section on the line III—III of Fig. 1. Fig. 4 is a side elevation illustrating a modification. And Fig. 5 is a vertical section illustrating a modification.

Referring to the drawings, 1 is the body of the table, preferably of cast steel, provided with the wheels 2 mounted upon the track 3 extending beneath a series of grinding and polishing machines, not shown. This table, as well as the others of the series, may be moved along the track by any suitable means, but this is preferably accomplished by means of a rack and pinion drive, the reference numeral 3ª indicating one of the racks extending longitudinally of the car or table.

The table has a glass supporting top 4 and integral ribs 5, 6, and 7 extending downwardly therefrom and serving as stiffening means to give the table its necessary rigidity. The upper surface of the table is provided with the sets of grooves 8, 9, 10, etc., each set being separate from the other sets and communicating with the downwardly extending suction pipes 11, 12, 13, etc. The ribs 5 on the lower side of the table are provided with inwardly projecting flanges 14 as indicated in Fig. 2 and to these flanges are bolted the plates 15 through which the pipes 11, 12, 13, etc. extend, as indicated in Fig. 3. Bolted on the lower end of each of the plates 15 is a casing 16, a flexible diaphragm 17 of rubber or other suitable material being clamped at its edges between the plate and the casing. Each of these diaphragms is provided with a downwardly projecting stem 18 having its lower end with a cap 19. The diaphragm is normally held in rearward position by a powerful spring 20 interposed between the cap and the casing 16. The space 21 above the diaphragm constitutes what may be termed a vacuum chamber and this chamber is preferably filled with a liquid, such as water. The content of these chambers is such that when the diaphragms are forced forward, as hereafter described, the liquid overflows the surface of the table filling the grooves 9, 10, 11, etc. and lying slightly above the level of the top surface of the table. A flange 22 which extends around the periphery of the table has its upper edge lying slightly above the surface of the table so as to prevent the liquid from running off, and also serving as a stop for the edge of the glass. The table is thus provided with twelve independent suction devices, so that in case of leakage, there is little chance that the glass sheet will become loosened and move with respect to the table since the holding power of the twelve devices is largely in excess of that actually necessary to keep the glass from movement under the force imposed by the grinders and polishers.

The suction devices are arranged to be actuated and also released by the movement of the table along the track. This is preferably accomplished by means of the cam member 23 having at its ends inclined portions 24 and 25 adapted to engage the caps 19 on the lower ends of the stems 18. The diaphragms are in this manner moved up successively, as the car moves to the right (Fig. 2), forcing the liquid in the chambers 21 out upon the surface of the table as the car is moved along the

track and to a position over the high portion of the cam 23. On a further movement of the car, the caps 19 pass onto the downwardly inclined portion 25 of the cam member so that the springs 20 are permitted to move the diaphragms downwardly, thus increasing the content of the chambers 21 and producing a suction effect in the space or area intermediate the glass sheet and the upper surface of the table. The glass is in this manner securely attached to the upper surface of the table and is so held while the table (together with a series of other similar tables) is moved beneath a plurality of grinding and polishing machines. After the sheet on the table has been surfaced, it becomes necessary to release it, and this is preferably accomplished by having the cars pass over another cam member similar to 23 heretofore described, the diaphragm members being moved upwardly at this time, thus forcing the liquid in the chambers 21 upwardly and releasing the suction effect so that the glass may be removed without difficulty from the table.

The type of table as just described, having the grooves 9, 10, 11, etc. cut into the metal constituting the top of the table, is preferably employed with sheets of glass which have had one side ground and polished, so that when this side is down and in contact with the wet surface of the table, there is no danger of leakage from one set of grooves to the other, and consequently no danger of the sheet of glass becoming entirely loosened through leakage from one set of grooves to the other. When the glass to be secured to the table has a rough surface, such as that produced by the ordinary casting or continuous rolling process, it is safer to employ upon the top of the table a yielding material, such as rubber, to act as a supporting surface for the glass. This construction is illustrated in Fig. 5, in which 26 is the steel top to the grinding table, 27 is a rubber sheet or pad cemented to the top of the table and 28 is a sheet of glass which is to be ground, mounted in position upon the table. In this construction, the grooves corresponding to the grooves 9, 10, 11, etc. of the Fig. 1 construction are provided by cutting out grooves in the rubber sheet 27, as indicated at 29. Fig. 5 also illustrates the method of connecting the upper end of one of the pipes 11, 12, 13, etc. with the table top so as to secure a tight joint. The upper end of the pipe is threaded, and upon its threaded end is mounted a nut 30 fitting into a suitable recess in the top of the table. Spaced back from the end of the pipe is a shoulder 31 adapted to oppose a similarly inclined surface 32 at the lower side of the table top, a suitable rubber gasket being interposed between the two inclined surfaces.

It is impracticable to fit the glass A (Fig. 1) with exactness inside the flange 22, and in order to hold the glass against lateral movement the wood blocks 22^a are employed fitting into sockets 22^b in the top of the table and lying between the edge of the glass and the flange 22. The crack thus provided between the glass and the flange is kept filled with water which acts as a seal for holding the vacuum beneath the glass. This crack is constantly kept filled by the water supplied to the glass at the grinding and polishing means and constituting a part of the mixtures applied with the sand and rouge.

In order to provide for possible leakage during the period of travel of the table under the series of grinders and polishers, which occupies a considerable period of time, it is desirable to provide means for setting the vacuum devices several times during such period. This is preferably accomplished by the use of a plurality of cams corresponding to the cam 23 (or to the cam device of Fig. 4, later described) spaced along the line of travel of the caps 19, such cam devices being of short length, however, so as to set one device at a time. In this manner, any air which may leak beneath the glass is pressed out, and partial vacuum, which is all that is required, is reestablished.

Fig. 4 illustrates a modification in which the cam member corresponding to the member 23 of Fig. 2 is formed by means of a pair of spaced guide rails 33 and a pair of chains 34 moving over the rails and around the sprocket wheels 35 and 36 adjacent the ends of the rolls. The caps 19 at the lower ends of the stems 18 of the diaphragms are adapted to contact with these chains which move along with the caps, so that the sliding friction involved in the Fig. 2 construction is avoided and the wear upon the caps 19 is practically eliminated. The Fig. 4 construction is for this reason preferred over that of Fig. 2. The sprockets 36 are preferably driven from an electric motor 37 operating through the intermediary of suitable reduction gearing in the casings 38 and 39. The construction of the cars and vacuum devices are the same as in the type of construction heretofore described in detail.

What I claim is:

1. The combination with a surfacing car or table mounted for movement along a track and having a glass supporting surface, of means for producing a suction effect intermediate said supporting surface and the glass carried thereby, and means operated by the movement of the table along the track for actuating said means to secure the glass to the table.

2. The combination with a surfacing car or table mounted for movement along a track and having a glass supporting surface, of means for producing a suction effect intermediate said supporting surface and the glass carried thereby, means for actuating said means, to secure the attachment by suc-

tion of the glass to the table, and means actuated by the movement of the table along the track for releasing the suction to free the glass from the table.

3. The combination with a surfacing car or table mounted for movement along a track and having a glass supporting surface, of means for producing a suction effect intermediate said supporting surface and the glass carried thereby, automatic means operated by the movement of the table along the track for actuating said means to secure the glass to the table, and means actuated by the movement of the table along the track for releasing the suction to free the glass from the table.

4. The combination with a surfacing table having a surface for supporting a glass sheet to be surfaced, of a vacuum device for applying suction to the area between the sheet and the supporting surface of the table, comprising a suction chamber communicating with said area, a movable suction member adapted on its forward movement to reduce the content of said chamber and on its rearward movement to increase such content, spring means normally holding said member in rearward position, and means operated by the movement of the table for moving said member forward.

5. The combination with a surfacing table having a surface for supporting a glass sheet to be surfaced, of a vacuum device for applying suction to the area between the sheet and the supporting surface of the table, comprising a suction chamber communicating with said area, a movable suction member adapted on its forward movement to reduce the content of said chamber and on its rearward movement to increase such content, spring means normally holding said member in rearward position, and means operated by the movement of the table for moving said member forward, and on further movement of the table permitting said spring means to move said member to the rear.

6. The combination with a surfacing table having a surface for supporting a glass sheet to be surfaced, of a vacuum device for applying suction to the area between the sheet and the supporting surface of the table, comprising a suction chamber communicating with said area, a movable suction member adapted on its forward movement to reduce the content of said chamber and on its rearward movement to increase such content, a body of liquid in said chamber, and spring means normally holding said member in rearward position.

7. The combination with a surfacing table having a surface for supporting a glass sheet to be surfaced, of a vacuum device for applying suction to the area between the sheet and the supporting surface of the table, comprising a suction chamber communicating with said area, a movable suction member adapted on its forward movement to reduce the content of said chamber and on its rearward movement to increase such content, a body of liquid in said chamber, spring means normally holding said member in rearward position, and means operated by the movement of the table for moving said member forward.

8. The combination with a surfacing table having a surface for supporting a glass sheet to be surfaced, of a vacuum device for applying suction to the area between the sheet and the supporting surface of the table, comprising a suction chamber communicating with said area, a movable suction member adapted on its forward movement to reduce the content of said chamber and on its rearward movement to increase such content, a body of liquid in said chamber, spring means normally holding said member in rearward position, and means operated by the movement of the table for moving said member forward, and on a further movement of the table permitting said spring means to move said member to the rear.

In testimony whereof, I have hereunto subscribed my name this 20th day of April, 1925.

HALBERT K. HITCHCOCK.