March 12, 1929. B. W. PAPE 1,705,336

PROCESS AND APPARATUS FOR HANDLING, ASSORTING, AND SCREENING MATERIAL

Filed March 21, 1925 3 Sheets-Sheet 1

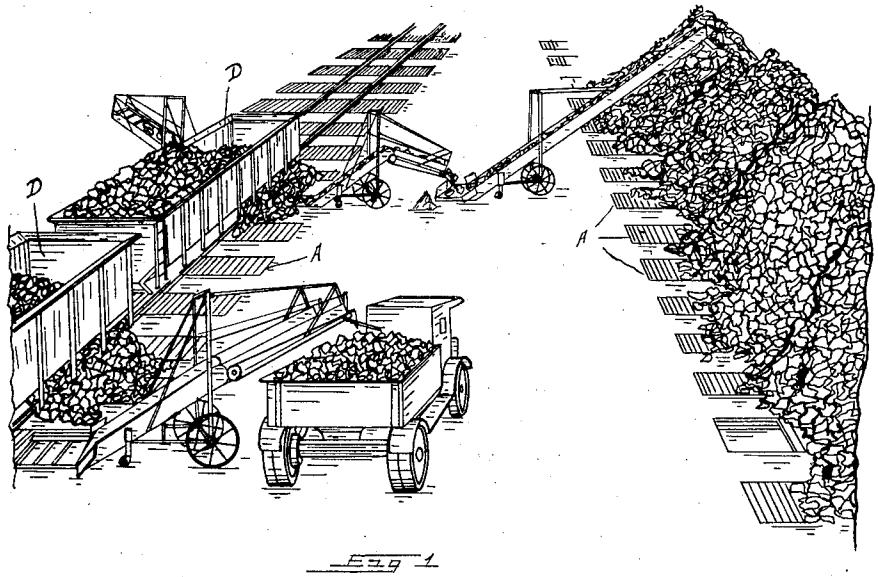


Fig. 1

Fig. 2.

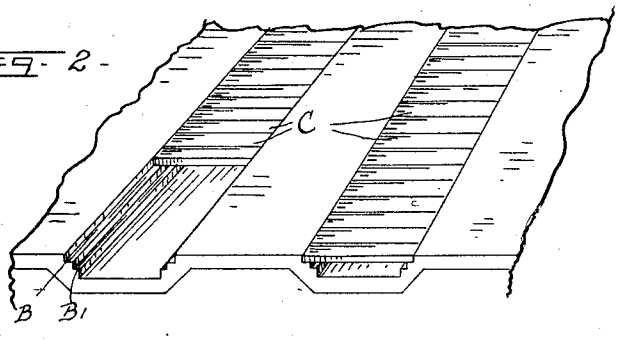
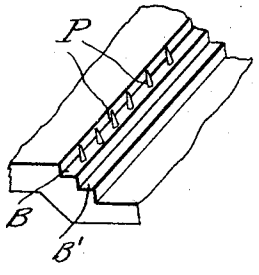


Fig. 11.



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PROCESS AND APPARATUS FOR HANDLING, ASSORTING, AND SCREENING MATERIAL

Filed March 21, 1925 3 Sheets-Sheet 2

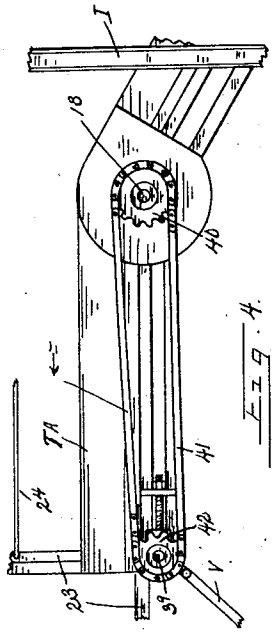


Fig. 4.

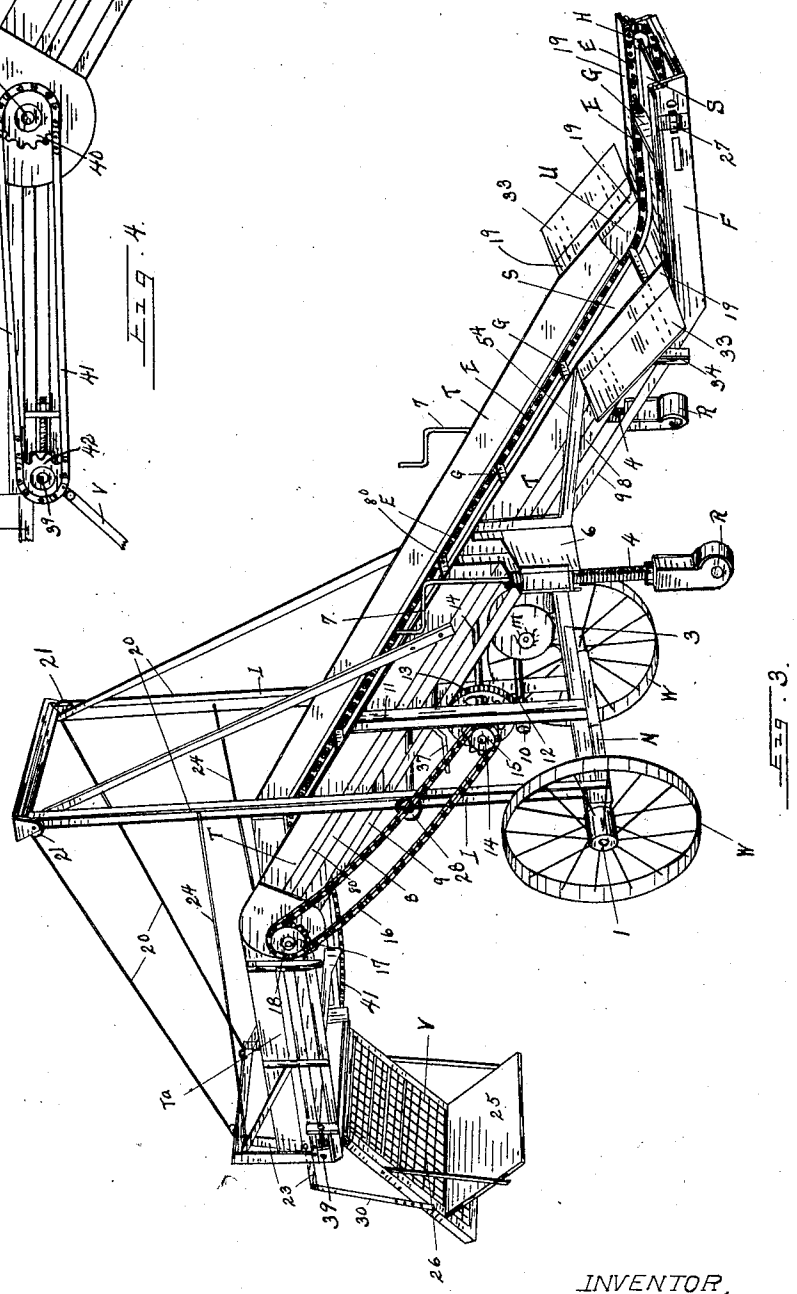


Fig. 3.

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PROCESS AND APPARATUS FOR HANDLING, ASSORTING, AND SCREENING MATERIAL

Filed March 21, 1925 3 Sheets-Sheet 3

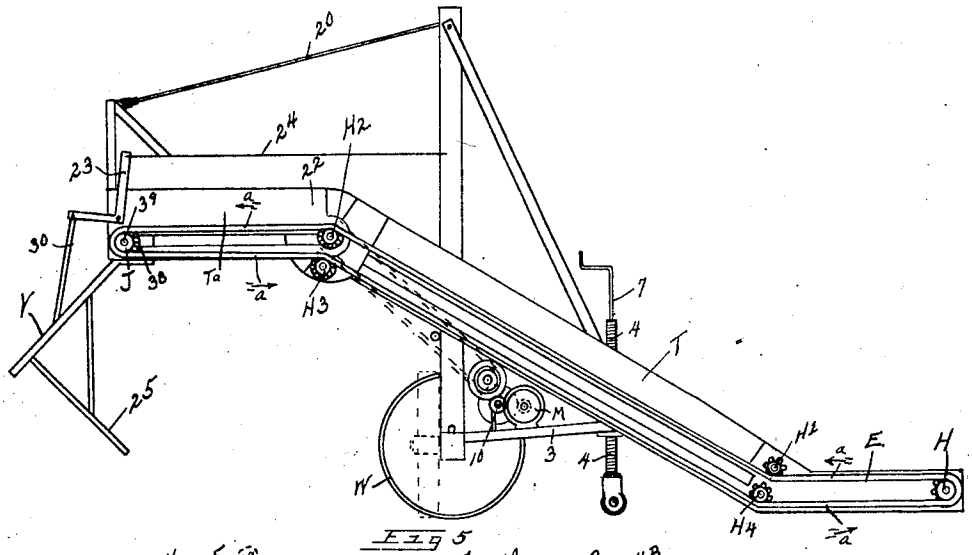


Fig 5

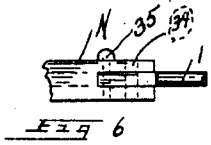


Fig 6

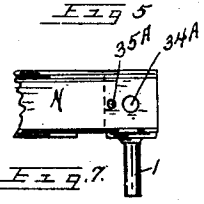


Fig 7.

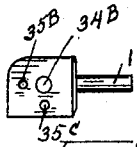


Fig 8

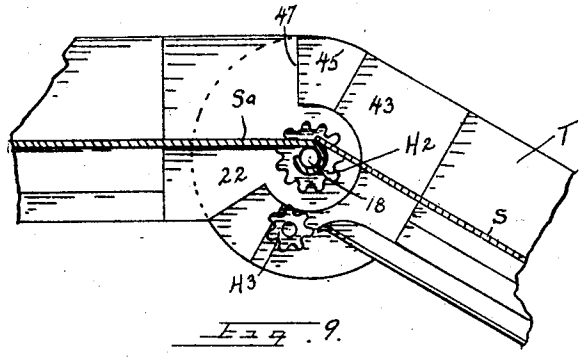


Fig. 9.

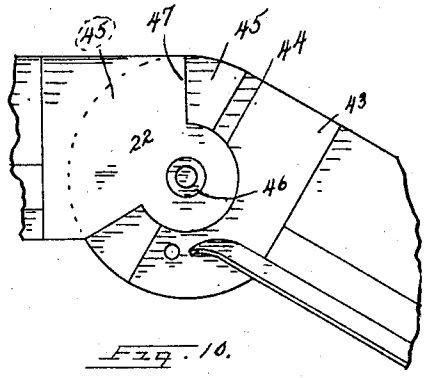


Fig. 10.

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UNITED STATES PATENT OFFICE.

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PROCESS AND APPARATUS FOR HANDLING, ASSORTING, AND SCREENING MATERIAL.

Application filed March 21, 1925. Serial No. 17,224.

My invention relates to handling coal in retail coal yards or distributing depots, and has for its object to provide an economical process for handling, screening and transferring coal from a coal transporting dump car into storage piles and for handling, screening and loading from a coal transporting dump car into delivery vehicles and for reclaiming and loading from storage piles into vehicles and the apparatus for carrying out the process.

While I have shown in the drawings, and shall hereafter refer to the material to be handled as coal, it will be understood that other material, such as burned lime, gravel, and beets may be handled, assorted and screened and loaded with equal facility.

In the drawings in which I have illustrated appropriate mechanisms by which the process may be carried out, Figure 1 is a view in perspective of a retail coal yard constructed and equipped with apparatuses to carry out the process. Figure 2 is a perspective of a portion of the yard. Figure 3 is a perspective of a machine by which the screening, assorting and elevating of the material may be accomplished. Figure 4 is a side elevation of the opposite side of the extension chute from that shown in Figure 3, parts cut away. Figure 5 is a longitudinal vertical section of the apparatus showing the chain belt operation and supporting rollers. Figure 6 is a side elevation of one end of the axle beam and one of the stub axles. Figure 7 is a plan view of the same end of the axle beam with the stub axle shifted to carry one of the wheels at right angles to the apparatus. Figure 8 is a plan view of one of the stub axles. Figure 9 is an enlarged side elevation of the hinge connection between the main chute and the extension chute. Figure 10 is a side elevation of the same hinge showing the bearing sleeve. Figure 11 is a detail view showing the relation of the retaining means to the recesses formed in the channels.

The invention consists of a new process for handling material from a railroad dump-car D, dumping the coal onto a specially constructed yard, and reloading such material by a new portable, sorting, screening and elevating apparatus for piling such material in a pile or separate piles and for loading it into vehicles as desired, and embraces certain new and novel features of mechanical construction, arrangement and combination of elements, used in the process.

In carrying out my process I construct a hard surfaced yard, preferably surfaced with concrete, and having a plurality of transverse channels A formed therein, which may have their bottoms connected to form a drain channel for the yard and with railway rails forming a railway track crossing over said channels. The sides of said channels have right angle recesses or ledges formed therein, as shown at B and B^1, which recesses, or ledges B, are to receive and support detachable rectangular sheets of stiff material such as plank or steel strips C with their ends resting on said ledges and their upper faces on a plane with said yard.

In case the strips C are of wood and not steel, vertical pointed pins P are embedded in the concrete of the ledges B, with their points projecting above the bottom of the ledge to stick into or between and hold said strips C against unintentional displacement or lateral slipping of said strips. In case the strips C are of steel they will be of sufficient weight so that they will not be easily displaced unintentionally, in which case vertical pointed pins will not be employed.

The said channels A are spaced apart and preferably parallel, and when the said strips C are in place therein, the portable apparatus and vehicles may be moved thereover as desired.

The coal or other material is unloaded from the dump car D by either side bottom dumps or center bottom dumps, onto the yard and will cover a portion of the strips C of the channels A near the railway track on which the dump car D is standing. Enough of the said strips C nearest the edge of the pile of material are then removed to allow the foot portion F of the elevating apparatus to be lowered into the uncovered portion of the channel A. The portable elevating apparatus is then moved toward the pile of material with said foot portion F below the unmoved material supporting strips C. The foot portion F being in place underneath the material supporting strips C and underneath the material which is supported by said strips and the elevating chain of the apparatus being in operation by its connected motor M, others of said strips C are removed, singly, beginning with the strip at the edge of the pile which would be where the foot portion F joins the chute T of the apparatus. The successive removal of the strips C, allows the material to fall and slide onto the foot por-

tion F of the elevating apparatus, by which said material is elevated, sorted and screened to different sizes and separately delivered by the screening elements of the apparatus to the desired individual pile or into vehicles for immediate delivery of the different grades according to size. When the strips C have been removed from over the foot portion F of the apparatus and the adjacent material has been handled, the apparatus may again be moved ahead and the operation repeated for the entire length of the channel A. After the material has been removed from over the first channel, the portable apparatus may be moved if desired, to the next adjacent channel A. As the material will fall or slide at practically an angle less than 45 degrees from the vertical, most of the pile of material will fall or slide into one or the other of the adjacent channels A and by having the channels near enough together, most all of the material will fall into one or another of the adjacent channels by force of gravity. It is evident that when the material is removed from a channel that is adjacent to another channel where the material has already been removed, a very small amount of material will remain on that surface or section of the yard between the two channels. This material may be readily pushed into the foot portion F of the apparatus.

As the apparatus is moved forward the strips C may be relaid behind the foot portion F covering the channels A and the apparatus and vehicles may then be moved over the yard as desired.

The elevating, sorting, screening and delivery of the material is accomplished by means of a portable conveyor having means connected therewith for screening, assorting and delivering the material as desired.

My apparatus consists of a frame I triangular in side elevation, which is mounted on a channel iron beam N, in the ends of which and between the bases or bottoms of the channels the stub axles 1 are pivoted by the pins 34 to allow said stub axles to be turned at right angles to said beam N for moving the apparatus sideways. The wheels W are journaled on said stub axles 1, and may be directed for travel along or over said channels A and manually moved. Aligned holes are bored through the bottom of the channels of the channel-iron-beam N and through the contiguous tenon portion of the stub axle 1. When the stub axle 1 is in alignment with the channel iron beam N the pins 34 are passed through the aligned hole 34^a of the channel iron beam N and the hole 34^b of the stub axle 1, forming a pivot of each of the pins 34 on which the axle stubs 1 may turn between the channels of the channel iron beam N. When the desired position of the stub axle 1 is longitudinal with the channel iron beam N, a pin 35 is passed through the aligned hole 35^a of the beam N and the hole 35^b of the stub axle 1, holding the axle stub rigidly in position and in alignment with the beam N. When the stub axles 1 are to be positioned at right angles to the beam N the pin 35 is passed through the aligned hole 35^a of the beam N and the hole 35^c of the stub axles.

The base bars 3 of said frame I are supported and mounted on castor rollers R, which are swiveled on the lower ends of externally threaded standards 4, that in turn are engaged with internal threads in the housings 6. Crank rods 7 are connected with the upper ends of said standards 4 to turn the standards and thereby raise and lower the foot portion F of the apparatus. The elevator chute T is supported by a brace member 8 which is parallel with the hypotenuse portion 9 of said frame. The brace 80 of the chute T is also parallel with said portion 9, and said brace 8, frame portion 9 and brace 80 and chute T are each secured to the vertical portion of said frame I. The brace 80 forms a guide strip over the chain E to prevent the chains E and the scraper blades G from raising off the bottom S of the chute T.

The said wheels W and the castor rollers R are each spaced from its respective coacting wheel and roller far enough to allow them to rest at all times on the surface of the yard between the channels A and not on the said strips C when the apparatus is being moved ahead with the foot portion F lowered in place into the channels A.

Guide rollers 27 are mounted on the sides of said foot portion F to engage the inner sides of the said channels A when the apparatus is being moved longitudinally as to said channels, in order that the sides of said foot portion F will not engage the sides of the channels A. A guide strip 19 is secured on the upper side of the foot portion F by means of angle brackets and extends outwardly and when the foot portion F is in use in the channel A this guide strip projects over the ledge B^1 of the channel A and prevents the material from falling into the channel A between the sides of the channel A and the side of the foot portion F. Said guide strip 19 also projects inwardly, covering and protecting the elevator chains E. Said guide strip 19 also extends on an incline along the upper edge of the chute T and to this portion of said guide strip 19 the aprons 33 are hinged. The guide strips 19 and the aprons 33 form a hopper and said hopper directs the falling and sliding material onto the foot portion F, and prevents it from falling into the channel A behind the foot portion F. The aprons 33 may be folded one over the other inside the chute T to afford the proper clearance when the apparatus is being moved ahead with the foot portion F in place in the channel A, and may readily be

folded outwardly to form the hopper when the material is falling and sliding into the foot portion F.

The motor M is mounted on the base portion of said frame with its shaft geared to a counter shaft 10 which is journalled in bearings mounted on the vertical standards 11. A spur gear 12 is secured on the end portion of said counter shaft 10 which has teeth thereon meshing with the teeth of a gear wheel 13, with its shaft 14 also mounted on said vertical standards 11. A sprocket wheel 15 is also secured on said shaft 14, and is the driving wheel over which the sprocket chain 16 engages.

Another sprocket wheel 17 is secured on one end portion of a horizontal shaft 18 which is journaled through sleeve bearings 46 which are fastened in the circular sheet 45 at the end of the chute T. The shaft 18 extends underneath the bottoms S and S^a and through the sides of said chutes T and has another sprocket wheel 40 on the end opposite said sprocket wheel 17. A sprocket chain 41 is engaged by said sprocket wheel 40 and is carried over a sprocket wheel 42, which in turn is secured on a shaft 39 that is mounted in bearings which are secured in the outer end of the extension chute T^a. The sprockets J are also secured on the said shaft 39, which shaft is the main drive shaft of the said chain E. A thin metal sheet S forms the bottom of the said chute T and foot portion F, of the apparatus and is the member which is encircled by the elevator chains E. Spaced apart angle irons are secured at their ends to each of said chains E with the horizontal portions of each, bearing against the said sheet S and forming the scraper blades G by which the material is moved up said chute when the apparatus is in use.

An extension chute T^a is provided by which the material may be raised or lowered to a higher or to a lower level than by the said chute T. The said extension chute T^a is connected with said chute T at the bearings 46 and the said chains E are operated around the sheet S^a in the same manner and direction as around the sheet S. The outer end portion of said extension chute T^a may be raised and lowered by the cables 20 which are run over sheave pulleys 21 that are mounted on the upper end of the said frame I, and the other end of chute T^a, is connected by the circular sheets 22 which are journaled on the bearings 46; and by the sheet S^a having a portion thereof bent in a circular groove to engage partially around the said shaft 18, and with the sheet S above the grooved or curved portion of said sheet S^a. This construction allows both sheets to be brought to the same inclined plane or allows the sheet S^a to be brought to a lesser inclined plane than the sheet S or allows the sheet S^a to be inclined downward from the said shaft 18, by the hinged connection between the chute T and the chute T^a. On the upper end of each side of the chute T is secured sheets 43 having a semi-circular segment 44 cut from its interior. Covering the said sheet 43 is another circular sheet 45 which together with the said sheet 43 is secured on the sides of said chute T. The central portion of said sheet 45 is cut out to receive the short sleeve bearings 46 which bearings are secured thereto by counter sunk bolts. On the adjacent end of the said chute T^a is secured a metal sheet 22 having a circular extension wing conforming with the segment opening 44 of the sheet 43, which extension wing is axially bored or cut away to surround the said sleeve bearing 46 and form a journal therefor. The ends of the sheet 43 are at right angles to the chute T and the upper end is diametrically through the center of the bearing 46. The upper portion of the end of the sheet 22 is cut on a radial line 47 extending from the wing extension at right angles to the sides of said sheet, in order that when the extension chute T^a is raised to the same inclined plane as the chute T that said radial cut 47 will abut against the end of the sheet 43. The sheet 43 and the sheet 22 are on a vertical plane and the said sheet 45 holds the sheets 43 and 22 in this vertical plane. Bell crank levers 23 are fulcrumed on the outer end of said chute T^a and with the arms of said levers connected by cables 24 with the said frame I, while other arms of said levers are connected with a screening and sorting member V by the adjustable connecting rods 30. The said screen V is pivoted below the discharge end of said chute T^a. The said screening and sorting member V has detachable screens 26 which are carried in a supporting frame, to carry the coarser material over the screen, while the finer particles will pass between the mesh of said screen and fall against the sheet 25 and by it be directed into one pile or vehicle. Another screen and directing sheet may be provided if more than two grades of material are desired.

The operation of the apparatus is as follows:—As heretofore explained in the process, the foot portion F of the apparatus is lowered into one of the said channels A by removing some of the planks or strips C nearest the coal pile and then lowering the foot end of the apparatus by turning the threaded standards 4 by means of the crank rods 7, then by advancing the apparatus within the said channel A by manually rotating said wheels W, the foot portion F is placed below and under the unremoved, and material supporting, strips C, others of said strips C are then removed one at a time and the material resting on them will fall and slide into the channel and onto the foot portion F. The motor M is then started and the

power transmitted to the chains E through the counter shaft 10, the spur gear 12, the gear wheel 13, the shaft 14, the sprocket wheel 15, the chain 16, the sprocket wheel 17, the shaft 18, the sprocket wheel 40, the chain 41, the sprocket wheel 42 and the shaft 39, which shaft has a small sprocket wheel 38 on each end portion thereof, over and by which the said chains E are operated. As the said chains E are moved up the chute T the scraper blades G slide on the said sheet S and the material is moved off of the foot portion F and up the inclined chute T and over the extension chute T^a, with the material resting on and sliding over the said sheet S^a, as indicated by the arrows *a*. The said chains E are operated over the end roller H of the foot piece, and sprocket wheels J of the extension chute. As indicated by the arrows *a* the said chains pass under the rollers H^1, then over the rollers H^2, and then around said sprockets J, and over the rollers H^3, and then under the rollers H^4 and around the rollers H. All of the said rollers H to H^4 inclusive are sprocket idler rollers. The rollers H, H^1 H^3 and H^4 idle on stub shafts and the rollers H^2 idle on the shaft 18. The rollers H^1 are encased in the housings U to prevent coal from falling onto and injurying said rollers or retarding the operation of said chains.

When desiring to change the inclination of the extension chute T^a, the winches 28 on which the cables 20 are wound are rotated on their axes by the crank handle 37 which raises or lowers the delivery end of said chute. It is evident that the chains E passing over the idler sprockets H^2 and over the idler sprockets H^3 at the hinge joint travel an equal distance at all times as the chute T^a is raised or lowered. When the material which is on the yard adjacent the channel A wherein the apparatus has been in operation is handled, the said foot piece F is raised out of the said channel A by turning the crank rods 7, and then by shifting the said axles 1, on their respective pivot pins 34, to a right angle to the said channel-iron beam N the said wheels W will be in travel alignment parallel with said beam N, and the apparatus may be manually moved or shifted laterally to the next or any channel A until the yard is cleared of the material. When desiring to pile the material in larger and higher piles I use two or more of the apparatuses, and discharge from the delivery end of one apparatus onto the foot portion F of the other operated apparatus, as shown in Figure 1.

Having thus described my process and the apparatus by which the new features of the process may be carried out, I desire to secure by Letters Patent and claim:—

1. A dump yard comprising a hard surfaced yard having a plurality of spaced apart receiving channels therein to receive a conveyor, removable elements forming a cover for said channels to give access for a conveyor to material on the yard.

2. A hard surfaced yard having a plurality of spaced apart channels therein, detachable strips forming a cover for said channels, whereby said cover strips may be removed to allow the foot portion of an elevating, sorting and screening apparatus to be inserted under others of said strips, to give access for the apparatus to material on the yard.

3. A hard surfaced yard having channels therein to receive a foot portion of an elevating, sorting and screening apparatus, ledges formed in the sides of said channels to receive and support removable cover strips which form a cover for said channels, with said strips on a plane with the surface of said yard; means for holding said cover strips against unintentional displacement, whereby said cover strips may be removed, singly, to allow the material to fall to the foot portion of a portable, elevating, sorting and screening apparatus.

4. A material handling apparatus comprising a dump yard having a plurality of spaced apart channels therein; detachable cover strips carried in said channels on a plane with the surface of said yard; a portable elevator having one portion adapted to operate longitudinally in said channels and another portion thereof set at an incline.

5. A material handling apparatus comprising a plurality of spaced apart channels, detachable cover strips for said channels, an inclined chute having a portion adapted to be inserted in said channels and below said cover strips, spaced apart chains operable in said chute; scraper blades secured between said chains, and slidable on the bottom of said chute and means to drive said chain.

6. A material handling apparatus comprising receiving channels, detachable cover strips for said channels, a wheel supported frame, an inclined elevator chute mounted on said frame with a horizontally disposed foot portion adapted to be inserted in said channels, means to raise and lower said foot portion in and out of said channels, a chain operable in said chute and means to drive said chain.

7. A material handling apparatus comprising a wheel supported frame, an elevator chute mounted on said frame, and having a horizontally disposed foot portion, means for raising and lowering said foot portion, an extension chute hinged to the delivery end of said elevator chute, a chain operable in said chutes, means to drive said chain, and discharge means pivoted on the extension chute.

8. In a storing and loading system, the combination with a floor, of means forming a trench below the floor level, a series of transversely extending narrow cover sections for the trench flush with the floor and

adapted to be separately removed to uncover different parts of the trench, and an elevating conveyor having its receiving end adapted to extend into the said trench below the floor level and underneath the cover section at the end of the said series, the said conveyor being bodily movable so that it can be periodically advanced as an entirety along the trench as successive cover sections are removed from the end of the said series.

9. A material handling apparatus comprising a wheel supported frame, an elevator chute mounted on said frame, a horizontally disposed foot portion, means to raise and lower said foot portion, an extension chute hinged to the delivery end of said elevator chute, means to raise and lower said extension chute, a chain operable in said chutes, means to drive said chain, and a discharge member pivoted on the extension chute.

10. A material handling apparatus comprising a wheel supported frame, an elevator chute mounted on said frame having a horizontally disposed foot portion, means for raising and lowering said foot portion, an extension chute hinged to the delivery end of said elevator chute, a pair of hinges, the plates of which connect the abutting sides of said chutes, a drive shaft at the pivot of said hinges, a bottom in the said extension chute which partially encircles the said shaft and on a lower plane and contiguous the bottom of the elevator chute, a chain operable in said chutes and slidable on said bottom plates, and means for driving said chains.

11. A dump yard comprising a hard surfaced yard having a channel immediately adjacent the surface, the channel adapted to receive a conveyor, and removable elements forming a cover for the channel to give access for a conveyor to material on the yard.

12. In a system for storing and reclaiming coal and similar material, the combination with a floor on which a pile of the said material may be supported, of means forming a channel immediately adjacent the floor and extending under the said pile, the last said means including a series of transversely extending narrow sections which may be separately removed to uncover the top of the channel, a conveyor adapted to be located in the channel and to be movable therealong with its receiving end extending underneath the edge part of the pile of material and underneath the removable section at the end of the said series, the said conveyor being bodily movable so that the conveyor can be periodically advanced along the channel and toward the pile as the surface of the pile recedes and as successive sections are removed from the end of the said series.

In testimony whereof I have affixed my signature.

BYRON W. PAPE.