

Dec. 18, 1962

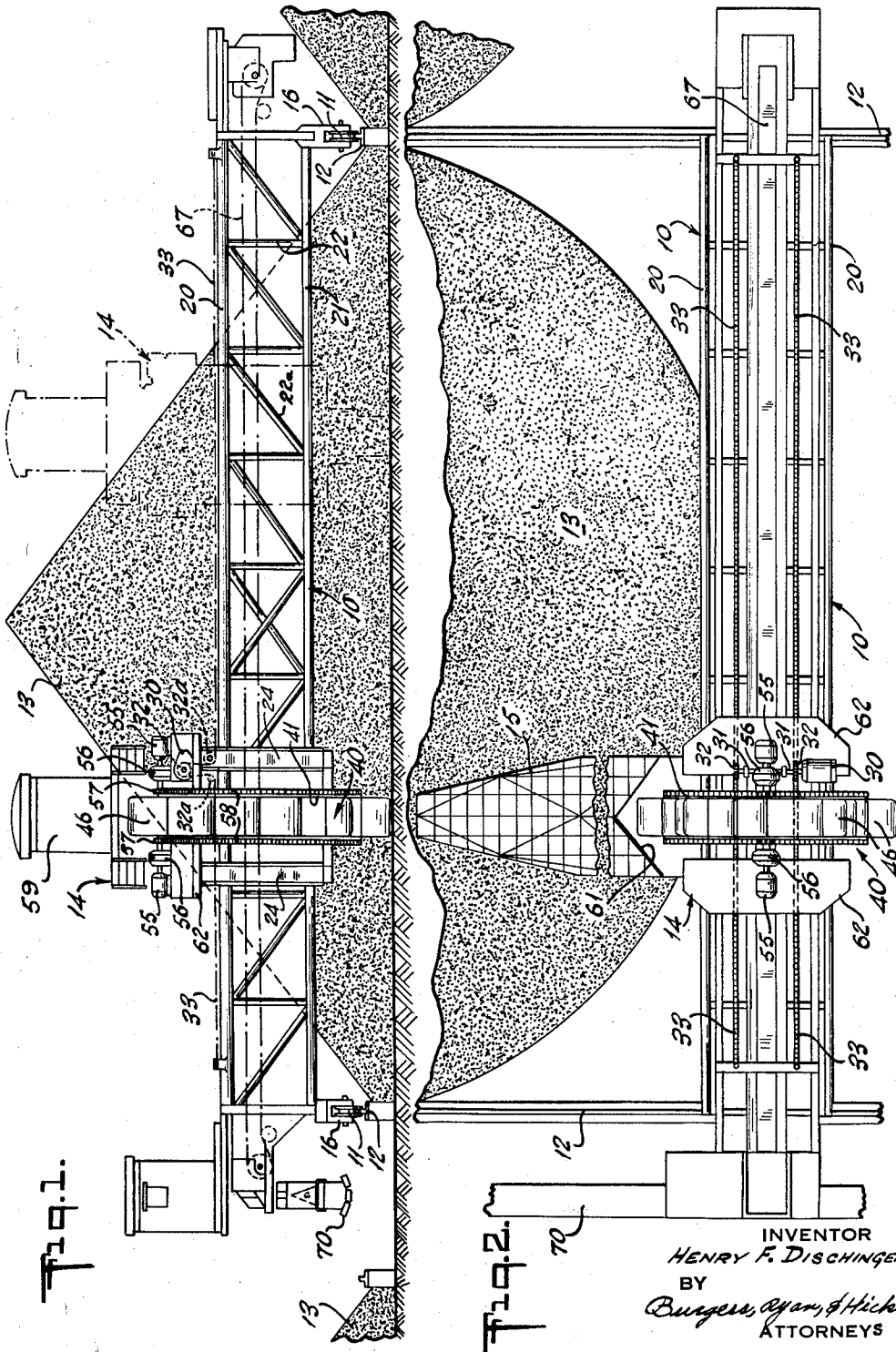
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3,069,027

RECLAIMING METHOD AND APPARATUS

Original Filed May 1, 1958

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RECLAIMING METHOD AND APPARATUS

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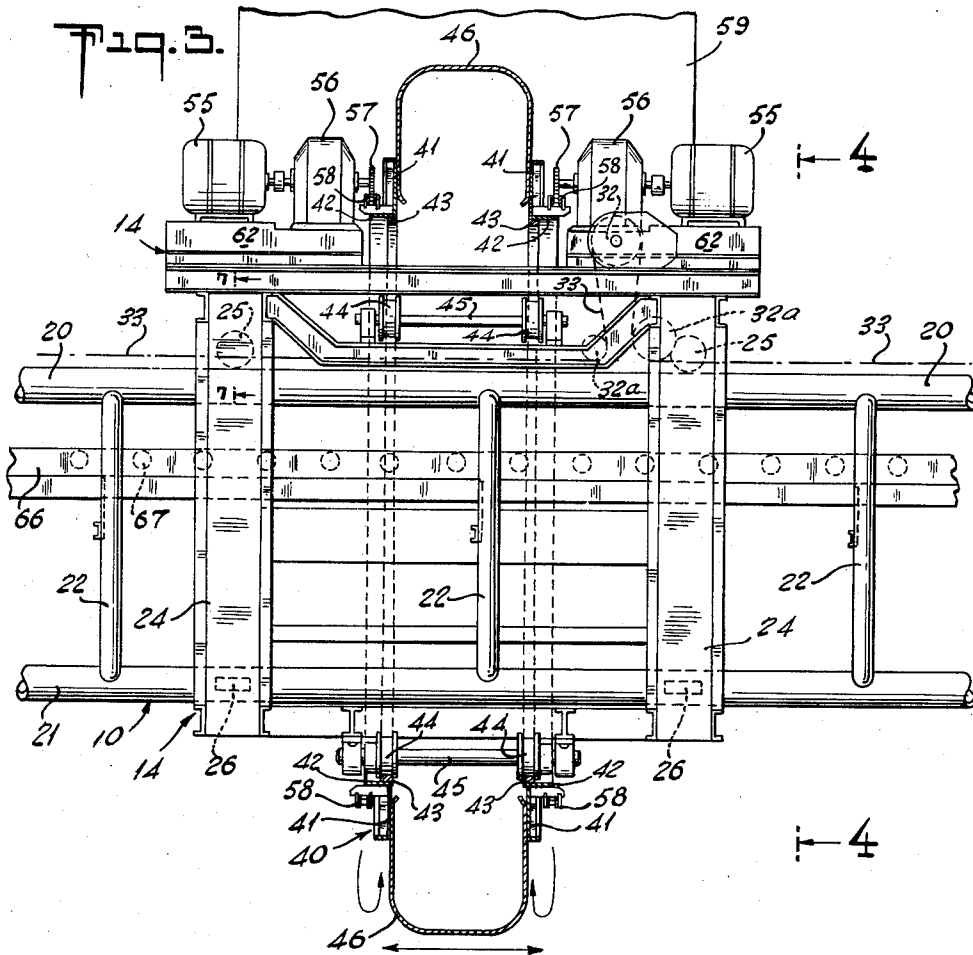
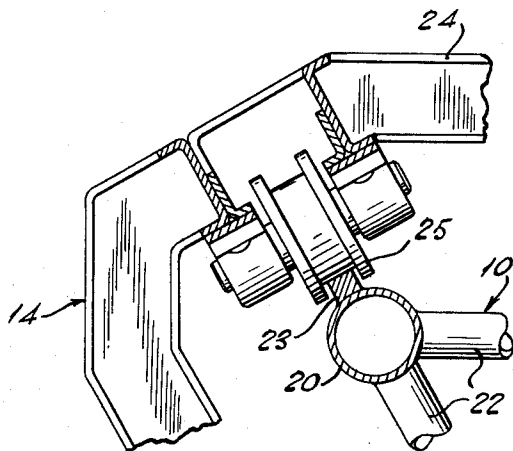


Fig. 7

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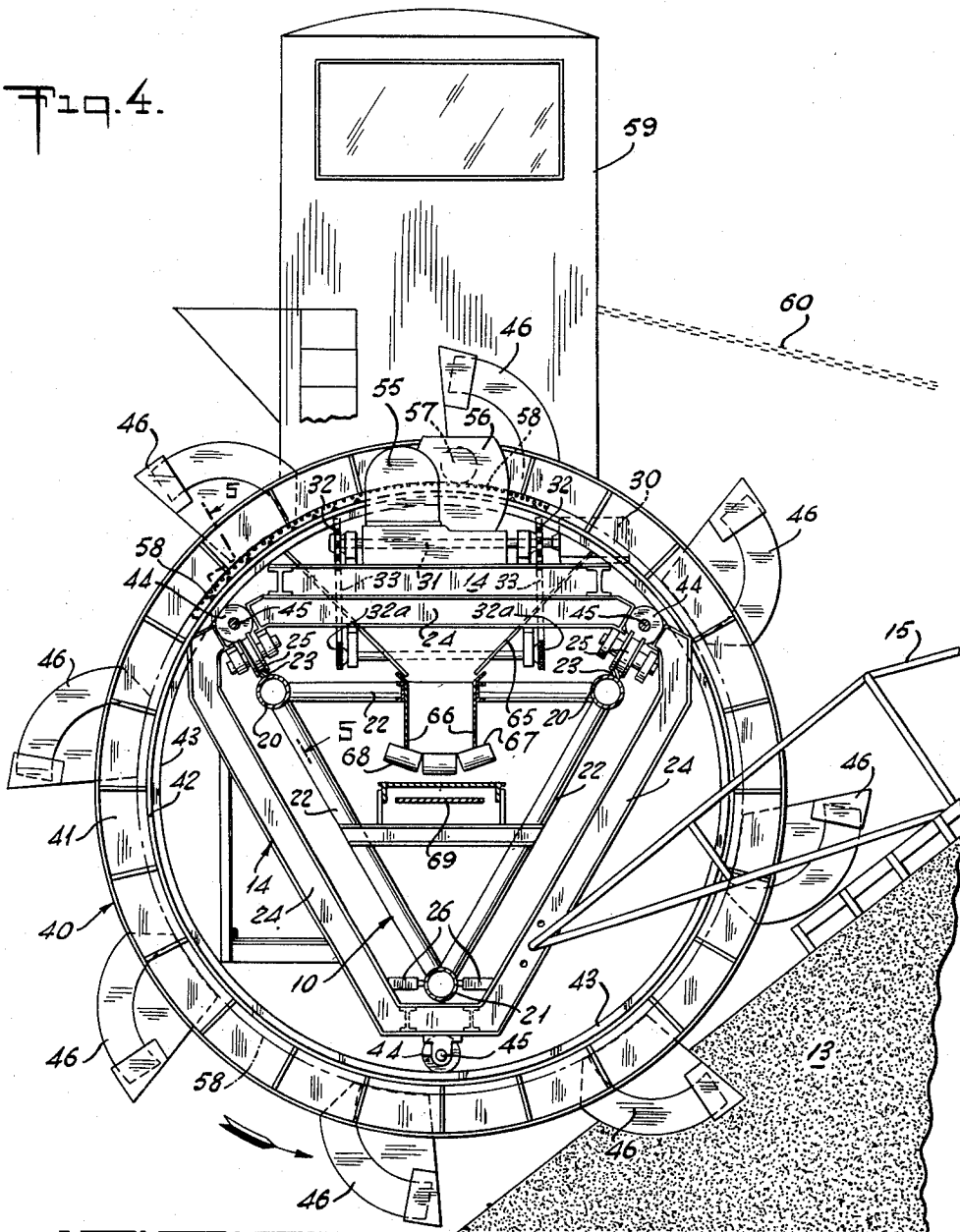
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Fig. 4.



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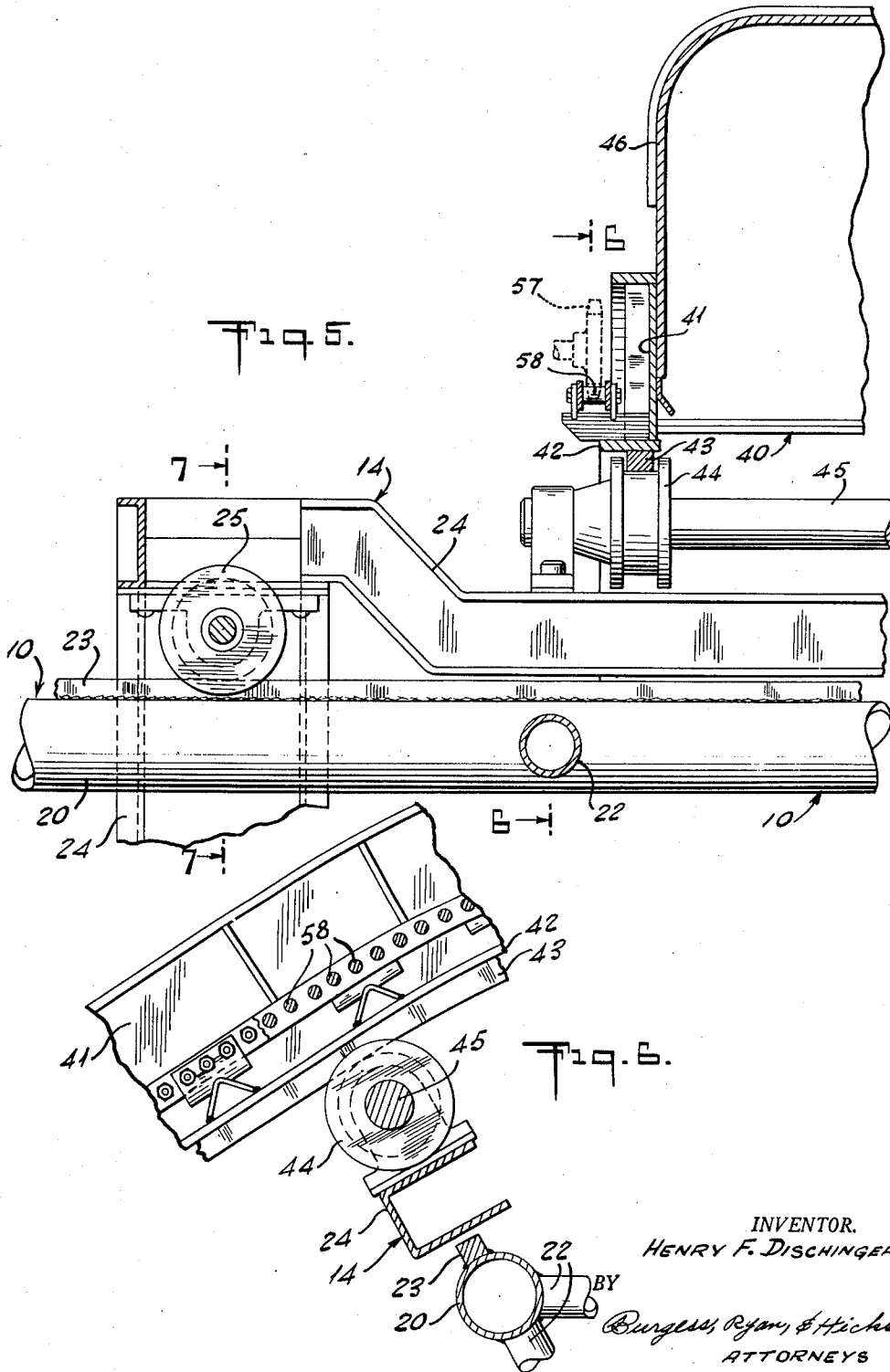
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Fig. 8.

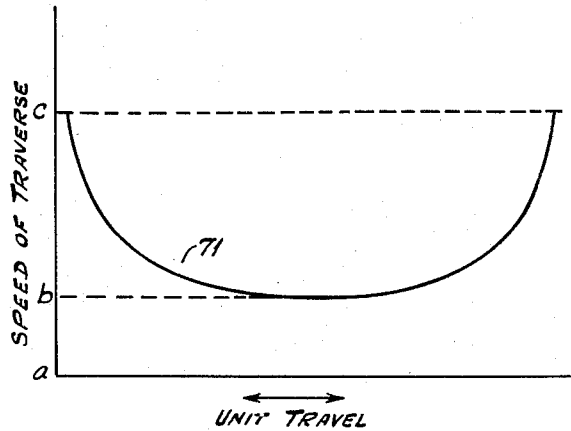
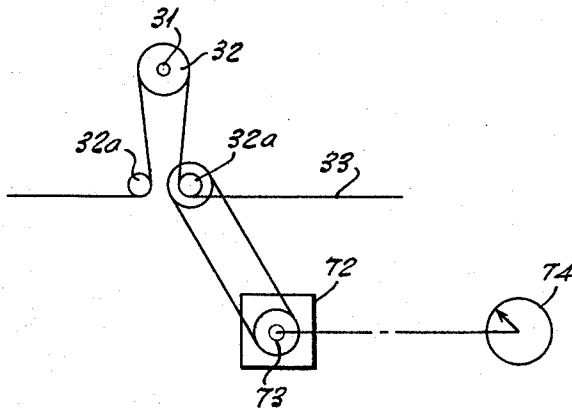


Fig. 9.

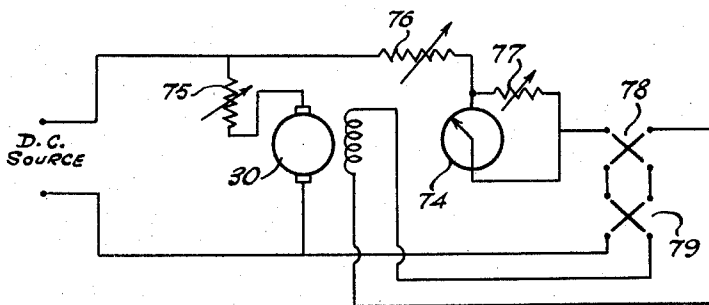


Fig. 10.

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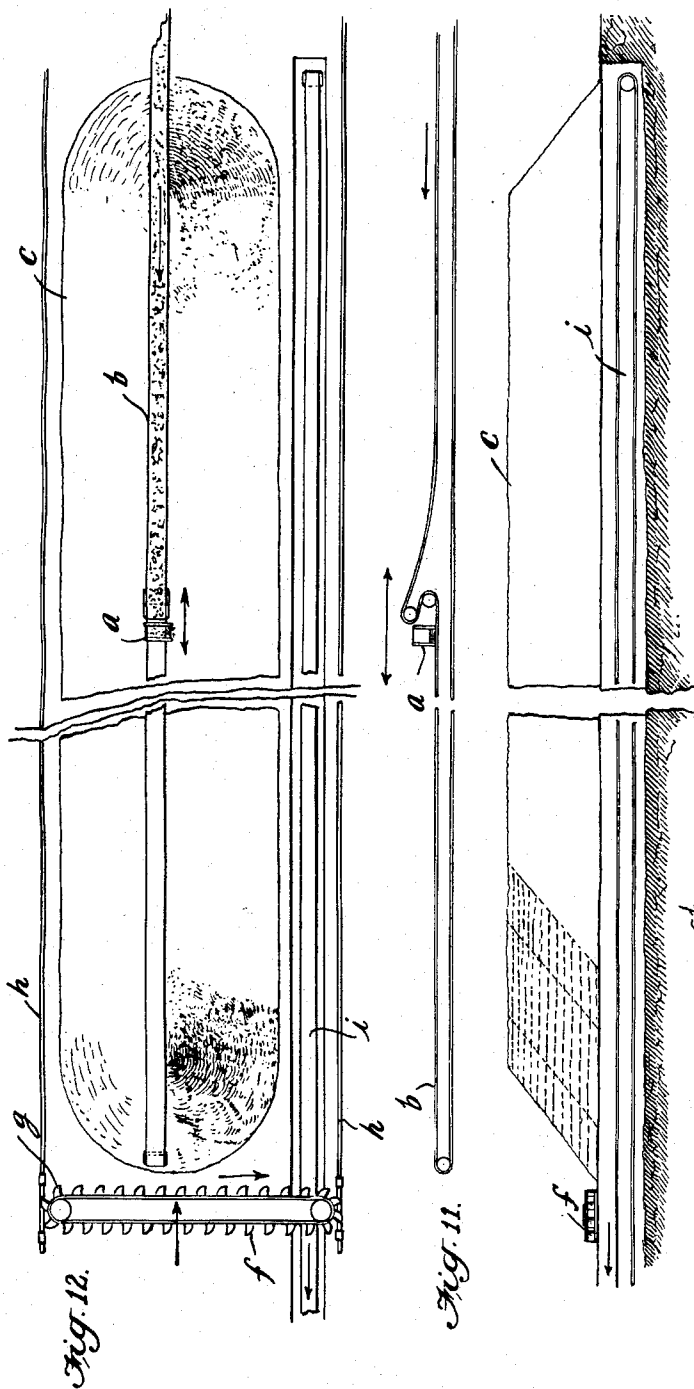
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3,069,027

RECLAIMING METHOD AND APPARATUS

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Continuation of application Ser. No. 732,268, May 1, 1958. This application May 23, 1962, Ser. No. 198,410 19 Claims. (Cl. 214-10)

The present invention relates to a method of reclaiming material from storage piles of such material and to reclaiming apparatus.

The invention has to do with the art of reclaiming coal, ore and the like from a pile of such material made up of many layers. As is well known, the material is removed progressively from an end face of the pile so that, by continuously taking away portions of all of the layers, a uniform blend of the material in the various layers is obtained. This application is a continuation of application Serial No. 732,268, filed May 1, 1958, now abandoned.

It is common practice to remove the material from such storage piles by means of a so-called reclaimer and one of the objects of the present invention is to provide a high capacity reclaimer especially adapted for use with and to effect thorough blending from extra large storage piles of layered material. As will presently appear, the preferred form of reclaimer herein described and shown in the drawings, for the purpose of illustrating the principles of the invention, is capable of carrying out an improved method of reclaiming which involves the handling of a uniform volume of material, commensurate with the capacity of the reclaimer mechanism, notwithstanding the fact that the end face of the pile is commonly of triangular shape and hence of widely varying height throughout its width.

Other objects, features and advantages of the invention will be apparent from the following description and the accompanying drawings, in which:

FIGURE 1 is a rear elevation of the preferred form of reclaimer according to the invention and, in the background, a pile of layered material to be reclaimed;

FIGURE 2 is a top plan view of the reclaimer and the end of the pile of material;

FIGURE 3 is an enlarged and partially sectioned elevational view of the reclaimer carriage unit of FIGURE 1;

FIGURE 4 is an enlarged sectional view, as on the line 4-4 of FIGURE 3;

FIGURE 5 is a still further enlarged sectional view, as on the line 5-5 of FIGURE 4;

FIGURE 6 is a broken-out section, as on the line 6-6 of FIGURE 5;

FIGURE 7 is a sectional view, as on the line 7-7 of FIGURE 5;

FIGURE 8 is a graph illustrating the speed regulation of the carriage;

FIGURE 9 is a diagrammatic illustration of the carriage drive and speed regulating apparatus;

FIGURE 10 is a schematic wiring diagram for the carriage drive;

FIGURE 11 is a schematic side elevational view of a pile of bulk material and apparatus for operating in association with the pile according to the prior art;

FIGURE 12 is a top plan view of the same;

FIGURE 13 is a partly sectioned end elevation.

The art to which the instant invention relates is perhaps best shown in its infancy in Messiter U.S. Patent #677,677, dated July 2, 1901. In fact, the FIGURES 11, 12 and 13 herein are exact copies of FIGURES 1, 2 and 3 of this Messiter patent. They are placed herein solely for purposes of illustrating the prior art. With

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reference to the three FIGURES 11, 12, and 13, it should be noted that according to the method therein illustrated, bulk material, such as iron ore, coal or other material, to be used in a process, is laid down in what is often referred to as a bed. The means of laying this material down in a bed as diagrammatically illustrated in these FIGURES consists of a conveyor and an associated traveling tripper device *a*. The conveyor *b* receives material from a boat, train, or other transportation means, and by means of the traveling tripper the material is spread along the length of the pile or bed *c*.

Those skilled in the art will recognize this process. The continuous travel back and forth of the tripping device results in a series of layers being "bedded" down. One layer is placed on top of the other as the stripper moves continuously back and forth over the pile. By selecting suitable lengths for the piles bedding systems can be made which are particularly adapted to the type of transport apparatus employed to bring the material towards the pile. That is, the unit load, such as a railroad car, can govern the speed and length of travel of the tripper.

With reference to FIGURE 13: It will be noted that the material is deposited at the apex of the pile and it falls down both sides. The materials are thus spread along the length of the pile and down its sides *d*, *e*. Each material will appear at two points along the base of each cross section; i.e., to each side of the center. (See FIGURE 13.) Thus no matter where the pile is sliced, transversely of its length, each material placed in the pile will be found in the slice. It is understood that 100% accuracy and occurrence of this perfect bedding is not usually achieved. However, this is very closely approached in properly designed and engineered installations.

Again with reference to FIGURES 11, 12 and 13, there is illustrated a device *f* by means of which it is intended that the pile be transversely cut at its base, and that the material be swept into a conveyor. It is contemplated that the material will slide down the face of the pile to be swept to the side and that the under-cutting device will be moved longitudinally along the length of the bed. This reclaiming process basically involves removing the bed in slices which extend laterally across the pile. This will result in maximum blending. By blending is meant the intermixing of materials such that the entire output from the bed is substantially uniform in particle size and chemical analysis.

United States Patent #858,008 to Messiter shows a machine for accomplishing reclaiming of the loose material as contemplated by the Messiter U.S. Method Patent #677,677.

This machine, which went into actual commercial use comprises a series of plow-like blades *g* connected to a chain (see FIGURES 12 and 13). This chain is supported on sprocket wheels and is driven so that the plow blades continually cut into the base of the material. As is also well known by those skilled in the art the plow blades are actually supported on plates which are connected to the blades and each plate is supported by rollers running on tracks. The blades operate over a base plate, and the plow points extend forwardly of the edge of the plate. The machine is mounted by wheels on rails *h* extending along the sides of the pile, and is driven forwardly into the pile while the plows are driven over the plate. The plow points actually cut the way for the plate to advance into the pile.

FIGURES 11-13 show the conveyor *i* and traveling hopper *j* into which the material is deposited by the plow blades.

As is also well known an "agitator device" is employed.

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This has a triangular frame which extends upwardly and forwardly from the plows. The agitating device can be oscillated. This results in a movement of the agitating device against the material in the pile face, and causes it to flow down the face to the plows.

The method of reclaiming disclosed in the Messiter patent, and the apparatus disclosed in the Messiter apparatus patent as stated above, and as is well known by those skilled in the art, went into commercial use. Machines embodying these ideas are still in use and some are still being sold. They were in fact highly successful commercially. They can be found in use in the United States, England, Germany, France, Italy, Japan, Mexico, Africa, India and elsewhere.

This machine, and the method of reclaiming employed, have certain limitations, however. These not only limit the size of piles and the rate of reclaiming but also dictate certain operating costs. These limitations can be appreciated from again considering FIGURES 11 through 13. It will be noticed therein that this reclaiming device consists of a series of plows which extend along substantially the full length of the machine. These plows cut material from the pile, force it onto the plate and then drag it across the plate to the side where it is deposited in the conveyor *i*. Thus the conveyor, the conveyor-machine association, and the plow-plate association on the machine provide inherent limitations. On the one hand this conveyor and its associated hopper must be depressed below the surface of the ground. This creates drainage and other construction problems, renders the conveyor less likely to be properly inspected and lubricated, and subjects the installation to down time due to snow, ice or rain or clogging of the hopper and conveyor.

The reason however for the sunken conveyor and hopper resides in the fact that the plows must move off the plate and over the conveyor to transfer the material from the plate to the conveyor. One other design limitation thus appears: the conveyor must be within the confines of the machine; i.e., the plows must extend over the conveyor. The machine must thus be of greater width than the pile face by a significant amount. Another disadvantage of this sunken conveyor construction is that it cannot be used by the tripper *a*. In most instances open piles of the type shown are provided with a tripper running alongside the pile on a pair of rails instead of the overhead tripper shown. The tripper is associated with a boom stacker for reaching the material to the apex of the pile. The overhead conveyor and tripper is disfavored because of the cost of the supporting structure required therefor. A separate conveyor must be provided for this tripper because of the difficulty that would be encountered in attempting to utilize a sunken conveyor for this purpose. Also, a separate set of rails must be provided for the tripper.

Another aspect of the previously known method and apparatus which is also well known is that it is necessary to provide a macadam-like surface beneath the plate over which the plows operate. This is required to prevent bulging of the ground surface and resulting plate-ground interference. The weight of the pile is the cause of bulging or upheaval of the ordinary run of earth adjacent the perimeter of the pile. This can jam the machine. Thus a specially prepared base is needed.

An additional adverse aspect of this known machine, due to the plate is that material must be dragged across the plate by the plows. This requires considerable power and often there is jamming and/or bending of blades due to wedging of particles between the plate and blades. Further, the plow blades themselves are subject to bending in frozen piles and on striking large particles.

Yet another limitation of this older machine is that its harrow-like device extends across the full width of the pile. Its size and the size of its agitating means or limiting factors, in addition to the fact that the pile cannot be wider

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with respect to the machine than the distance between one end of the machine and the sunken conveyor.

All the above referred to details and disadvantages of the heretofore known methods and machines are well known to those skilled in the art.

It will become apparent to those skilled in the art from perusing the following description of the herein disclosed invention, that the instant invention contemplates overcoming the restrictions imposed by the above described method and apparatus of reclaiming. It should be noted, however that the above described machine and method of reclaiming were the commercially accepted, most superior, method and apparatus heretofore known. They provided far superior results as contrasted to what can be obtained with grab buckets and shovels, for example.

Some of the advantages of utilizing the instant invention are: the pile size can be materially increased, the restrictions due to the continuous wearing and jamming of plow blades and plate, and damage thereto, are eliminated. The need for a sunken conveyor is eliminated. Further, it is possible to utilize a single conveyor for placing the material into the pile and removing the material therefrom. In addition, it is not necessary to employ a large harrow extending the full width of the pile. Also, according to the instant invention, a machine of much greater capacity, that can operate with much less attention, and is more suitable for automatic operation, is provided. In addition, the heretofore need to build a macadam surface underneath the pile is eliminated, and, as an added benefit, the reclaimer machinery elements can now be raised above the surface of the ground where they are less subject to the effects of moisture, rain, snow, etc.

As shown in the drawings, the reclaimer according to my invention comprises a main frame, generally designated 10, which is supported adjacent its ends by wheels 11 designed to run on the rails 12 extending longitudinally and adjacent the edges of a storage pile 13 of layered material to be reclaimed; and mounted on the main frame for movement lengthwise of it (that is, back and forth across the end face of the pile of material) are one or more material handling units 14. One such unit is illustrated at the left of FIGURE 1 while a second such unit is indicated in dotted line toward the right of FIGURE 1. In general, the use of two or more material handling units, each of which traverses a portion of the pile face, will improve the blend of the reclaimed material.

On the forward or pile side of the material handling unit, there is suitably mounted a harrow 15, which may be of any preferred form, its general function (except as mentioned below) being conventional. As will be understood, appropriate power means, such as variable speed motors incorporated in the wheel trucks 16 of the main frame, or as may be preferred, are provided for advancing the reclaimer on its rails toward the end face of the pile at a desired speed.

As shown particularly in FIGURE 4, the main frame of the reclaimer is of inverted triangular section, including two spaced upper side members 20 and a lower or apex member 21, all extending longitudinally of the frame and united by members 22 and 22a. The upper side members 20 support rails 23 (FIGURE 7) on which the material handling unit 14 runs in traversing the main frame. The material handling unit includes a carriage having a framework 24, which is likewise of inverted triangular cross section (FIGURE 4) surrounding the triangular structure of the main frame and carrying flanged wheels 25 engaging the rails 23. At its lower end, the carriage framework 24 is shown as incorporating guides 26 which engage with opposite sides of the lower or apex member 21 of the triangular structure of the main frame.

Power means are provided for traversing the material handling unit with respect to the main frame. As shown, the power means comprises a variable speed, reversible electric motor 30 (FIGURES 2 and 4) mounted on the

carriage and which drives a shaft 31 carrying spaced sprockets 32, over which chains 33 pass from idler sprockets 32a. The chains extend substantially from one end to the other end of the main frame and are anchored or fixed to the main frame at their ends (FIGURE 2).

The mechanism by which the material is reclaimed at the foot of the end face of the pile comprises a bucket wheel, generally designated at 40, rotatably mounted on the traversing carriage unit 14. The bucket wheel encircles the main frame and also the carriage framework (FIGURE 4) and has spaced, annular side members 41 (FIGURE 5) with flanges 42 formed thereon. Rails 43 carried on the inner periphery of the flanges are engaged by flanged wheels 44 which are mounted on the carriage framework adjacent the outer ends of circumferentially spaced shafts 45. The flanged wheels 44 are free-running, of course, to support the wheel for rotation about the carriage in a vertical plane normal to the end face of the pile.

As shown, the annular side members 41 of the wheel are united by buckets 46 spaced around the wheel and disposed to enter the base of the pile and scoop up material from it as the wheel is rotated counter-clockwise as viewed in FIGURE 4.

Power means are provided for so rotating the bucket wheel, such as the electric motors 55 which, through reduction units 56, drive the sprockets 57 which engage rollers 58 spaced around and suitably supported on the outer periphery of flanges 42 of the annular side members of the wheel (FIGURES 5 and 6).

The traversing carriage also supports and is surmounted by an operator's cab 59 in which the necessary controls may be located, including that of chain 60 (FIGURE 4) by which the angle of attack of the harrow may be adjusted in the usual manner. As shown in FIGURE 2, the base or lower end of the harrow is notch-shaped, so that it partially surrounds the wheel buckets and thereby tends to prevent such cascading of the material as might overload the buckets or feed to them more material than they could handle.

As will be seen, the power drive means, both for traversing the carriage and for rotating the wheel, are mounted on a platform structure 62 secured to the upper part of the carriage.

The material scooped up by the wheel buckets is raised to the upper part of their path of travel and is there dumped on to a suitable conveyor mounted on the main frame of the reclaimer and extending longitudinally of it through the center of the wheel, to transport the material to one end or the other of the reclaimer (in this instance, the left hand end as viewed in FIGURE 1). As shown particularly in FIGURE 4, the buckets dump their loads into the wide mouth of the funnel-shaped receiver 65 mounted on the traversing carriage, the open bottom of the receiver being disposed to discharge into the space between the side plates or baffles 66 which are secured to and extend the length of the main frame and serve to guide the descending material on to the upper run 67 of a power driven conveyor belt supported on troughing idlers 68. The lower or return run of the belt is indicated at 69. As indicated in FIGURES 1 and 2, the reclaimer conveyor may discharge to a ground-supported conveyor 70 by which the reclaimed material is carried to its destination. The ground conveyor may be located at either end of the main frame with the reclaimer conveyor being operated in an appropriate direction.

The carriage is traversed continuously back and forth across the end face of the pile of material, with its bucket wheel rotating; and, when a single carriage unit is employed, as in the form illustrated, and the single wheel serves the whole pile face (rather than only a portion of it, as would be the case where two carriages were traversed between the center and the ends of the main frame), the reclaimer lends itself to operation by an extremely efficient method. Under these conditions, the

speed of traversing the carriage and the speed of rotation of the wheel, for a predetermined bite of the wheel into the pile, are correlated to provide for reclaiming at a uniform rate. This may be accomplished by rotating the wheel at a constant speed and regulating the traverse speed so that it is greater toward the outer portions of the usually triangular pile face, where the height of the face is less, and is less in the central portion of the traverse, where the height is greater. As the result of so operating the reclaimer, the amount of material available to the buckets is substantially constant throughout the traversing of the carriage and the reclaimer is thereby enabled to operate at maximum capacity for the particular wheel and the reclaiming operation to be performed in minimum time.

As will be recognized, the magnitude of the traverse speed and the required speed variations between the central and end portions of the path of traverse of the carriage may readily be plotted for the particular installation. For a triangular pile face, the relationship between the speed of traverse (v) and the height of the pile (h) may be expressed by the equation:

$$hv=k \text{ (where } k \text{ is a constant)} \quad (1)$$

The Equation 1 is a hyperbolic function and is graphically represented in FIGURE 8 by curve 71 where the speed of traverse is plotted against travel of the material handling unit with respect to the pile face.

The means for automatically varying the speed of the material handling unit as it moves across the pile face includes a speed reducing unit 72 which is driven from one of the idler sprockets which directs the drive chain 33 around the sprocket 32 on the drive shaft 31, as shown in FIGURE 9. The speed reducing unit is geared so that its output shaft 75 makes one complete revolution during movement of the material handling unit across the pile face. The output shaft 73 drives a speed control device 74, such as a rheostat or inductor, in circuit with the drive motor 30 shown in FIGURE 10.

The speed control device 74 may be connected in the field circuit of the drive motor 30, as shown in FIGURE 10, and in this instance is arranged to vary the speed of the drive motor from a minimum speed (b) to a maximum speed (c), as represented in FIGURE 8, as it rotates through 180° and back to the minimum speed (b) as it rotates through the remaining 180° to 360°. An adjustable resistance or inductor 75 is also connected in the armature circuit for the drive motor and the setting of this resistor will determine the minimum speed (b) at which the unit moves in its travel across the pile face.

An adjustable resistor or inductor 76 which is connected in series with the speed control device 74 in the field circuit of the drive motor determines the maximum speed (c) at which the unit moves in its travel across the pile face. In other words, the setting of the resistors 75 and 76, respectively, determines the speeds (b) and (c) between which the speed control device automatically varies the speed at which the unit travels across the pile face. The resistors 75 and 76 are manually adjustable so that the maximum and minimum speeds can be readily set as desired. An adjustable resistor 77 may also be connected in shunt with the speed control device 74 to provide a fine control of the range of speeds at which the unit travels.

As shown in FIGURE 10, reversing switches 78 and 79 are also connected in the field circuit of the drive motor. One of the reversing switches is operated each time the material handling unit reaches the end of its travel across the pile face in one direction and thus, reverses the direction of rotation of the drive motor, causing the material handling unit to be driven across the pile face in the opposite direction.

It will be understood that other suitable automatic or semi-automatic controls may be employed to carry out the described method of operation.

It will also be understood that various changes and modifications may be made in the method and in the particular embodiment of the invention illustrated and described herein without departing from the scope of the invention as defined by the claims appended hereto.

I claim:

1. In a reclaimer, a wheeled frame of inverted triangular section incorporating upper side frame members and a lower frame member, a rail carried by each of the upper side frame members, a carriage having wheels adapted to run on said rails, a bucket wheel rotatably mounted on said carriage and encircling the said frame, means mounted on the carriage for traversing it back and forth on said rails between the ends of said frame and means on the carriage for simultaneously rotating the bucket wheel.

2. In a reclaimer, a wheeled frame of inverted triangular section incorporating upper side frame members and a lower frame member, a rail carried by each of the upper side frame members, a carriage of inverted triangular section surrounding the frame and having wheels adapted to run on said rails and guide means adapted to engage the said lower frame member and a bucket wheel rotatably mounted on the carriage and encircling it and the said frame.

3. In a reclaimer, a wheeled frame of inverted triangular section incorporating upper side frame members and a lower frame member, a rail carried by each of the upper side frame members, a carriage having wheels adapted to run on said rails, a bucket wheel rotatably mounted on said carriage and encircling the said frame, a platform supported on the carriage and means mounted on the platform for traversing the carriage on the rails and for rotating the bucket wheel.

4. In a reclaimer, a wheeled frame of inverted triangular section incorporating upper side frame members and a lower frame member, a rail carried by each of the upper side frame members, a carriage having wheels adapted to run on said rails, a bucket wheel rotatably mounted on said carriage and encircling the said frame, rollers supported on a peripheral portion of the wheel and drive means for the wheel mounted on the carriage, including a sprocket adapted to engage the said rollers.

5. In a reclaimer of the type described which has a frame extending across the face of a pile of material and a material handling unit mounted on said frame and being movable across the face of said pile, said unit including movable buckets engaging with and lifting material from the face of the pile, the improvement which comprises an electric motor having drive connections to the material handling unit, said motor being reversible for moving said unit across the face of the pile in opposite directions, and means for varying the speed at which the material handling unit moves across the face of the pile so as to remove material from the face of the pile at a uniform rate, said means including a speed reducer connected to the drive motor and a speed control device in circuit with the motor, said speed control device being connected to and driven by the speed reducer.

6. In a reclaimer of the type described which has a frame extending across the face of a pile of material and a material handling unit mounted on said frame and being movable across the face of said pile, said unit including movable buckets engaging with and lifting material from the face of the pile, the improvement which comprises an electric motor having drive connections to the material handling unit, said motor being reversible for moving said unit across the face of the pile in opposite directions, and means for varying the speed at which the material handling unit moves across the face of the pile so as to remove material from the face of the pile at a uniform rate, said means including a speed reducer connected to the drive motor, a speed control device in circuit with the motor, said speed control device being connected to and driven by the speed reducer, and manually adjustable

resistors in circuit with the motor for controlling the maximum and minimum speeds of movement of the material handling unit across the face of the pile.

7. In a reclaimer of the character described, the combination comprising a wheeled frame of triangular section incorporating upper side frame members and a lower frame member, a carriage movably carried on the upper frame members, a bucket wheel rotatably mounted on said carriage and encircling said frame, said wheel being rotatable in a vertical plane on an axis extending parallel to the frame and discharging onto a conveyor located inside of the triangular frame and extending lengthwise thereof, drive means on the carriage for rotating said bucket wheel and a second drive means on the carriage for moving the carriage and the bucket wheel lengthwise with respect to the frame across the face of a pile of stored material, said carriage drive means including a reversible electric motor, chain sprockets driven by said motor and chains engaging with said sprockets, said chains extending lengthwise of the frame and being anchored at the ends thereof, and means for varying the speed at which the carriage moves across the face of the pile of material so as to obtain uniform loading of the conveyor from the discharge of the bucket wheel.

8. In a reclaimer of the character described, the combination as defined in claim 7 wherein the means for varying the speed of the carriage includes a speed reducer connected to and driven by the carriage drive motor and a speed control device connected in circuit with the motor and driven by the speed reducer.

9. In a reclaimer of the character described, the combination as defined in claim 7 wherein the means for varying the speed of the carriage includes a speed reducer connected to and driven by the carriage drive motor, a speed control device connected in circuit with the motor and driven by the speed reducer, and adjustable resistors connected in circuit with the carriage drive motor for controlling the maximum and minimum speeds thereof.

10. In a reclaimer of the type which includes an elongated, wheeled frame having a pair of spaced upper side frame members which is adapted to extend across and to be advanced toward an end face of a pile of material, the improvement which comprises a supporting carriage movably mounted on the upper side frame members of the wheeled frame, said carriage being movable lengthwise of the wheeled frame between the ends thereof and parallel to the end face of the pile of material; a bucket wheel rotatably mounted on and encircling said movable carriage, said bucket wheel having a series of spaced digging buckets extending from the outer circumference thereof and being rotatable in a vertical plane normal to the end face of the pile of material; means for traversing the bucket wheel back and forth between the ends of the frame, means for simultaneously rotating the bucket wheel, and a harrow adjustably supported from the carriage and engaging with the end face of the pile of material, said harrow having a notch-shaped lower end portion extending on opposite sides of the buckets on the bucket wheel at one point in the rotation thereof.

11. In a reclaimer of the type which includes an elongated, wheeled frame having a pair of spaced upper side frame members which is adapted to extend across and to be advanced toward an end face of a pile of material, the improvement which comprises a supporting carriage movably mounted on the upper side frame members of the wheeled frame, said carriage being movable lengthwise of the wheeled frame between the ends thereof and parallel to the end face of the pile of material; a bucket wheel rotatably mounted on and encircling said movable carriage, said bucket wheel being rotatable in a vertical plane normal to the end face of the pile of material; means for traversing the bucket wheel back and forth between the ends of the frame, said means including an electrically operable motor and a control circuit for regu-

lating the speed of said motor, said control circuit being arranged to reduce the speed of the motor when the movable carriage is at the center of the end face of the pile of material; and means for simultaneously rotating the bucket wheel during movement of the carriage on the frame.

12. In a reclaimer of the type which includes an elongated, wheeled frame having a pair of spaced upper side frame members which is adapted to extend across and to be advanced toward an end face of a pile of material, the improvement as defined in claim 11 which includes an endless belt conveyor mounted on and extending lengthwise of the frame, said belt conveyor passing through the center of the bucket wheel and being positioned to receive material discharged therefrom.

13. In a reclaimer of the character described, the combination comprising an elongated, wheeled frame adapted to extend across and to be advanced toward the end face of a pile of material to be reclaimed, said frame including a pair of upper side frame members having a space therebetween, a carriage movably supported on said upper side frame members; a bucket wheel rotatably mounted on and encircling the carriage, said bucket wheel being rotatable in a vertical plane and discharging into the space between the upper side frame members; a harrow adjustably supported from and movable with the carriage, said harrow having an upper portion engaging with the end face of the pile of material at a point above the bucket wheel and having a notched lower end portion extending on opposite sides of the bucket wheel at one point in the rotary movement of the wheel through the end face of the pile of material, power means for traversing the carriage and the bucket wheel lengthwise with respect to the frame; and a second power means on the carriage for rotating the bucket wheel.

14. In a reclaimer of the character described, the combination as defined in claim 13 wherein the power means for traversing the carriage includes an electrically operable motor mounted on the carriage, a sprocket wheel driven by said motor and a chain engaging with and driven by the sprocket wheel, said chain extending lengthwise of the frame and being fixed thereto at its ends.

15. In a reclaimer of the character described, the combination as defined in claim 13 wherein the power means includes an electrically operable motor mounted on the carriage and a control circuit for regulating the speed of said motor.

16. In a reclaimer of the character described having an elongated frame and a carriage movably supported on said frame, the improvement which comprises a bucket wheel rotatably mounted on the movable carriage and a harrow carried by the carriage and extending outwardly therefrom above the bucket wheel, said harrow having an upper end extending beyond the bucket wheel and having a divided lower end extending outwardly with respect to the bucket wheel on opposite sides thereof.

17. In an apparatus for reclaiming piled bulk material, the combination comprising a frame, means movably supporting said frame for movement into reclaiming relationship with the face of a pile of bulk material, a bucket wheel mounted on said frame for rotation about a horizontal axis, said wheel surrounding a portion of the frame and being movable into digging relationship with the face of the pile when said frame is moved into said reclaiming relationship with the pile, a conveyor supported on the frame in a position to receive material discharged from the wheel, said conveyor being operative to move

said material along the frame, pile raking means associated with the wheel and adapted to rake the face of the pile at a point above said wheel when the wheel is in digging relationship with the face of the pile, said pile raking means extending above the wheel and forwardly with respect to the wheel, said pile raking means being operative and in operative relation to the wheel so as to rake the face of the pile which is in digging relationship with said wheel and to cascade loosened material downwardly over the face of the pile in a regulated manner into a position to be reclaimed by the wheel while the latter operates on the base of the pile, said wheel and said pile raking means being mounted for movement along the face of the pile, and means for moving said wheel and pile raking means in a longitudinal plane relative to the frame and along the face of the pile.

18. In a reclaiming apparatus adapted to reclaim piled bulk material in a uniformly blended condition, a frame, means movably supporting said frame for movement normal of a pile of bulk material to be reclaimed into reclaiming relationship with the pile, a bucket wheel mounted on said frame for rotation about a horizontal axis and for movement into digging relationship with the face of a pile of material when said frame is moved into said reclaiming relationship, a pile raking means associated with the wheel and adapted to rake the face of the pile at a point above the wheel when the wheel is in digging relationship with the face of the pile, means mounting said pile raking means on said frame in operative relation to said wheel with said pile raking means extending upwardly and forwardly with respect to said wheel so as to be in a pile raking relationship with the face of a pile which is in said digging relationship with said wheel, means for moving said wheel and said pile raking means in a longitudinal plane along the face of a pile while the said wheel and said pile raking means are in said operative relation to each other so as to rake the face of a pile which is in digging relationship with said wheel and cascade material downwardly over the face of the pile in a regulated manner into position to be reclaimed by said bucket wheel while the latter operates on the face of the pile with which it is in said digging relationship.

19. The art of reclaiming bulk material from a pile having an end face in which the material is reposed at an angle in a manner to obtain a uniformly blended sample of the material at all times, consisting of reclaiming by digging into the end face of the pile at the bottom of the face and only at a restricted area of the face with respect to the total width of the face, while simultaneously raking the face of said pile over an area which extends a substantial distance above said bottom over said restricted portion and which extends to the side thereof, but which area is substantially restricted in width as compared to the total width of said face so as to cascade material from a substantial area of the face, as compared with said restricted portion, but from a relatively small area as compared to the total area of said face downwardly of the face to the base thereof in a controlled manner into position to be dug, and so as to control the slope of said face through raking said face and while cascading material downwardly of said face to the base thereof, and simultaneously jointly moving the restricted digging area and the raking area along the said face from side to side thereof.

No references cited.

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,069,027

December 18, 1962

Henry F. Dischinger

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

In the grant, lines 2 and 12, and in the heading to the printed specification, line 4, for "Hewitt-Robbins Incorporated", each occurrence, read -- Hewitt-Robbins Incorporated --; column 1, line 41, for "reclaimed;" read -- reclaimed; --; column 2, line 15, for "stripper" read -- tripper --; column 6, line 35, for "75" read -- 73 --.

Signed and sealed this 8th day of October 1963.

(SEAL)
Attest:

ERNEST W. SWIDER
Attesting Officer

EDWIN L. REYNOLDS
Acting Commissioner of Patents