

Jan. 5, 1960

F. P. ROBBINS
CLASSIFYING DEVICE

2,919,804

Filed Sept. 20, 1957

3 Sheets-Sheet 1

FIG. 1

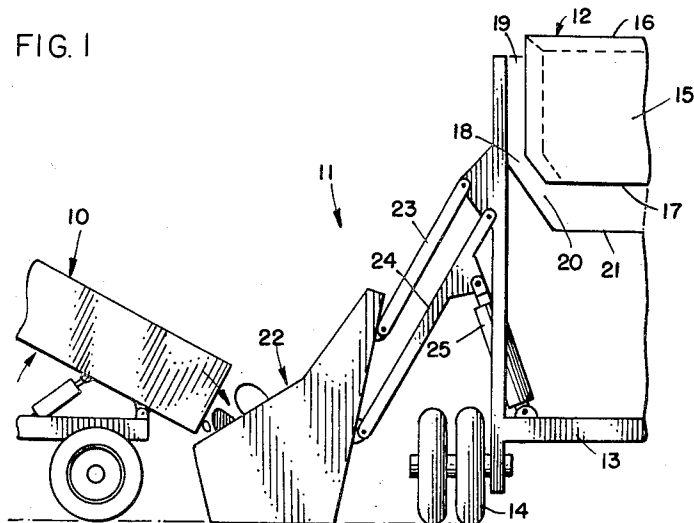
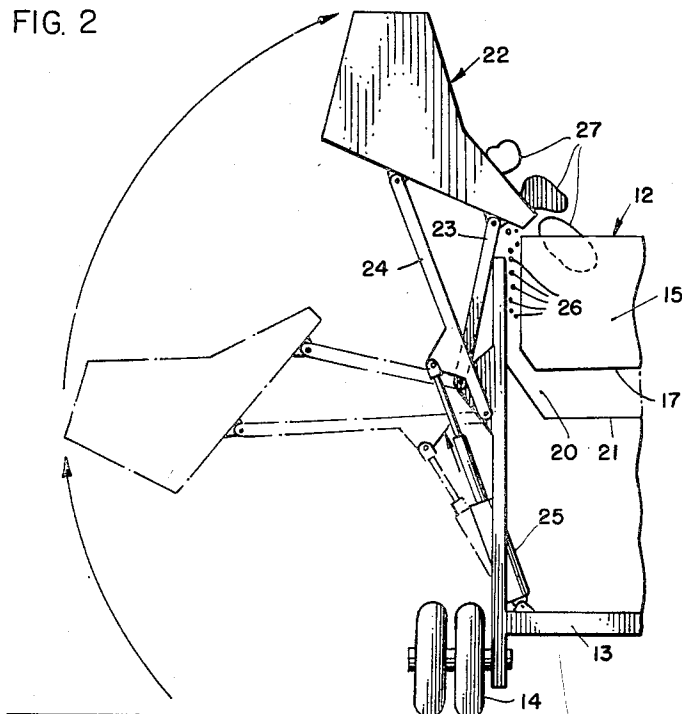


FIG. 2



INVENTOR:
FREDERICK P. ROBBINS
BY *Marshall Johnston,*
Cook & Root

ATT'YS

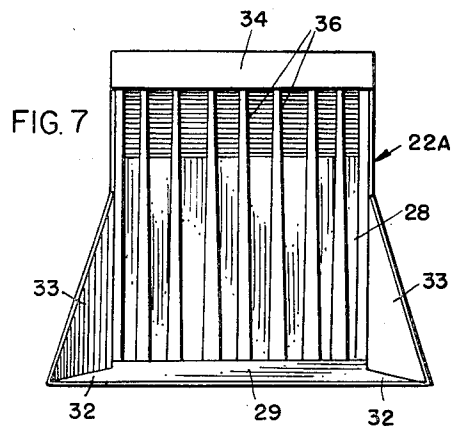
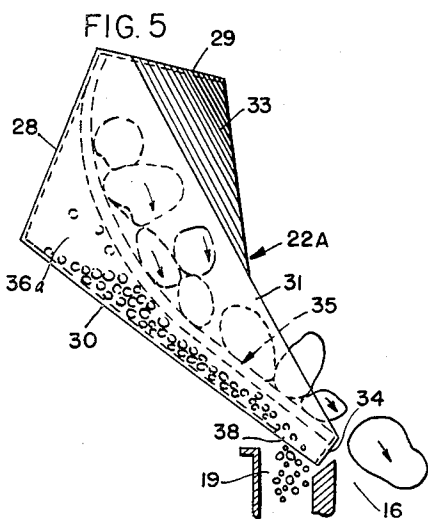
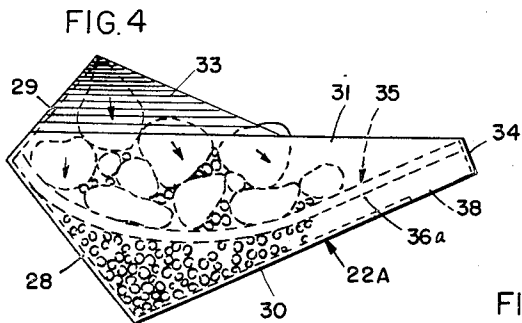
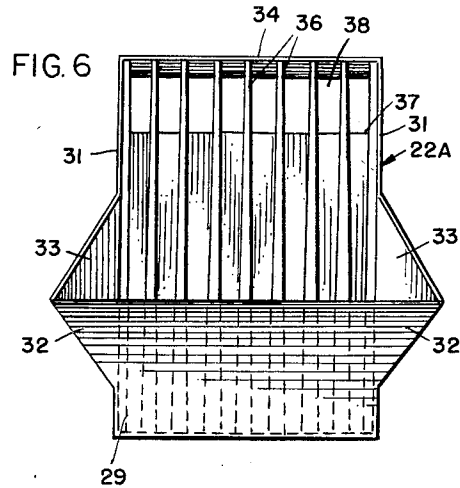
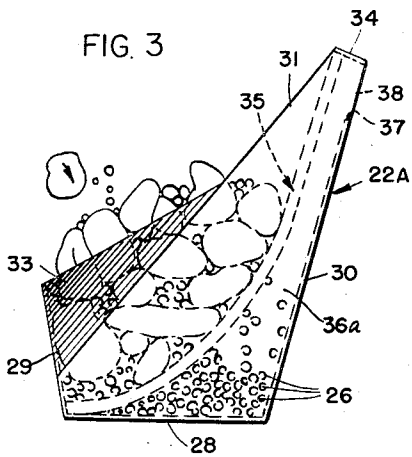
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3 Sheets-Sheet 2



INVENTOR:
FREDERICK P. ROBBINS
BY *Margall Johnston,*
Cook & Root
ATT'YS

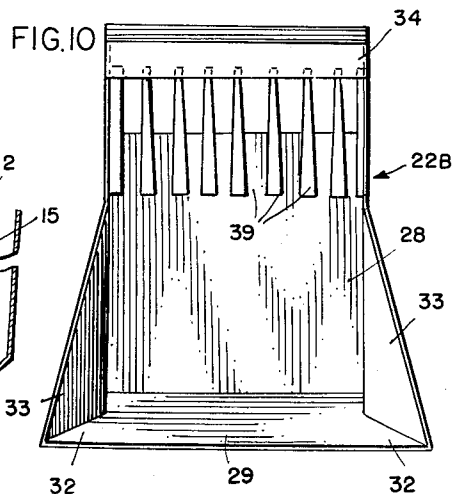
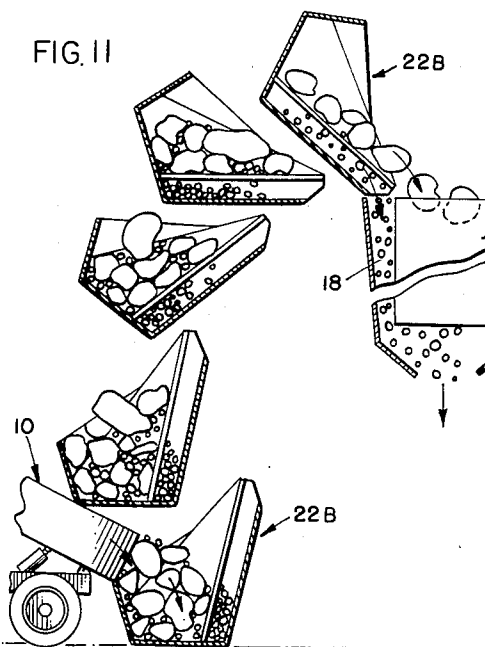
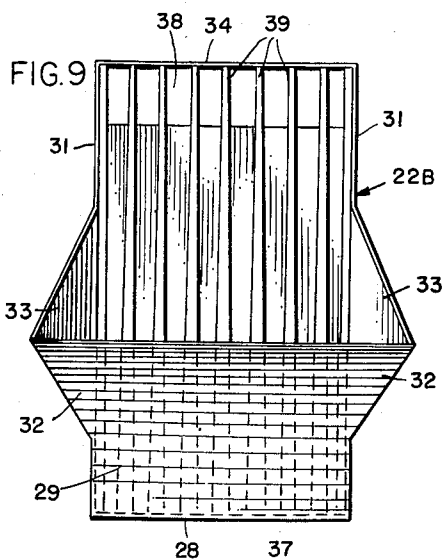
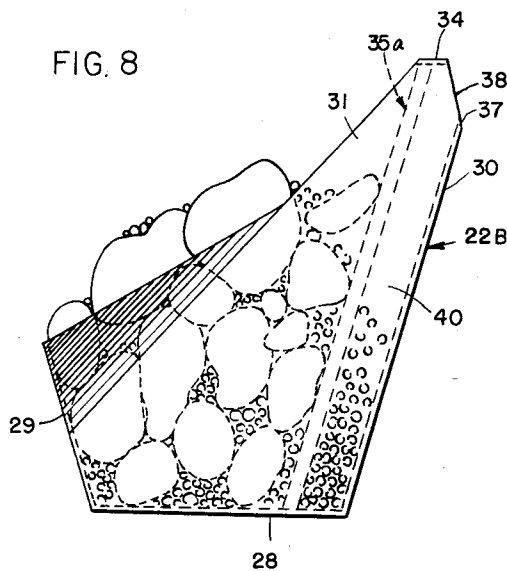
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2,919,804

Filed Sept. 20, 1957

3 Sheets-Sheet 3



INVENTOR:
FREDERICK P. ROBBINS
BY *Marzell Johnston*
Cook & Root
ATT'YS

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2,919,804

CLASSIFYING DEVICE

Frederick P. Robbins, Highland Park, Ill.

Application September 20, 1957, Serial No. 685,201

5 Claims. (Cl. 209—418)

This invention relates in general to classifying devices, and has more particular reference to skips or buckets having a classifying grid therein which serves to classify fines from larger aggregate in the handling of dump loads of unclassified material, the invention pertaining more especially to the mechanism for receiving dump loads of unclassified material and elevating, agitating, classifying, and feeding the loads to a crusher inlet and a crusher bypass inlet, whereby fines are classified from the loads and delivered to the bypass inlet and the larger aggregate is delivered to the crusher inlet.

The requirement for millions of tons of concrete aggregate materials for the building of highways has evolved the market and manufacture of portable crushing and screening plants which may be used in rock pits along the right of way of the highways for the purpose of procuring the necessary aggregate materials. The crushing plants are generally of the gravity-flow variety which requires a gravity differential to enable processing of the rock, this differential being generally gained through elevation by shovel loading, ramp loading, hopper and elevator loading, all of which decrease the flexibility, portability, and the capacity of the unit. Further, a classifying feeder is necessary to transport the rock directly into the primary crusher. Other methods of transporting the rock to the crusher require the crusher to be set up and rigged directly adjacent the rock source and point of digging thereby necessitating frequent moving of the crusher to be within reach of material. Truck transport of the rock from the rock source and point of digging to a remotely located portable crushing plant still requires means for elevating, classifying, and feeding the load into the crusher. The transfer of the loads from the trucks to the crusher has heretofore required two or more mechanisms which increases the operating costs of the plant and the ultimate product desired.

An important object of the present invention is to provide a mechanism of the character mentioned which decreases the cost of operating a portable crushing plant whereby transfer of rock from a truck to a portable crusher will accomplish all of the actions heretofore necessitating the use of several mechanisms.

Another important object is to provide a mechanism for agitating, elevating, classifying and feeding a load of unclassified material into a portable crusher in one action.

A further object of the invention is to provide a mechanism to be used in combination with a rock crusher which receives a load of rocks and in one motion elevates, agitates, classifies and feeds the rock into a crusher and crusher bypass hopper.

Another important object is to provide a classifying device for use in combination with portable rock crushers having a skip or bucket equipped with a scalping grid therein which separates the fines from the larger aggregate during elevation of the skip to dump the load by gravity feed into a portable crusher and crusher bypass hopper.

A further object of this invention is to provide a classi-

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fyng device having a bottom, upstanding front, rear and side walls, and a scalping grid therein defining a chamber into which fines are separated from the larger aggregate, and an opening at one end of the chamber for emptying the chamber when dumping the skip.

Another important object resides in providing in combination with a rock crusher having an inlet and discharge, a crusher bypass having an inlet adjacent the crusher inlet and an outlet communicating with the crusher discharge, and mechanism for receiving dump loads of unclassified material, and elevating, agitating, classifying, and feeding the loads to the crusher inlet and the bypass inlet, whereby fines are classified from the loads and delivered to the bypass inlet and the larger aggregate is delivered to the crusher inlet, said mechanism comprising a skip having a bottom, upstanding front, rear and side walls, said front and rear walls being at an incline from the bottom and away from each other, said rear wall extending substantially above said front wall, a classifying grid in said skip extending between the side walls and from said bottom along said back wall but in spaced relation therefrom to define a chamber into which fines are classified, and a chamber outlet in said back wall at one end of said chamber adapted to empty the classified fines into said bypass inlet when emptying the skip, and means for elevating said skip from a ground receiving position to a raised dumping position, said means tilting said skip during elevating, thereof thereby causing agitation and classifying of the load.

The foregoing and numerous other important objects, advantages, and inherent functions of the invention will become apparent as the same is more fully understood from the following description, which, taken in connection with the accompanying drawings, discloses a preferred embodiment of the invention.

Referring to the drawings.

Fig. 1 is a fragmentary and partially diagrammatic view of a portable crushing plant embodying the invention;

Fig. 2 is a fragmentary and diagrammatic view of the portable crushing plant of Fig. 1 and illustrating certain of the parts in various positions;

Figs. 3, 4, and 5 are side elevational views of the classifying device according to the invention and illustrating various positions of the device between ground position and dump position and the manner in which classifying takes place;

Fig. 6 is a front elevational view of the classifying device of Figs. 3, 4, and 5;

Fig. 7 is a top plan view of the classifying device of Figs. 3, 4, and 5;

Fig. 8 is a side elevational view of a modified classifying device according to the invention;

Fig. 9 is a front elevational view of the classifying device of Fig. 8;

Fig. 10 is a top plan view of the classifying device of Fig. 8; and

Fig. 11 is a fragmentary and partially diagrammatic view of a portable rock crushing plant illustrating the operation of the modified classifying device of Figs. 8, 9, and 10.

To illustrate the invention, the drawings show, especially in Fig. 1, a conventional dump truck 10 emptying its load into a skip or bucket of the mechanism 11 of the present invention which serves to elevate, agitate, classify and feed the dump load into the rock crusher 12. Exemplary operation of this crushing plant would be in locating the portable crusher and classifying device attached thereto at a point near the rock source but remote to the extent that it would not interfere with the removal of the rock from the rock source, whereby the rock would be initially loaded onto dump trucks

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which would transport the rock in its unclassified stage to the site of the crushing plant.

The portable crusher 12 includes a frame 13 mounted on wheels 14 which render the crusher mobile. A primary crusher 15 is supported on the frame which includes a crusher inlet 16 and a crusher discharge 17. A hopper or crusher bypass 18 surrounds the primary crusher 15 and includes a bypass inlet 19 and a bypass outlet or discharge 20 which communicates with the crusher discharge 17 and a common discharge 21. The bypass permits fines that may be classified from the larger aggregate to bypass the primary crusher 15.

Attached to the portable crusher frame 13 is the classifying device 11 which includes a classifying skip or bucket 22. Upper and lower links 23 and 24 are pivotally mounted on one end of the frame 13 and at the other end to the skip 22 in such a manner that when a hydraulic cylinder 25 pivotally mounted on one end to the frame 13 and on the other end to an intermediate point of the lower link 24 is operated, the skip 22 will be elevated and tilted from ground position as seen in Fig. 1 to dump position as seen in Fig. 2 whereupon fines 26 are emptied from the skip 22 into the crusher bypass 18 and the larger aggregate 27 is emptied into the primary crusher 15. This arrangement permits, if desired, three classifying devices 11 to be employed at the same time on three adjacent sides of the crusher for classifying and feeding loads of unclassified material into the crusher.

Referring now to Figs. 3, 4, 5, 6, and 7, a classifying skip or bucket 22A to be used with the classifying device 11 includes a bottom 28 adapted to normally rest the skip on the ground at the ground position, a front wall 29, a rear wall 30, and upstanding side walls 31, 31. The front and rear upstanding walls 29 and 30 are inclined away from each other and form obtuse angles with the bottom 28 as seen most clearly in Fig. 3, and the rear wall 30 extends a substantial distance above the upper edge of the front wall 29. As seen most clearly in Fig. 6, the inclined front wall 29 includes oppositely extending triangularly shaped wing sections 32, 32 the outer upstanding edges which are connected to outwardly flared side wall extensions 33, 33 for the purpose of giving a wider opening into which the unclassified material may be initially dumped. A cross piece or panel 34 extends between the upper ends of the side walls 31 from the forward edges of the side walls to the rear edges thereof for the purpose of additionally reinforcing the skip and for other purposes to be hereinafter set forth.

A scalping or classifying grid 35 is arranged within the skip and in spaced relation from the rear wall 30 to define a chamber 36a which receives fines 26 separated from the larger aggregate. The grid 35 comprises a plurality of longitudinally extending bars 36, arcuate in shape, and attached at their upper ends to the cross panel or piece 34 and at their lower ends to the bottom 28. Accordingly, a more or less concave grid is defined by the arcuate bars 36 which forms a bottom for the larger aggregate dumped into the skip. The chamber 36a is therefore defined by the concave classifying grid 35, the bottom 28, the rear wall 30 and the cross panel 34. It may be noted in Figs. 6 and 7 that the grid bars 36 are tapered from their bottom ends to their upper ends thereby defining slots of varying width widening toward the upper ends. The upper edge of the back wall 30 terminates at 37 below the cross panel 34 to define a chamber outlet or discharge 38 adapted to empty the fines from the chamber 36a when the skip is tilted to a dump position. As seen in Fig. 5, the chamber outlet 38 is so aligned with the portable crusher as to empty the fines into the bypass inlet 19 when the skip is in dump position, while the larger aggregate is gravity fed into the crusher inlet 16.

In operation, as the dump truck dumps its load into

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the grounded upright skip, Fig. 3, the inertia of the dump action against the grid 35 produces some separation of the fines from the larger aggregate. The skip is then raised towards the crusher and gradually tilted during the raising operation thereby effectively rocking the load of unclassified material against the grid 35. The rocking of the load upon the grid causes agitation which effects additional separation of the fines through gravity and impact which work loose and drop through the grid without being squeezed within the load that otherwise would be moved over the grid. In this connection, the turning movement of the skip causes the unclassified material on the grid 35 to roll over and thus aid in complete separation of fines from the larger aggregate components. When the skip reaches the dump position, Fig. 5, the load is fully separated and then gravity fed with the oversize or larger aggregate entering the crusher inlet 16 and the fines entering the bypass inlet 19. The skip is then returned to a ground or load position, Fig. 3, to receive another dump load. Thus, in one action and with one mechanism, elevating, agitating, classifying and feeding of a dump load to a crusher is accomplished.

In some instances it may be desired to further classify the fines, wherein a screen may be arranged between the scalping grid and the back wall of the skip thereby providing three classified discharge products.

Although the means for elevating and tilting the skip 22, Figs. 1 and 2 is of a hydraulic mechanical type, it will be appreciated that other well known elevating and rolling skip devices may be employed, it being appreciated that the specific mechanism used only performs the necessary functions outlined above to give the proper elevating and tilting action.

A modified classifying skip or bucket 22B, shown in Figs. 8, 9, 10, and 11, differs from the skip 22A only in the type of scalping grid employed, and therefore will have identical parts identified by the same numerals as applied to the skip 22A. The scalping grid of this modification, generally designated by the numeral 35a, comprises spaced grid bars 39 extending parallel to the rear wall 30. These grid bars 39 are attached at one end to the cross panel 34 and at the other end to the bottom 28 adjacent the lower end of the back wall 30 and thereby define with these components a chamber 40 into which the fines are classified. The operation of the skip 22B is substantially the same as the operation of the skip 22A and is shown in Fig. 11, wherein the load of unclassified material is dumped into the skip at ground position from a dump truck 10. The skip is then elevated and tilted during the elevating action to further classify and separate the fines from the larger aggregate by rolling of the load during the tilting operation. When the skip reaches the dump position, the fines are substantially completely separated from the oversize or larger aggregate and dumped into the bypass 18 while the larger aggregate is dumped into the crusher 15. When the skip is emptied, it is relocated to the ground or load position for receiving another dump load from another dump truck.

It is thought that the invention and its numerous attendant advantages will be fully understood from the foregoing description, and it is obvious that numerous changes may be made in the form, construction and arrangement of the several parts without departing from the spirit or scope of the invention, or sacrificing any of its attendant advantages, the form herein disclosed being a preferred embodiment for the purpose of illustrating the invention.

The invention is hereby claimed as follows:

1. A classifying device for segregating fines from larger aggregate comprising an open topped bucket having rigidly interconnected bottom, front, rear and side walls, said front and rear walls being mutually inclined outwardly away from the bottom wall toward the open

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top of the bucket, said side walls having projecting ends extending outwardly of the terminal end of the rear wall, remote from the bottom wall, a cross panel extending between and rigidly secured to said projecting ends of the side walls in position, spaced from the terminal end of the rear wall, to define a discharge opening between said panel and said terminal end of the rear wall, a classifying grid comprising a plurality of spaced apart bars disposed between the side walls and extending between and secured rigidly at their opposite ends to said panel and said bottom wall in position, spaced inwardly of the rear wall, to define a loading chamber, in front of said grid, for receiving material to be classified when the bucket is in loading position, and a classifying chamber, behind the grid, into which fines may be delivered through the grid for discharge thence through said opening in response to rearward tilting of the bucket from loading position to angularly tilted dumping position.

2. A classifying device as set forth in claim 1, wherein said spaced apart bars extend parallel with respect to the rear wall.

3. A classifying device as set forth in claim 1, wherein the spaced apart bars have end portions extending substantially parallel with respect to the rear wall, adjacent the panel, and panel remote end portions bendingly inclined toward the front wall at its junction with the bottom wall.

clined toward the front wall at its junction with the bottom wall.

4. A classifying device as set forth in claim 1, wherein the rear wall is substantially longer than the front wall, and the front wall, at its end edge remote from the bottom wall, is wider than the rear wall, the side walls being flared outwardly away from the bottom wall and adjacent the front wall.

5. A classifying device as set forth in claim 1, including means for elevating the bucket from a loading position to a raised dumping position and for tilting the bucket rearwardly through an angular displacement substantially in excess of ninety degrees, to effect classification of the material while the bucket is being elevated and tilted between loading and dumping positions.

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