

907,134.

A. N. DIEHL.
BLAST FURNACE CHARGING APPARATUS.
APPLICATION FILED DEC. 10, 1907.

Patented Dec. 22, 1908.
3 SHEETS—SHEET 1.

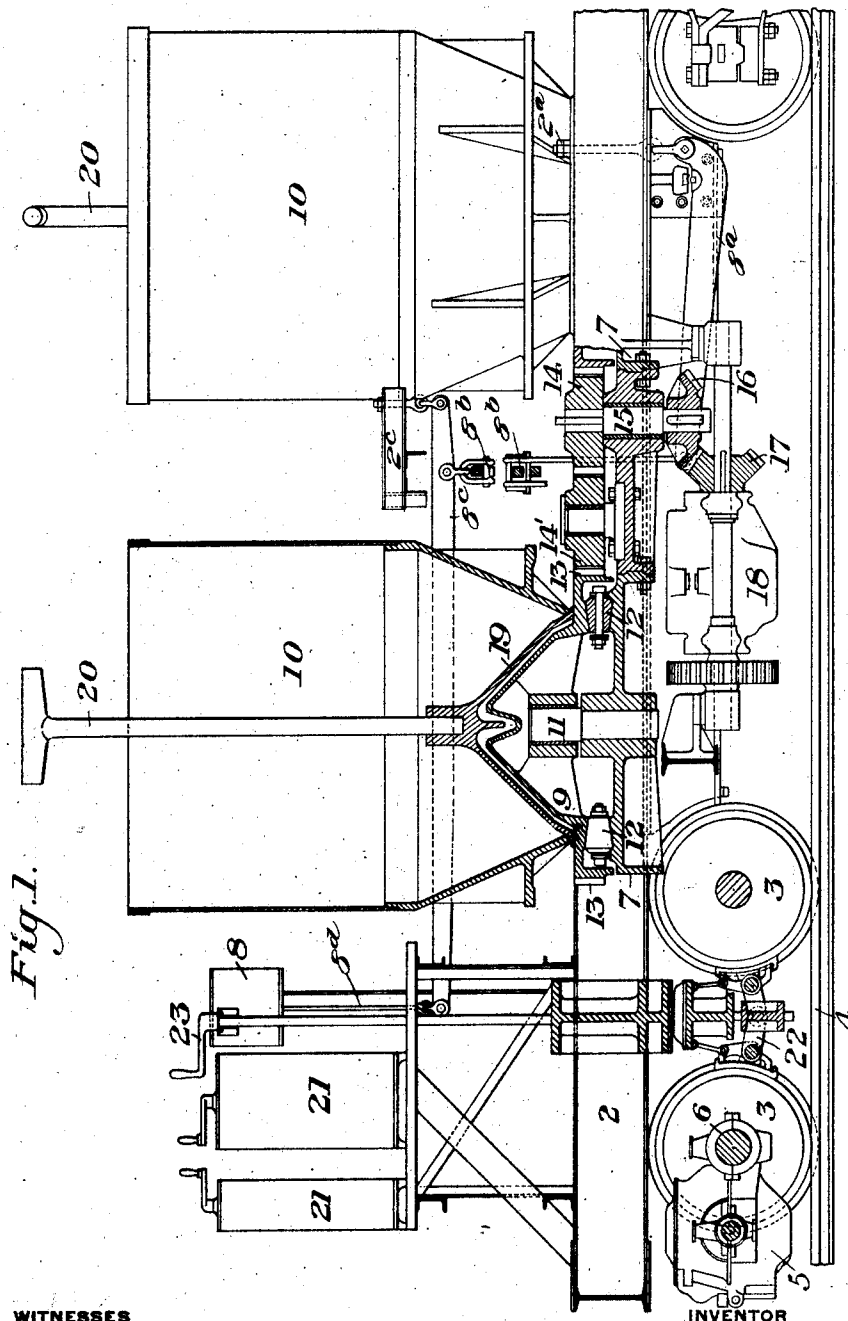


Fig. 1.

WITNESSES

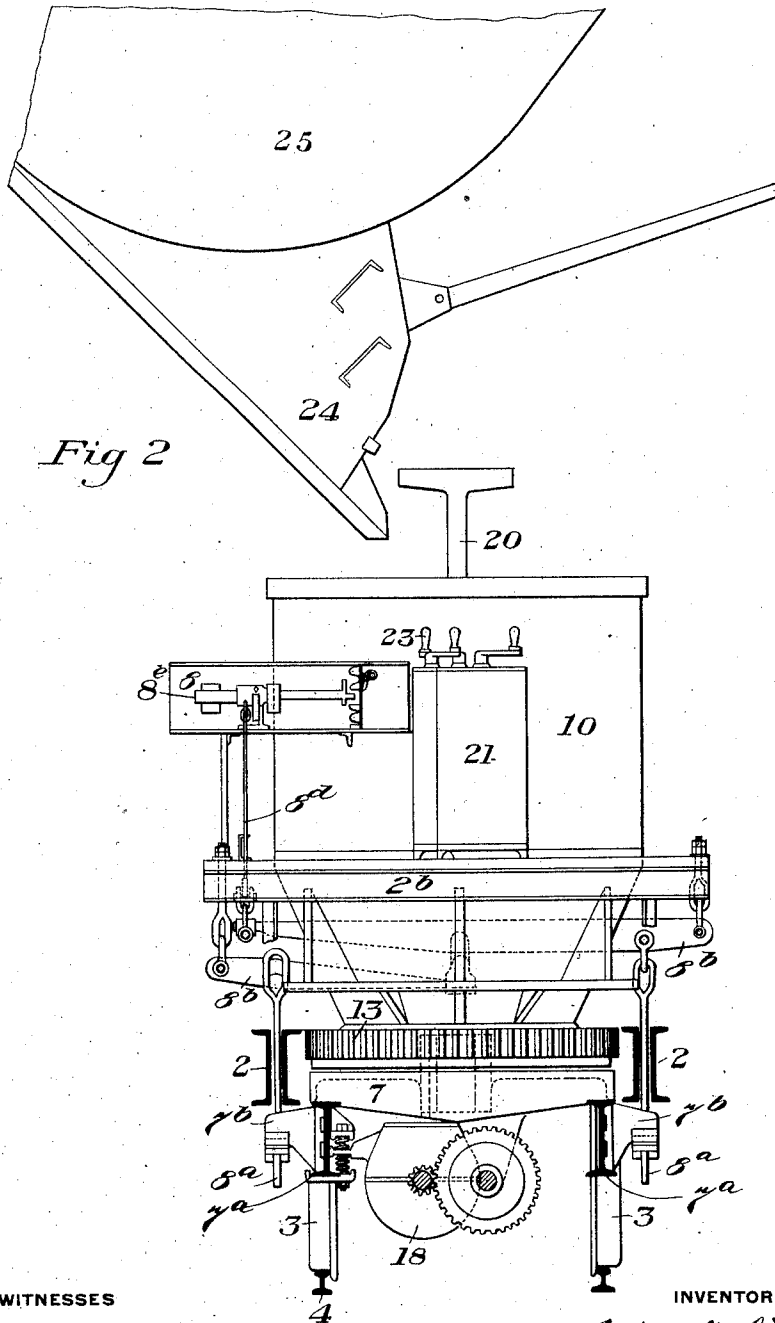
R. A. Balderson
W. W. Swartz

Antoine N. Diehl
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his atty

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R. A. Balderson
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INVENTOR

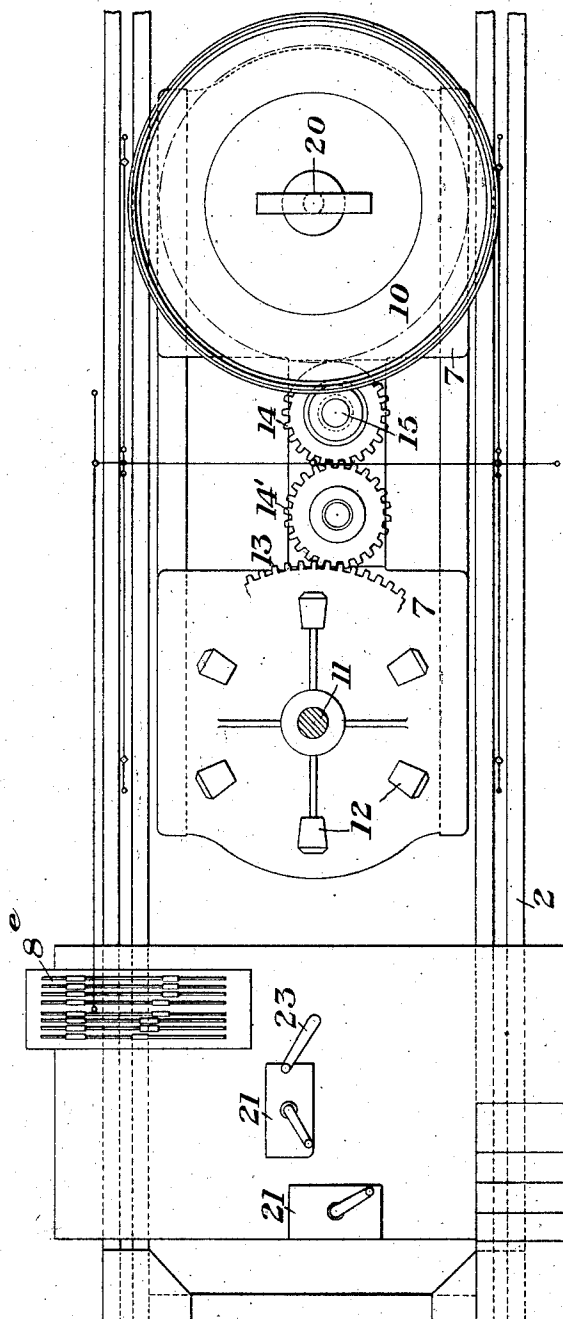
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3 SHEETS—SHEET 3.

Fig. 3.



WITNESSES

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UNITED STATES PATENT OFFICE.

AMBROSE N. DIEHL, OF DUQUESNE, PENNSYLVANIA.

BLAST-FURNACE-CHARGING APPARATUS.

No. 907,134.

Specification of Letters Patent.

Patented Dec. 22, 1908.

Application filed December 10, 1907. Serial No. 405,860.

To all whom it may concern:

Be it known that I, AMBROSE N. DIEHL, of Duquesne, Allegheny county, Pennsylvania, have invented a new and useful Improvement in Blast-Furnace-Charging Apparatus, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

10 Figure 1 is a side elevation partly in section of a lorry or scale car constructed in accordance with my invention; Fig. 2 is an end elevation partly in section, of the car in position on the lorry car track which is located beneath the stock bins; Fig. 3 is a plan view partly in section showing the removable stock receptacles mounted on the car and showing the turning mechanism by which these receptacles are rotated on the car.

20 My invention relates to apparatus employed in charging stock into blast furnaces and in distributing stock charged into such furnaces and is designed to provide an improved apparatus which will distribute the stock in any desired manner within the charging buckets or receptacles in which the stock is carried to the top of the furnace, and to provide apparatus which will permit of the stock being distributed at the base of the furnace where it is under the eye and control of the operator.

35 The invention is further designed to provide a simple and effective distributing apparatus which can easily be applied to and used with the hoisting apparatus used on existing furnaces, one form of such hoisting apparatus being shown and described in Patent No. 579,011, granted May 16th, 1896 to William Rothhoff and Marvin A. Neeland.

40 In the drawings, 2 represents the body of the lorry or scale car having wheels 3 which are mounted to run upon the rails 4 forming the lorry track. The lorry track extends from in front of the stock bin where the stock receptacles are filled to a point below the foot of the inclined track or hoist upon which the filled stock receptacles are lifted from the lorry car and are lifted to the top of the furnace where the buckets or receptacles are discharged into the furnace. The car 2 is provided with a driving motor 5 which is connected by suitable slow-down gearing with the axle 6 on the front wheels of each

55 wheel truck under the scale car. The lorry car is preferably provided with a scale mechanism interposed between the platform 7 and the car frame 2, the platform being suspended from the frame 2, although the weighing mechanism may be omitted in which case the platform 7 and supporting beams 7^a will be rigidly secured to the car body 2. As shown the platforms 7 are supported on beams 7^a which are connected by the brackets 7^b to the scale levers 8^a. One end of the levers 8^a is pivotally connected by eye-bolts 2^a to the car body 2, the movable ends of the scale levers 8^a are connected in a suitable manner with the multiple levers 8^b, the multiple levers being fulcrumed to the overhanging beams 2^b which are carried on the car body 2. The movable ends of the multiple levers 8^b are in turn connected to the scale lever 8^c which is fulcrumed to an overhanging beam 2^c on the car body 2 and the moving end of the lever 8^c is connected by the rod 8^d with the finger beams 8^e which are located in a beam box 8 on the lorry car 2.

On the platforms 7 are rotating bucket supports 9 which carry the removable buckets or stock receptacles 10. The bucket supports 9 are provided with vertical shafts 11 which are secured in the central bearings in the platform 7 so as to be rotatable. Anti-friction rollers 12 are provided between the platform 7 and bucket supports 9 so as to lessen the friction when the bucket supports 9 are rotated. The peripheries of each of the supports 9 are provided with spur-gear teeth 13 which mesh with the teeth in the spur pinions 14, 14' and as shown in Figs. 1 and 3, the pinion 14 is mounted on the vertical shaft 15 which is provided on this lower end with a bevel gear 16 which meshes with a similar bevel gear 17 on the slow-down mechanism connected with the driving motor 18.

Instead of having one motor 18 to rotate both of the spur-gears, a separate motor may be employed for each of these gears in which case they may be rotated independently.

100 The stock receptacles 10 are provided with drop bottoms 19, each of these bottoms having a vertical post or rod 20 and preferably a T-head on the top of these rods which engages with a hook on the trolley by which the receptacles are lifted from the car to the inclined hoist and are carried on the hoist to the top of the furnace.

Suitable controllers 21 are provided by which the motors used on the car are operated and controlled, and a hand brake 22 which is operated by means of the hand lever 5 23 is also provided on the car.

In the use of my improved apparatus, the car 2 is moved upon the track rails 4 until one of the receptacles 10 is in position beneath one of the spouts 24 on the stock pins 25 to 10 receive the materials discharged from the spout. The gates of the stock bin 25 being opened, the materials are then delivered into the bucket 10. This bucket or receptacle may be constantly rotated while it is being 15 filled, causing the material to be deposited in such manner that there is formed a spiral column of coarse material and also one of fine material. It is evident that the more revolutions the bucket makes the nearer equal 20 will be the proportions of coarse and fine material in each vertical plane passing through the center of the bucket. Or the bucket may be held stationary while being filled, in which case the receptacle is rotated before 25 and after being filled. The second of the receptacles 10 is filled in a like manner and the car is then moved on the track until the receptacles are in position to be removed from the car and be hoisted to the top of the furnace by the usual hoisting mechanism. The 30 buckets 10 are placed in position on the top of the furnace hopper by the trolley and the bottoms 19 of the buckets are then lowered so as to permit the materials to flow from the bottom of the bucket in an annular sheet 35 into the furnace hopper. After the buckets are emptied at the top of the furnace, they are lowered by the hoisting apparatus and are again replaced on the car when the above 40 described operations are repeated.

When the receptacles 10 are not continuously rotated while being filled, they are caused to rotate through a part of a revolution so as to bring the buckets into different 45 positions between the time the bucket is replaced upon the car after being hoisted to the furnace top and the time when it is again in position to be lifted, in this way changing the relative angular position of the imaginary 50 vertical plane dividing the coarse, lumpy materials and the finer materials in the successive receptacles and changing the relative position of the lump materials in successive charges emptied into the top of the furnace. 55 The advantages of my invention are many and will be apparent to those skilled in the art.

Instead of employing the independent distributing mechanism as has heretofore been 60 necessary, the distributing mechanism is carried on and forms a part of the lorry car and the stock charged into the furnace is distributed in the stock receptacles instead of being distributed after being emptied from the re-

ceptacles. The manner of distributing the 65 stock may be varied as is desired.

The apparatus is simple and is easily kept in repair and by the addition of the turning mechanism to the lorry car my improved apparatus may be applied to any of the existing 70 stock charging arrangements which are in use with such furnaces.

Variations in the arrangement and construction of the parts may be made without departing from my invention. 75

The weighing mechanism, instead of being part of the scale proper, may be omitted and an ordinary platform scale located in the track leading from the stock bin may be used and many other changes may be made. 80

I claim:—

1. Apparatus for charging blast furnaces comprising a car, a cylindrical stock receptacle removably mounted thereon and adapted to be rotated on the car and mechanism on the car for rotating the cylindrical receptacle. 85

2. Apparatus for charging blast furnaces, comprising a car having a cylindrical stock receptacle mounted thereon, said receptacle 90 being arranged to rotate about its vertical axis; and mechanism arranged to rotate the receptacle on said car; substantially as described.

3. Apparatus for charging blast furnaces, 95 comprising a lorry car, a rotatable bucket support on said car, a bucket removably mounted on said support and mechanism arranged to rotate the support and bucket on said car; substantially as described. 100

4. Apparatus for charging blast furnaces, comprising a lorry car, a rotatable bucket support on said car, a bucket having a drop bottom removably mounted on said support and mechanism arranged to rotate the support and bucket on said car about the axis of 105 the bucket; substantially as described.

5. Apparatus for charging blast furnaces comprising a lorry car, a weighing mechanism mounted upon said car, a stock receptacle rotatably mounted on said car, and connected 110 to said mechanism, and means for rotating the receptacle on said car; substantially as described.

6. Apparatus for charging blast furnaces 115 comprising a lorry car, a plurality of bucket supports rotatably mounted on said car, buckets removably secured on said bucket supports and mechanism by which the supports are rotated each on its own axis on said 120 car; substantially as described.

7. In an ore lorry car, the combination of a wheeled car, a stock receptacle rotatably mounted on said car and a motor on the car by which said receptacle is rotated on the 125 car; substantially as described.

8. In an ore lorry car, the combination of a wheeled car, a scale mechanism mounted on

said car, stock receptacles rotatably mounted on the car and connected to said weighing mechanism and means for rotating said receptacles on the car; substantially as described.

9. In apparatus for charging blast furnaces, a car having a stock receptacle comprising bottom and side portions mounted thereon so as to rotate about its vertical axis and means for rotating the receptacle on said car; substantially as described.

10. In apparatus for charging blast fur-

naces, a lorry car, a stock receptacle comprising removable side and bottom portions rotatably mounted thereon, and means on the receptacle whereby the receptacle is removed and replaced on said car, substantially as described.

In testimony whereof, I have hereunto set my hand.

AMBROSE N. DIEHL.

Witnesses:

GEORGE L. NEFF,
JNO. C. HARGRAVE.