

March 22, 1927.

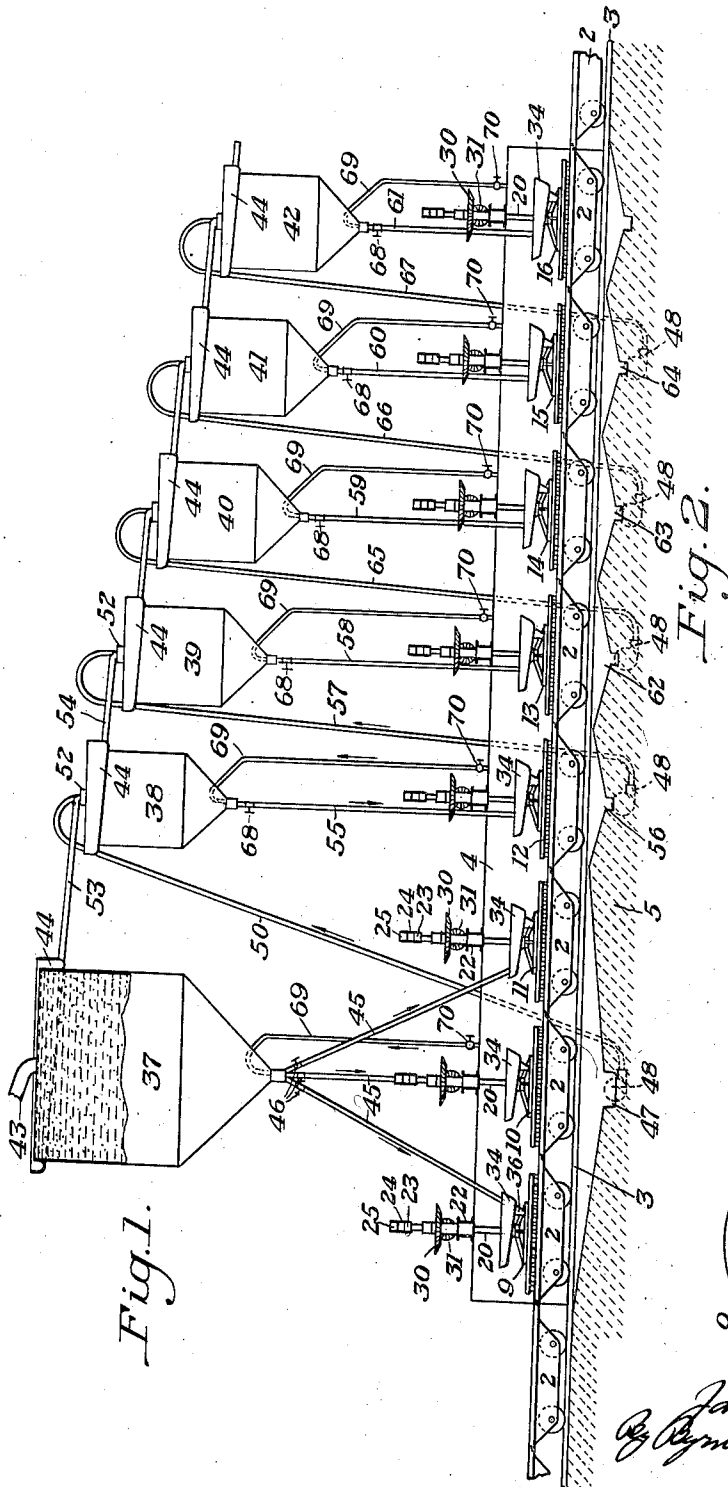
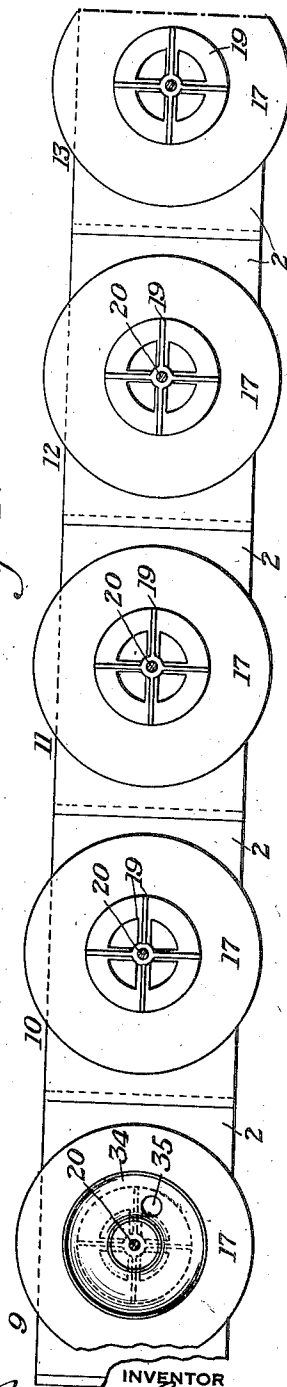
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1,622,091

METHOD AND APPARATUS FOR GRINDING GLASS

Filed Oct. 20, 1923

2 Sheets-Sheet 1



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Fig. 3.

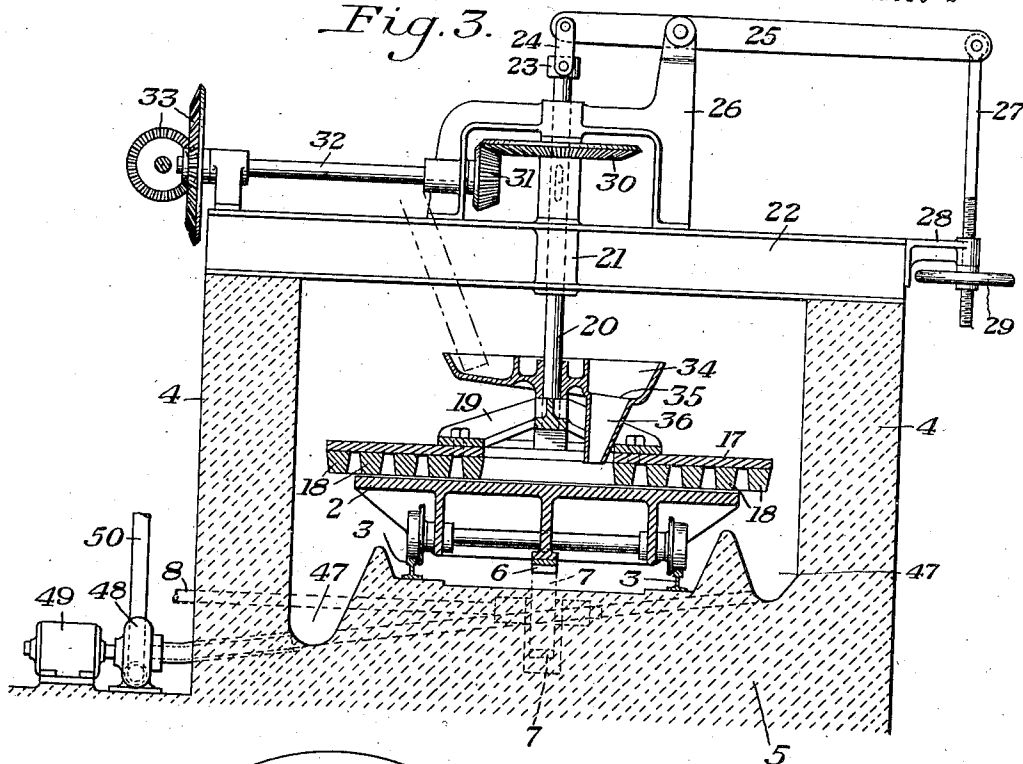
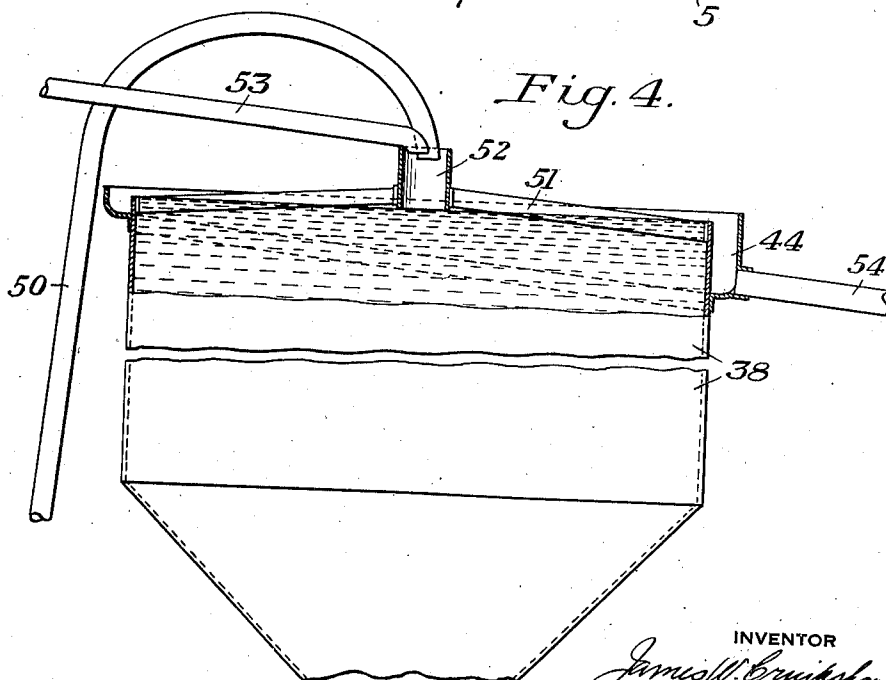


Fig. 4.



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METHOD AND APPARATUS FOR GRINDING GLASS.

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The present invention relates broadly to the grinding and polishing art, and more particularly to the grinding of plate glass.

In the accompanying drawings, there is shown for purposes of illustration only, one embodiment of my invention, it being understood that the drawings do not define the limits of the invention, as changes may be made in the construction and operation therein disclosed without departing from the spirit of the invention or scope of my broader claims.

In the drawings:

Figure 1 is a view partly in elevation and partly in longitudinal vertical section of an apparatus embodying my invention;

Figure 2 is a plan view illustrating a series of tables connected end-to-end and each having a runner positioned above the same;

Figure 3 is a transverse sectional view through the apparatus shown in Figure 1; and

Figure 4 is a fragmentary detail view of one of the tanks.

The apparatus for carrying out my method of grinding may comprise a continuous line of rectangular tables 2 traveling on a track 3 extending between the side walls 4 of a suitable concrete foundation 5. Each table may be provided with a rack 6 on the under side thereof adapted to be engaged by a pinion 7 on a drive shaft 8 driven from a suitable source of power, such as a motor (not shown), whereby the entire line of tables may be caused to travel slowly in the direction of the arrow (Figure 1) under a series of grinding heads 9, 10, 11, 12, 13, 14, 15 and 16.

The tables may be laid with glass at a convenient point and then lifted by an overhead traveling crane and placed one by one on the track 3 at the rear end of the line of tables thereon. After the tables pass under the grinding heads, they may then continue on the track 3 and pass under suitable polishing heads (not shown). In Figure 3 I have shown the pinion 7 and its shaft 8 in dotted lines merely to illustrate the manner of moving the tables, it being understood that the pinion is actually located at some point in advance of the series of grinding heads, so that after a loaded table is placed on the track 3 by the crane

and moved into engagement with the end table of the line of moving tables, its rack will be engaged by the pinion.

Referring to Figure 3, each grinding head comprises a runner embodying a circular disk 17 having iron blocks 18 on the lower side thereof and having a spider 19 secured on the upper side thereof. A vertical shaft 20 extends upwardly from the spider through a bearing 21 in a transverse beam 22 supported on the side walls 4 of the foundation 5. The upper end of the shaft rotates in a collar 23 which is connected by a link 24 with one end of a lever 25. The latter is pivoted intermediate its ends upon a bracket 26 and at its other end is pivoted to the upper end of a rod 27. The lower end portion of this rod is screw threaded and extends through a bracket 28 projecting from the beam 22. A hand wheel 29 is screwed onto the rod and engages the lower side of said bracket. By turning the hand wheel the shaft 20 may be vertically adjusted to cause the runner to apply the desired pressure on the glass during the grinding operation. A bevel gear 30 is mounted on the shaft 20 between the beam 22 and the bracket 26, said gear being engaged by a bevel pinion 31 on a shaft 32 driven from a suitable source of power through cooperating bevel gears 33. An annular trough 34 is carried by the shaft 20 just above the spider 19. This trough has an inclined bottom with an opening 35 at the lowest point thereof and a spout 36 extends downwardly from this opening between the arms of the spider and through a central opening in the runner disk 17.

Above the grinding heads may be located a series of grading tanks 37, 38, 39, 40, 41 and 42. The first tank 37 may be supplied with a mixture of water and coarse sand or other suitable abrasive material through pipe 43. The top of each tank is surrounded by a trough 44 and the lower portion of each tank is funnel-shaped. The coarser particles of sand gravitate towards the bottom of tank 37, while the finer particles of sand remain in suspension in the water and are carried over into the trough 44 by the water which overflows into said trough.

This mixture of water and the coarser particles of sand may be supplied from the tank 37 to the troughs 34 of any number of

grinding heads, as, for example, the first three, 9, 10 and 11, through pipes 45 having suitable valves 46 associated therewith for regulating the supply to each of said grinding heads. The sand and water supplied to these first grinding heads flows over the side edges of the tables moving beneath the heads into sumps 47 at opposite sides of the track 3. The mixture of sand and water may be pumped from these sumps by means of a suitable pump 48, driven by a motor 49, and delivered through a pipe 50 to the top of the next tank 38. It will be apparent that the coarse sand delivered to the first grinding heads will have been broken up into finer particles during the grinding operations performed by these heads.

Referring to Figure 4, which may be considered as a fragmentary sectional view of the second tank, but which is illustrative of each of the several tanks 38, 39, 40, 41 and 42, the top of the tank carries a spider 51 which supports above the center of the tank a short vertical tube 52, the lower end of which preferably terminates in the plane of the upper edge of the tank. The upper end of the pipe 50 extends into the upper end of the tube 52 and the discharge end of another pipe 53 also projects into said tube, said latter pipe extending from the trough 44 at the top of the tank 37, whereby the mixture of water and fine particles of sand overflowing into said trough is discharged into the top of the tank 38.

The coarser particles of the sand supplied to the tank 38 through pipes 50 and 53 gravitate towards the bottom of this tank and the finer particles are carried by the water overflowing the upper edge of the tank, which should be in a perfectly horizontal plane, into the trough 44 at the top of the tank and are delivered through a pipe 54 to the top of the next tank 39. Grinding head 12 is supplied with a mixture of sand and water from the tank 38 through a pipe 55 and this mixture overflows into sumps 56 at the sides of the track 3 and is pumped through a pipe 57 into the next tank 39. In like manner, tanks 39, 40, 41 and 42 supply successively finer grades of sand to the grinding heads 13, 14, 15 and 16 through pipes 58, 59, 60 and 61, the mixtures of sand and water in the sumps 62, 63 and 64 beneath the grinding heads 13, 14 and 15 being delivered to the tops of the tanks 40, 41 and 42 through pipes 65, 66 and 67. Preferably each of the pipes 55, 58, 59 and 60 is supplied with a regulating valve 68. Each of the grading tanks has an ejector or blow-out pipe 69 associated therewith and controlled by a valve 70, the said pipes extending to the bottom portions of their respective tanks. These blow-out pipes are normally closed by their valves, but may be brought into action at any time to loosen

the sand in the bottom of the tanks, in case such sand becomes caked so as to interfere with the operation of the apparatus. Obviously, however, a mechanical cleaner might be employed for this purpose.

It will be seen that by this method of grinding, the grinding done by each grinding head breaks up the sand supplied to that head into smaller particles, so that the sand taken from the sumps beneath such head has a larger proportion of fine sand than the sand that was delivered to that particular head. Furthermore, the finer sand overflowing the horizontal upper edge of each preceding tank of the series of tanks into its overflow trough 44, is discharged into the next succeeding tank. Therefore the sand employed in the successive grinding operations becomes finer and finer, whereby abrasive material of suitable fineness is automatically supplied for such operations.

While I have referred to sand as the abrasive material used, I do not desire to be limited to the use of this abrasive material, as other suitable abrasive materials may be used. Moreover, I may use a set of tanks arranged in series for one kind of abrasive material followed by a second series of tanks for the use and grading of another kind of abrasive material.

The advantages of the present invention arise from the provision of means whereby a plurality of grinding operations requiring successively finer grades of abrasive material may be carried out in a continuous and economical manner.

I claim:

1. The method of grinding glass, which consists in successively moving the glass under a series of grinders, flowing abrasive in water through a series of grading compartments and successively separating coarse and fine abrasive in each compartment, supplying abrasive from successive compartments to successive grinders, and flowing the used abrasive from each grinder into the next succeeding grading compartment.

2. The method of grinding glass by the continuous process wherein the glass is moved under a series of grinders requiring successively finer grades of sand, which consists in grading the sand in a series of compartments, each of which retains the coarser material applied thereto and delivers the finer to the next succeeding compartment, supplying successive grinders with sand from the successive compartments, and flowing the sand from each grinder to the next succeeding compartment, whereby the sand, as it is broken down in the successive grinding operations, travels through successively fewer grading compartments.

3. Apparatus for grinding glass by the continuous process including a series of grinding units using successively finer sand,

a series of grading compartments, each of which receives the overflow from a preceding compartment, means for supplying material to the first compartment, means for
5 delivering graded sand from each compartment to its respective grinder, and means for delivering the used sand from each grinder to the next succeeding grading compartment.

4. Apparatus for grinding glass, comprising a series of grinders, a series of tanks
10 each arranged to supply abrasive material to certain of said grinders, a conveyor for moving the glass to said grinders one after the other, means for conducting the abrasive
15 material from the lower portion of each tank to the grinder or grinders to be supplied

thereby, means for collecting the abrasive material from the grinder or grinders supplied by each preceding tank of the series of tanks and delivering it to the top of the
20 next tank of the series, means for conducting the overflow of finer abrasive material from the top of each tank except the last of the series and delivering it to the next succeeding tank, and means for continuously supplying abrasive material and water to the
25 first tank of the series, substantially as described.

In testimony whereof I have hereunto set my hand.

JAMES W. CRUIKSHANK.