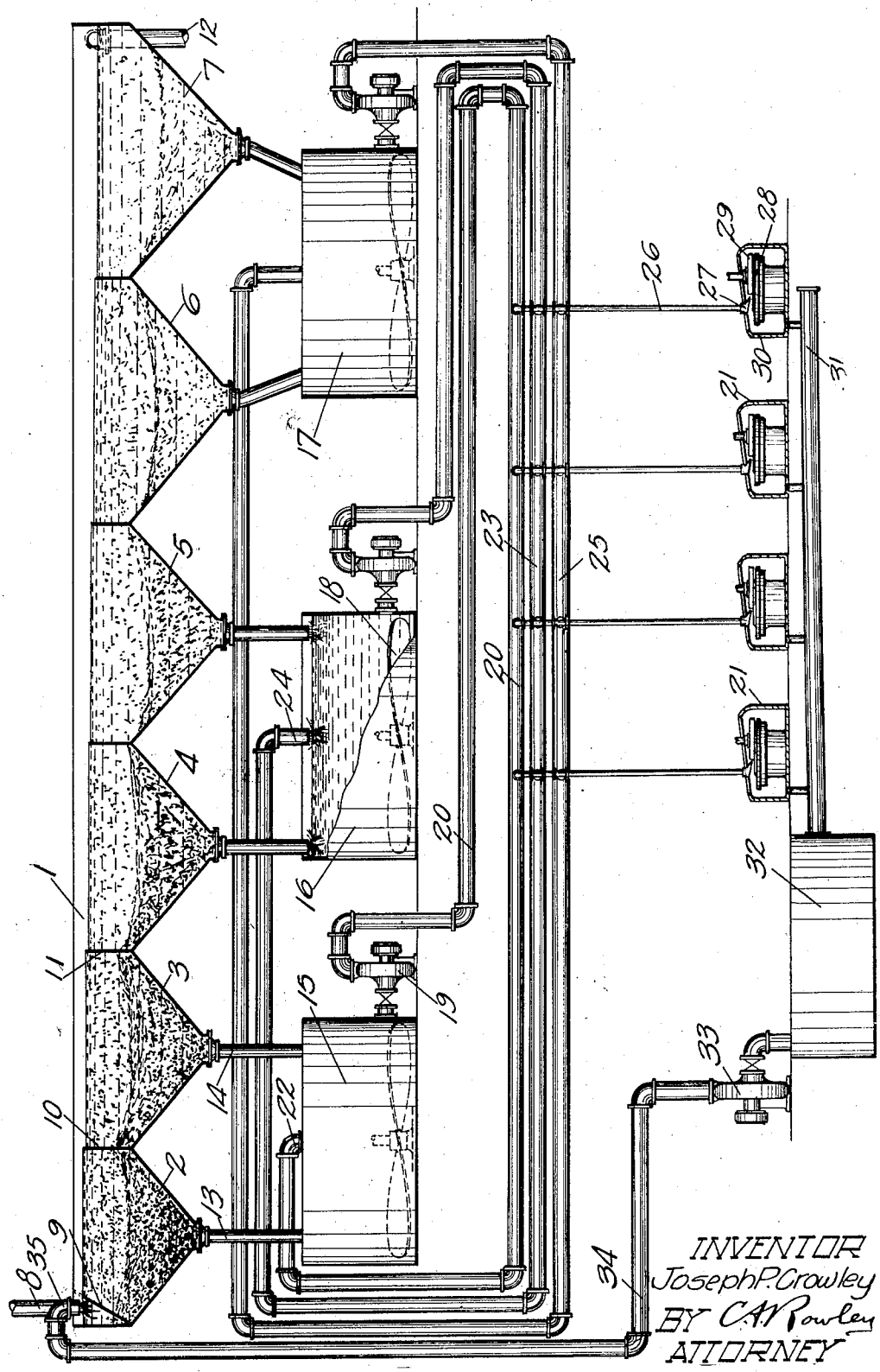
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GRINDING PLATE GLASS

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GRINDING PLATE GLASS

Application filed April 10, 1924. Serial No. 705,449.

This invention relates to the art of grinding plate glass, and more particularly to a new and improved abrasive mixture and a continuous process for grading the same.

According to this invention a mixture of substantially pure silica-sand and crystalline garnet, suspended in water, is first passed through a grading apparatus of the flotation type wherein the materials settle out in a series of distinct grades which are drained off into suitable storage receptacles. These different grades of abrasive are maintained in suspension in the storage receptacles and a continuous circulation system which carries the abrasive past the several grinding machines, and portions of the several grades, successively from coarse to fine, are drawn from these circulating systems and fed to the contacting surfaces of the glass sheet and the grinding tool. The used material is collected and pumped back to the grading system where it is regraded and returned to the circulating system. The harder and heavier garnet, which does the greater part of the cutting in the first coarse grinding process, will be deposited in the heavier grade of abrasive, whereas the softer and finer sand will predominate in the finer grade used for the smoothing process. In this way the entire grinding operation is carried out rapidly and efficiently and a very smooth finish obtained on the glass plate. If the abrasive materials are first mixed in the proper proportions and fed to the grading apparatus, the continuous grading process will be carried out automatically and the respective material distributed to the best advantage in the several grades of abrasive mixture.

The invention will be more clearly understood from the following detailed description of one typical system for grading and supplying this improved abrasive mixture to a series of grinding machines.

The accompanying drawing shows diagrammatically a grading and abrasive feeding system adapted to continuously supply the abrasive mixture to a plurality of grinding machines.

At 1 is shown a grader of the flotation type comprising a series of separate compartments 2 to 7 respectively, the abrasive materials mixed with water being fed into the first compartment 2 through a feed pipe 8. A screen 9 below the pipe 8 serves to remove any excessively large-grained materials that may have found their way into the mixture. The mixture in receptacle 2 flows over the partition 10 into the receptacle 3 wherein the glass level is slightly lower than in the first receptacle 2. In the same manner the mixture in compartment 3 flows over partition 11 into compartment 4 and so on throughout the series. The larger grained and heavier materials will settle out in the first tank 2, the next heaviest materials will settle out in compartment 3 and so on, the finest material suitable for use settling in the last compartment 7. The excess water and suspended materials too fine for abrading purposes will pass out through the overflow pipe 12. It is to be understood that although six compartments are here shown, this number is merely illustrative and that any desired number might be used.

In the present mechanism three grades of abrasive are used in the grinding process. The materials deposited in the first two receptacles, numbered 2 and 3 respectively, are drained off through pipes 13 and 14 into a storage reservoir 15. In the same way the material from tanks 4 and 5 is collected in a reservoir 16 and the finest material from tanks 6 and 7 is collected in reservoir 17. Sufficient water is added in each reservoir to bring the mixture to the proper consistency, and a constantly driven agitator 18 is provided to keep the material in the reservoir in suspension.

By means of a suitable pump 19 the heaviest grade of abrasive in tank or reservoir 15 is forced through a pipe line 20 which extends past each of a series of grinding machines 21. The unused abrasive in pipe 20 flows back and is discharged into the top of tank 15 as at 22. In an exactly similar manner the medium grade of abrasive in tank 16 is forced through pipe line 23, the unused abrasive being discharged back into tank 16 at 24. In the same manner a supply of the finest grade of abrasive from reservoir 17 is maintained in the pipe line 25.

A supply pipe 26 has valved connections at its upper end with each of the circulation pipes 20, 23 and 25, and at its lower end is adapted to discharge the abrasive mixture from a spout 27 onto the upper face of the glass sheet 28 beneath the grinding tool 29. The unused abrasive thrown off from the rotating sheet and grinding tool, as well as the used abrasive which has been reduced in size by the grinding process, is collected in the housing 30 and drained through pipe 31 into a sump 32. From this sump the abrasive mixture is lifted by pump 33 through pipe 34 and discharged into the grading tank 2 at 35 along with the new abrasive that may be added through feed pipe 8. This used abrasive then passes through the series of grading tanks and is properly distributed to the several reservoirs 15, 16 and 17.

The grading and feeding system briefly described above is disclosed more in detail and claimed in my copending application, Serial No. 682,495, filed December 24, 1923.

According to the present invention a mixture of silica-sand and crystalline garnet, in approximately the proportions of ten parts sand to one part garnet, are mixed with water and fed through pipe 8 to the grading mechanism. The garnet should be of a grade that will pass through a 150 mesh screen. The principal function of the garnet is to perform the rough grinding operation. The sand should be no heavier than will pass through a 150 mesh screen, and a large proportion of it will be much finer than this. The sand used is substantially pure silica-sand, which has a hardness sufficient to perform the final smoothing process without the aid of any harder abrasives such as emery or garnet. This sand performs the double function of operating as a cushioning medium for the garnet during the rough and intermediate grinding operations, and serves as the main abrasive agent in the final smoothing process.

Since the garnet has a relatively high specific gravity, a large proportion of the garnet will settle out in the first grading tanks, and a very small proportion, and that of the finest grade, will pass through the series to find its way into the mixture used for smoothing purposes. The heavy sand will settle out in the first tanks, and at the same time a large amount of the fine sand will be carried down in these first tanks by the heavier garnet crystals. In this way the abrasive mixture in tank 15, used for the rough grinding process, will contain most of the garnet, all of the heavy sand and a large proportion of lighter sand. The medium grade of abrasive in tank 16 will consist of the intermediate grades of sand, with a small percentage of the finer garnet. The finest abrasive, in tank 17, used for the final smoothing process, will be nearly all sand of exceedingly fine grains.

The garnet crystals are harder and sharper than the sand and more efficient for cutting away the glass in the first rough grinding process. At the same time the sand in the mixture will act as a cushioning agent between the grinding tool and the glass to prevent the garnet crystals from grooving the glass too deeply. This cushioning action of the sand will be especially effective in the intermediate and final grinding processes where it is quite important to prevent the scoring of the sheet which would take place if the harder garnet crystals were used alone. In systems where garnet or other hard abrasives are used for the final smoothing process, it is necessary to use a very accurate grading process to prevent any large grains of garnet from finding their way into the smoothing abrasive, and also to supply a very small quantity of this abrasive to the apparatus, otherwise the surface of the glass will become scratched or scored and the sheet ruined. In the present process the use of a large quantity of very fine silica-sand for this smoothing abrasive will quickly and effectively perform the smoothing operation and at the same time protect the glass from any garnet particles that may find their way into this mixture, and serve as a cushion between the tool and the glass sheet to prevent the too rough grinding action of this garnet. This smoothing mixture may be freely applied to the glass sheet without danger of injuring the same.

It will be seen that with this system the rapid grinding action of the garnet, and the less violent smoothing action of the sand are distributed through the different stages of the grinding process so as to obtain the most effective results. The proper sorting of the material takes place automatically, and the different grades of material may be fed freely to the apparatus without any intermediate washing processes, and the total grinding time will be much shorter than would be the case if either material were used separately or if the two materials were fed separately to the machine at different stages of the grinding process.

Claims:

1. In the art of grinding plate glass, the process of rough-grinding the sheet with a mixture of crystalline garnet and silica-sand, the sand serving as a cushion to control the abrasive action of the garnet, and then smoothing the sheet with fine silica-sand, grading the mixture by a settling process, whereby the coarser grades contain most of the garnet, the grinding and smoothing abrasives both being obtained from the same continuous grading process.

2. In the art of grinding plate glass, the process of suspending a mixture of silica-sand and garnet in water, grading the mixture by a settling process, and successively

feeding the grades, from coarse to fine, to a grinding mechanism.

3. In the art of grinding plate glass, the process of suspending a mixture of silica-sand and garnet in water, grading the mixture by a settling process whereby the greater portion of the garnet is contained in the coarser grades, successively feeding the grades, from coarse to fine, to a grinding mechanism, collecting the used abrasive and returning it through the grading process.

4. In the art of grinding plate glass, the process of suspending a mixture of silica-sand and garnet in water, grading the mixture by a settling process, whereby the coarser grades contain most of the garnet, and successively feeding the grades, from coarse to fine, to a grinding mechanism.

5. In the art of grinding plate glass, the process of suspending a mixture of silica-sand and garnet in water, grading the mixture by a settling process whereby the greater portion of the garnet remains in the coarser grades, again suspending each grade of the mixture in water and maintaining it in suspension by agitation, successively feeding some of each grade, from coarse to fine, to the grinding mechanism, collecting the used abrasive and returning it to the grading process.

Signed at Toledo, in the county of Lucas and State of Ohio, this 7th day of April, 1924.

JOSEPH P. CROWLEY.