Aug. 8, 1967 C. LUDWIG 3,334,759

COMBINATION STACKER AND RECLAIMER

Filed Sept. 3, 1965 4 Sheets-Sheet 1

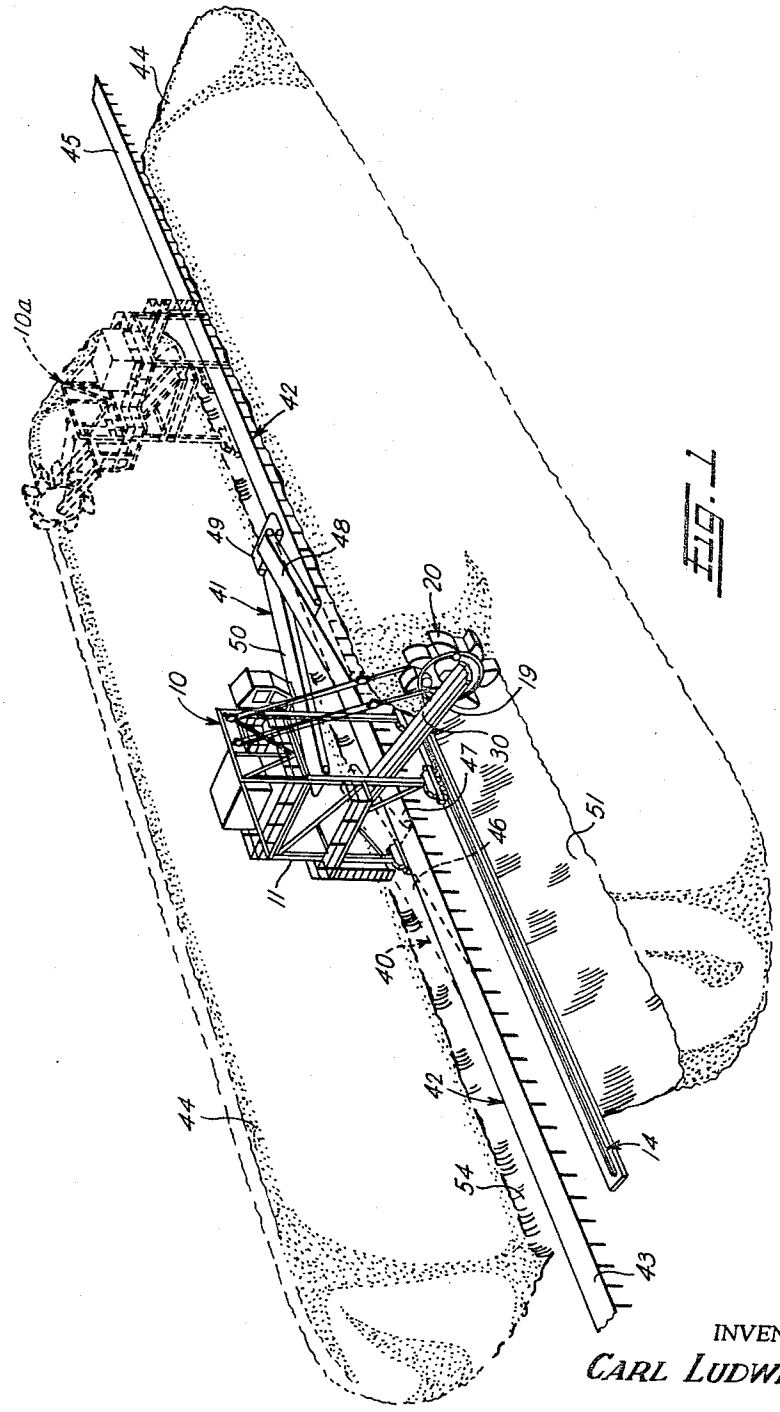


FIG. 1

INVENTOR
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COMBINATION STACKER AND RECLAIMER

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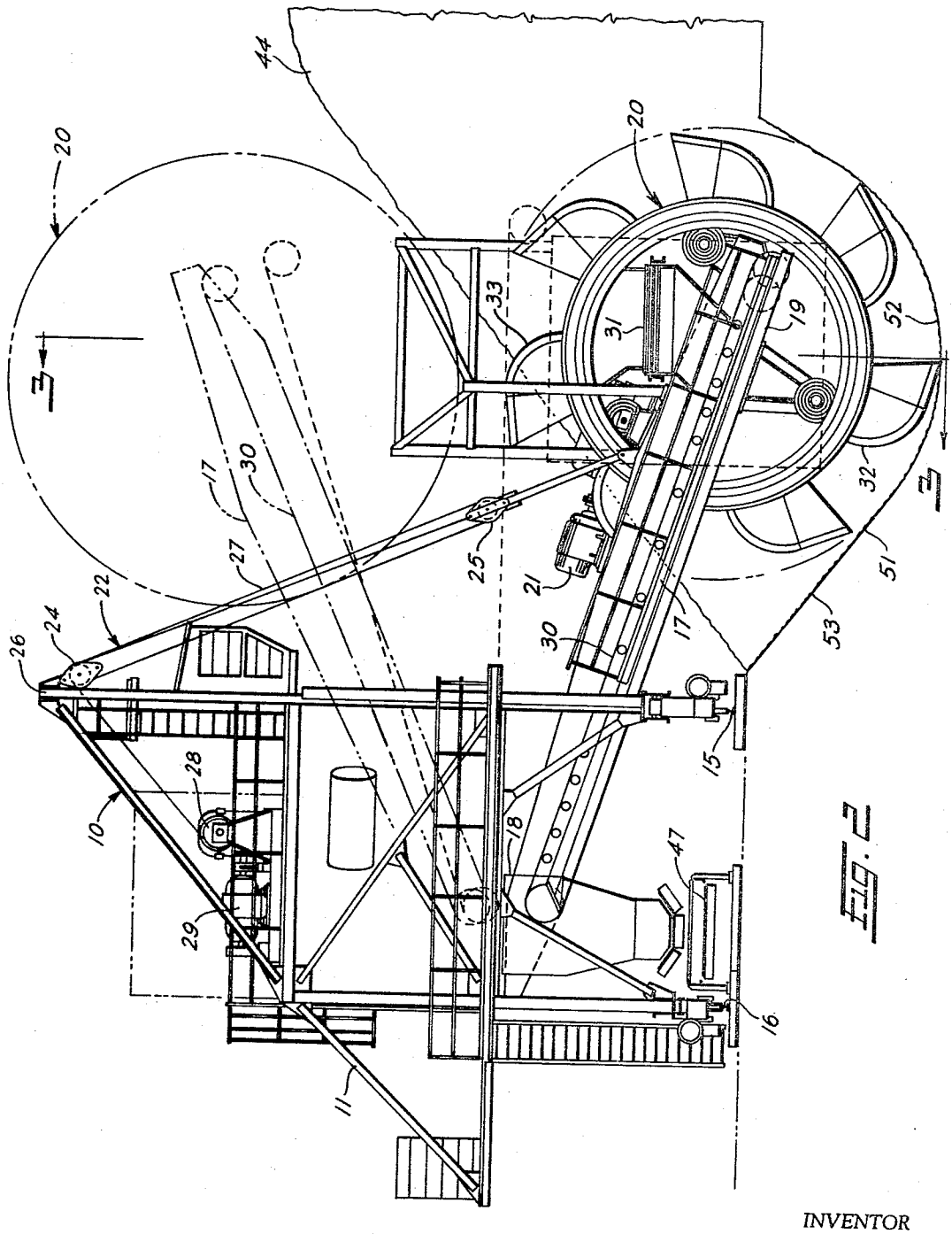


FIG. 2

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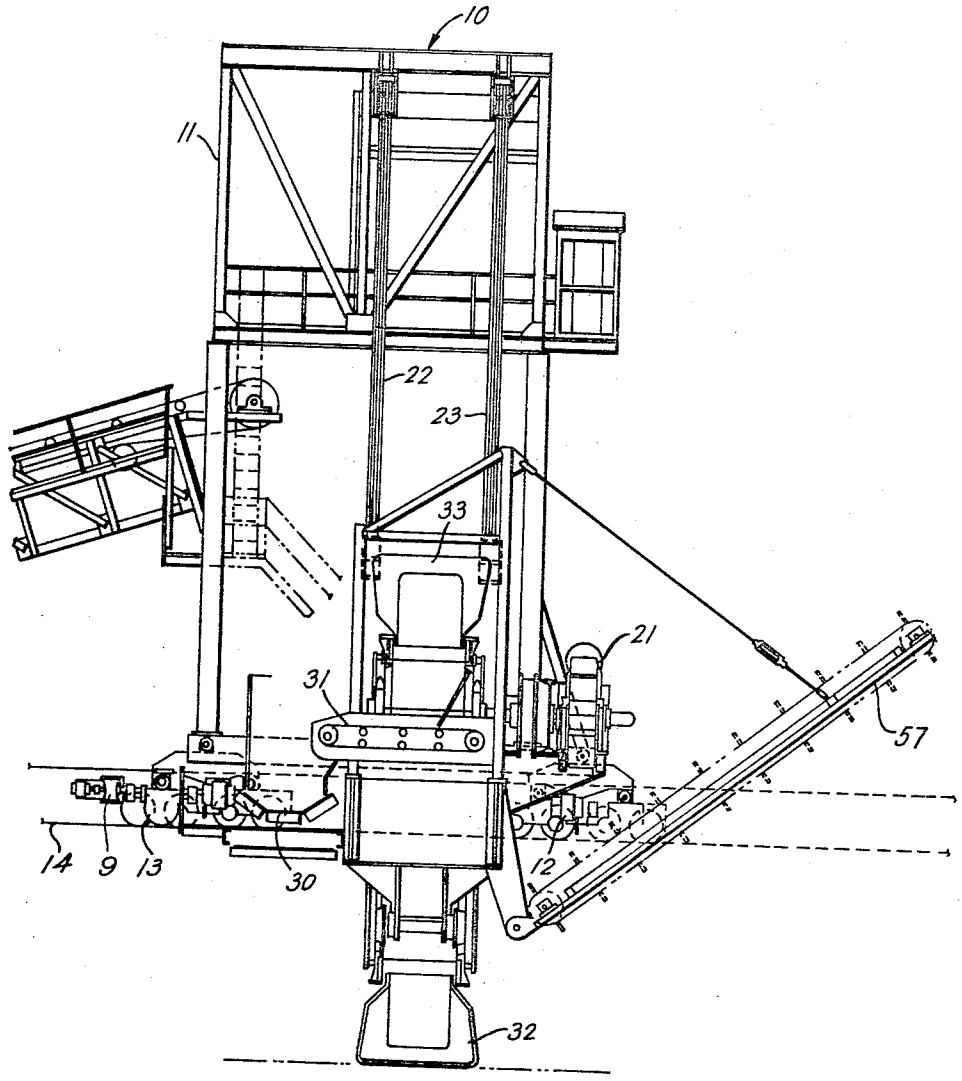


Fig. 3

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COMBINATION STACKER AND RECLAIMER

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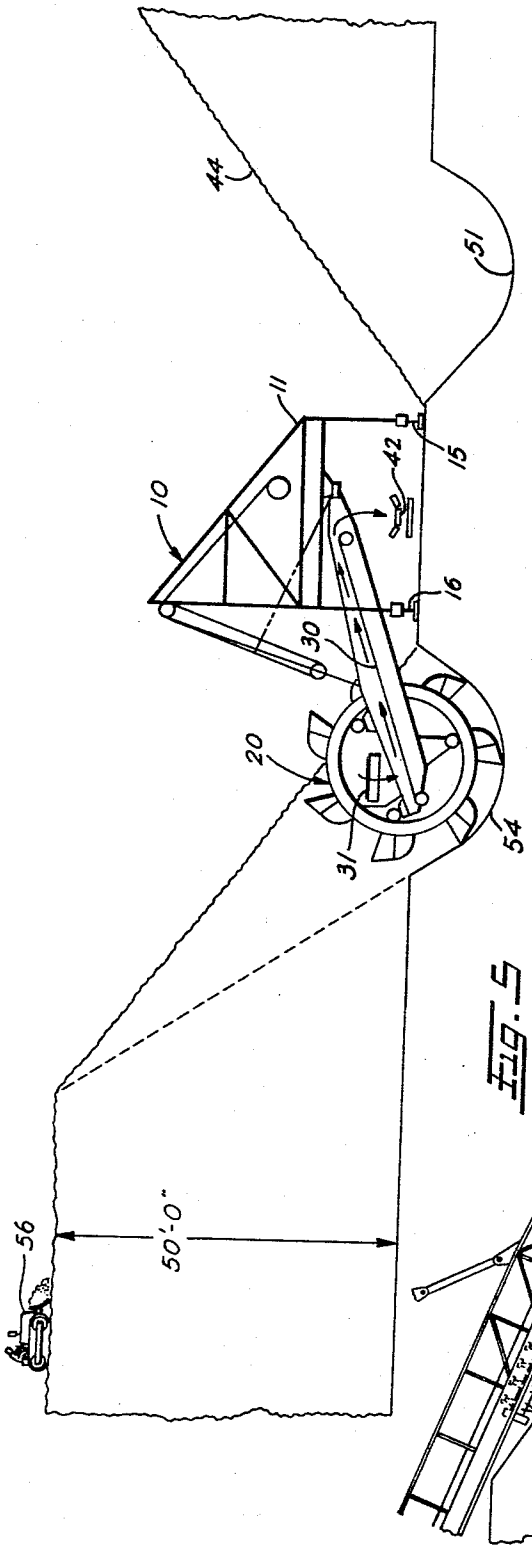


FIG. 5

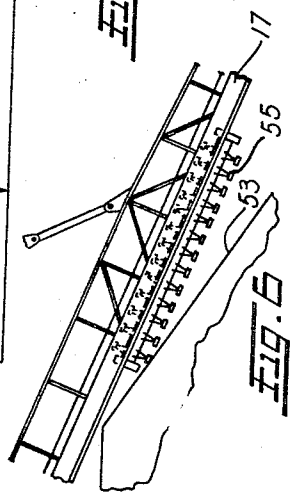


FIG. 6

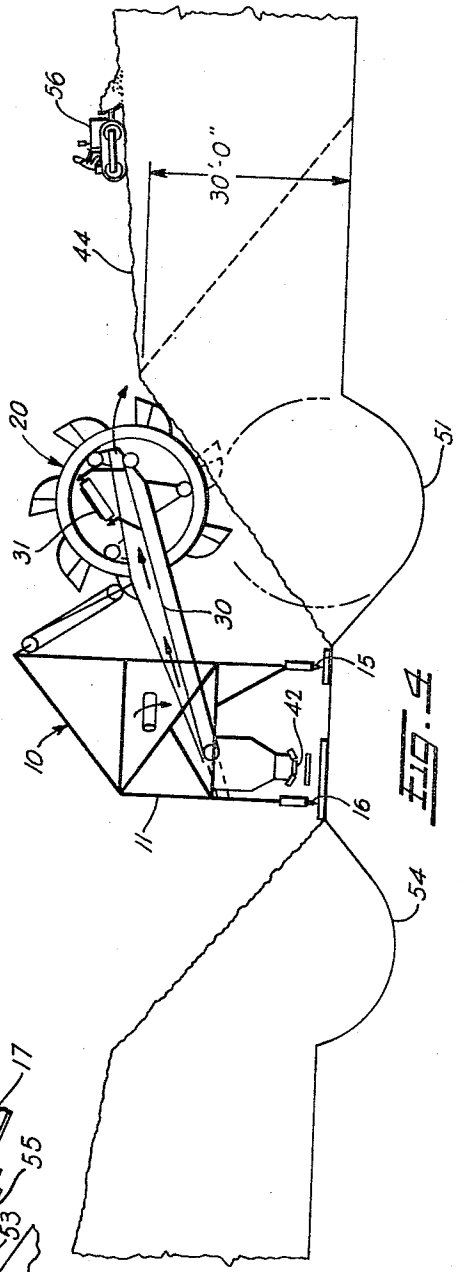


FIG. 4

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United States Patent Office 3,334,759 Patented Aug. 8, 1967

3,334,759

COMBINATION STACKER AND RECLAIMER

Carl Ludwig, Cleveland, Ohio, assignor to McDowell Wellman Engineering Company, a corporation of Ohio

Filed Sept. 3, 1965, Ser. No. 484,990
4 Claims. (Cl. 214—10)

ABSTRACT OF THE DISCLOSURE

A conveyor system used for carrying material to and from a conveyor mounted on the boom of a device used for stacking and reclaiming material such as coal. Briefly, the system employs a main feed conveyor having a tripper portion intermediate its ends. A swingable conveyor is mounted adjacent this portion for receiving material from said portion and dumping it on an adjacent oppositely disposed tripper used for dumping material on the boom conveyor. The swingable conveyor can be swung or rotated to a position where it is aligned with the main feed conveyor for redepositing material back on the main conveyor beyond the tripper portion of the main conveyor. This system is designed to permit removing material from either end of the main feed conveyor.

This invention is particularly well suited for stock piling coal received from a source of supply, e.g. a train or ship, and reclaiming it for use in large industrial plants, e.g. power plants requiring about 1000 tons of coal per hour.

In such plants, it has been found advantageous to stock pile the coal outside the plant and reclaim it as it is needed. Because of the method of operating such a large plant, it is normal that the stock pile contain one week's supply of coal at least. It should be readily understood that stock piling a one week's supply of coal used at a rate of about 1000 tons an hour presents many problems and involves large, heavy materials handling equipment. Further, the coal in the stock pile must be continuously compacted or "ironed" out as the stock piles are built in order to prevent combustion of the coal. This is ordinarily done with bulldozers, scrapers, rollers, etc. Many systems presently employed in stock piling coal outside such large plants utilize heavy cumbersome equipment working in unison, e.g. a stacker and a separate reclaimer, requiring a great deal of space in which to operate. This type of materials handling equipment is costly to build, operate and maintain.

This invention was particularly designed to work in conjunction with the bulldozers, scrapers, etc., used in "ironing" the longterm stock pile or week's supply of coal. Also, it was designed as a combination stacking and reclaiming unit thereby eliminating a need for a separate stacker and reclaimer as is used in some cases. Further, this unit is particularly well suited for use in a system for stacking and reclaiming coal, which is automatically controlled. This combination stacker and reclaimer is designed to replace the costly materials handling equipment presently employed, thus reducing the tremendous costs of operating such large plants, such savings being reflected in the cost of electric power to the consumer.

The invention will be better understood by having reference to the annexed drawing wherein:

FIG. 1 is a perspective view of an embodiment of the combination stacker and reclaimer of this invention;

FIG. 2 is a side view of the combination stacker and reclaimer;

FIG. 3 is a front view of the combination stacker and reclaimer as seen from the plane indicated by the line 3—3 of FIG. 2;

FIG. 4 is a diagrammatic illustration of the stacker and reclaimer in the process of stacking or stock piling the coal;

FIG. 5 is a diagrammatic illustration of the stacker and reclaimer in the process of reclaiming the coal from a stock pile; and

FIG. 6 is a fragmentary side view of a boom with rotating pug paddles mounted thereon.

Referring generally to FIGS. 1–5 and more particularly to FIGS. 2 and 3, there is shown a combination stacker and reclaimer generally indicated at **10**, which for convenience will be hereinafter referred to as the S & R Unit.

The S & R Unit **10** comprises a bent or frame generally indicated at **11** composed of conventionally designed structural members. The frame **11** is mounted on wheels, e.g. trucks **12** and **13**, which are movable along a trackway generally indicated at **14** composed of spaced apart rails **15** and **16**. As the S & R Unit **10** is designed to operate automatically it is desirable that the frame **11** move along a fixed predetermined path such as the fixed trackway **14**. Any suitable means may be used for automatically moving the frame **11** along the trackway **14**, e.g. an electrically or electronically controlled motor **9** for driving the wheels of the truck **13**.

A boom **17** is mounted on the frame **11** for rotation in a plane normal to the longitudinal axis of the trackway **14**. The boom end **18** is rotatably mounted to the frame **11** by any suitable means. The free boom end **19** extends beyond the frame **11** over a trough **51** formed adjacent the trackway **14**.

A rotary bucket wheel generally indicated at **20** is mounted on the free boom end **19**. The bucket wheel **20** is similar to that described in my copending application having Ser. No. 359,340, filed Apr. 13, 1964. The bucket wheel **20** is rotated by any suitable driving means, e.g. motor **21** mounted on the boom **17**. The rotary bucket wheel **20** arcuately moves into and out of the trough **51** as the boom **17** is rotated. The boom **17** is rotated by any suitable means, e.g. a pair of block and tackle systems generally indicated at **22** and **23**.

The block and tackle systems **22** and **23** are similar, therefore their description will be given in relation to block and tackle system **22**. A pair of opposing sheaves or pulleys **24** and **25** are mounted on the frame top **26** and boom end **19**, respectively. A cable **27** is reaved around the pulleys **24** and **25** forming a block and tackle **22** having a predetermined mechanical advantage.

The free end of the cable **27** is secured to a winch **28** for paying the cable in whereby the pulleys **24** and **25** move towards each other and the rotary bucket wheel **20** is raised (note dotted outline of raised bucket wheel **20**), and paying out the cable **27** whereby the pulleys **24** and **25** move away from each other and the rotary bucket wheel **20** is lowered. The winch **28** is mounted on the frame **11** adjacent the frame top **26**, and is operated by any suitable means, e.g. motors **29**.

A boom conveyor **30** is mounted on the boom **17**. The boom conveyor **30** is substantially coextensive with the boom **17** and is used to convey the coal to and from the free boom end **19**.

A short bucket wheel conveyor **31** is transversely mounted on the free boom end **19** within the rotary bucket wheel **20** in material unloading relation to the boom conveyor **30**. In other words, the bucket wheel conveyor **31** traverses the width of the buckets, e.g. buckets **32** and **33**, and extends over the boom conveyor **30**. Material reclaimed by the buckets on the rotary bucket wheel **20** is dumped onto the bucket wheel conveyor **31** which in turn carries the material and dumps it onto the boom conveyor

30. The operation of the conveyors 30 and 31 will hereinafter be more fully described.

Two feeder type conveying systems generally indicated at 40 and 41 (FIG. 1) are used in combination with the S & R Unit 10. The feed conveyor systems 40 and 41 are designed to bring material to the boom conveyor 30 and take it therefrom. Both systems utilize a continuous main feed conveyor generally indicated at 42. The main feed conveyor 42 is disposed intermediate the rails 15 and 16 and extends beyond one or either end of the trackway 14, depending on which type conveying system is utilized.

The feed system 40 (shown in dotted line) can only be used where coal is brought from a train or ship located at the main feed conveyor end 43 to the S & R Unit 10 for stacking in a pile 44, and reclaimed from the pile 44 and taken off the opposing main feed conveyor end 45 to a power plant. In other words, as seen in FIG. 1, the coal is received from the left side 43 of the conveyor 42 and taken off the right side 45 of the main feed conveyor 42.

The conveying system 41 is utilized in the aforementioned situation and also where the coal is brought from and taken off the same end of the main feed conveyor 42, e.g. the main feed conveyor end 43. In other words, as seen in FIG. 1, the coal is received and taken off the left side 43 of the main feed conveyor 42.

In operation using conveying system 40, the coal is brought in on the main feed conveyor 42 from the conveyor end 43. The coal moves along the conveyor 42 up the inclined conveyor portion 46 and drops on the boom conveyor 30, where it is fed to the boom end 19 and dropped therefrom forming the stock piles 44. The coal is reclaimed from the stock pile 44 by the rotating bucket wheel 20. The coal falls from the bucket wheel 20 onto the bucket wheel conveyor 31 which moves the coal and drops it on the boom conveyor 30. The boom conveyor 30 carries the coal away from the boom end 19 and deposits it on the main feed conveyor section 47. The coal then moves along the conveyor 42 in a direction towards the conveyor end 45 and to the power plant.

In operation using the feeder system 41, the coal moves from the main feed conveyor end 43 along the conveyor 42 up the inclined conveyor portion or tripper 48. The coal is dropped from the conveyor portion 48 onto a short swingable transversely disposed conveyor 49. The coal is carried by the swingable conveyor 49 and dumped on a reversely inclined conveyor portion 50 which carries the coal to the boom conveyor 30 and deposits it thereon. In a similar manner the coal is taken by the boom conveyor 30 to the boom end 19 and dumped therefrom forming the stock pile 44. The coal is similarly reclaimed and dumped onto the boom conveyor 30 and taken from the boom end 19 and similarly deposited on the conveyor portion 47. The coal can be moved back towards the conveyor 43 by reversing movement of the main conveyor 42. The coal can also be moved towards the conveyor end 45 and power plant by rotating or swinging the swingable conveyor 49 so that its belt moves in the same direction as the main conveyor 42 moves. In other words, the swingable conveyor 49 takes material from the conveyor portion 48 and redumps it onto the main conveyor 42 for movement towards the main conveyor end 45.

As previously indicated the S & R Unit 10 is designed to automatically stack and reclaim coal into and from a pile 44. This is accomplished by moving the S & R Unit 10 along a predetermined fixed trackway 14. In carrying out this loading and unloading operation the ditch or trough 51 is formed adjacent the trackway 14. The trough 51 may be preformed, for example, from concrete, or may be formed in the compacted coal which is normally the case. The trackway 14 is coextensive with the ditch 51. The lowest trough portion 52 is preferably arcuately formed having a radius substantially equal to the radius of the bucket wheel 20. Thus, any coal falling into the trough 51 is readily removed. The side 53 of the trough 51 adjacent the trackway 14 is preferably sloped upwardly toward the adjacent rail 15. Any coal in the trough 51 adjacent the rail 15 will move by gravity into the lowest trough portion 52 where it is removed by the rotating bucket wheel 20. It may be desirable to utilize means for moving the coal adjacent the trackway 14 into the lower trough portion 52, e.g. a rotating auger (not shown) or rotating pug paddles 55 mounted on the boom 17 adjacent the sloped trough side 53 (FIG. 6). A similar trough 54 may be formed adjacent the other rail 16 of the trackway 14. When two piles 44 are used, a second S & R Unit 10*a* (FIG. 1) may be utilized, one unit stacking and the other reclaiming when moving in one direction and the same units reclaiming and stacking when moving in the opposite direction.

As previously indicated, the length of the boom 17 is such that the rotary bucket wheel 20 arcuately moves into and out of the ditch 51. The coal when it is stacked cascades into the ditch 51. This coal is readily removed as the S & R Unit 10 traverses the stock pile 44. As previously indicated, the S & R Unit 10 is also designed to be used in conjunction with bulldozers, scrapers, etc., for "ironing" the stock pile. In cases where the coal is removed from the trough 51 and not immediately replenished the bulldozers, e.g. bulldozers 56, etc., are utilized to move coal from the stock pile 44 into the ditch 51. This method of forming the ditch 51 adjacent the trackway 14 cascading coal into it and removing it with the rotary bucket 20 is particularly well suited for an automatically controlled operation.

A conventionally designed rake 57 may be used in conjunction with the S & R Unit 10 for cascading material from the stock pile 44 into the trough 51.

Thus, there has been provided a stacking and reclaiming unit which is well suited for such an automatically controlled operation. This stacker and reclaimer is used in conjunction with a trackway and a ditch or a trough formed adjacent thereto and coextensive therewith. This simplified system is designed to utilize relatively lightweight materials handling equipment which is economically manufactured, operated and maintained.

Other modes of applying the principle of this invention may be employed instead of those specifically set forth above, changes being made as regards the details herein disclosed, provided the elements set forth in any of the following claims, or the equivalent, be employed.

It is, therefore, particularly pointed out and distinctly claimed as the invention:

1. In combination:
   - (a) a trackway;
   - (b) a frame movable along the trackway;
   - (c) a boom carried by the frame;
   - (d) a conveyor mounted on the boom;
   - (e) a system for conveying material to and from the boom conveyor, comprising in combination:
     - (1) a continuous main feed conveyor for carrying material to and from the boom conveyor, at least a portion of said main conveyor being in material receiving relation to the boom conveyor for carrying away material received from the boom conveyor, said main conveyor including a tripper portion and having a pair of opposing ends, one of which ends receives material for movement towards the boom conveyor;
     - (2) a swingable conveyor mounted in material receiving relation to the tripper portion and traversing and extending from said tripper portion, said swingable conveyor being spaced farther from the material receiving end of said main conveyor than said frame on the trackway;
     - (3) an intermediate conveyor in material receiving relation to the swingable conveyor and material dumping relation to the boom conveyor, extending between the swingable conveyor and boom conveyor for receiving material from said

swingable conveyor and dumping it on said boom conveyor; and

(4) means for swinging the swingable conveyor to a position where the swingable conveyor is substantially aligned with the main conveyor and in material receiving relation and dumping relation thereto, such that material received on said swingable conveyor can be dumped back onto said main conveyor at a point farther spaced from the frame on the trackway than where material is received on the swingable conveyor, said swingable conveyor being positionable to carry material beyond the tripper portion and towards the end of the main conveyor opposing the material receiving end of said main conveyor.

2. The combination of claim 1, wherein the main feed conveyor is disposed within the rails of the trackway along which said frame moves.

3. The combination of claim 2, wherein the intermediate conveyor slopes away from the swingable conveyor and above the plane of the main conveyor and is disposed parallel to the main conveyor.

4. The combination of claim 3, which includes:

(5) means for inclining the tripper portion of the main conveyor adjacent the swingable conveyor to place said portion in material dumping relation to said swingable conveyor.

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