Jan. 6, 1925. 1,521,820

R. L. LLOYD

ORE DISTRIBUTING MECHANISM FOR CHARGE CARS

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Fig. 2.

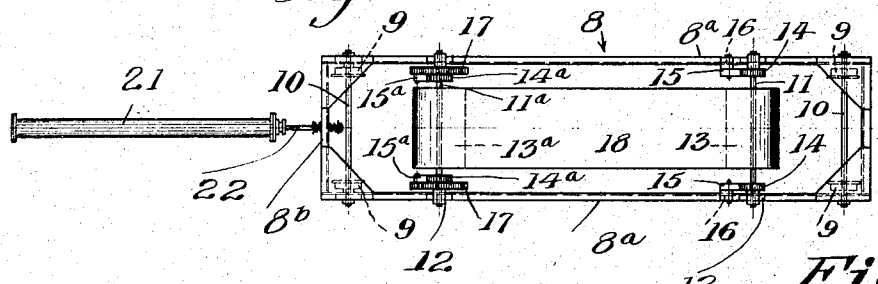


Fig. 1.

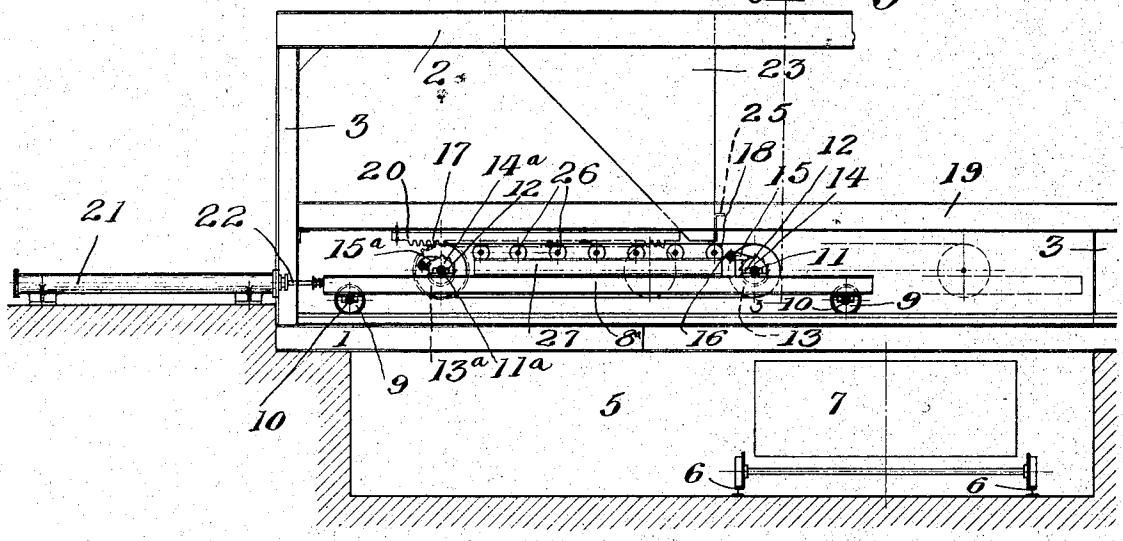
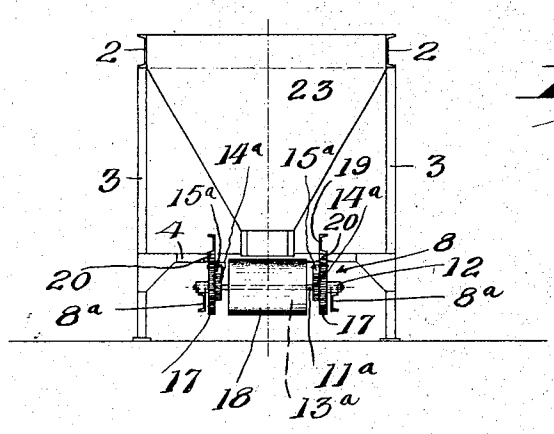


Fig. 3.



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Fig. 5.

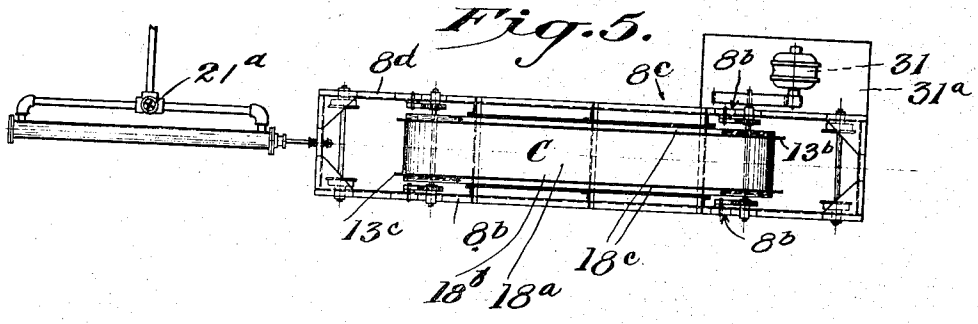


Fig. 4.

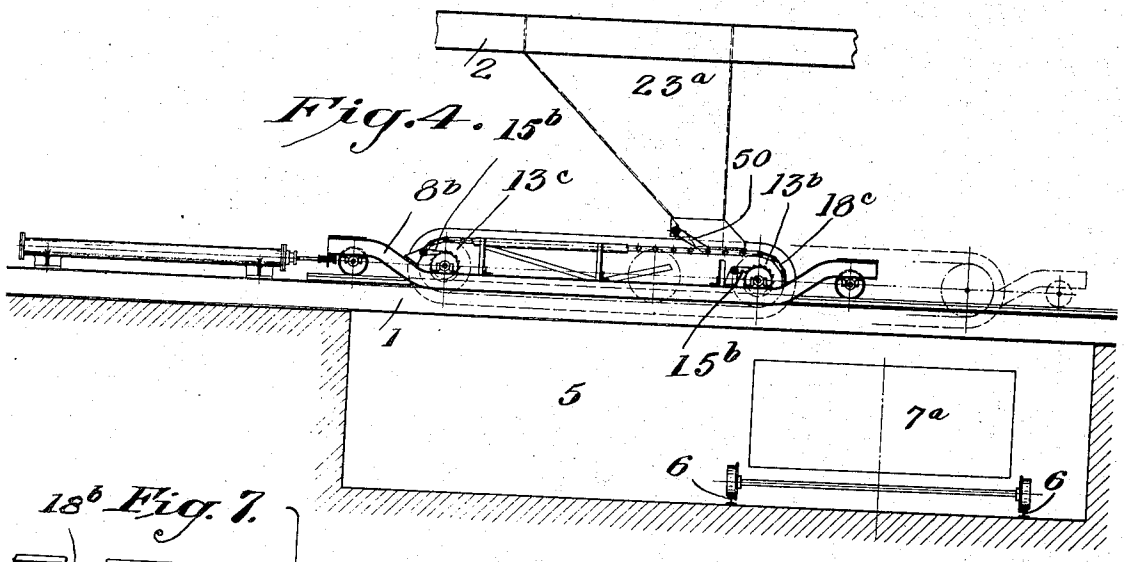


Fig. 7.

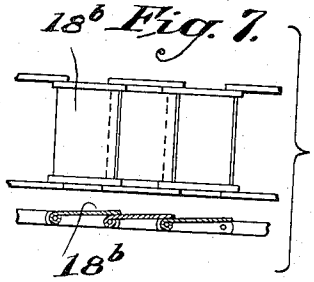
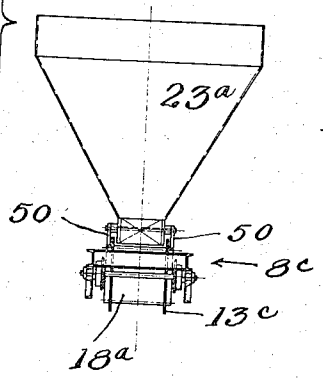


Fig. 6.



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UNITED STATES PATENT OFFICE.

RICHARD LEWIS LLOYD, OF NEW YORK, N. Y., ASSIGNOR TO DWIGHT & LLOYD METALLURGICAL COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY.

ORE-DISTRIBUTING MECHANISM FOR CHARGE CARS.

Application filed March 6, 1920. Serial No. 363,731.

To all whom it may concern:

Be it known that I, RICHARD L. LLOYD, citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Ore-Distributing Mechanism for Charge Cars, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to an apparatus for forming piles or strata of granular or reduced material which are normally uniform in thickness or vertical dimension but which can be optionally varied in respect to such dimension as desired. It is especially designed for the handling of ore and the materials used in ore treatment, particularly the mechanism employed for loading the cars which are employed to carry charges of the component materials that are introduced into blast furnaces.

In the drawings:—

Figure 1 is a side elevation of an apparatus embodying my improvements.

Fig. 2 is a plan view of the distributing element, of the apparatus, and of the means for propelling this element across a vehicle which is to be charged or loaded thereby.

Fig. 3 is a view taken on the plane of line 3—3 of Fig. 1, and showing the upper part of the apparatus.

Fig. 4 is a side view similar to that presented in Fig. 1, but showing a modification of the distributing element.

Fig. 5 is a plan view of the distributor shown in Fig. 4.

Fig. 6 is a view similar to Fig. 3, but showing the modification illustrated in Fig. 4.

Fig. 7 shows in top view and in section a part of a modified form of carrier apron.

The framework supporting the apparatus comprises the bars 1 and 2, the uprights 3, and suitable cross bars or braces as at 4, these being preferably formed of sheet or angle or channel metal. The channel bars 1 extend across a depressed runway 5, in which are laid rails 6, 6 for supporting and guiding the charge car 7. The loading or charging element comprises the car 8 provided with axles 10 on which are mounted wheels 9.

11, 11^a are shafts in bearings 12 secured to the upper faces of the side bars 8^a of the car 8. Each of the shafts 11, 11^a, carries a drum 13, 13^a, rigidly secured thereto, the drums being positioned equi-distant from the sides of the car 8. 14, 14^a are ratchet wheels also rigidly secured to the shafts 11, 11^a. 15, 15^a are dogs adapted to engage with the ratchets, the dogs of the front pair being pivotally secured to mounting 16 on the side bars 8^a, and those of the rear pair being mounted on pinions 17 pivotally mounted on the rear shaft 11^a.

18 is a belt or endless apron on the drums 13, 13^a. It may be made of any suitable material for carrying the ore which is to be deposited in the charge car. The upper run or section of the belt is additionally supported upon small rollers 26, 26, mounted in bearings on side bars 27, positioned longitudinally and fastened to the tops of the channel bars 8^a.

On the cross bars 4 are placed longitudinal channel irons 19 of the same length as the channels 1 and 2. On the bottom faces of the channels 19 respectively are secured racks 20, each adapted to engage with one of the pinions 17 on the rear axle 11^a.

21 is a pneumatic or hydraulic cylinder in which is fitted a plunger connected by a rod 22 to the rear end bar 8^b of the car 8 for moving it forward and backward over the runway 5 as desired.

23 is a hopper in which the material is initially placed which is to be deposited in the charge car. This hopper is supported at the top by the channel irons 2, 2, and it tapers toward its lower end, which is open. The bottom edge of the forward wall is cut away to provide a discharge passage, the area of which can be varied by means of a vertically sliding gate 25.

The method of operation of the apparatus will be readily understood. When it is desired to form a pile or stratum of granulated ore, broken or reduced material (such as ore, lime-stone, rock, carbon, or mixtures of such material) the hopper 23 is first loaded. Then the gate 25 is opened. The gate is adjusted to have its bottom edge line in the horizontal plane of the top surface of the stratum desired. The fluid agent, oil or water, is introduced at the outer end of the cylinder 21, its inflow and escape being controlled by a three-way valve at 21^a or other suitable control device. The plunger advances and pushes forward

the car 8. The apron 18 moves bodily forward with the car but is relatively stationary thereon. The ore flows down and outward from the hopper 23 and settles upon the apron, its depth being regulated by the gate 25, as described. The forward advance of the car and apron is continued until the forward end part of the latter reaches the vertical planes of the outer side of the charge car 7 or reaches the vertical lines of the outer edge of the stratum or pile to be formed, during which movement the dogs 15 engage with the ratchets 14 and thus prevent the apron or belt from moving backward at the top. The apron under ordinary circumstances, and unless locked would tend to move backward, relatively to the car, because of the resistance to the forward movement of the top run or section of the belt caused by the heavy material flowing from the hopper.

The pinions 17, however, are free to rotate on the shafts 11^a in a counter clockwise direction and while the car is moving forward these pinions are caused to loosely rotate, they carrying the dogs 15^a loosely around, that is out of engagement with, the teeth of the ratchet wheels 14^a.

When the car has reached the position indicated by dotted lines in Fig. 1, the movement of the plunger and the rod 22 in the cylinder 21 is reversed, the operator, by the necessary valves, reversing the intake and exhaust of the fluid agent; and the car or distributing element 8 is drawn backward to its original position. Now the pinions 17 by engagement with the ratchet 20 are caused to rotate in a clockwise direction, and the dogs 15^a on the rear axle 11^a engage with the ratchet wheels 14^a and cause them to rotate the drums 13—13^a and to relatively move the apron forward. This causes the material of the stratum on the apron or belt to be distributed over and dropped from the front roller 13 and deposited in the car 7 or on any preferred support. As the operative parts act automatically a uniform stratum is deposited which is normally exactly similar in its dimensions to the stratum formed on the apron or belt. If it be desired to deposit another stratum of dimensions equal to that described above, the gate 25 is allowed to remain in the position which it has been occupying and the movements of the car 8 are repeated. If it be desired to form a layer which is of greater or less vertical dimension than that of a previously formed stratum, the gate 25 is adjusted correspondingly and then the car is moved in the manner above described. If it be necessary to form in the car 7 a stratum which in one region is of greater depth than in another, this is attained by controlling the movements of the plunger 22 in such a way as to cause the delivery end of the apron to reciprocate over shorter or longer sections of the total path of the distributor. Or use may be made of a power device or motor, supplemental to those above referred to, by which the forward roller 13 can be rotated at will even while its supporting car is relatively stationary.

If it be desired to form strata, in the charge car, each composed of different material, for example, one being composed of ore and the others respectively composed of the heat generating and the flux-forming ingredients, supplemental sets of devices similar to those described can be provided by duplicating the mechanism shown, each hopper to be supplied with one of the various materials. In such case the charge car, after receiving one or more strata of the material in the first hopper, can be advanced to the second to receive a proportionate quantity of a second material, and so on throughout the series.

In Figs. 4, 5 and 6 I have shown a modified mechanism to serve as the stratum forming and distributing element. The car 8^c, here, is so constructed that the upper run or section of the distributing apron is considerably lower relatively and the several parts are more compactly arranged. The side bars 8^d of the car 8^c have the portions between the axles drooped down as in Fig. 4. A strong durable stratum support 18^a is formed of metallic carrier sections 18^b (Fig. 7), fitted to chains 18^c positioned along the sides. The floor parts of the sections overlap, each the next, and provide a continuous floor support for the ore or other material. This carrier is supported on drums 13^b, 13^c having ratchets and dogs. The latter, however, differ from those in the construction in Figs. 1, 2 and 3 in that those connected to the rear drum are mounted and operate in a way similar to that in which the forward ratchets are mounted and operated.

A simple device for effecting a movement of the sectional apron 18^b is combined with it; the same consisting of dogs 50 supported by pivots on the hopper 23^a, there being one of these in the vertical longitudinal plane of each of the chains 18^c. When the apron in the mechanism in Fig. 4 is moved forward with the car 8^c, it is bodily stationary on the car as dogs 15^b engage the ratchets and prevent any backward movement of the upper run. During such forward movement of the car 8^c the dogs 50 vibrate idly vertically as the chain links move under them. But when the car 8^c is drawn backward again by the plunger, the lower end of each dog 50 engages with the ends of the link bars or with the cross bars or pintles of the links of its chain and the chains 18^c and the metal apron 18^b are held stationary relative to the hopper; but are moved, relative-

ly, around the rollers. And therefore the material of the stratum, which was deposited on the metal apron during the forward movement of the car 8^c, is now dropped over the forward, receiving, end of the distributor and a corresponding stratum is formed below it, as in car 7^a, in the manner above described.

The apparatus in these Figs. 4, 5 and 6 comprises a supplemental motor 31, such as was above referred to. It is mounted on a platform 31^a secured rigidly to the car 8^c and is connected by gearing of suitable character and strength to the roller 13^b. Whenever it is desired to deposit in one region relatively more material than is deposited in another, the movement bodily, of the car 8^c is stopped, and the motor 31 is put into action. Thereupon the stratum supporting apron moves around its drums and continues to deliver material until the motor is again stopped.

While I have above described somewhat in detail devices which can be employed to carry out my invention it is to be noted that modification can be made without departing from the spirit thereof. It will be seen that the charge car at 7 is to be regarded as typical of final supports of predetermined areas upon which the strata are to be formed; and also that each operative section of the endless apron can be considered as an initial support for the stratum, which latter support together with the stratum are movable bodily in one direction over the aforesaid final area, and further that the initial support is movable bodily in the opposite direction and is also relatively movable so as to deliver the stratum to the car or final support. The car 8 serves as a carrier for the initial support, which as exemplified here is an endless apron that moves bodily with the carrier when the latter is moving in one direction, and moves both bodily with and in relation to the carrier when the latter is moving in the opposite direction.

What I claim is:

1. In an apparatus for forming a horizontal stratum of ore upon a support of predetermined area, the combination of a movable horizontal support adapted to have the stratum initially formed thereon, means for moving the last said support and the initial stratum thereon bodily in one direction over the said area, and for moving said support bodily in the opposite direction and causing it to simultaneously deliver said stratum over the said area.

2. In an apparatus for forming a horizontal stratum of ore upon a support of predetermined area, the combination of an initial receptacle, a movable horizontal support arranged to receive from the receptacle an automatically formed stratum of the material, means for moving the last said support and the initial stratum thereon bodily in one direction over the said area, and means for causing the movable support to move bodily in the opposite direction and to simultaneously deliver said stratum over the said area.

3. In an apparatus for forming a horizontal stratum of ore upon a support of predetermined area, the combination of a movable carrier, a second ore support on the carrier adapted to have a predetermined stratum of material formed thereon, said support being stationary on the carrier but movable bodily therewith when the carrier is moving in one direction over the aforesaid area and movable both bodily with and also relatively to the said carrier when the latter is moving in the opposite direction.

4. In an apparatus for forming a horizontal stratum of ore upon a support of predetermined area, the combination of an initial receptacle, a movable carrier, and a second ore support on the carrier arranged to receive from said receptacle a predetermined stratum of ore, said second support being stationary relatively to the carrier but movable bodily therewith when the carrier is moving in one direction over the aforesaid area, and being movable both bodily with and also relatively to said carrier when the latter is moving in the opposite direction.

5. In an apparatus for forming a horizontal stratum of ore upon a final support, the combination of a movable flexible support adapted to have a stratum initially formed thereon, means for moving the last said support and the initial stratum thereon bodily in one direction over the said area, means for moving said support bodily in the opposite direction, and means operable only upon movement of the support in the opposite direction causing it to simultaneously flex downward to deliver said stratum over said area.

6. In an apparatus for forming a horizontal charge stratum of ore upon a predetermined area, the combination of a supply mechanism, a movable apron carrier, an endless apron thereon adapted to be moved in one direction over the said area bodily with the carrier while stationary in relation thereto and to be moved both bodily with and also relatively to the said carrier only when the latter is moving in the opposite direction.

7. In an apparatus for forming a horizontal charge stratum of ore upon a support of predetermined area, the combination of a supply mechanism, a movable apron carrier, an endless apron thereon adapted to receive material from said supply mechanism and adapted to be held stationary on the carrier and to be moved bodily therewith in one direction over the said area and to be moved both bodily with and also rela-

tively to the said carrier when the latter is moving in the opposite direction.

8. In an apparatus of the class described, the combination of a reciprocating carrier, an initial ore support thereon to receive a stratum of ore, means for bodily moving the carrier in one direction, and means operable only when said carrier is moving in the opposite direction for moving the support relatively to the carrier while said support is moving bodily therewith.

9. In an apparatus of the class described, the combination of a reciprocating carrier, an initial ore support thereon adapted to receive a stratum of ore and to move bodily with the carrier in one direction while stationary in relation thereto, and to be moved bodily therewith when moving in the opposite direction, and means independent of the carrier and operable only when said carrier is moving in the opposite direction for moving the support in relation to the carrier.

10. In an apparatus of the class described, the combination of a reciprocating carrier, an ore support thereon movable with said carrier, in both directions and adapted to receive a stratum of ore, and means operable only when said carrier is moving in one direction automatically to effect relative movements between said carrier and said support.

11. In an apparatus of the class described, the combination of a reciprocating carrier, an ore support thereon movable with said carrier in both directions and adapted to receive a stratum of ore, and means operable only when said carrier is moving in one direction automatically to effect movement of said support relative to said carrier.

12. In an apparatus of the class described, the combination of a reciprocating carrier, an ore support thereon movable with said carrier and adapted to receive a stratum of ore, means for securing said ore support against movement relative to said carrier when said carrier moves in one direction, and means automatically to effect movement of said support relative to said carrier when said carrier moves in the opposite direction.

13. In an apparatus of the class described, the combination of a reciprocating carrier, an ore suporting belt movable with said carrier in both directions and adapted to receive a stratum of ore, means automatically operable only upon movement of the carrier in one direction to move said belt relative to said carrier, and means to secure said belt against relative movement when said carrier is moved in the opposite direction.

14. In an apparatus of the class described, the combination of a suitable receptacle, a carrier reciprocably mounted below said receptacle, a support to which said receptacle delivers mounted on said carrier and movable relatively thereto, means for securing said support against relative movement during reciprocation of said carrier in one direction, and means automatically to effect movement of said support relative to said carrier when said carrier is moved in an opposite direction.

15. In an apparatus of the class described, the combination of a carrier support, a carrier reciprocably mounted on said support, an ore support mounted on said carrier and movable therewith in both directions, and means on said carrier support automatically to engage and effect relative movement of said ore support when said carrier is moved in one direction.

16. In an apparatus of the class described, the combination of a reciprocable carrier, belt supporting shafts mounted on said carrier, a relatively movable ore supporting belt mounted on said shafts and movable with said carrier in both directions, and means operable only upon movement of said carrier in one direction automatically to engage and drive one of said shafts and effect movement of said belt relative to said carrier.

17. In an apparatus of the class described, the combination of a reciprocable carrier, belt supporting shafts mounted on said carrier, a relatively movable ore suporting belt mounted on said shafts, and means operable only upon movement of said carrier in one direction automatically to drive one of said shafts and effect movement of said belt relative to said carrier.

In testimony whereof, I affix my signature.

RICHARD LEWIS LLOYD