J. W. CRUIKSHANK.

APPARATUS FOR SUPPLYING AND GRADING ABRASIVES TO GLASS GRINDING MACHINES.

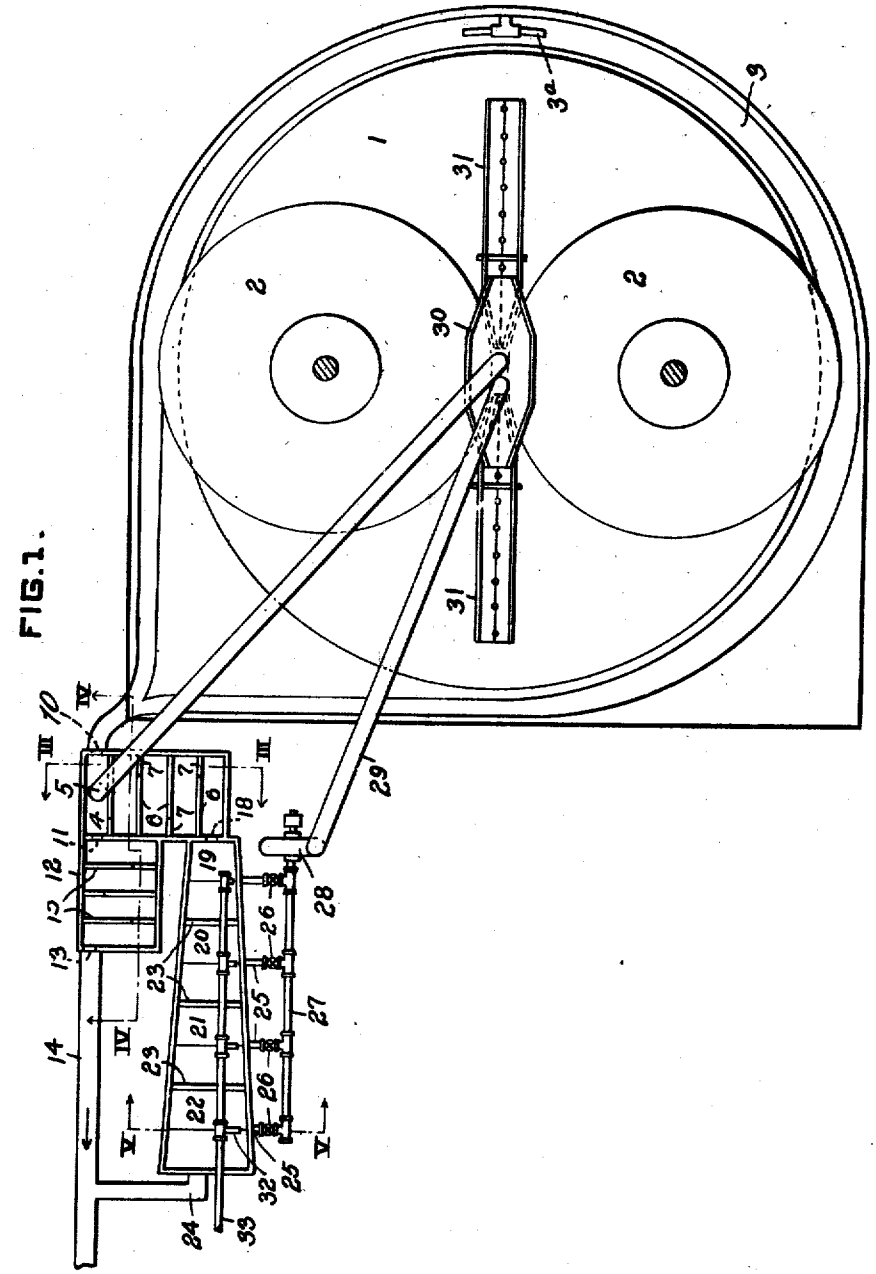
APPLICATION FILED NOV. 3, 1916.

1,343,710.

Patented June 15, 1920.

2 SHEETS—SHEET 1.

FIG. 1.



WITNESSES

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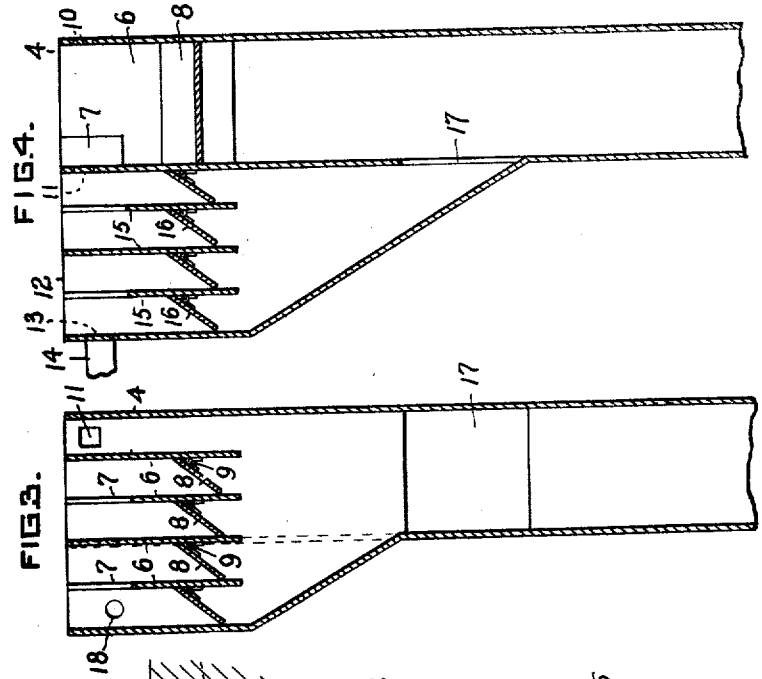


FIG.4.

FIG.3.

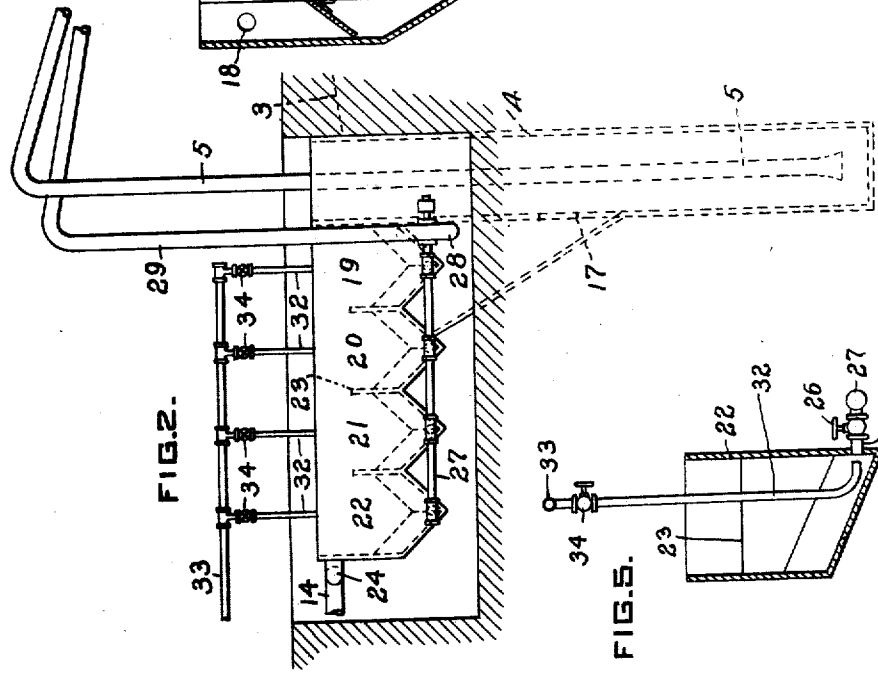


FIG.2.

FIG.5.

WITNESSES

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APPARATUS FOR SUPPLYING AND GRADING ABRASIVES TO GLASS-GRINDING MACHINES.

1,343,710. Specification of Letters Patent. Patented June 15, 1920.

Application filed November 3, 1916. Serial No. 129,262.

To all whom it may concern:

Be it known that I, JAMES W. CRUIKSHANK, resident of Pittsburgh, county of Allegheny, State of Pennsylvania, have invented a new and useful Apparatus for Supplying and Grading Abrasives to Glass-Grinding Machines, of which the following is a full, clear, and exact description.

The invention has for its object improvements in apparatus for supplying, feeding and grading sand to plate glass grinding machines. Heretofore in apparatus of this kind the grading has been uncertain and unstable in that there have been no positive means for producing a constant flow of abrasive and water through the grading apparatus independently of the varying conditions of flow in the preliminary tank due to the varying amounts of water supplied to the grinding apparatus and the varying conditions of operation. In the apparatus which is the subject of this application positive means are provided by which a constant flow of water carrying the abrasive is maintained at all times, irrespective of disturbing influences which arise from the altering conditions of the process. At times in the process of grinding coarse abrasive is fed direct to the utilizing apparatus and at other times the stoppage of this supply of coarse material causes a varying outflow from the grading apparatus, from the pit or that part of the apparatus in which the coarse sand is manipulated.

A further object of the invention is to obtain economy in the use of abrasive, heretofore the amount of abrasive used for the grinding process when mechanically applied has been excessively large due to losses of sand through the overflow of the preliminary tank in the class of apparatus in which there is a direct connection from the preliminary grading tank to the sewer, the extra cost of the material to a large extent nullifying the advantages obtained from the mechanical and quick return of the abrasive to the utilizing apparatus. This was due largely to the escape of sand from the overflow of the sump pit and grader. By returning the overflow from the grader to the grinder ditch some of the sand was reutilized but the principal loss was from the overflow from the preliminary grader or sump pit.

A further object of my invention is to obtain a uniform grade of fine sand and to prevent coarse sand from passing from the sump pit into the grading apparatus. It is a well known fact in the art that all the coarse sand applied to the table cannot be reduced to fine sand in one operation as a large amount of the coarse sand is continually thrown off from the table and passes through the spaces between the iron runner bars with which the grinder runners are covered. These bars are usually blocks about 2½″ wide x 5″ long and they are put on so that there is a space between each bar of 2½″ with an end space of about the same dimension. It will readily be seen that a large proportion of the sand will pass off the grinding table without touching the runner bars, and that this sand will be returned to the sump pit at the end of the rough grinding process. Moreover after the roughgrinding is finished and the process has been commenced of applying fine sand, there will be a certain amount of the coarse sand remaining in the ditch surrounding the machine, which will be washed down into the grading apparatus some time after the stoppage of the application of the coarse sand to the machine. This coarse sand has a tendency to find its way into that part of the apparatus which is used for grading the fine sand, which will cause scratches on the glass. In my apparatus I provide means so that this coarse sand will not be able to enter the fine sand grading boxes.

Referring to the drawings:

Figure 1 is a plan view of the apparatus.

Fig. 2 is an elevation of the sand feeding and grading apparatus.

Fig. 3 is a sectional view of line III—III, Fig. 1.

Fig. 4 is a sectional view of line IV—IV, Fig. 1.

Fig. 5 is a detail section on line V—V, Fig. 1.

The numeral 1 represents the usual plate glass grinding table having runners 2 surrounded by a ditch 3 with a water supply pipe 3ª leading to a pit 4 in which is installed an air lift pump 5 of a suitable construction but preferably of the type illustrated in my Patent No. 1,089,909. 6 are vertical partitions having openings 7; partitions 8 are attached to them by hinges 9. 10 is the inflow

opening from the ditch, 11 the outflow which leads to an auxillary box 12 which has an overflow 13 to the sewer 14 and is provided with vertical and hinged partitions 15 and 16 of the same construction as those in tank 4. Box 12 communicates by opening 17 with pit 4. Overflow opening 18 leads to a grader consisting of boxes 19, 20, 21, and 22 which have partitions 23 and are provided with an outlet 24 to the sewer 14. Connected to the bottom of the grading boxes 19, 20, 21, and 22 are pipes 25 provided with valves 26, connected to a manifold pipe 27 which leads to a pump 28 having an outlet pipe 29 which leads to a hopper 30 which supplies the sand to the grinding table by means of adjustable spouts 31 of the form shown in Patent No. 1,063,434. 32 are water lines supplying water to each separate grading box 19, 20, 21 and 22 connected to a water supply line 33 controlling valves 34.

The operation is as follows: The grinding table 1 is put in motion and fresh coarse sand is supplied to it by any suitable means. It may be deposited in the pit 4 and fed to the table 2 by the pump 5 or preferably it may be fed directly to the table from a bin placed above, water being used to wash it down. This sand is thrown off from the table 1 and is collected by the ditch 3 and washed down to the pit 4 by water supplied from the pipe 3^a. After a certain amount of rough grinding has been done by the new sand the pump 5 is started, if it is not already used for supplying coarse sand, and returns the rough sand now accumulated in the pit 4 to the table. During this part of the operation water carrying sand is flowing through the openings 7 in the partition 6 toward the outlet 18 to the sand grading boxes 19, 20, 21, and 22. This outlet 18 is of fixed size at a predetermined level below the bottom of the overflow 11 and so proportioned that it will flow full at all times from the excess water supplied by the ditch pipe 3^a. If there is surplus water at this stage of the operation it will overflow into box 12 through the overflow 11 and neither the constant flow nor the head of water from the opening 18 will be disturbed.

As the sand passes in its course through the opening 7 through the channels formed by the partitions 6, the coarser sands will be deposited between these partitions and will accumulate in the V shaped spaces formed by the inclined partitions 8. These inclined hinged partitions 8 are constructed of material of less specific gravity than water for example light wood, or of sheet metal constructed with an air space inside, or I may provide cork or hollow floats under them so as to keep them in the position shown tending to keep them closed. When there is a certain accumulation of sand in a space the weight will cause the partition 8 to open and the sand will be redeposited into the lower portion of pit 4, where it will be available to be returned to the grinding table. Occasionally this sand will stick which will necessitate its being pushed through with a pole. While some of this sand is fine it will contain a certain amount of coarse sand which would otherwise pass through the opening 18 into the grading boxes. It will be noted that the grades of sand deposited between the partitions 6 are available for inspection and that should there be too much fine sand deposited, the top portion of one or more of the partitions 6 may be removed so that the sand will have a more direct course toward the opening 18. The inclined partitions 8 have a further use in preventing any flow from the intake opening 10 to the opening 18 other than over the top and through the openings 7, whereas without these valvular partitions the current would short circuit and coarse grains would be carried upwardly to the opening 18.

The abrasive carried by the water that passes through the opening 18 into the boxes 19, 20, 21 and 22 over the partitions 23 which are preferably at the same height, is deposited in successively finer grades in these boxes. The boxes 19, 20, 21, and 22 are made successively wider in form so that the current in 19 is swifter than in 20, and becomes slower in each box, so that independently of the principle of the carrying capacity of a horizontal stream of water, the form of these grading boxes will insure a more uniform grade of sand than if the sides were parallel. The bottom of the boxes is V shaped and inclined toward the outlet pipes 25 so that the sand and water can be readily discharged from the boxes through the pipes into the manifold 27. In order to facilitate the flow of abrasive from the grinding boxes, water is supplied through the pipes 32. The flow from each box is controlled by the valves 25 which are successively opened as the grades of sand are required, the pump 28 supplies the fine sand by means of pipe 29 to the grinding apparatus.

When the operation of supplying comparatively rough sand from the pit 4 to the grinding machine is finished and the finer sands are being supplied from the grading boxes, the water from the ditch pipe 3^a will still be running and as the pump 5 is stopped all the water carrying abrasive must now pass out through the openings in the top of pit 4. As the opening 18 is limited in size, the surplus water will rise and pass out through opening 11 to box 12 which is provided with vertical partitions 15 and inclined partitions 16 similar to sump pit 4, the operation of which has been previously described. At this time as at all other

times during the grinding operation the surplus water passes through this box 12 and the utilizable sand is all deposited between the partitions 15 so that there is no waste of abrasive by its being carried by the overflow 13 into the sewer 14. When there is sufficient weight of sand deposited between the partitions the inclined part 16 will open and the sand will fall back to the bottom of the sump pit 4 through the opening 17 where it is available to be redelivered to the grinding table. The finer sands which are in circulation at this period of the operation will find their way back into pit 4 and will pass to the grading boxes 19, 20, 21, and 22 or if caught in the pit 4 will be supplied to the table and regraded in the next coarse sand operation. It has been found that during one operation of the grinding a side of glass insufficient fine sand is deposited but with the sand available from the last operation there will be sufficient accumulation of fine sand for the smoothing or finishing process.

The drawings show the preferred form of my apparatus, but it is understood that I may make any changes without departing from the spirit of my invention and that it is not necessary to employ the exact number of grading boxes and partitions as shown and that I may use other forms of pumps than those shown or may elevate the grading tanks above the level of the grinding machine and supply the abrasive to the table by gravity. I may modify the construction at the top of the receiving pit and use other forms of baffle plates with the object of settling the coarser sand out of suspension.

I claim—

1. In a grinding and smoothing mechanism using an apparatus for supplying and grading with water an abrading material, the combination of a collecting receptacle in position to receive the abradant material and water discharged from the grinding mechanism, said receptacle having at its intake portion a plurality of preliminary grading devices through which the said material passes into said receptacle and which separate and deliver the coarser material into the receptacle, and a secondary grader arranged to receive a constant volume of flow from the preliminary grading devices, substantially as described.

2. In a grinding and smoothing mechanism using an apparatus for supplying and grading with water an abrading material, the combination of a collecting receptacle in position to receive the abradant material and water discharged from the grinding mechanism, said receptacle having at its intake portion a plurality of preliminary grading devices, consisting of downwardly extending partitions forming compartments, means whereby said compartments are caused to discharge into said receptacle, and a secondary grading receptacle having an inflow passage leading from the upper portion of the preliminary grader, substantially as described.

3. In a grinding and smoothing mechanism using an apparatus for applying and grading with water an abrading material, a tank to receive the abrasive and water from the collecting ditch of the grinding mechanism and a secondary grader, an outlet at the top connecting to the secondary grader, a collecting tank connected to an overflow of the receiving tank above the level of the outlet arranged to return abrasive from the bottom of it to said receiving tank, substantially as described.

4. In a grinding and smoothing mechanism using an apparatus for applying and grading with water an abrading material, a collecting tank provided with means for removing the abrasive and water from the bottom of the tank, a secondary grader to which the abrasive and water are discharged through an opening of limited and fixed size from the collecting tank, means for settling out of suspension the coarser abrasive in the collecting tank before it enters the secondary grading tank, substantially as described.

5. In a grinding and smoothing mechanism using an apparatus for applying and grading with water an abrading material, a receiving pit, with connection to a secondary grading tank having a horizontal flow with walls converging toward its inlet so that its separate collecting chambers become successively wider, substantially as described.

6. In a grinding and smoothing mechanism using an apparatus for supplying and grading with water an abrading material, the combination of a collecting receptacle in position to receive the abradant material and water discharged from the grinding mechanism, said receptacle having at its intake portion a plurality of preliminary grading devices through which the said material passes into said receptacle and which separate and deliver the coarser material into the receptacle, and a grading tank having a gravity flow connection with the upper portion of the collecting tank, said grading receptacle being arranged to have a substantially horizontal flow therethrough, and having means which act to cause such flow to decrease in velocity from its receiving toward its discharge end, and other means whereby said flow is caused to be substantially constant in volume, substantially as described.

7. In a grinding and smoothing mechanism using an apparatus for applying and grading with water an abrading material,

a pit which receives the abrasive and water from the grinding mechanism, a grading tank, the pit having an outlet, of an area so proportioned that the flow through it will be less than the flow received from the grinding mechanism, leading to the top of the grading tank; and provided with an overflow opening at a predetermined level above the outlet to the grading tank, so as to produce a constant head and pressure through the outlet and through the grading tank continuously through the entire grinding operation, substantially as described.

8. In a grinding and smoothing mechanism using an apparatus for applying and grading with water an abrading material, the combination of a primary grader, a secondary grader means for delivering the abrasive and water from the top of the primary grader to the secondary grader, vertically extending partitions in the primary grader forming canals through which the abrasive and water is forced to travel horizontally, bottoms movably mounted so that the abrasive deposited in the canals will be discharged back into the primary grader, substantially as described.

9. In a grinding and smoothing mechanism using an apparatus for applying and grading with water an abrading material, a primary grader comprising a receiving pit and a collecting tank, the receiving pit having an inlet from the collecting ditch of the grinding mechanism, and an overflow from its top for the surplus water to the sewer, the collecting tank interposed between said overflow and the sewer, a return conduit for the abrasive from the bottom of the collecting tank to the receiving pit, means for removing the abrasive from the bottom of the receiving pit to the grinding mechanism, substantially as described.

10. In a grinding and smoothing mechanism using an apparatus for applying and grading with water an abrading material, a primary grading pit provided with an inlet from the collecting ditch of the grinding mechanism and an outlet at the top, vertically extending partitions between the inlet and the outlet forming canals through which the water and abrasive is forced to travel horizontally, bottoms movably mounted at the lower ends of the partitions for the discharge of the deposited abrasive to the bottom of the pit, means for removing the abrasive from the bottom of the pit, substantially as described.

11. In a grinding and smoothing mechanism using an apparatus for applying and grading with water an abrading material, comprising the combination of a preliminary grading tank and a grader, the preliminary grading tank having an outlet of limited size connecting to one end of the grader, the grader having walls horizontally converging toward its inlet and divided by vertical cross partitions into separate collecting chambers, comprising means for producing a horizontal flow of constant volume and progressively decreasing velocity, means for removing the abrasive from the collecting chambers, substantially as described.

12. In a grinding and smoothing mechanism using an apparatus for supplying and grading with water an abrading material, the combination of a collecting receptacle in position to receive the abradant material and water discharged from the grinding mechanism, and a horizontal flow grading tank having a gravity flow connection of constant limited area with the upper portion of the collecting receptacle, said tank having lateral walls which diverge from its inlet end and act to produce a decreasing rate of flow therethrough, substantially as described.

13. In a grinding and smoothing mechanism using an apparatus for applying and grading with water an abrading material, the combination of a preliminary grading tank connected to a secondary grader, the secondary grader provided with means for producing a horizontal flow of constant volume with progressively decreasing velocity, chambers to collect the abrasive in separate grades and means for removing the abrasive, substantially as described.

14. In a grinding and smoothing mechanism using an apparatus for applying and grading with water an abrading material, a primary grading pit provided with an inlet from the collecting ditch of the grinding mechanism and an outlet at the top, vertically extending partitions between the inlet and the outlet forming canals through which the water and abrasive is forced to travel horizontally, whereby abrasive settles toward the bottom of the pit, means for removing the abrasive from the bottom of the pit, substantially as described.

15. In a grinding and smoothing mechanism using an apparatus for applying and grading with water an abrading material, a grading pit provided with an inlet at the top to receive the abrasive and water from the grinding mechanism, and an outlet at the top, partitions at the top of the pit forming spaces intercommunicating at their lower ends, whereby the water with abrasive is deflected in its horizontal course between the inlet and the outlet and the coarser abrasive settles toward the bottom of the pit, means for removing the abrasive from the bottom of the pit, substantially as described.

16. In a grinding and smoothing mechanism using an apparatus for applying and grading with water an abrading material, a grading pit provided with an inlet from

the collecting ditch of the grinding mechanism and an outlet at the top, vertically extending partitions between the inlet and the outlet forming canals, openings in the top of the partitions communicating between the canals arranged so that the abrasive and water will travel in a deflected course through the canals and openings from the inlet to the outlet, whereby abrasive settles toward the bottom of the pit, and means for removing the abrasive from the pit.

17. In an apparatus for grading with water an abrading material, a collecting tank in position to receive the abrasive and water from the utilizing apparatus, means for depositing the coarser material in the bottom of the receiving tank and means for removing it with water, an overflow outlet at a level above an outlet of fixed and limited area leading from near its top for part of the water carrying the finer abrasive, a secondary grading tank in position to receive the water and abrasive from said outlet, producing therein a constant flow irrespective of the withdrawal of the water and abrasive from the receiving tank, substantially as described.

18. In an apparatus for grading with water an abrading material, a preliminary grading and collecting tank in position to receive the abrasive and water from the utilizing apparatus, having means for removing the coarser abrasive therefrom and having an outlet near its top of fixed and limited area leading to a secondary grader with an overflow at a higher level, a secondary grader in a position to receive the water and abrasive from the said outlet, producing therein a constant flow, substantially as described.

19. In apparatus for grading with water an abrading material, a collecting receptacle having a series of preliminary grading compartments therein and constructed and arranged to provide for a substantially horizontal flow therethrough of the water and material to be graded, said compartments having bottom members which are supported to move and discharge the contents of the compartments under the action of the weight of the material which accumulates in the compartments, substantially as described.

20. In apparatus for grading with water an abrading material, a collecting receptacle having an intake, an outlet, and baffles arranged to cause an interrupted tortuous substantially horizontal flow across the upper portion of said receptacle, said baffles forming compartments which communicate with the lower portion of the receptacle, substantially as described.

21. In apparatus for grading with water an abrading material, a collecting receptacle having an inlet, an outlet and an overflow, a series of baffles between the inlet and outlet, and other baffles between the intake and the overflow, and a receptacle below said baffles with which the compartments between the baffle are all arranged to communicate, substantially as described.

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Witnesses:
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