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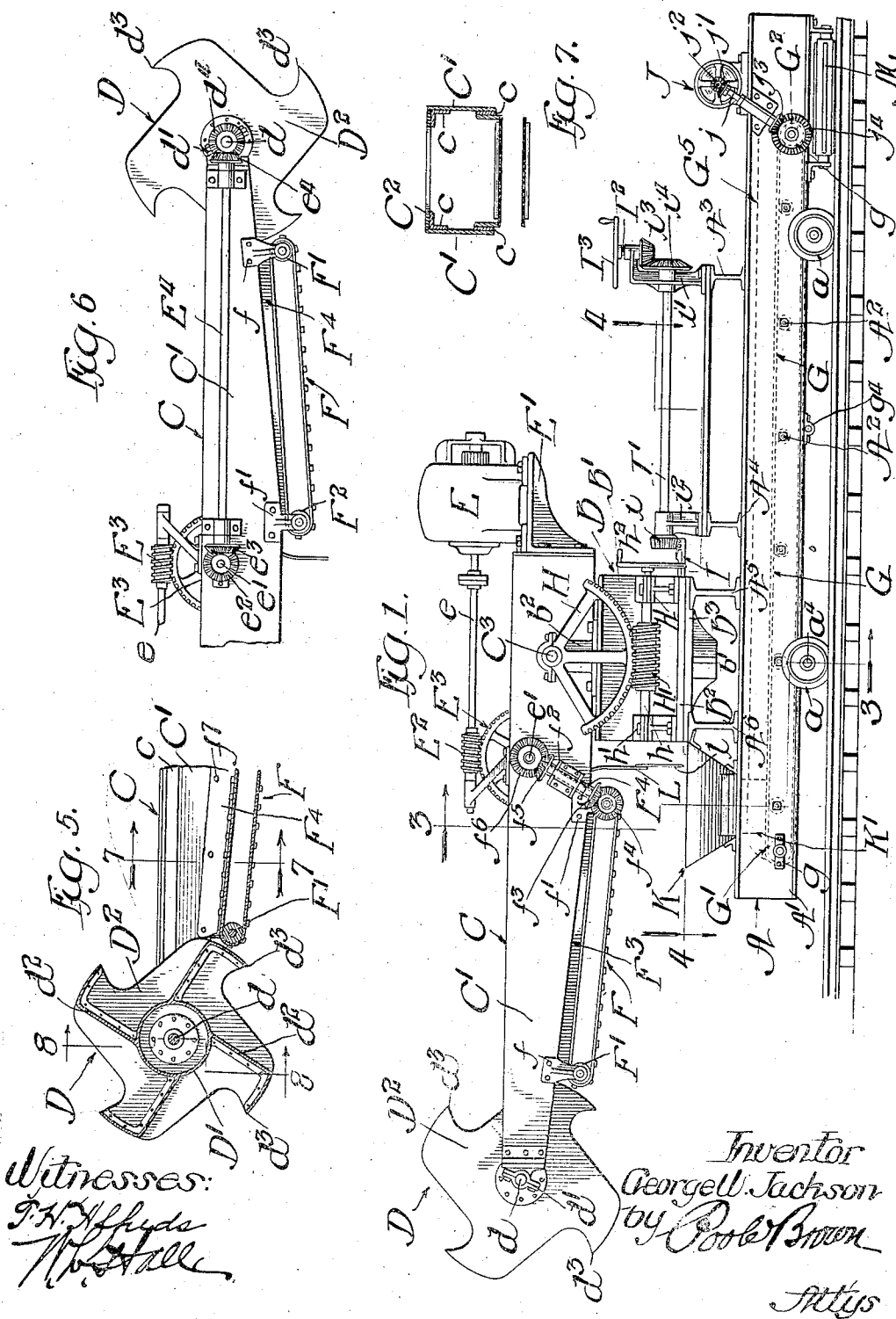
G. W. JACKSON.

PATENTED MAY 26, 1908.

APPARATUS FOR HANDLING LOOSE MATERIALS.

APPLICATION FILED DEC. 6, 1907.

3 SHEETS—SHEET 1.



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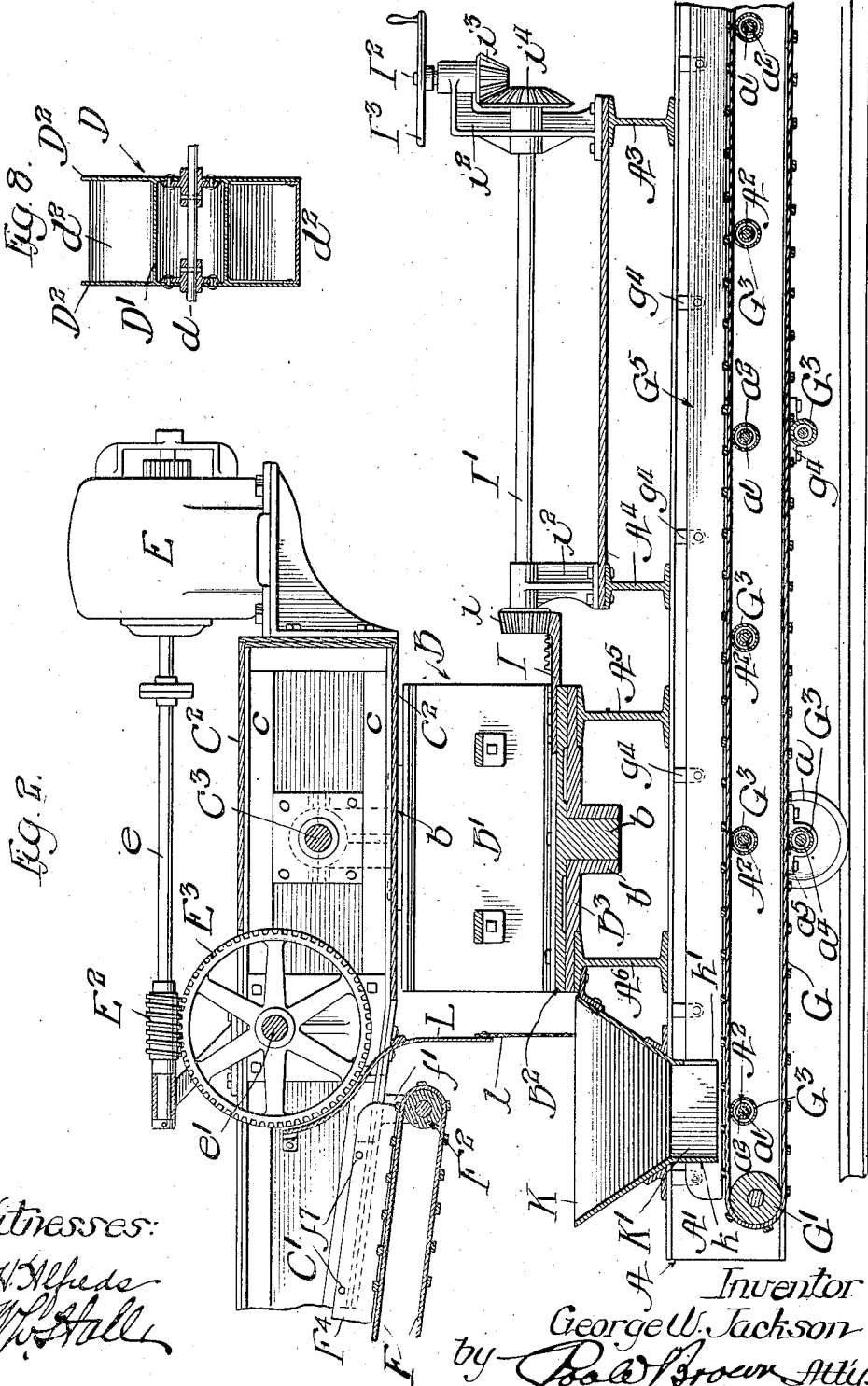
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Witnesses:
P. H. Alford
W. H. Hall

Inventor
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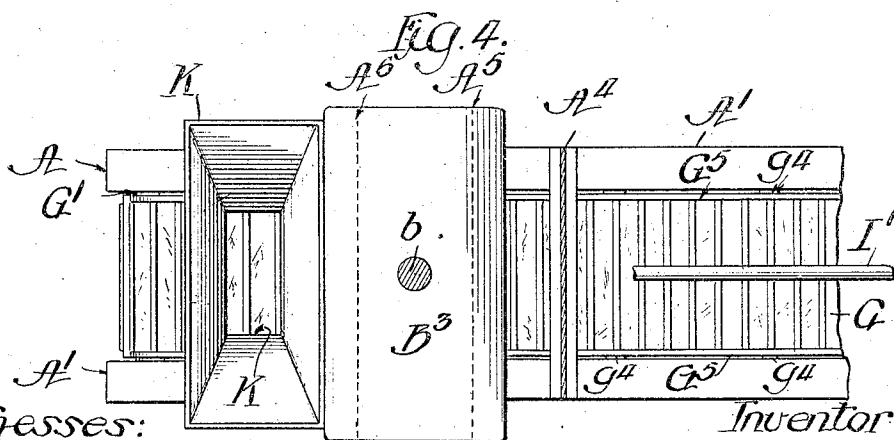
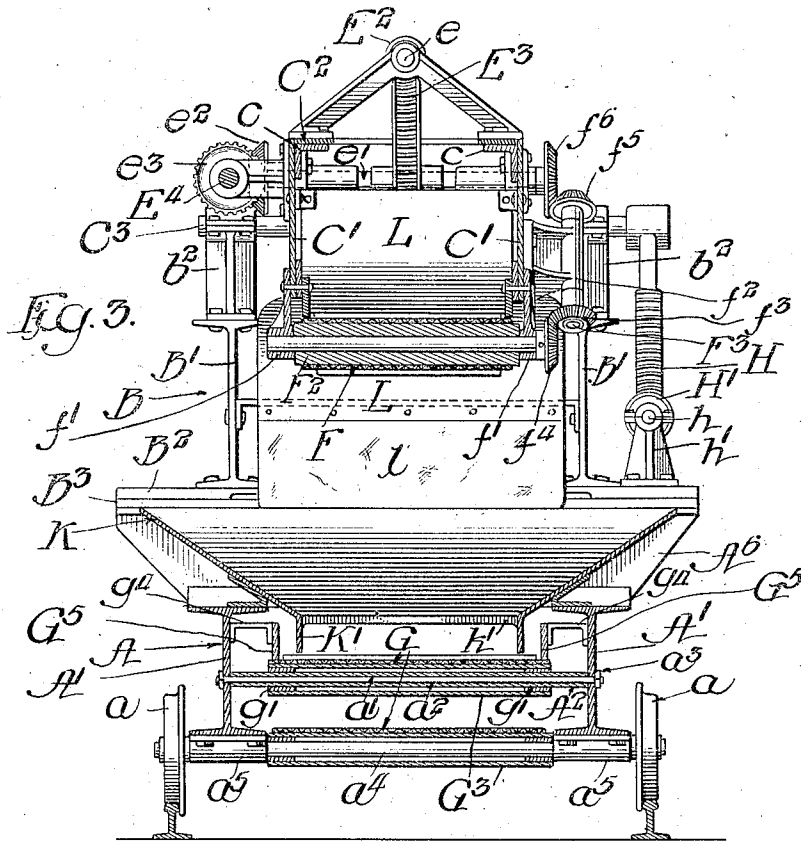
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APPARATUS FOR HANDLING LOOSE MATERIALS:

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3 SHEETS—SHEET 3.



Witnesses:
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UNITED STATES PATENT OFFICE.

GEORGE W. JACKSON, OF CHICAGO, ILLINOIS.

APPARATUS FOR HANDLING LOOSE MATERIALS.

Specification of Letters Patent.

Patented May 26, 1908.

Application filed December 6, 1907. Serial No. 405,418.

To all whom it may concern:

Be it known that I, GEORGE W. JACKSON, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Apparatus for Handling Loose Materials; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in machines for handling loose material, such as coal, ore, cinders, ashes, loose dirt and the like, and is designed for continuously removing such materials from a pile or mass thereof and directing it to a point of use or to a vehicle by which it may be conveyed from the premises.

The machine herein shown as embodying my invention embraces, in general terms, an arm which swings both horizontally and vertically and carries at its outer end a device in the nature of a scoop for picking up the loose material from the pile or mass, a suitable conveyer carried by the arm by which the material picked up by the scoop device is carried backwardly to a second conveyer which conveys it away from the machine. By reason of the horizontal and vertical swing of the scoop carrying arm, the scoop device is capable of picking up the material throughout a considerable horizontal and vertical range.

The invention consists in the matters hereinafter set forth and more particularly pointed out in the appended claims.

As shown in the drawings:—Figure 1 is a side elevation of a machine made in accordance with my invention. Fig. 2 is an enlarged longitudinal, vertical section of the central part of the machine. Fig. 3 is a transverse section, taken on line 3—3 of Fig. 1. Fig. 4 is a horizontal plan taken on the line 4—4 of Fig. 1. Fig. 5 is a vertical section of the outer end of the scoop carrying arm and the scoop device. Fig. 6 is a partial side view of the other side of the arm, showing the scoop in side elevation and the gearing for operating the same. Fig. 7 is a transverse section, taken on line 7—7 of Fig. 5. Fig. 8 is an axial section of the scoop device, taken on line 8—8 of Fig. 5.

As shown in said drawings, A indicates, as whole, the main frame of the machine sup-

ported on wheels *a*; B an arm supporting frame mounted thereon embracing in its construction or associated with a horizontally rotative turn-table; C a vertically swinging arm mounted on the supporting frame; D a rotary scoop device carried by the free end of the arm, and E a motor, likewise carried by the arm, for operating the scoop device.

F designates a conveyer belt supported on the arm for carrying material delivered thereto by the scoop device to the receiving end of a second conveyer belt G which directs the material from the machine. As herein shown, said conveyer belt G extends beneath the machine and conveys the material delivered thereto by the belt F to a point in rear of the machine.

Referring to the construction of the main frame, A¹ A¹ designate parallel side members, and A² A² transverse connecting members thereof. Said side members, as herein shown, assuming the form of I-beams arranged with their web portions in parallel vertical planes, and the transverse connecting members comprise tie-rods *a*¹ extending through openings in the web portions of said I-beams and are surrounded by spacing tubes *a*² which maintain the side members the proper distance apart. Said tie-rods are threaded at their ends and are provided with nuts *a*³ which serve to clamp the side members A¹ against said spacing tubes. In addition to said tie-rods other transverse members A³ A⁴ A⁵ and A⁶ having the form of I-beams, span the side members and are arranged with their bottom flanges resting upon and secured to the top flanges of said side members. Said cross-members A³, A⁴, A⁵ and A⁶ also serve as supports for other parts of the machine and will be hereinafter described. The supporting wheels *a* of the main frame are fixed to axles *a*⁴ which are journaled in boxes *a*⁵ bolted to the bottom flanges of the I-beam frame members A¹. Said wheels may rest and roll on track rails or may be constructed to roll directly on the ground, whereby the machine may be easily moved from place to place.

The arm supporting frame B comprises parallel vertical, laterally separated plates B¹ B¹ having the form of I-beams, which rise from and are secured to a horizontal plate B², which latter rests upon a platform B³ supported on the transverse members A⁵ A⁶ of the main frame (Figs. 1 and 2). The

horizontal plate B² and platform B³ constitute parts of a horizontally rotative turn table. For this purpose the plate B² is provided with a central vertical pivot stud *b* which extends downwardly into and has ro-
 5 tative engagement with a vertical bearing sleeve *b*¹ made integral with said platform.

The particular form of scoop bearing arm herein shown comprises a latticed girder, it
 10 embracing two laterally separated flat plates C¹ C² (Figs. 3 and 7) connected by transverse bars C³ C⁴ and reinforced at their upper and lower margins by angle bars *c c*. The arm is supported at a point near its rear end upon a
 15 horizontal shaft C³ fixed to the side members of said arm in any suitable manner and has bearing at its ends in pillow blocks *b*² mounted upon the side plates of the arm supporting frame.

The pivot stud *b* of the turn table constitutes the vertical axis about which the scoop bearing arm swings horizontally, and the
 20 horizontal shaft C³ constitutes the axis about which said arm swings vertically. Thus the said arm is capable of movement through a
 25 wide vertical and horizontal range to present the scoop device at widely divergent angles to the pile or mass from which the material is being removed.

The scoop device herein shown rotates about an axis transverse to the arm C and comprises a plurality of symmetrically dis-
 30 posed scoops which are brought successively by rotation thereof into scooping contact with the pile or mass of the material being
 35 removed, each scoop being filled at one point in its rotation and dumping the contents thereof on the conveyer belt at another point in its rotation. Said scoop device is made as follows: D¹ designates a cylinder or
 40 drum fixed to a shaft *d* which is journaled in bearing members *d*¹ *d*² carried by the end of the scoop bearing arm C. To the periphery of said drum are fixed a plurality of plates or
 45 vanes *d*³ which extend outward therefrom in a direction tangential to a cylinder of slightly less radius than the drum. The outer margins of said blades are bent forward, with respect to the direction in which the scoop
 50 device rotates, to constitute the advance or cutting blades *d*³ of the scoops, the plates *d*² constituting the bottoms of the scoops. D² D² designate laterally separated plates which are fixed to the ends of the drum and
 55 to the end margins of the scoop bottoms, and said plates constitute the side walls of the scoops or buckets. Said side wall plates are marginally recessed in their parts adjacent to the cutting blades of the scoops, so as to
 60 give clearance to the cutting blades and thus facilitate the operation of the scoop in removing material from a pile or mass.

The motor E, which may conveniently be an electric motor, is supported upon a shelf
 65 or bracket E¹ which is fixed to the rear end

of the arm C. Its motor shaft is connected with and rotates a shaft *e*, which latter carries at its outer end a worm E² which meshes with a worm gear E³ fixed on a transverse
 shaft *e*⁴ which is journaled in the side plates C¹ of the arm C. To one end of said shaft *e*¹
 70 is fixed a beveled gear *e*² which meshes with a beveled gear *e*³ fixed to the rear end of a longitudinal shaft E⁴ journaled in bearing mem-
 75 bers fixed to the outer face of the adjacent side member of the arm C. To the forward end of said longitudinal shaft E⁴ is fixed a beveled gear *e*⁴ which meshes with a beveled gear *d*⁴ on the adjacent end of the scoop shaft
 80 *d*. The gear connections described between the motor and scoop device are maintained in operative relation in all positions of the arm and the proportions of the gears are such as to constitute a speed reducing gear
 85 mechanism by which the scoop device may be rotated at a suitably low speed.

Next referring to the mechanism shown for actuating the arm to swing it vertically about its horizontal axis, said parts are made
 as follows: H designates a worm gear seg-
 90 ment which is fixed to one end of the horizontal pivot shaft C³ and depends therefrom. Said gear segment meshes with a horizontal worm H¹ located below the level of the arm C
 and carried by a rotative shaft *h* which is
 95 journaled in bearing members *h*¹ bolted to and rising from the horizontal plate B² of the turn table. To the end of said worm shaft *h* is fixed a hand wheel *h*² through the medium of which a worm is rotated and imparts
 100 through the gear segment H, vertical movement to said scoop carrying arm.

The mechanism shown for horizontally swinging the scoop bearing arm about its vertical axis is made as follows: I designates
 105 a beveled gear segment that is bolted or otherwise fixed to the upper face of the upper member of the turn table. Meshing with said segment is a beveled pinion *i* carried by the forward end of a horizontally arranged,
 110 longitudinally extending shaft I¹ which is journaled in bearing members *i*¹ *i*² rising from and supported on the transverse members A³ A⁴ of the main wheeled frame. The bearing member *i*¹ is formed to provide also
 115 a bearing for a short vertical shaft I² which carries at its lower end a beveled pinion *i*³ meshing with a beveled pinion *i*⁴ on the adjacent end of said horizontal shaft I¹. The vertical shaft I² is provided at its upper end
 120 with a hand wheel I³ by means of which the parts are operated to effect the horizontal adjustment of the scoop bearing arm.

The conveyer belt F which receives the material from the scoop device and deposits
 125 the same upon the conveyer belt G is trained about rollers F¹ F², (Figs. 1 and 2) the shafts or trunnions of which are rotatively mounted in bearing members *f* *f*¹ fixed to the side
 130 plates of the scoop bearing arm. The said

conveyor belt F is thus carried by the scoop bearing arm and beneath the same, and is maintained in the angular relation with respect to said arm and scoop device in all positions of the arm. The rearmost roller F² constitutes the driving roller of said conveyor belt and is conveniently driven from the gear mechanism which connects the motor E with the scoop device. The means for driving said conveyor belt F as herein shown is made as follows: F³ designates a shaft which is rotatively mounted in a bearing member f² fixed to one side of the scoop bearing arm, and is provided at its lower end with a beveled gear f³ which meshes with a beveled gear f⁴ carried by the adjacent end of the shaft or trunnion of the roller F². The upper end of said shaft F³ carries a beveled gear f⁵ which meshes with a beveled gear f⁶ carried by the adjacent end of the shaft e' of the worm gear e². Plates F⁴ attached to the side members of the arm by bolts f⁷ are located at the sides of the conveyor belt F to prevent the material falling off of said belt.

The forward end of the conveyor belt F is located as closely to the scoop device as conditions will permit, as best shown in Figs. 1, 5 and 6. The scoop device rotates in the direction indicated by the arrows in said last mentioned figures, and the construction of the scoop device is such that the contents of each scoop or bucket, as the said scoop turns rearwardly over the axis of rotation of said device, falls upon the reverse side of the bottom of the scoop next in advance thereof and is guided by said rearwardly inclined bottom to the receiving end of the conveyor belt F. The bottom of each scoop and the parts of the side plates D² at the ends thereof thus constitute, in effect, a chute through which the material dumped from a scoop next in rear thereof is directed to the conveyor belt thereby insuring a complete delivery of said contents to the conveyor.

The conveyor belt G which receives the material from the conveyor F and conveys said material away from the machine is herein shown as mounted between the side members of the wheeled frame A and is trained about front and rear rollers G¹ G², the shafts or trunnions of which are rotatively mounted in bearing members g g attached to the side members of said frame. The upper lap of the conveyor belt G is supported at intervals by idler rollers G³ which are rotatively mounted, as herein shown, on the spacing tubes a² of the transverse connecting members of the wheeled frame. Said rollers, as herein shown, have bearing at their ends only on said spacing tubes, as best shown in Fig. 3, the central parts of the rollers being free from contact with the spacing tubes. To this end the rollers are provided at their ends with hollow plugs g⁴ which fit tightly in the ends of the rollers and are formed with bearing

openings of a diameter to rotate freely on the spacing tubes. The lower lap of the conveyor belt G is likewise supported at intervals upon rollers G³ G³, two of which are journaled upon the axles of the wheels a¹, and another or intermediate one of which is journaled in bearing members g⁴ fastened to the bottom flanges of the side frame members A¹. Horizontal bars G⁵ are arranged longitudinally at the sides of the upper lap of the conveyor belt to prevent the loose material from falling off the same, as best shown in Fig. 2, and said bars are attached to the side members of the frame by means of brackets g⁴.

The conveyor belt G is conveniently driven by a motor J, which may be an electric motor, and which is mounted on the rear end of the machine frame, as shown in Fig. 1. Said motor is operatively connected with the rear or driving roller G² of the conveyor belt G by means of a shaft j which carries at its upper end a beveled gear j¹ which meshes with a beveled gear j² on the motor shaft. The shaft j carries at its lower end a beveled gear j³ which meshes with a beveled gear j⁴ fixed to the shaft of the rear or driving roller of the conveyor belt.

The loose material is delivered from the conveyor belt F to the lower conveyor belt G through a hopper K supported on the forward end of the frame above said lower belt, said frame being extended a distance from the turn-table to provide a support for said hopper. The hopper is provided with a transversely disposed, downwardly extending spout K¹ which extends downwardly between the side members of the frame and made of a width substantially that of the lower conveyor belt. The front wall k of said hopper spout is continued approximately to the plane of the belt while the rear wall k¹ is cut away to permit the material on the conveyor belt to pass rearwardly therefrom. In order to prevent the material delivered by the upper carrier belt F from being thrown against the worm gear E³ or entirely over the hopper, a guard L is provided in rear of said upper conveyor which extends across the space between the side members of the scoop carrying arm and is attached at its margins to said side members. Said guard is carried downwardly to the level of the upper end of the hopper, and the lower portion l of the guard may be made flexible. A transverse conveyor M may be arranged beneath the conveyor G to receive the material from the latter conveyor and convey it laterally from the machine. Said transverse conveyor may, if desired, be arranged in front of the machine frame to receive the material directly from the conveyor F through the hopper K.

It will be observed that the position of the motor on the scoop carrying arm is such with respect to the horizontal pivot of said arm as to tend to counterbalance the free end of the

arm and the scoop carried thereby thus enabling said arm to be raised with the exertion of comparatively little power.

The details of construction herein described may be considerably varied without departing from the spirit of the invention and I do not wish to be limited to such details except as hereinafter made the subject of specific claims. It will be understood that the several gears and operative parts may be incased to protect the same clogging by dust or the material which the machine is handling.

I claim as my invention:—

1. A machine for handling loose material comprising a carriage, a horizontally and vertically swinging arm mounted thereon, a scoop device carried by the free end of said arm, a conveying device carried by said arm and receiving the material from the scoop device and conveying it towards the pivoted end of said arm and a motor carried by said arm for driving said scoop device and conveying device.

2. A machine for handling loose material comprising a carriage, a horizontally and vertically swinging arm mounted thereon, a rotative scoop device carried by the free end of said arm, a conveying device carried by said arm and movable with said arm, and arranged with its receiving end closely adjacent to said rotative scoop device, a motor carried by said arm for driving said scoop device and conveying device and a conveyer belt located with its receiving end beneath the rear end of the conveying device for receiving said material and directing it from the machine.

3. A machine for handling loose material comprising a carriage, a horizontally and vertically swinging arm mounted thereon, a rotative scoop device carried by the free end of said arm, a conveyer belt trained about rollers carried by and movable with said arm, and arranged with its receiving end closely adjacent to said rotative scoop device, a motor carried by said arm for driving said scoop device and conveyer belt and a second conveyer belt arranged beneath the carriage with its receiving end beneath the rear end of the conveyer belt carried by said arm for carrying the material deposited thereon away from the machine.

4. A machine for handling loose material comprising a carriage, a horizontally and vertically swinging arm mounted thereon, comprising laterally separated, rigidly connected plates, a rotative scoop device carried by the free end of said arm, a conveyer belt beneath said arm and trained about rollers carried by and movable with the arm, said belt being arranged with its receiving end closely adjacent to said rotative scoop device, and extending rearwardly therefrom and plates fixed to the lateral plates of the

arm at the sides of said belt arranged to prevent the material falling off the sides of said belt.

5. A machine for handling loose material comprising a frame, a horizontally and vertically swinging arm mounted thereon, a rotative scoop device mounted at the free end of said arm, a conveying device carried by the arm for conveying material from said scoop and a motor carried by the arm on the side of its pivot remote from the scoop device for driving the scoop device and conveying device.

6. A machine for handling loose material comprising a carriage, a horizontally and vertically swinging arm mounted thereon, a scoop device carried by the free end of said arm, a motor carried also by said arm and operatively connected with said scoop device, a conveying device carried by said arm and receiving the material from the scoop device, and a conveying device located beneath the rear end of the first mentioned conveying device for receiving said material and directing it from the machine.

7. A machine for handling loose material comprising a carriage, a horizontally and vertically swinging arm mounted thereon, a scoop device carried by the free end of said arm, a motor carried also by said arm on the side of its horizontal axis remote from the scoop device in a manner tending to counter-balance the free end of said arm and the scoop carried thereby, and operatively connected with said scoop device, a conveying device carried by said arm and receiving the material from the scoop device, and a conveying device located beneath the rear end of the first mentioned conveying device for receiving said material and directing it from the machine.

8. A machine for handling loose material comprising a carriage, a horizontally and vertically swinging arm mounted thereon, a rotative scoop device mounted at the free end of said arm, a motor carried by said arm for imparting rotation to said scoop device, and a conveying device carried by said arm and driven by said motor for conveying material from said scoop.

9. A machine for handling loose material comprising a carriage, a horizontally and vertically swinging arm mounted thereon, a rotative scoop device mounted on the free end of said arm, a motor carried also by said arm and operatively connected with the rotative scoop device by means including a speed reducing gear mechanism, a conveyer belt beneath and carried by said arm and arranged to receive material from the scoop device and to convey it rearwardly, and operative connections between the low speed side of said reducing gear mechanism and said conveyer belt for operating the latter.

10. A machine for handling loose material

comprising a carriage, a horizontally and vertically swinging arm mounted thereon, a rotative scoop device mounted on the free end of said arm, and means for rotating the same, said scoop device comprising a central body or drum, radial plates arranged at the ends thereof and plates extending outwardly from said drum and from one radial plate to the other, the intermediate plates constituting the bottoms and the lateral plates the sides of a plurality of scoops, whereby the material dumped from each scoop is discharged through a chute composed of the bottom of the next advanced scoop and said radial plates.

11. A machine for handling loose material comprising a carriage, a horizontally and vertically swinging arm mounted thereon, a rotative scoop device mounted on the free end of said arm and means for rotating the same, said scoop device comprising a central body or drum, radial plates arranged at the ends thereof, plates extending outwardly from said drum and from one radial plate to the other, the intermediate plates constituting the bottoms and the radial plates the sides of a plurality of scoops, whereby the material dumped from each scoop is dis-

charged through a chute composed of the bottom of the next advanced scoop and said radial plates, and a conveying device carried by said arm and arranged to receive the material discharged from said scoop device.

12. A machine for handling loose material comprising a carriage, a horizontally and vertically swinging arm mounted thereon, a rotative scoop device mounted on the free end of said arm and means for rotating the same, said scoop device comprising a central body or drum, radial plates arranged at the ends thereof, and plates extending outwardly from the drum and from one radial plate to the other and provided at their outer margins with forwardly turned cutting margins, said radial plates being recessed at their margins adjacent to said cutting edges, for the purpose set forth.

In testimony, that I claim the foregoing as my invention I affix my signature in the presence of two witnesses, this 12th day of November A. D. 1907.

GEORGE W. JACKSON.

Witnesses:

F. A. GETTLESON,
WILLIAM CORBETT