

W. WHALEY.

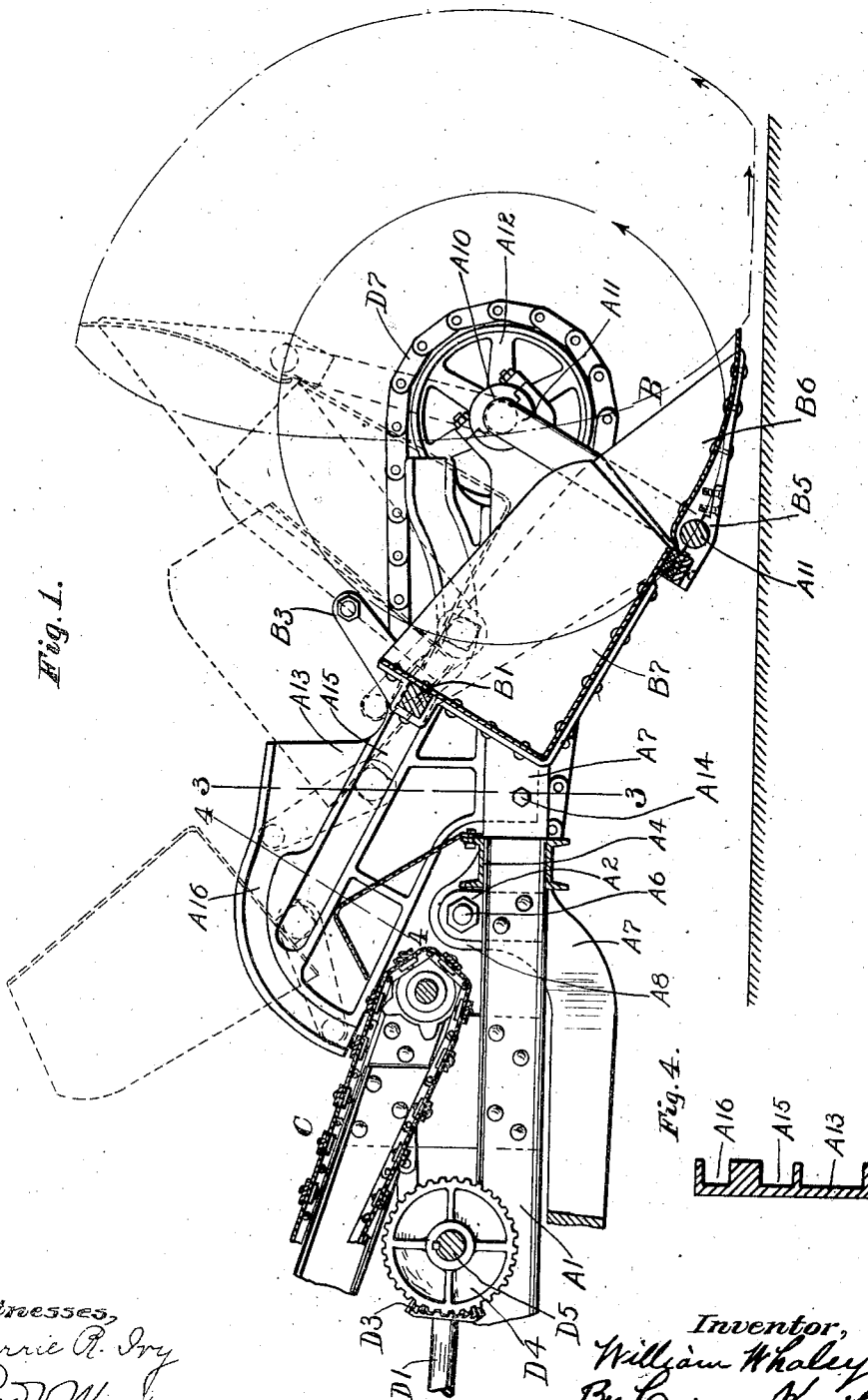
SHOVELING MACHINE.

APPLICATION FILED AUG. 24, 1908. RENEWED SEPT. 7, 1909.

940,998.

Patented Nov. 23, 1909.

4 SHEETS—SHEET 1.



Witnesses,
Learie A. Dry
R. V. Myers

Inventor,
William Whaley,
By Cyrus Kehr
Attorney.

W. WHALEY.
SHOVELING MACHINE.

APPLICATION FILED AUG. 24, 1908. RENEWED SEPT. 7, 1909.

940,998.

Patented Nov. 23, 1909.

4 SHEETS—SHEET 2.

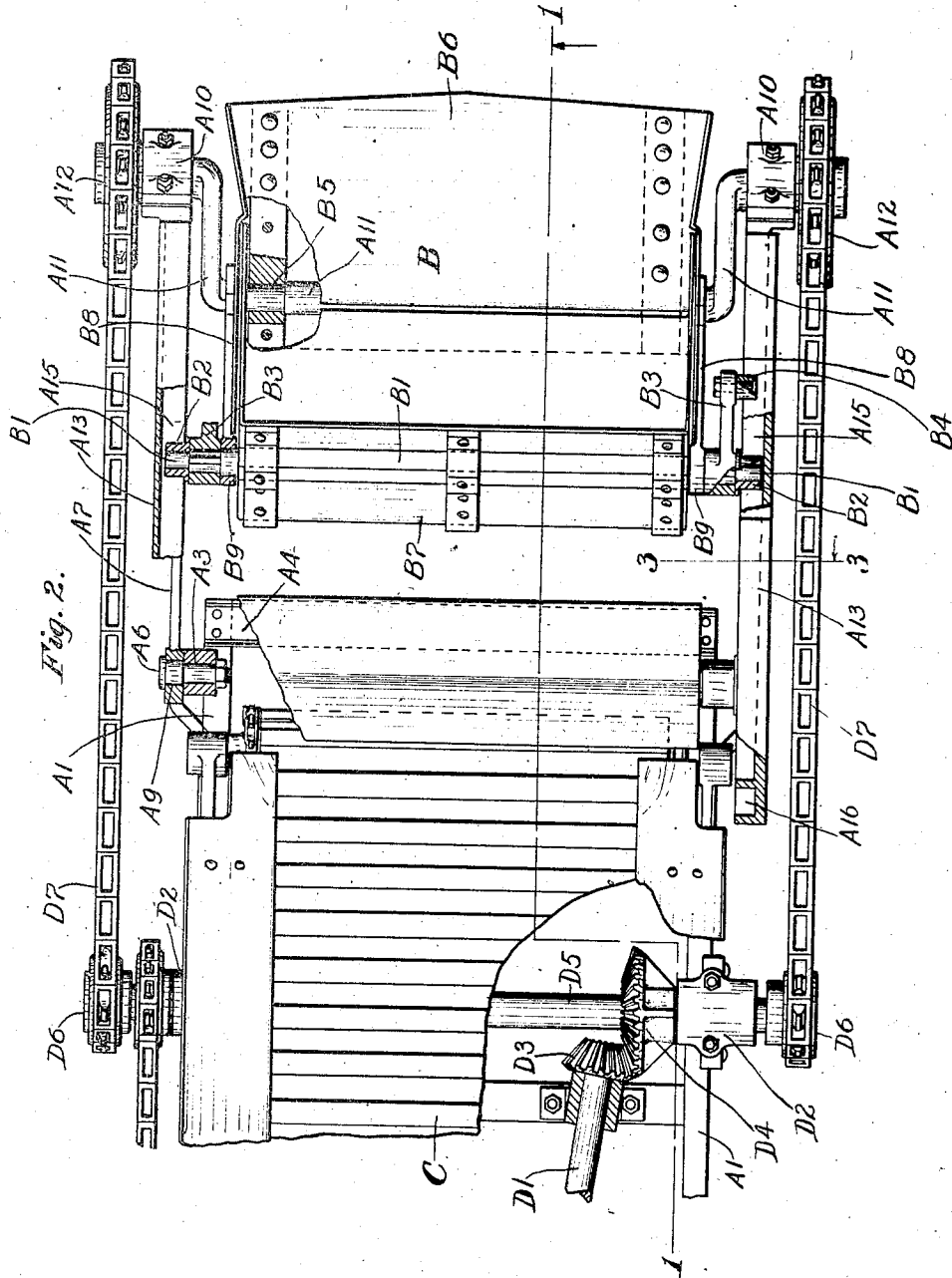
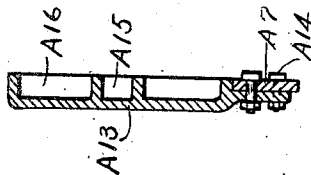


Fig. 3.



Witnesses,
Carrie R. Joy
H. M. Porter

Inventor,
William Whaley
By Cyrus K. Khr
Attorney.

W. WHALEY.
SHOVELING MACHINE.

APPLICATION FILED AUG. 24, 1908. RENEWED SEPT. 7, 1909.

940,998.

Patented Nov. 23, 1909.

4 SHEETS—SHEET 3.

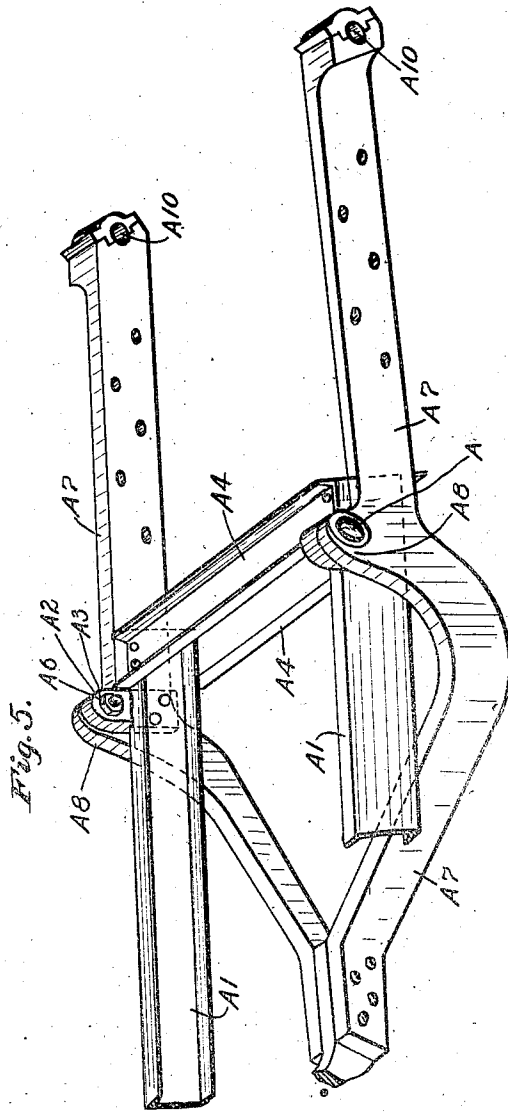


Fig. 5.

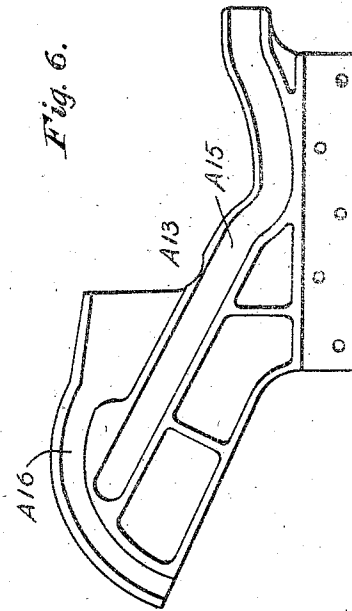


Fig. 6.

Witnesses,
Carrie R. Iry
H. M. Porter.

Inventor,
William Whaley
By Cyrus K. Kohn
Attorney

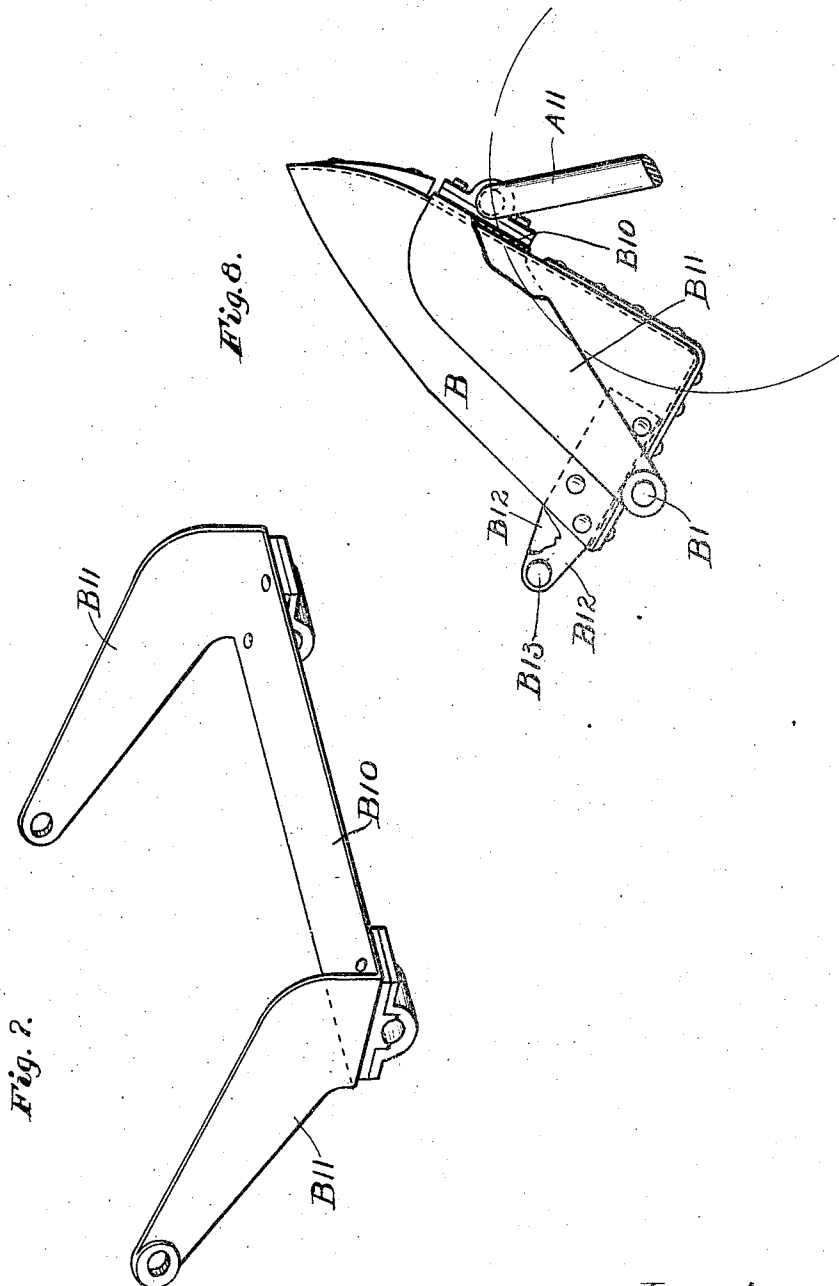
W. WHALEY.
SHOVELING MACHINE.

APPLICATION FILED AUG. 24, 1908. RENEWED SEPT. 7, 1909.

940,998.

Patented Nov. 23, 1909.

4 SHEETS—SHEET 4.



Witnesses,
Carrie R. Ivy
H. M. Parker

Inventor,
William Whaley
By Cyrus K. Eber
Attorney

UNITED STATES PATENT OFFICE.

WILLIAM WHALEY, OF KNOXVILLE, TENNESSEE.

SHOVELING-MACHINE.

940,998.

Specification of Letters Patent.

Patented Nov. 23, 1909.

Application filed August 24, 1908, Serial No. 450,062. Renewed September 7, 1909. Serial No. 516,539.

To all whom it may concern:

Be it known that I, WILLIAM WHALEY, a citizen of the United States, residing at Knoxville, in the county of Knox and State of Tennessee, have invented a new and useful Improvement in Shoveling-Machines, of which the following is a specification, reference being had to the accompanying drawing.

My improvement relates particularly to machines for loading coal and other minerals in approximately horizontal mine workings and in storage places and for shoveling earth, sand, and gravel where excavations are being made, and elsewhere.

The present improvement is a modification of the shovel-actuating mechanism constituting a portion of a machine described in an application for Letters-Patent of the United States, Serial No. 381,624, filed by me July 1, 1907, the machine described by said application comprising (1) a section which is, in effect, a low car having four wheels intended to rest upon light track rails; (2) an approximately horizontal, endless apron conveyer or carrier supported by said car; (3) a jib crane section pivotally mounted upon said car and projecting horizontally forward from the car; (4) an endless apron conveyer or carrier mounted upon said jib section in proper position to discharge upon the first mentioned apron, in whatever position the jib section may stand; (5) a shovel or scoop supported at the outer or free end of said jib section and so controlled as to move forward with its nose upon the floor or ground and take a load, lift the load and move it rearward and discharge it upon the forward conveyer. In the machine of said application, a portion of the shovel is turned or tilted rearward during the bodily rearward movement of the shovel, until said portion is inverted to such extent as to pour its contents upon said forward conveyer, and such turning of said portion of said shovel is effected by means of cog gearing—a segment cog gear rigid with said portion of said shovel and a relatively stationary cog rack in the path of said segment.

The object of the present invention is to dispense with said cog gearing and produce a smoother movement for said portion of the shovel than can be produced by means of said cog gearing.

Inasmuch as the present improvement re-

lates only to the shovel and the parts directly associated therewith, it is deemed unnecessary to illustrate and describe the entire machine.

In the accompanying drawings, Figure 1 is an upright longitudinal section of an apparatus embodying my improvement; Fig. 2 is a plan of the same apparatus, portions being broken away; Fig. 3 is a section on the line 3—3 of Figs. 1 and 2; Fig. 4 is a section on the line 4—4 of Fig. 1; Fig. 5 is a perspective of the framing upon which the shovel is supported; Fig. 6 is a side elevation of one of the cam plates used for controlling the movements of the shovel; Figs. 7 and 8 illustrate a modification.

Referring to said drawings, A¹, A¹ are side rails or arms of a jib frame or any other frame by which the shovel and the shovel-actuating mechanism are supported. At the right hand end of each of said side rails is secured a short standard, A², having a horizontal transverse bearing, A³. Said arms, A¹, are joined to each other by transverse horizontal frame pieces, A⁴, joined to said arms by bolts or rivets, A⁵. To the arms, A¹, thus described is applied a supplemental shovel frame (Fig. 5) comprising two side pieces, A⁷, having between their ends upright ears, A⁸, in which are bearings, A⁹, through which extend bolts, A³, which bolts also extend through the bearings, A³, which have been described as being supported by the standards, A². Said shovel frame side pieces, A⁷, extend downward from said ears and then toward each other beneath the main arms until they meet each other. Said pieces, A⁷, may bear against the lower faces of the side rails, A¹.

On the right hand end of each shovel frame side piece, A⁷, is a horizontal transverse bearing, A¹⁰, in which rest the ends of a crank shaft, A¹¹, to which is applied one end of the shovel, B, as will be hereinafter described. Each end of the crank shaft projects through the adjacent bearing, A¹⁰, and bears a sprocket wheel, A¹², keyed to said shaft. Between said bearings, A¹⁰, and the ears, A⁸, an upright cam plate, A¹³, is secured to each side piece, A⁷. The lower edge of each of said cam plates overlaps the outer face of the adjacent side piece, A⁷, and is secured to the latter by bolts or rivets, A¹⁴. Along the inner face of each of said cam plates is a cam groove, A¹⁵, in which slidably rest the ends of a horizontal transverse

bar, B¹. The ends of said bar are shown surrounded by an anti-friction roller, B². Said bar, B¹, supports the rear end of the shovel, as will be hereinafter described.

5 Said cam plate, A¹³, extends obliquely upward and toward the main portion of the jib—away from the crank shaft, A¹¹. Above about the middle of the length of the groove, A¹⁵, a groove, A¹⁶, begins on the inner face

10 of said plate, and extends thence rearward—away from the crank shaft, A¹¹, and forms a downward curve a little way beyond and then lower than the rear end of the groove, A¹⁵. The forward portion of said groove, A¹⁶, is wide or flaring, and the remainder is

15 approximately the width of the groove, A¹⁵, and forms a curve nearly equaling a quarter of a circle. One point to be observed regarding these grooves is that the rear end of the groove, A¹⁶, is rearward of and below

20 the rear end of the groove, A¹⁵. The function of said groove, A¹⁶, is to receive and change the course of a crank on the bar, B¹, which supports the rear shovel section, B⁷, as will be next described.

A little rearward of the nose of the shovel, B, are bearings, B⁵, in which rests the crank shaft, A¹¹. The shovel is composed of a forward section, B⁶, and a rear section, B⁷.

30 The forward section has at each side a rearward extension, B⁸, terminating in a bearing, B⁹, loosely surrounding the bar, B¹, so that said forward section, B⁶, is journaled to said crank shaft, A¹¹, by means of the bearings, B⁹, and also to said bar, B¹, and must adapt itself to the movements of the crank of said crank shaft and said bar as will be hereinafter described. The rear section, B⁷, of said shovel rests between the rearward

40 extensions, B⁸, of the forward section and is immovably secured to said bar, B¹, and the forward portion of said rear section rests loosely within the rear portion of said forward section, B⁶, so that, by the rotation of

45 the bar, B¹, contra-clockwise, as viewed in Fig. 1, said section, B⁷, may turn or tilt with said bar (on an axis which is horizontal and transverse to the length of the machine), the forward end of said section being lifted

50 out of the section, B⁶.

The movement of the forward portion or nose of the shovel section, B⁶, is controlled by the crank shaft, A¹¹. Said crank shaft is rotated contra-clockwise as viewed in Fig. 1,

55 or in the direction of the arrow shown in said figure. The movement of the rear end of said forward shovel section is controlled by the cam grooves, A¹⁵, the transverse bar, B¹, as above described, sliding in said

60 grooves. Hence it will be observed that the nose of said forward shovel section will travel in a relatively large orbit while its rear end merely reciprocates in a path which is nearly straight and approximately horizontal. In other words, said forward shovel

section is moved nearly like an ordinary pitman attached to an ordinary crank, the movement in the present case being modified by the irregularity of the cam grooves. And said forward section turns or tilts (not so far as the rear section) on the bar, B¹, or on an axis which is horizontal and transverse to the length of the machine.

When during its descent, the nose of the shovel reaches the floor, it is desirable that

75 said nose move forward horizontally or in a plane parallel to the floor until the forward section of the scoop is filled with the material to be loaded. This parallel or horizontal movement of said nose is attained by lowering the rear end of the shovel during the interval of forward movement needed for the filling of said forward section. Such lowering of the rear end of the shovel is attained by lowering or inclining the portion

80 of the cam groove, A¹⁵, which is forward of the bar, B¹, when the nose of the shovel reaches the floor, and continuing such inclination as far as said bar has to travel before said forward section of the shovel begins to lift its load. The load thus taken by the forward section of the shovel is to be transferred from said section into the rear shovel section, and then transferred by the latter to the forward endless apron carrier,

95 C. For making such transfer of said load from the forward shovel section to the rear shovel section, the shovel is tilted, the nose rising higher and higher while the rear portion remains at approximately the same

100 level. The nose of the shovel is to be thus raised sufficiently to cause its load to slide rearward and downward into the rear shovel section. Said position is attained when the crank shaft, A¹¹, is in the position shown by dotted lines in Fig. 1, the bar, B¹, then resting in the lowest portion of the cam grooves, A¹⁵. The load being now in the rear shovel section, the further movement of the crank shaft moves the entire shovel rearward until

110 the cranks, B³, enter the groove, A¹⁶. Said cranks are keyed on the bar or shaft, B¹, at each side of the shovel between the extensions, B⁸, of the forward shovel section and the cam plate, A¹³, and extend forward and upward at an angle of approximately forty-five degrees when the shovel is in its lowest position, as shown in Fig. 1. By the time the crank shaft, A¹¹, has raised the forward portion of the shovel as high as it will go,

120 said cranks are directed rearward and upward, as shown by the dotted lines in the expanded portion of the groove, A¹⁶, of the cam plate, A¹³, in Fig. 1, the wrist, B⁴, on each of said cranks, B³, entering the wide portion of the groove, A¹⁶. Upon the further rearward movement of the bar, B¹, by the further rotation of the crank, A¹¹, said wrists of said crank, B³, are forced rearward and downward in said groove, A¹⁶, whereby

125 130

the rear shovel section revolves partially around the bar, B¹, contra-clockwise as viewed in Fig. 1, until it becomes inverted to such extent as to discharge its load by gravity. But the rapidity of such movement of the rear shovel section may be varied by varying the positions and curves of the grooves, A¹⁵ and A¹⁶, and by varying the length of the cranks, B³. If so desired, such movement may be made sufficiently rapid to cause the throwing of said load forcibly rearward instead of permitting it to slide off said shovel section by gravity. When the crank shaft, A¹¹, has turned rearward to its limit, said forward shovel section and said bar, B¹, cease rearward movement and begin a forward movement, whereby the cranks, B³, reverse their movement and cause a reverse turning movement of the bar, B¹, and such reverse movement of said bar causes the rear shovel section to revolve in the forward direction until said cranks are disengaged from the grooves, A¹⁶. This occurs when the forward shovel section is already well down toward the floor and the rear shovel section has to turn approximately sixty degrees to attain its normal position of rest in the forward section. Through such arc, said rear section falls by gravity. The crank shaft, A¹¹, is driven by two sprocket chains, D⁷, one surrounding each sprocket wheel, A¹², and a sprocket wheel, D⁶, on a horizontal transverse shaft, D⁵, resting in bearings, D²; and power is transmitted to said shaft, D⁵, by means of a bevel gear, D³, which is mounted on a shaft, D¹, and meshes with a bevel gear, D⁴, mounted on the shaft, D⁵.

While the two sections, B⁶ and B⁷, may be regarded as together constituting a shovel, as they have been above described, the forward section, B⁶, may be by itself regarded as the shovel while the rear section, B⁷, is regarded as a receptacle or receiver, the function of which is to take the material from the shovel proper and carry it rearward and discharge it upon the apron carrier, C.

In Figs. 7 and 8, the front and rear shovel sections are merged into a single section, B, of approximately the size of said two sections, and a stirrup-like frame comprising a transverse piece, B¹⁰, secured to the crank, A¹¹, and rearward extensions, B¹¹, corresponding to the rearward extensions, B⁸, of the previous form, constitutes a rest for the forward portion of said shovel, the rear portion of this second form being secured to the bar, B¹, to which the rear section of the preceding form is secured. And in this modified form, the cranks, B³, are omitted from the said bar, B¹, and in their stead plates, B¹², bearing at their upper ends a lateral wrist, B¹³, are secured to each side wall of the shovel. Said wrists take the place of the wrists, B⁴, on the cranks, B³. In Fig. 7,

which is a side elevation, one of the plates, B¹², stands behind the other. But it is to be observed that, theoretically, one of these plates is sufficient for the turning of the shovel; but for strength and durability, two such plates should be used.

I claim as my invention:

1. In a machine of the nature described, a shovel member hinged on a horizontal transverse axis, means for moving said member bodily rearward and forward, and cam mechanism for turning said member upon said axis during such rearward and forward movement.

2. In a machine of the nature described, a shovel member, a cam way on which said member may move bodily rearward and forward, and another cam way of proper form and in proper position to engage said shovel member for rearward and forward turning during its rearward and forward bodily movement.

3. In a machine of the nature described, a shovel comprising a forward section and a rear section, automatic mechanism for moving said shovel forward to take a load and then raising and inclining said shovel rearward, and cam mechanism for tilting said rear section for the discharge of the load.

4. In a machine of the nature described, a shovel comprising a forward section and a rear section, crank mechanism for imparting an orbital movement to the front of the shovel and mechanism for imparting to the rear portion of the shovel an approximately horizontal movement, and cam mechanism for tilting said rear section for the discharge of the load.

5. In a machine of the nature described, a shovel, crank mechanism for imparting an orbital movement to the front of the shovel, a cam for imparting to the rear portion of said shovel an approximately horizontal movement, and a cam for tilting said rear section for the discharge of the load.

6. In a machine of the nature described, a shovel comprising a forward section and a rear section, and automatic mechanism for moving said shovel forward to take a load and then raising and inclining said shovel rearward, and a cam plate having a cam way for imparting to the rear portion of said shovel an approximately horizontal movement and a second cam way for tilting said rear section for the discharge of the load.

7. In a machine of the nature described, a shovel comprising a forward section and a rear section, said rear section being hinged on a horizontal axis and having a member eccentric to said axis and adapted to be engaged by a cam way, a member having a cam way adapted to receive said member on said section, and automatic mechanism for moving said shovel forward to take a load

and then raising and inclining said shovel rearward.

8. In a machine of the nature described, a shovel comprising a forward section and a rear section, said rear section being hinged on a horizontal axis and having a member outside of said axis and adapted to engage a cam way, a member having a cam way adapted to receive said member on said section, and crank mechanism for imparting an orbital movement to the front of the shovel and mechanism for imparting to the rear portion of the shovel an approximately horizontal movement.

15 9. In a machine of the nature described, a

shovel comprising a forward section and a rear section, crank mechanism for imparting an orbital movement to the front of the shovel, a crank applied to the rear section of the shovel, a cam for guiding said crank approximately horizontally and another cam for partially rotating said crank.

In testimony whereof I have signed my name, in presence of two witnesses, this twenty-first day of August, in the year one thousand nine hundred and eight.

WILLIAM WHALEY.

Witnesses:

CYRUS KEHR,

C. A. MORSE.