July 16, 1929. J. M. COFFEY 1,720,666

MICA FLAKE SORTING MACHINE

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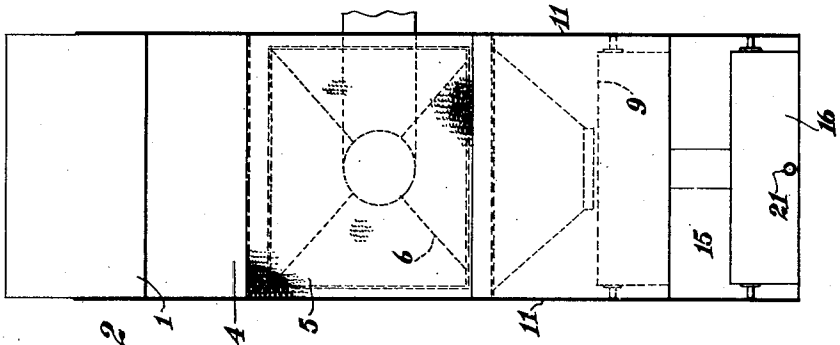


Fig. 2

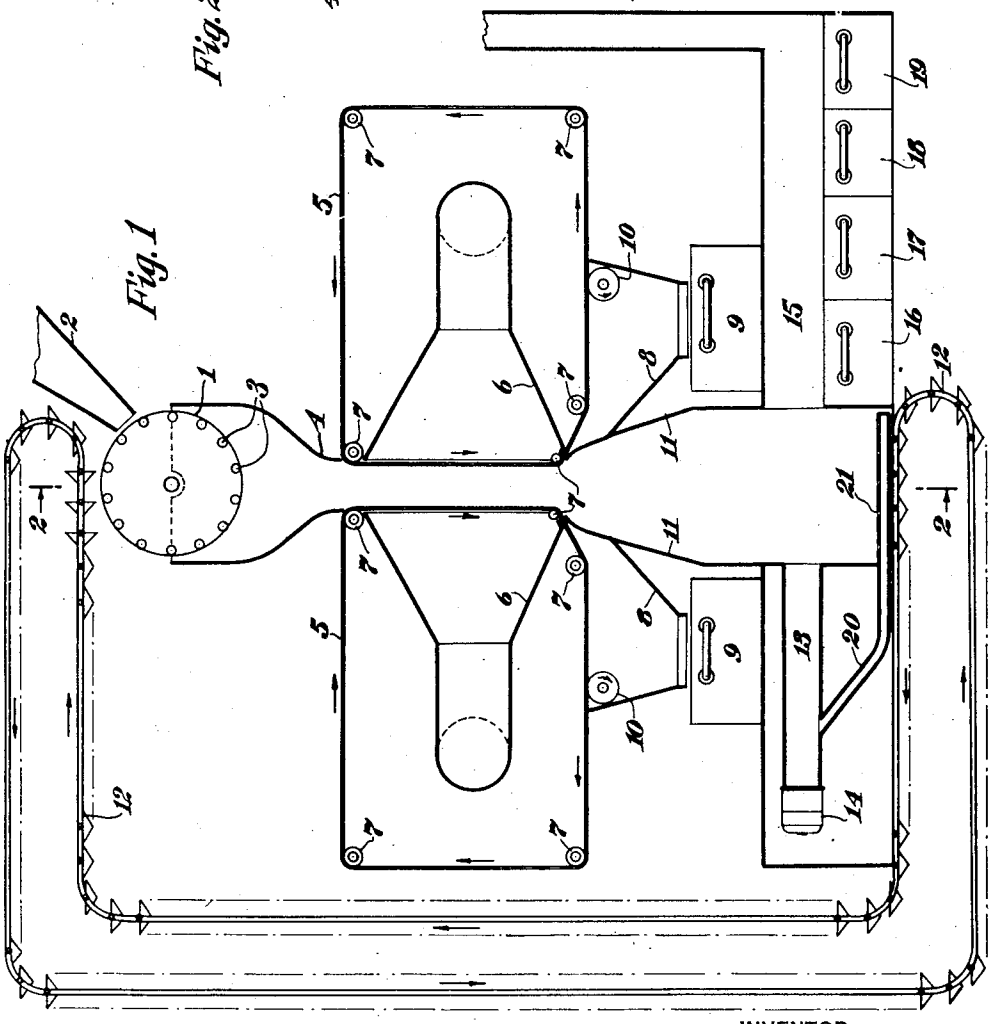


Fig. 1

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Fig. 4

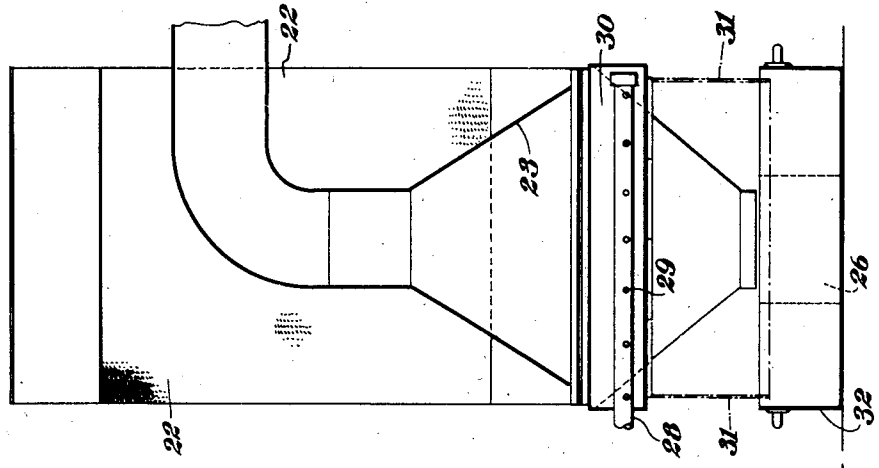
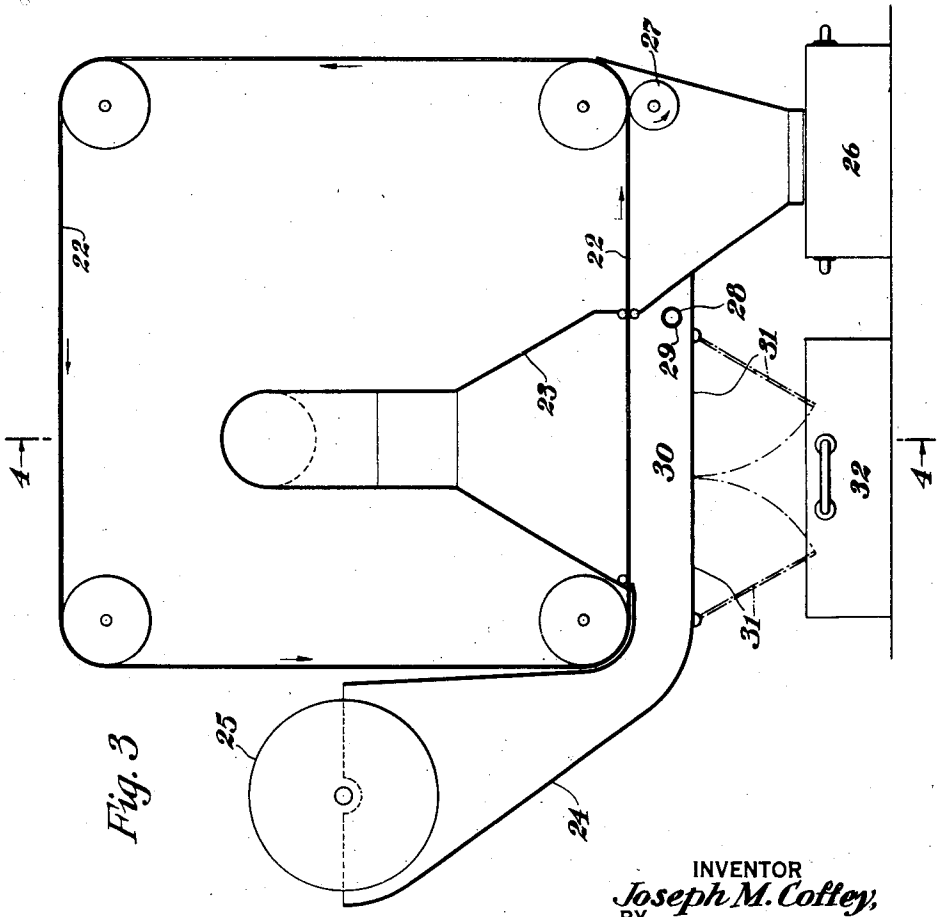


Fig. 3



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Patented July 16, 1929. 1,720,666

UNITED STATES PATENT OFFICE.

JOSEPH M. COFFEY, OF SCHENECTADY, NEW YORK, ASSIGNOR TO MICA INSULATOR COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY.

MICA-FLAKE-SORTING MACHINE.

Application filed July 5, 1928. Serial No. 290,494.

My invention relates to machines for sorting mica flakes.

Mica flakes for commercial purposes, such as for use in building electrical and thermal insulating material, should be of substantially uniform weight or thickness. To obtain such flakes suitable for commercial use, mined mica block must first be split to obtain very thin laminations, and these laminations must then be sorted according to thickness, size or weight. My invention comprises a machine adapted to take mica block after it has been split by any suitable process, and to grade and clean the splittings. My machine is also adapted to complete the separation of more or less adhering layers, and to return for further treatment block which has not been sufficiently split for use. Unlike sorting machines in use heretofore, which merely separated the mica flakes into two parts, those above and those below a given size, my machine may be arranged to grade the flakes into as many divisions as desired.

Preferably, my machine comprises a revolving drum, in which any unsplit mica is separated, suction means for eliminating foreign particles such as dust from the flakes and for collecting against a screen the lightest mica flakes, blowing means for directing the remaining flakes into receptacles and for grading them and means for separating out and returning the heaviest mica for further separation of the laminations.

For a better understanding of my invention, reference should be had to the accompanying drawings of which—

Fig. 1 illustrates somewhat diagrammatically one form of a machine constructed according to my invention;

Fig. 2 is a view on the line 2—2 of Fig. 1;

Fig. 3 illustrates my invention as embodied in a somewhat simpler machine; and

Fig. 4 is a view on the line 4—4 of Fig. 3.

Referring to Figs. 1 and 2, 1 indicates a revolving drum into which the split mica after any suitable preliminary separation, is fed from a hopper 2. The drum 1 is provided with longitudinal bars 3 to insure tumbling of the material and consequent further separation of the flakes. A vertical chute 4 receives the flakes from the drum, and delivers them between two vertically moving spiral wire belts 5 to which the lightest flakes are attracted by suction created by a blower (not shown) acting through funnels 6. The belts 5 are continuous and pass over the open sides of the funnels 6 and are guided by passage over rollers 7. Chutes 8 leading into boxes 9 are arranged to receive the light mica flakes which have been attracted to the belts 5 by suction and which fall therefrom as the suction zone is passed. To insure that no flakes adhere to the belts, revolving brushes 10 driven counter to the direction of movement of the belts are provided to brush against the portions of the belts traveling over the chutes 8. The mica flakes not attracted to the belts 5 fall between walls 11 toward a return conveyor 12. Before reaching the conveyor, however, the flakes are acted upon by a blast of air issuing from a horizontal duct 13 generated by a blower 14.

Flakes, sufficiently light to be carried by the air blast, are directed into a passage 15 in line with the duct 13. Boxes 16, 17, 18 and 19, opening into the passage 15 along its lower side, are arranged to receive the flakes carried by the air blast, the heaviest flakes being carried the shortest distance will fall into box 16, the next heaviest into box 17, etc. A branch pipe 20 leads from the air duct 13 and terminates in a horizontal portion directly over the return conveyor 12. Openings 21 in the upper wall of the horizontal portion of the pipe 20 direct an upward stream of air against any of the mica flakes which may have escaped the horizontal air current. This upward air stream, by lifting flakes of usable lightness back into position to be acted upon by the horizontal blast, insures that no such flakes will be received by the return conveyor. Both air currents tend to further separate any of the mica blocks which may not have been sufficiently separated by the preliminary splitting or by the tumbling in the drum 1. There is a tendency for the suction acting through funnels 6 to draw some air from the duct 13 and pipe 20. This is advantageous, as any light splittings which may have escaped the belts on their downward path, or which may have been separated from other layers by the air blast are thus carried to one or the other of the belts 5 and thereby delivered to boxes 9.

With suitable pressure generated by the blower, only mica that is unfit for use without further treatment will reach the return

conveyor 12. The conveyor 12 may be of any suitable construction and may return the too-thick mica for further splitting or to the tumbling drum. The particular conveyor illustrated is one which returns them to the drum and is of the swinging bucket type, the buckets being suitably tripped over the drum 1 to empty their contents therein.

It will be understood that the machine will be provided with suitable means for continuously rotating drum 1 and brushes 10 and for continuously driving belts 5 and return conveyor 12. As such means are well known and form no part of my invention, they have been omitted from illustration in the interests of simplicity.

The machine above described effectively cleans the mica flakes of dust or other adhering particles, as such matter is drawn through the screen belts 5 by suction, and the machine also eliminates all heavy matter such as sticks, or metal, etc., which fall upon the conveyor 12. A wide range of gradations of mica is obtainable by properly adjusting the strength of the suction device and of the blower and by varying the number and sizes of the boxes 16, 17, etc.

The machine illustrated somewhat diagrammatically in Figs. 3 and 4 operates on the same principle as that of Figs. 1 and 2 but is simpler, and is useful when sorting is desired in only two grades of mica, those above and those below a given standard. The machine, however, is capable of adjustment so that the line of demarcation between the grades may be varied at will. Instead of two vertically moving continuous belts this machine has one horizontally moving continuous belt 22 to which the lighter weight flakes are attracted by suction acting from a single funnel 23. The mica is fed to the machine through a chute 24 and tumbling drum 25 in the same manner as in the machine of Figs. 1 and 2. The mica carried by the belt 22 and dropped therefrom by the passage of the belt from the suction zone is collected in the box 26. A revolving brush 27 to remove any adhering mica flakes corresponds with the brushes 10 of Fig. 1. An air blast is delivered through horizontal pipe 28 having the openings 29 leading into the space 30 below the suction funnel. This space 30 comprises a chamber which receives the flakes from the chute 24 and is provided with doors 31 through which the heaviest flakes may be removed and dropped into a box 32. The box 32 could, of course, be replaced by a return conveyor similar to that shown in Fig. 1. By varying the strength of the suction developed in the funnel 23 the average weight of the mica in the boxes 26 and 32 may be correspondingly varied.

As in Figs. 1 and 3, driving means for the traveling belt and means for rotating the tumbling drum and brush have been omitted from Figs. 3 and 4 as being well known and forming no part of my invention.

This machine cleans the mica by removing the dust therefrom, as does the machine of Figs. 1 and 2. The air blast aids the suction in lifting the flakes to the traveling belt and likewise aids in separating any block which may not have been sufficiently split in the preliminary process or separated by the tumbling.

The mica block, before it is delivered to either of the machines above described, may be split by passage through corrugated rollers, or manually with a knife. I prefer, however, to use the splitting machine invented by Henry H. France, Joseph J. Piekney and myself and described in our application, Serial No. 290,493, filed on even date herewith, which places the mica in a very satisfactory condition for the sorting operation. When used with the splitting machine of the above mentioned application, the return conveyor 12 of Fig. 1 may be used, if desired, to return the heaviest mica to the splitting machine rather than to the tumbling drum 1.

I have now described two embodiments of my invention, both of which utilize continuously moving perforated belts acted upon by suction for cleaning the mica and for separating the lighter from the heavier flakes, and both of which utilize a blast of air for assisting in the sorting. Each machine is adjustable to vary the standards according to which the mica is sorted. Obviously many changes could be made in the particular machines illustrated without varying from the spirit of my invention, and I do not wish to be limited to the particular arrangement shown except as so limited by the appended claims.

The term "perforated" conveyor as used in my claims, is intended to include any form of conveyor material pervious to air which would permit of the action of suction therethrough, such as spiral wire, mesh screens, etc.

I claim:

1. A machine for grading mica flakes including mica flake feeding means, a continuously movable conveyor, suction means adapted to clean the flakes and to separate the lighter from the heavier flakes by drawing the lighter to the conveyor, and separate receiving means for the flakes thus separated.

2. A machine for grading mica flakes, including mica flake feeding means, suction means, a perforated endless conveyor adapted to move past said suction means to permit the latter to separate the lighter from the heavier flakes by drawing the lighter flakes from said receiving means to the con-

veyor, means for receiving from the conveyor the lighter flakes carried thereby after leaving said suction means, air pressure means for agitating and splitting the flakes received from said feeding means, and means for receiving the flakes not drawn to the conveyor.

3. A machine according to claim 2 including means for removing adhering flakes from said conveyor comprising a brush rotating counter to the direction of travel of said conveyor so located as to deliver said adhering flakes to the appropriate receiving means.

4. A machine for grading mica flakes comprising in combination, a tumbling drum adapted to receive, agitate, and drop mica flakes, means for creating fixed zones of suction in the path of mica dropped from said drum, a plurality of receptacles for the mica, continuously movable perforated conveyors adapted to receive the lighter mica flakes by travel past said zones and to deliver the same to certain of said receptacles by travel thereover after leaving said zones, means for directing a current of air upon such of the mica flakes as fall past said zones in a direction to carry the same to other of said receptacles.

5. A machine for grading mica flakes comprising in combination, a tumbling drum for the mica flakes, a chute leading from said drum, a continuously moving perforated conveyor having a vertical portion of its path of travel in line with said chute, means for creating a zone of suction behind said vertical portion of the path of travel of said conveyor, a receptacle located under a horizontal portion of the path of travel of said conveyor beyond the suction zone, a revolvable brush located over said receptacle and arranged to brush against the conveyor, a plurality of receptacles located below and to one side of the suction zone, air pressure supply means and means for directing the air current therefrom in such a direction as to act upon the mica flakes which have fallen past the suction zone from said drum and to carry the same over said plurality of receptacles.

6. A machine as claimed in claim 5 including a return conveyor arranged to receive such of the heaviest mica as has passed through said air current without being carried thereby.

In testimony whereof, I have signed my name to this specification.

JOSEPH M. COFFEY.

DISCLAIMER

1,720,666.—*Joseph M. Coffey*, Schenectady, N. Y. MICA-FLAKE-SORTING MACHINE. Patent dated July 16, 1929. Disclaimer filed January 16, 1930, by the assignee, *Mica Insulator Company*.

Enters its disclaimer as to claims 1, 2, and 3 of said Coffey patent of every combination of elements therein claimed except wherein the "conveyor" of said claims where acted upon by the suction means presents a substantially plane surface and wherein the mica-flake-feeding means feeds the flakes along a path adjacent to but not toward the said conveyor surface whereby substantially all flakes carried on such surface have been drawn thereto by suction alone.

[*Official Gazette February 4, 1930.*]