April 2, 1935. W. G. ELY, JR 1,996,369

PROCESS FOR SURFACING PLATE GLASS

Filed Aug. 16, 1934 2 Sheets-Sheet 1

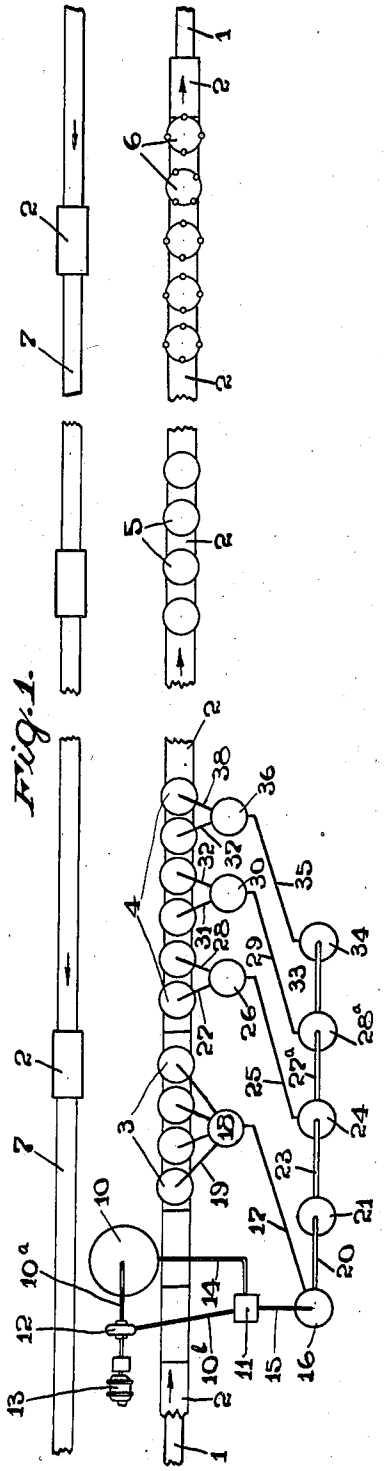


Fig. 1.

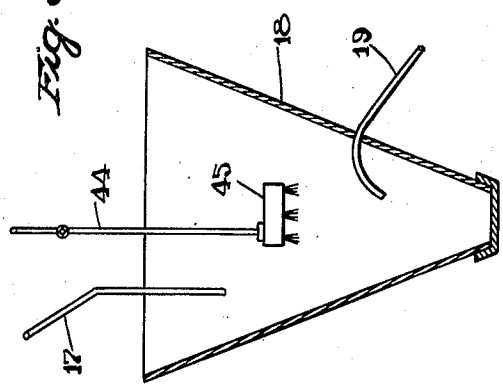


Fig. 3.

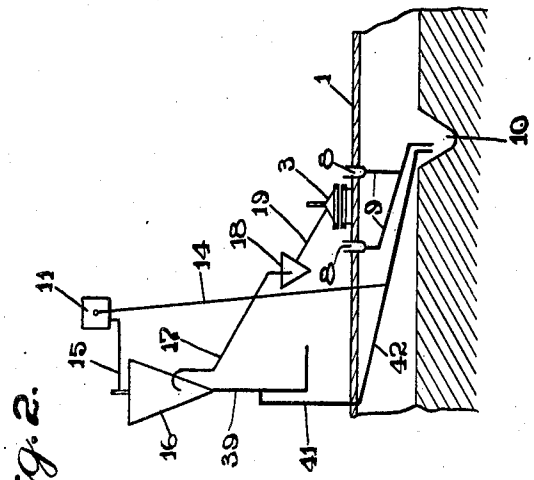


Fig. 2.

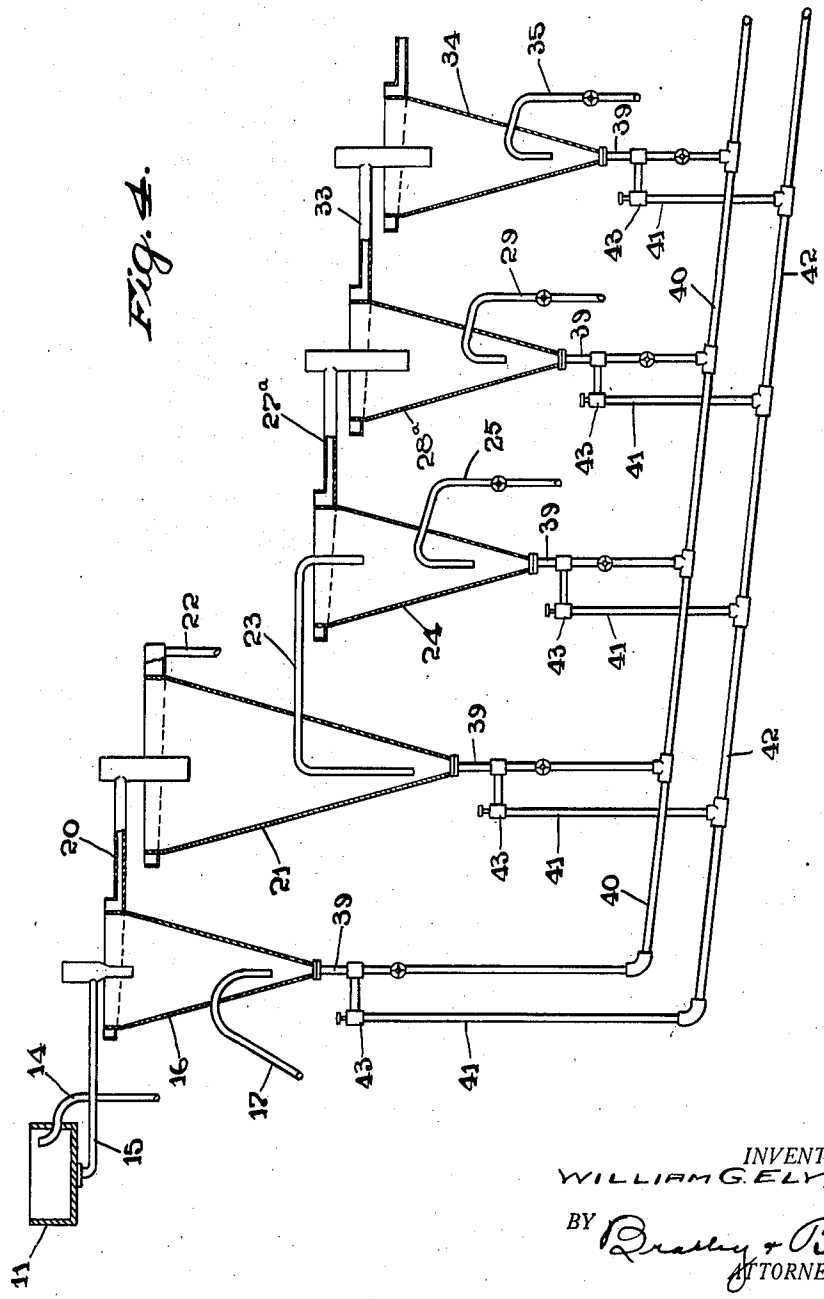
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Fig. 4.



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PROCESS FOR SURFACING PLATE GLASS

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Application August 16, 1934, Serial No. 740,088

2 Claims. (Cl. 51—278)

The invention relates to a process for surfacing plate glass in the so-called straight away process, such as that of the Fox Patent No. 1,554,804, in which the glass plates or sheets are carried upon the tops of cars or tables which form a train moved continuously beneath a series of grinding and polishing machines, the tables being returned to the grinding end of the system where the sheets are removed and new sheets are applied. During the travel of the tables, the plates are first subject to grinding with coarse sand (mixed with water) followed by grinding with finer and finer grades of sand and emery (also mixed with water), after which they are polished. During the polishing operation, considerable heat is developed by the friction of the polishing pads on the glass, so that the tables at the beginning of the next operation have a temperature substantially above atmospheric temperature, often well above 100 degrees F. During the rough grinding operation, the application of the water carrying the coarse sand cools the tops of the tables rapidly, and as a result the tops warp upward at the corners. It follows that the plates are ground down more at the corners than at the middle portions. During the subsequent grinding and smoothing with finer sand and emery, the tables gradually assume a more uniform temperature throughout, and the tops flatten out, so that the smoothing action of the abrasive (comprising the fine grades of sand and the emery) at the corners of the glass plates, which are now at a lower level than the middle portions, is substantially less than at such middle portions. When the sheets are polished, therefore, the corners (due to their poor "smooth") have a polish which is inferior to that of the body of the sheet, thus reducing the value of the product.

The object of the present invention is to overcome the difficulty above explained, and briefly stated, this is accomplished by heating the water with which the coarse sand for the rough grinding or facing operation is mixed. This is preferably done by supplying steam to the distributing cone from which the coarse sand is fed to the tables, although the same result may be accomplished by preliminarily heating the water supplied to the cone by any suitable means, or by heating the mixture of abrasive and water as it passes through the conduit leading from the cone to the rough grinding machines. The application of heat to the glass in this manner prevents the table tops, to which the heat is transmitted from the glass, from cooling at too rapid a rate as compared with the underframing or ribbed body portions with which the top is ordinarily integral, and as a result the tops of the tables remain relatively flat during the rough grinding (facing) operation, thus insuring a grinding finish or smooth at the corners and edges of the glass plates which is comparable to that of the central portions of the plates.

The grading water which supplies the finer grades of sand and emery is also ordinarily heated to temperatures of about 75 degrees F., but this is primarily to improve the separation of the grades of abrasive in the graders, and is not an essential in so far as the present invention is concerned. Apparatus for practicing the invention is illustrated in the accompanying drawings, wherein:

Figure 1 is a diagrammatic plan view showing the apparatus in a simple form. Fig. 2 is a diagrammatic vertical section. Fig. 3 is a detail sectional view on an enlarged scale through the coarse sand distributing cone to which the heat is supplied. And Fig. 4 is a side elevation on an enlarged scale partially in section of the grading apparatus. It will be understood that in apparatus as actually installed and used, the number of grinding and polishing machines is multiplied several times over and that a larger number of grading cones are used than are shown.

Referring to the drawings, 1 is a track on which are mounted a series of tables or cars 2 which constitute a continuous train and carry on their upper surfaces the glass sheets to be surfaced. These cars are moved continuously to the right, as indicated by the arrows, to carry them beneath the series of grinders and polishers. 3 are the facing grinders to which a mixture of coarse sand is supplied of finer and finer grades; 5 are the grinders to which emery is supplied with water to give the glass its final "smooth"; and 6 are the polishers which are supplied with a mixture of rouge and water in order to give the final finish to the glass. After the tables emerge from beneath the polishers at the right-hand end of the track 1, they are transferred to a return track 7, which is parallel to the track 1, this transfer operation being accomplished by means of transfer cars which are not shown. The cars or tables are then moved to the left along the track 7 until they arrive at the left-hand end of the tracks 1 and 7 where they are transferred by transfer cars back to the tracks 1. During this return movement of the cars, the glass sheets are removed and fresh sheets of unpolished glass are secured to their top surfaces, the cars then being attached to the train on the track 1 at the left hand end thereof.

As indicated in Fig. 2, troughs 8 are provided at the sides of the track 1 for collecting the mixture of abrasive and water which drains from the tables during the operation. This is returned through pipes 9 to a sump 10 from which it is pumped through the pipes 10a and 10b (Fig. 1) to the sand box 11 by means of the centrifugal pump 12 operated by the electric motor 13. The sand box has an overflow pipe 14 leading back to the sump and a discharge pipe 15 leading into a grading cone 16. Leading from the bottom of this cone is a pipe 17, which discharges into the distributing cone 18. The sand thus supplied is the coarsest in the system and is employed in the facing operation. The pipes 19 lead from the lower portion of the cone 18 to the facing grinders 3, the discharge of the water and abrasive being preferably at the center of the runners or grinders in order to insure a distribution of the abrasive over the surface of the glass sheets on the tables 2. The overflow from the cone 16 carrying the finer grades of sand discharges through the conduit 20 to the top of the dewatering cone 21 having an overflow 22 leading to the sewer, the purpose being to remove the excess water in the mixture and thus thicken it. A pipe 23 leads from the lower portion of this cone into the grading cone 24. This cone discharges through the pipe 25 to a distributing cone 26 similar to the cone 18 heretofore described. Two discharge pipes 27 and 28 lead to the first two of the fine sand grinders 4.

The cone 24 has an overflow outlet 27a discharging to the grading cone 28a, and this grading cone 28a has an outlet pipe 29 leading to the distributing cone 30. Such cone 30 has two outlet pipes 31 and 32 leading to the second pair of fine sand grinders. The cone 28a has an overflow passage 33 leading to the grading cone 34, and such grading cone 34 has a discharge pipe 35 leading to the distributing cone 36, such cone having a pair of discharge passages 37 and 38 leading to the third pair of fine sand graders.

Each of the cones 16, 21, 24, 28a and 34 has a pipe 39 leading into its lower end and connected to a pipe 40. This pipe leads to a pressure main and in the operation of the apparatus, a regulated flow of water occurs upward through the bottom of each cone to give the necessary grading action. Other pipes 41 lead from the pipes 39 to a pipe 42 which discharges to the sump or to the sewer. This provides for drainage when it becomes necessary to clean out the cones, suitable valves 43 being provided in the pipes 41 which normally close such pipes. It will be understood that the cones 24, 28a and 34 supply finer and finer sand to the grinding runners 4 to progressively smooth the glass, this being old and well known in the art.

The grading system as just described is illustrated in very simple, abbreviated form, being disclosed in detail in the Parkinson and Gelstharp Patent No. 1,914,039, there being nothing novel in this grading apparatus or the grinding system as so far described in so far as the present application is concerned.

The feature of novelty in the apparatus is shown in Fig. 3, wherein the coarse sand distributing tank 18 is shown as provided with a steam pipe 44 terminating in a perforated head 45. During the operation of the apparatus, steam is supplied to the mixture of coarse sand and water in the cone so as to raise the temperature of the water substantially above atmospheric temperature. The temperature to which the water is raised will vary depending upon conditions, but for the purpose of example, it may be stated that it ranges ordinarily between 115 and 125 degrees F. As heretofore pointed out, the application of this heated facing mixture to the glass on the tops of the tables prevents the tops from cooling during this period of operation more rapidly than the body portions so that their corners lie in a plane above their central portions. The upper faces of the glass sheets as they pass beneath the facing runners 3 are, therefore, substantially flat and receive the same amount of grinding at the corners of the sheets as at their central portions. When these sheets of glass pass beneath the fine sand graders 4, they are smoothed to substantially the same extent throughout their upper surfaces. This condition is maintained as the glass plates are passed beneath the emery grinders and are smoothed to the last degree possible preliminary to the polishing operation. Since the glass sheets have a uniform smooth throughout their areas when they reach the polishers, such polishers act to give a uniform polishing over the sheets, and if any portions such as the extreme corners are lacking in a perfect polish, such portions are reduced to a minimum, thus avoiding the difficulty heretofore explained as to poorly polished corners and reducing the loss incident to this trouble to a minimum.

What I claim is:

1. In the process of surfacing plate glass, which comprises carrying the glass plates on tables in a continuous train beneath surfacing means including facing grinders supplied with a mixture of coarse abrasive and water, finishing grinders supplied with mixtures of water and finer and finer abrasive and polishers, removing the glass sheets from the tables after they pass the polishers, returning the tables to the train at the front end thereof and applying glass plates to be surfaced thereto, the step which consists in heating the grading water which supplies the coarse abrasive beneath the facing grinders to a point substantially above table temperature.

2. In the process of surfacing plate glass, which comprises carrying the glass plates on tables in a continuous train beneath surfacing means including facing grinders supplied with a mixture of coarse abrasive and water and finer and finer abrasive and polishers, removing the glass sheets from the tables after they pass the polishers, returning the tables to the train at the front end thereof and applying glass plates to be surfaced thereto, the step which consists in heating the grading water which supplies the coarse abrasive beneath the facing grinders to a point which will prevent any substantial warping of the tops of the tables during the facing operation.

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