United States Patent

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[54] **APPARATUS AND PROCESS FOR RECLAIMING PAVING MATERIAL**
14 Claims, 3 Drawing Figs.

[52] **U.S. Cl.** **259/148, 94/23**
[51] **Int. Cl.** **B28c 7/00**
[50] **Field of Search** 94/40, 23, 42; 259/147, 148, 149, 153, 154, 155, 156, 157, 158, 161; 209/11, 13, 238, 284, 288

[56] **References Cited**

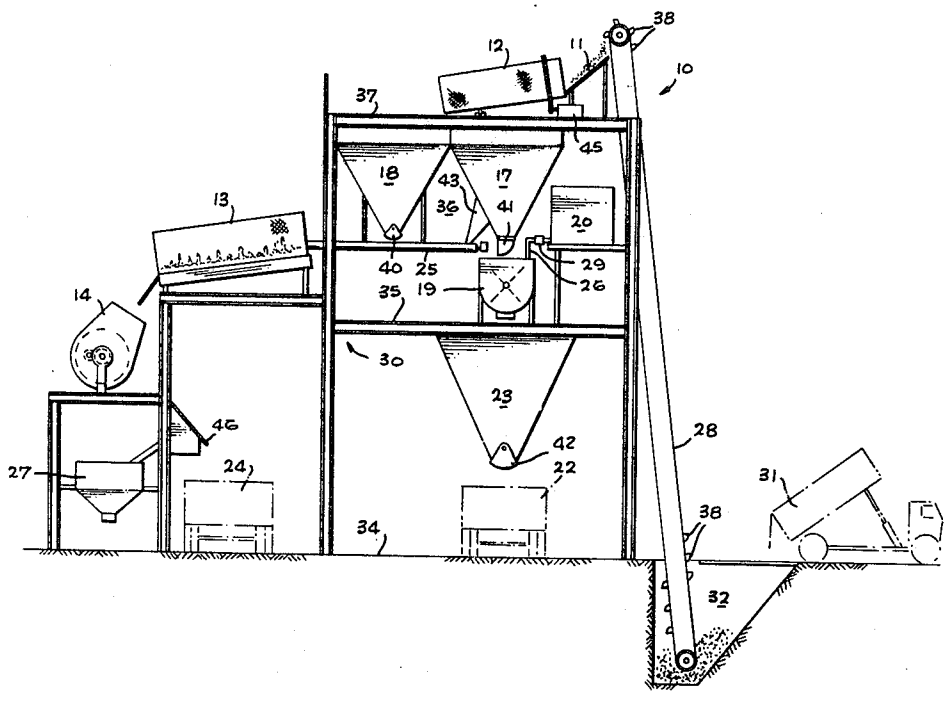
UNITED STATES PATENTS

2,257,637	9/1941	Moore	94/40
2,298,160	10/1942	Pollitz	259/153
2,487,887	11/1949	McEachran	259/158X
3,221,617	12/1965	Quigg	94/42

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ABSTRACT: Asphalt and aggregate that has been removed from roads and other surfaces is taken to a multilevel reprocessing plant (FIG. **2**) where it is raised to the uppermost level (37 in FIG. **1** and 137 in FIG. **2**) from which it can move by gravity to an inclined classification screen or grid (12, FIG. **1**) preferably a rotating cylindrical grid disposed over a hopper as shown at **112**(FIG. **2**), thence to a roaster 13 for burning off any asphalt binder that may be adhering to the aggregate, then to a "rattler" for shaking the burned asphalt loose. The apertures in the screen or grid are of such size that only the aggregate will pass through, the larger rocks dropping from the end of the rotating grid into a second hopper 18.

Closures in the bottoms of the hoppers permit them to be opened so that their contents may be released into suitable conveyances for taking the graded rocks to storage bins or sites for later use as may be required.



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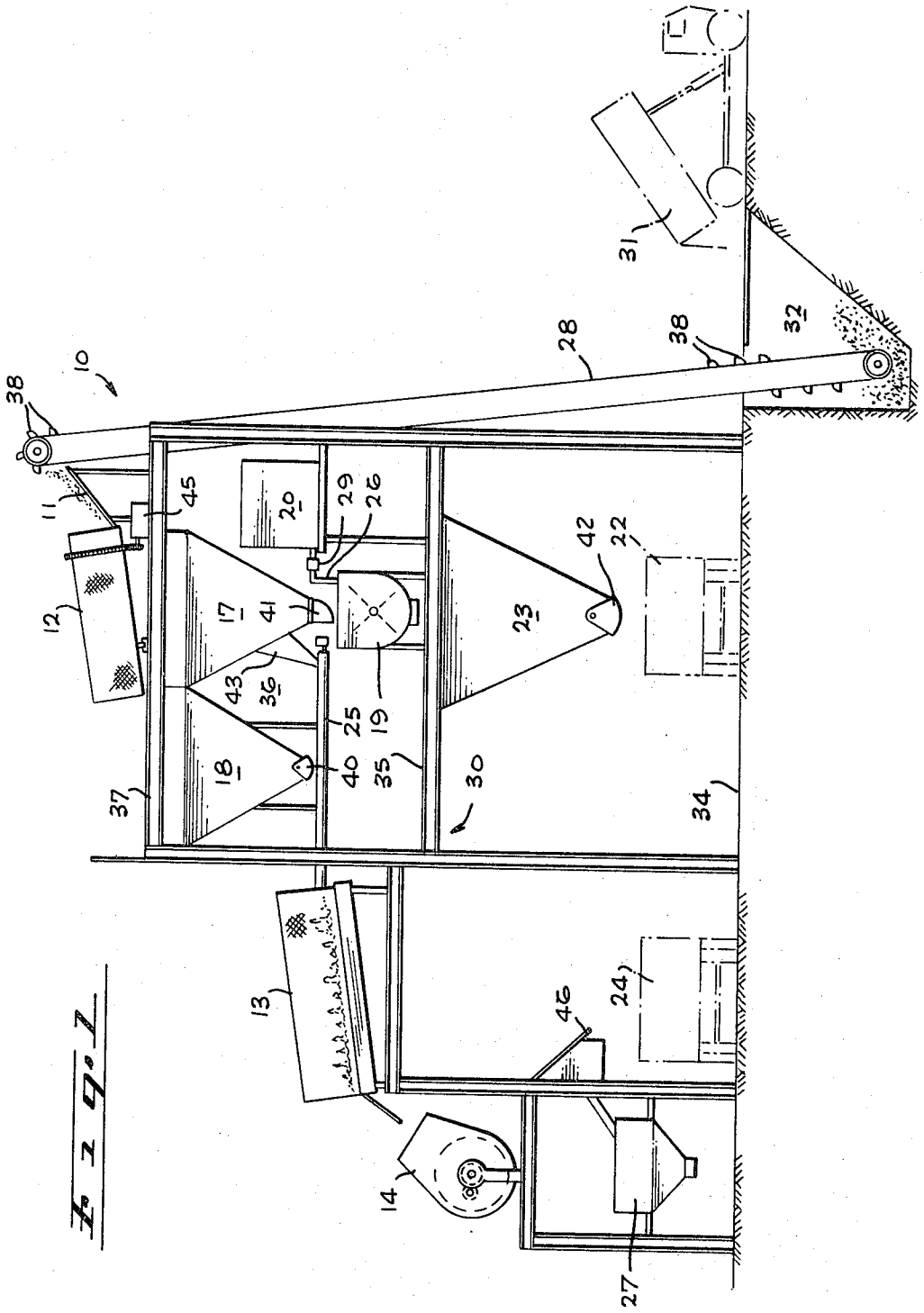


FIG. 1

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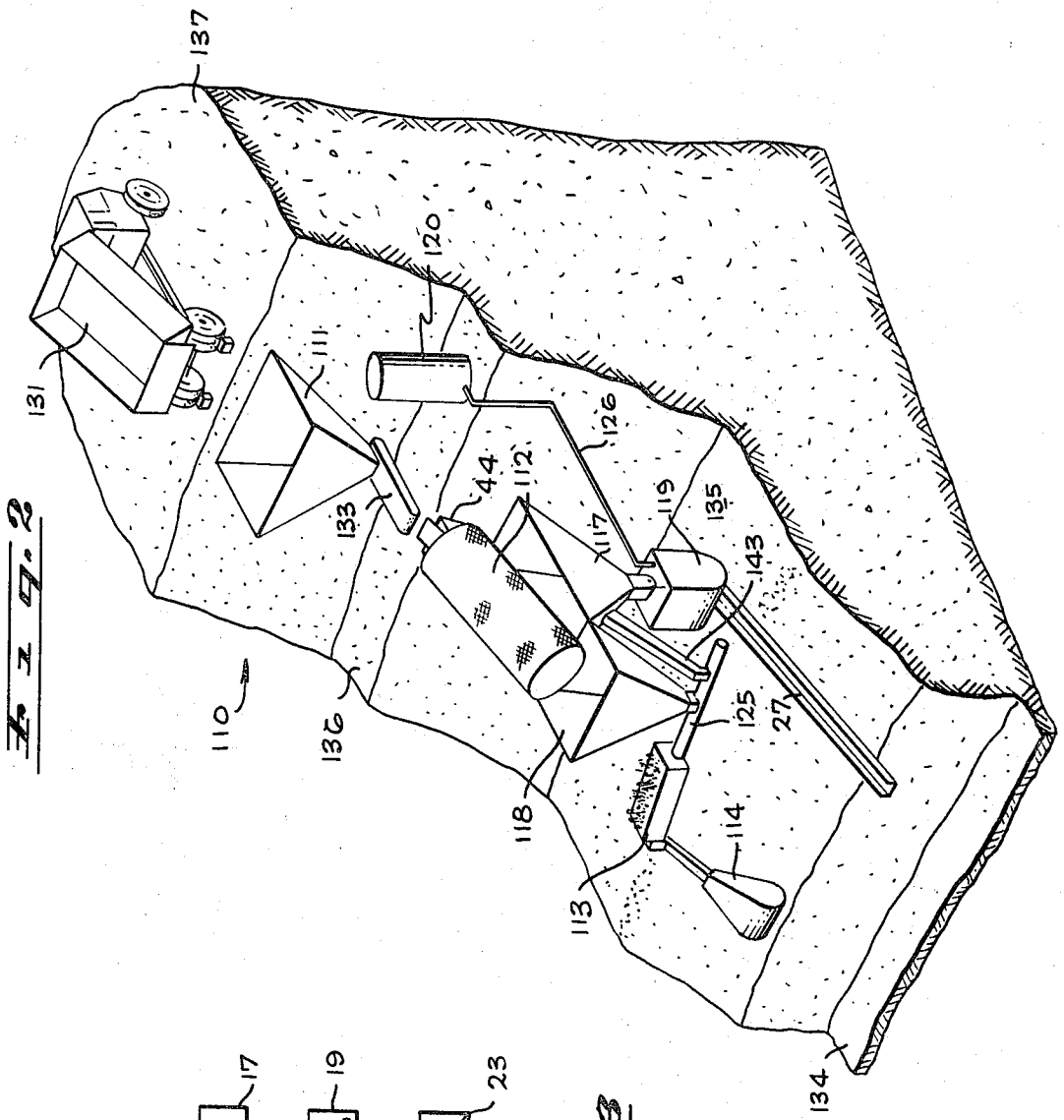


FIG. 2

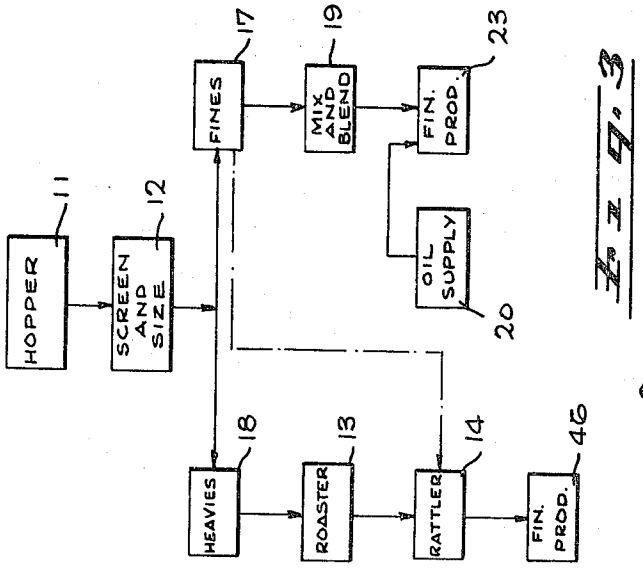


FIG. 3

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APPARATUS AND PROCESS FOR RECLAIMING PAVING MATERIAL

The invention herein described pertains to means and methods for reclaiming used paving material, such as aggregate, and particularly aggregate that has been removed from streets immediately after their surfaces have been softened by surface heaters.

Heretofore, the paving material that has been removed from streets requiring repaving has been discarded in dumps, or in ravines that were being filled in for one reason or another, and the repaving has been done with new material.

As cities grow, the dumps must constantly be located further away from the city itself, and ravines that require filling are of course in outlying areas that are just being built up. As a consequence, the cost of hauling the old material away becomes ever greater.

Most of the old material, although presently discarded, could be reused in one form or another if the aggregate were separated from the asphalt that binds it together. One of the objects of the present invention is to provide means and methods to perform this separation automatically, and to grade and classify the reusable material.

Another object is to provide means for automatically loading the segregated material onto conveyors or trucks whereby the material may be moved to nearby storage areas.

This invention possesses many other advantages, and has other objects which may be made more clearly apparent from a consideration of illustrative embodiments thereof. For this purpose, two such embodiments are shown in the drawings accompanying and forming a part of the present specification. These embodiments will now be described in detail, illustrating the general principles of the invention; but it is to be understood that this detailed description is not to be taken in a limiting sense, since the scope of the invention is best defined by the appended claims.

IN THE DRAWINGS

FIG. 1 is an illustration of an assembly of equipment in which a generally vertical carrier is used to raise the material that is to be sorted to a high level from which it is carried to the various sorting devices by means of gravity;

FIG. 2 is an isometric view of similar apparatus installed on a hillside; and

FIG. 3 is a block diagram of the general process of the present invention as it is employed in both of the aforementioned embodiments.

When asphalt and aggregate are scraped or otherwise removed from a street immediately after having been softened by surface heaters, it is not advisable to allow the material to cool, as it then becomes hardened into a solid block. If such hardened material were to be reused in any form, it would have to be broken or crushed into usable sizes. This would reduce much of the large rock to sizes smaller than is used for the best grade of paving material. It is thus very important that the hot material removed from the street be reprocessed before very much cooling can occur.

In road work, the term aggregate applies to rocks that will not pass through apertures in a screen that are less than three-quarters of an inch across. If the asphalt is burned from rocks of this size immediately, the rocks can of course be reused as aggregate or first-class paving material. Accordingly, the material that has been removed from the street should immediately be passed to a classification screen or grid. In the presently preferred equipment for practicing the processes of the instant invention, this screen is of a rotary type, the material being fed into a rotating cylindrical grid.

If a substantially level site is available for the plant, a strong framework **30** of steel or heavy timbers is constructed so that apparatus may be installed on three successively higher levels above the ground **34**, as shown in FIG. **1**. The used material that is hauled to the plant to be reclaimed must be raised to the uppermost of the levels **37**. In the presently preferred arrangement, the material is taken to the upper level by an endless, substantially vertical conveyor **28**, which may be provided with a plurality of buckets **38**. To accommodate the lower end of this endless conveyor, a pit **32** may be provided into which the material from the transporting dump trucks **31** may be released.

If the vertical conveyor shown in FIG. **1** is moving in a counterclockwise direction, the buckets on the right side will of course be open-side up. They will scoop up material from the pit **32** and raise it to the upper end of the conveyor, where the buckets will turn over and dump their contents onto a chute **11** that empties into the rotating screen **12**. The pit **32** may appropriately have a capacity of 30 tons.

If the apertures in the rotating classification screen are of proper size, the chunks of paving material that are less than three-quarters of an inch across will pass through the screen into the hopper **17** which, in the presently preferred assembly of equipment, has a capacity of 20 tons. The rocks or chunks of larger size will fall by gravity from the opposite end of the rotating screen into the hopper **18**. The hopper **18** may directly dump its contents onto a horizontal conveyor **25**, or this material may be temporarily retained in the hopper **18** by providing it with a closure **40** so that the material may be released therefrom as desired.

The conveyor **25** dumps the asphalt-covered rocks therefrom into a roaster **13** which burns off most of the asphalt. The rocks that have passed through this moving roaster are dropped into a "rattler" **14** which shakes the burned asphalt from the rocks. The contents of the rattler may than be discharged onto the sloping screen **46**, from which the rocks drop into a container or waiting truck **24**, as the carbon falls through the screen and into a hopper **27** or onto the ground if no hopper is used. Instead of trucks **24**, an appropriate conveyor may be used to convey the rocks to a storage location.

The hopper or bin **17** that has received the smaller pieces that have dropped through the classification screen **12**, dumps its contents into a mixer **19**. This material will of course consist of small rocks and of sand and oil to which additional proportions of oil must be added before the contents of the mixture are ready for reuse as "storage." One suitable oil mixture comprises appropriate proportions of No. 5 fuel oil and No. 200 or 300 penetration oil, which may be added according to specifications to be mixed in the mixer with the material that may be dumped therein from the bin **17**. This bin, like bin **18**, may have a suitable closure **41** at its lower end.

A tank **20** is provided for the oil mixture. This tank has an outlet pipe **26** that empties into the mixer **19**, a valve **29** being provided to release the oil mixture as desired.

After the material in the mixer **19** has been mixed for the desired amount of time, its contents are released into the hopper **23** from which they may be dumped into trucks **22** or onto a suitable conveyor. This second-grade paving material is usually called "storage," and it may be conveyed to a stock pile for future use.

If desired, material may be released from the hopper **17** through a chute **43** onto the moving horizontal conveyor **25** where it, like the previously discussed aggregate, may pass through the roaster **13** and the "rattler" **14**, from which it may be discharged onto the separating screen **46**, as previously described.

In the hillside plant illustrated in FIG. **2**, the hot material scraped from the streets immediately after the surface heater has passed thereover, may be hauled to the upper level **137**, where the contents of each dump truck **131** may be released into the hopper **111**, which is appropriately supported on the next lower level **136**. It may be released from this hopper through a chute or conveyor **133** into a smaller hopper **44** that communicates directly with the inside of the rotating screen **112**. This screen, in order that the material may all be moved by gravity, is of course located at a lower level than the hopper **111**, and the hopper **117** is supported at a still lower level **135** upon which the hoppers **117** and **118** are installed. Hoppers

117 and 118 are the counterparts respectively of the previously described hoppers 17 and 18. The contents of hopper 118 may be conveyed by a suitable conveyor 125 to the roaster 113 and thence to the "rattler" 114.

The hopper 117 releases its contents into the mixer 119 into which a suitable oil mixture from the tank 120 is conveyed by means of piping 126. The chute 143 in FIG. 2 is the counterpart of chute 43 in FIG. 1.

The mixer 119 may dump its contents, after a suitable period of mixing, into a chute 27 from which it falls by gravity into trucks that are brought as needed along the service road 134.

Various modifications may of course be made in the processes and equipment hereinbefore described, and components may be omitted or replaced by other components performing the same functions plus additional functions, all without departing from the broad spirit of the invention as succinctly set forth in the appended claims.

I claim:

1. Means for processing old paving material for reuse, said means comprising: a movable inclined grid having openings therein to permit the passage therethrough of rocks and other fragments of used paving material that are smaller than a predetermined size; power-driven means for moving said grid; a first hopper disposed beneath said grid for receiving the rocks and other material that have dropped through said grid; a second hopper disposed under the low end of said grid for receiving rocks and other fragments of used paving material that have fallen from said low end; a roaster for burning off any asphalt binder that may be adhering to the rocks; a rattler for receiving the hot rocks, fragments, and other material from said roaster and shaking the burned asphalt loose.

2. The combination set forth in claim 1 with the addition of means for conveying material from said second hopper to said roaster and optionally from said first hopper to said roaster.

3. The combination set forth in claim 2 with the addition of a chute communicating with said first hopper and said material-conveying means for releasing material from said first hopper onto said material-conveying means as desired.

4. The combination set forth in claim 1 with the addition of a bin for receiving used paving material that is to be reprocessed; and a substantially vertical conveyor for moving material from said bin to said grid.

5. The combination set forth in claim 1 with the addition of power-driven means for moving said grid.

6. The combination set forth in claim 1 with the addition of a mixer disposed beneath said first hopper for receiving material therefrom, said mixer having a closable outlet opening; a tank for storing an oil mixture to be added to the contents of the mixer; a pipe from said tank to said mixer, and a valve in said pipe for releasing the oil mixture into said mixer as desired.

7. The combination set forth in claim 6 with the addition of a third hopper disposed beneath said mixer for receiving the contents thereof and releasing it therefrom as desired.

8. The combination set forth in claim 1 in which the apparatus above the ground level is supported on framework.

9. The combination set forth in claim 1 in which the components are installed on the side of a hill, there being a higher level than that on which the first hopper is supported so that dump trucks on said higher level may dump their contents into said first hopper.

10. The method of reprocessing used paving material containing rocks and asphalt, which includes the following steps: heating the old paving material by means of a surface heater while it is still in place; removing the used paving material while it is still hot; separating the aggregate from the other ingredients by means of a sloping separation screen having apertures therein through which the aggregate cannot pass; and placing the material that has passed through the screen in a mixer with a predetermined quantity of mixing oil.

11. The process set forth in claim 10 with the additional step of retrieving the material that falls from the low end of the screen and roasting it to burn the substances that have bound the aggregate to the other ingredients of the used paving material.

12. The process of claim 11 with the addition of the following steps: transferring the material from the roaster to a rattler and shaking the material vigorously to free the burned asphalt and other ingredients from the aggregate.

13. The process of claim 10 in which the equipment employed is so supported that at least the screen is above ground level to permit gravity to remove the material therefrom; and initially elevating the material to the screen by means of a power-driven endless conveyor.

14. The process of claim 10 in which at least the screen used in the process is so supported above other equipment used therein that gravity may be employed to remove the material from the screen; and in which the material to be reprocessed is initially transported in vehicles to a level above the screen by means of a roadway and moved from the vehicles to the screen by gravity.