

No. 766,888.

PATENTED AUG. 9, 1904.

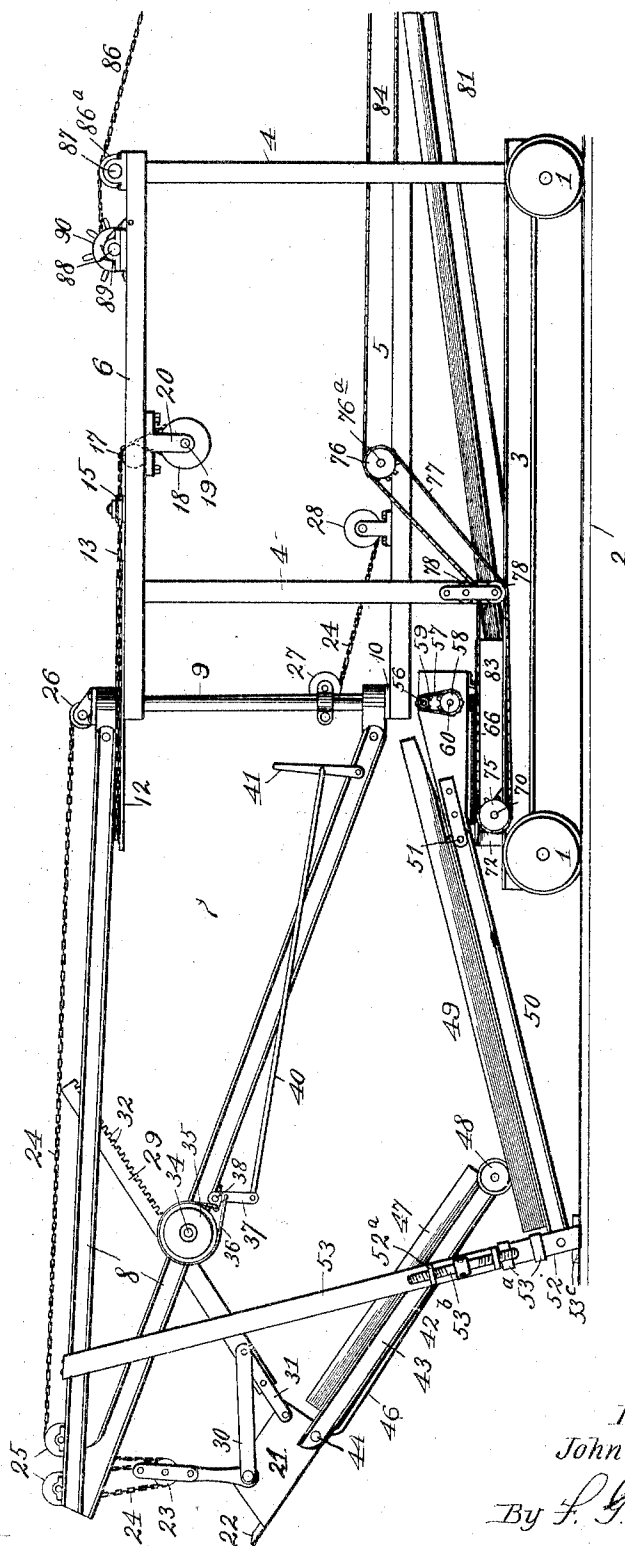
J. H. MILLER.
EXCAVATOR.

APPLICATION FILED NOV. 6, 1903.

NO MODEL.

4 SHEETS—SHEET 1.

Fig. 1.



Witnesses:

A. M. Arthur
P. A. Hickey

Inventor:
John H. Miller

By *F. G. Fischer*
Atty.

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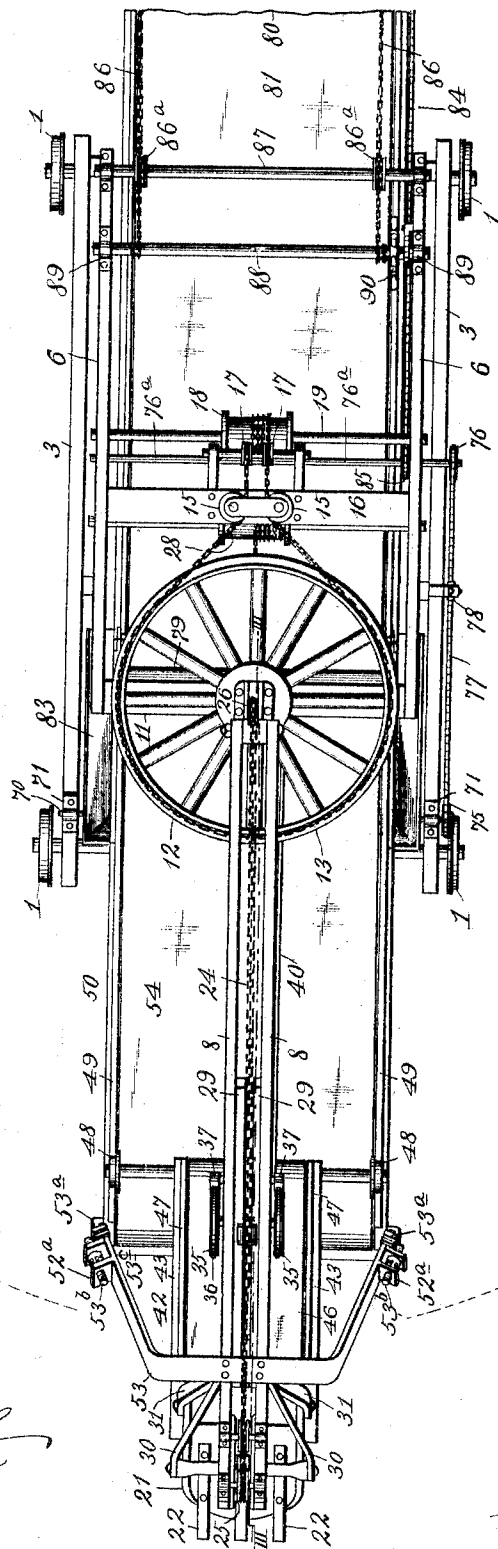
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4 SHEETS—SHEET 2.

Fig. 2.



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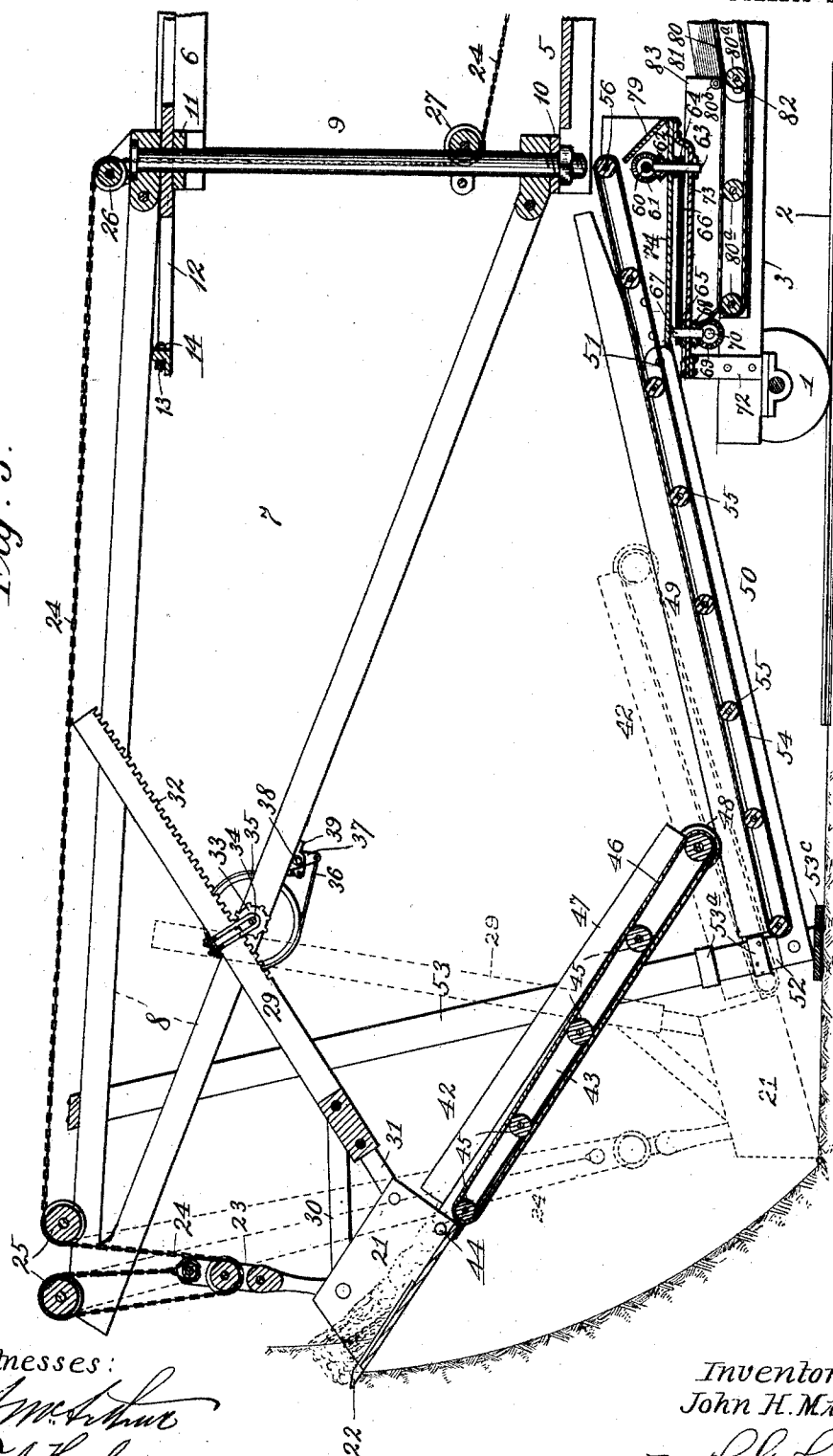
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APPLICATION FILED NOV. 6, 1903.

NO MODEL.

4 SHEETS—SHEET 3.

Fig. 3.



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4 SHEETS—SHEET 4.

Fig. 4.

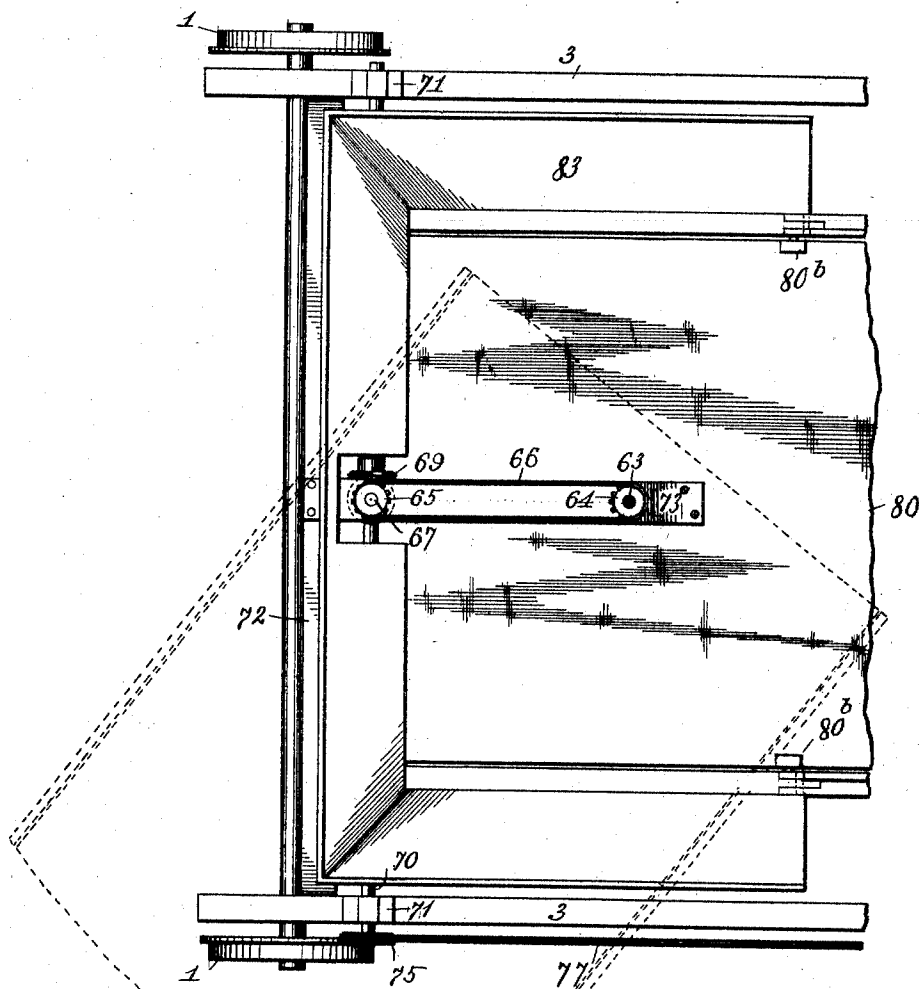
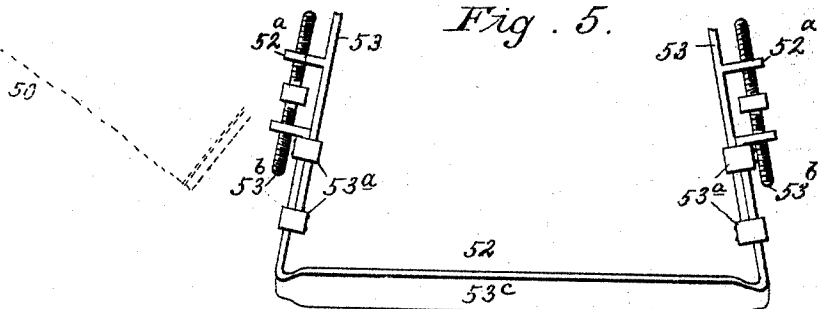


Fig. 5.



Witnesses:

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Inventor:

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UNITED STATES PATENT OFFICE.

JOHN HENRY MILLER, OF KANSAS CITY, MISSOURI.

EXCAVATOR.

SPECIFICATION forming part of Letters Patent No. 766,888, dated August 9, 1904.

Application filed November 6, 1903. Serial No. 180,024. (No model.)

To all whom it may concern:

Be it known that I, JOHN HENRY MILLER, a citizen of the United States, residing at Kansas City, in the county of Jackson and State of Missouri, have invented certain new and useful Improvements in Excavators, of which the following is a specification.

My invention relates to improvements in portable excavators for cutting down embankments, digging canals and ditches, cutting channels through hills, excavating gravel-pits, &c., and it may be mounted upon traction-wheels and rendered self-propelling, or by removing the wheels and axles it can be placed upon and operated from a flat-boat for excavating canals or mounted upon railway-trucks for railroad building.

One important advantage possessed by my machine over other excavators resides in the fact that it delivers the material at its rear instead of at its side. Consequently in going through a hill it is only necessary to make the cut wide enough to admit the passage of the machine, whereas machines having a side delivery must cut an additional width for the admission and turning around of the transport-wagons and their teams. Where only a narrow cut or road is needed, this additional width represents so much loss of time, labor, and expense, which more than equals that of making the narrow cut with my machine.

Other features of the invention reside in the novel construction and arrangement of parts for successfully and economically obtaining the rear delivery, and in order that it may be fully understood reference will now be made to the accompanying drawings, in which—

Figure 1 represents a side elevation of my excavator with the rear portion of the discharge-conveyer broken away. Fig. 2 is a plan view of the same, with the platform broken away. Fig. 3 is an enlarged vertical section of the forward portion of the machine and crane, taken on line III III of Fig. 2. Fig. 4 is a broken plan view of the front portion of the machine-frame, showing a hopper forming part of the invention. Fig. 5 is a broken detail front elevation of a yoke and a U-shape bar adjustably secured to the lower ends of the same.

In the drawings I have represented the excavator mounted upon railway-trucks 1 operating on a track 2.

The frame of my machine consists of sills 3, posts 4, a platform 5 for carrying the engine and boiler or other motive power, and longitudinal beams 6, which connect the upper ends of posts 4.

7 designates a crane comprising a boom 8, swiveled at its rear ends to a tubular mast 9, rigidly secured at its opposite ends in cross-pieces 10 and 11, secured to the forward portion of platform 5 and the forward ends of beam 6, respectively.

12 designates a horizontal wheel journaled upon the upper portion of the mast and rigidly secured to the under side of the upper members of boom 8.

13 designates a chain secured to the periphery of the wheel by a bolt 14 and extends around the wheel, back between a pair of sheaves 15 on cross-bar 16, down over a pair of sheaves 17, and is wound around the opposite sides of a drum 18 in such a way that when said drum is turned in one direction the boom will be swung to the left and when turned in the opposite direction the boom will be swung to the right in the well-known manner. Drum 18 is mounted upon a shaft 19, carried in brackets 20, depending from the under sides of beams 6.

21 designates a shovel open at its front and rear and armed at its forward end with tangs 22 for penetrating and loosening the soil. Said shovel is suspended at its forward end from a block 23, which is adjusted as to height by a hoisting-chain 24, attached at its forward end to the upper terminal of block 23. Said chain extends from the block to a pair of sheaves 25 on the boom-head, thence over a sheave 26 at the rear upper portion of the boom; down through the tubular mast, beneath a sheave 27, clamped to the latter, and is wound around a hoisting-drum 28, located upon platform 5.

When digging, the shovel is held into the soil by a pair of shovel-arms 29, provided at their lower ends with connecting-bars 30 31, pivotally secured at their lower forward ends to the opposite sides of the shovel. The un-

der side of the shovel-arms have rack-teeth 32 for engagement with a pinion 33, mounted upon a shaft 34. Said shaft is also provided with rigidly-mounted friction-wheels 35, embraced by straps 36, secured at their opposite ends to bell-crank levers 37, rigidly mounted on shaft 38, journaled in a bearing 39, secured to the under side of the boom.

One of bell-crank levers 37 is secured by a connecting-bar 40 to an operating-lever 41, pivoted to the rear portion of the boom adjacent to platform 5, so the operation of the shovel-arms may be controlled by the engineer on the platform, and thus dispense with the usual staging carried by the boom for the support of the extra man who usually attends to this operation.

When cutting into the face of an embankment, the soil is discharged from the rear of the shovel as the latter is elevated upon a short conveyer 42, which consists of side bars 43, pivoted at 44 to the rear portion of the shovel and provided with a plurality of transverse rollers 45, which gradually diminish in diameter as they approach the shovel, so the adjacent roller will not form an obstacle to the passage of the material from the shovel onto an endless belt 46, operating around the rollers. The upper edges of bars 43 are provided with fenders 47 to prevent the material from falling off the sides of belt 46, and the rear ends of the bars are provided with rollers 48, operatively mounted upon the upper edges of fenders 49, forming part of a conveyer 50, arranged to receive the material discharged from conveyer 42.

Conveyer 50 is similar in construction to conveyer 42 except that its side bars are hinged at 51, and its front portion is carried by a U-shape bar 52, secured to a yoke 53, depending from the forward portion of the boom.

U-shape bar 52 is adjustably secured to the lower ends of the yoke by loops 53^a and right and left threaded screws 53^b, which latter engage the upper outturned ends of the bar and lugs 52^a on the yoke, so the bar may be let down upon the ground, and thus relieve mast 9 of the weight of the forward portion of boom 8 and its apparatus. The transverse portion 53^c of the bar is made rather wide, so it will not sink into the ground when swung to the right or left with the boom.

Endless belt 54, forming part of conveyer 50, is operated by the rear one of a plurality of rollers 55 and is rigidly mounted upon a shaft 56, driven by a sprocket-wheel 57, driven by another sprocket-wheel 58 through the instrumentality of a connecting endless sprocket-chain 59. Sprocket-wheel 58 is rigidly mounted upon one end of a shaft 60, provided near its central portion with a bevel-gear 61, driven by a small bevel-gear 62, mounted upon a short vertical shaft 63, provided with a rigidly-mounted sprocket-wheel 64, driven by a

sprocket-wheel 65 through the instrumentality of an endless connecting sprocket-chain 66. Sprocket-wheel 65 is rigidly mounted upon the upper end of a short vertical shaft 67, provided at its lower end with a rigidly-mounted bevel-gear 68, which is driven by a small bevel-gear 69, rigidly mounted near the central portion of a transverse shaft 70, journaled in bearings 71 at the upper forward portion of sills 3.

72 designates a transverse yoke secured at its opposite depending ends to the forward portion of sills 3 and provided at its central portion with a rearwardly-extending arm 73, in the opposite end of which vertical shafts 63 67 are journaled, the former shaft being arranged vertically below mast 9 to permit conveyer 50 to swing to the right or left with the boom, the conveyer being pivotally secured to said shaft by a transverse apron 74, secured to the side bars of said conveyer.

Shaft 70 is provided at one end with a rigidly-mounted sprocket-wheel 75, driven by a sprocket-wheel 76 on shaft 76^a through the instrumentality of an endless connecting sprocket-chain 77, which latter is retained in a horizontal position from sprocket-wheel 75 to the adjacent forward post 4 by depression-rollers 78, so its upper strand will not interfere with the swing of conveyer 50. Forward posts 4 are located to the rear of mast 9, so they will not interfere with the swing of conveyer 50, which is adapted to describe almost a semicircle in order to give shovel 21 a wide range in which to operate.

The material is discharged from belt 54 onto a chute 79 at the rear portion of conveyer 50, which delivers it upon an endless belt 80, forming part of conveyer 81, having its side bars hinged at 82, so its rear end may be gradually elevated to clear the increasing pile of material delivered therefrom or to discharge the material into the transport wagons or carts employed in hauling it away. The forward portion of conveyer 81 is arranged vertically below the rear portion of conveyer 50, so it will catch the material discharged therefrom when the latter is turned at an angle, as shown by dotted lines, Fig. 4, and to insure catching all of said material I provide a hopper 83, secured upon the upper forward stationary portion of the side bars of conveyer 81.

Belt 80 is retained in a horizontal position from its forward portion to pivot 82 by rollers 80^a and idlers 80^b, and it is driven by an endless sprocket-chain 84, operating over a sprocket-wheel 85, rigidly mounted upon shaft 76^a, which may be suitably connected to the motive power (not shown) located on platform 5. The adjustment of the rear end of conveyer 81 is controlled by chains 86, extending from the rear thereof over sheaves 86^a on a shaft 87 and wound around a shaft 88, journaled in bearings 89 and provided with an

operating-wheel 90. By thus locating the platform 5 with the motive power, drums, &c., above conveyer 81 and pivotally mounting conveyer 50 upon shaft 63 it is obvious that the material will have an unobstructed path from shovel 21 to the discharge end of conveyer 81 regardless of whether the shovel is operating directly in front of the machine or whether it be swung to the right or left thereof.

In operation the shovel is let down to its lowermost position, as shown by dotted lines, Fig. 3. It is then elevated by hoisting-chain 24 and during the latter operation is held in contact with the face of the embankment by arms 29, which swing as from a pivot on pinion 33, the latter being locked by friction-wheels 35. Should the arms force the shovel too deep into the bank or should the shovel meet with an obstruction too hard to cut through, it is permitted to swing backwardly far enough to clear said obstruction by releasing the friction-wheels, and thus permit arms 29 to move upwardly and backwardly on the pinion. As the material accumulates upon the shovel it is forced back upon conveyer 42 until the shovel and the conveyer attain a sufficient elevation for the material to gravitate to conveyer 50, which being operated by sprocket-wheel 57 elevates and conducts it to conveyer 81, which latter discharges it at the rear end of the machine.

From the above description it is apparent that I have produced a machine which is simple and compact in construction, easily operated, and thoroughly effective for the purpose intended, and while I have shown the preferred form of construction I reserve the right to make such changes as properly fall within the scope of the appended claims.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. An excavator comprising a frame, a crane mounted at one end thereof, a shovel carried by the crane, and one or more traveling conveyers leading from the shovel to the rear of the frame for receiving and conducting the material from said shovel to the rear end of the machine.

2. An excavator comprising a frame, a crane mounted at one end thereof, a shovel operatively carried by the crane, a conveyer arranged to swing with the crane and adapted to receive the material discharged from the shovel, and another conveyer carried by the frame and extending from a point below the rear end of the first conveyer to a point at the rear of the machine.

3. An excavator comprising a frame, a crane mounted at one end thereof, a shovel operatively carried by the crane, a conveyer arranged to swing with the crane and adapted to receive the material discharged from the shovel, a second conveyer arranged to swing with the crane and adapted to receive the ma-

terial discharged from the first-mentioned conveyer, and a third conveyer carried by the frame and extending from a point below the rear of the second conveyer to a point at the rear of the machine.

4. An excavator comprising a frame, a crane mounted at the front end thereof, a shovel open at its opposite ends operatively carried by the crane, a conveyer suitably secured to the rear end of the shovel, a second conveyer arranged to swing with the crane and adjustably carry the rear end of the first conveyer, and a third conveyer carried by the frame and adapted to receive and conduct the material from the second conveyer.

5. An excavator comprising a frame, a crane mounted at one end thereof, a shovel open at its opposite ends operatively carried by the crane, a conveyer pivotally secured at its forward end to the rear end of the shovel, and another conveyer secured to the frame which adjustably carries the rear end of the first conveyer and receives and conducts the material away from said first conveyer.

6. An excavator comprising a frame, a crane mounted at one end thereof, a shovel open at its opposite ends operatively carried by the crane, a conveyer secured at its forward end to the shovel and mounted at its rear end upon rollers, a second conveyer arranged to swing with the crane and provided with trackways for the reception of the rollers on the first conveyer, and a third conveyer carried by the frame and adapted to receive and conduct the material from the second conveyer to the rear of the machine.

7. An excavator comprising a frame, a crane mounted at one end thereof, a shovel open at its opposite ends operatively carried by the crane, a conveyer secured at its forward end to the shovel, a second conveyer carrying the rear end of the first conveyer and arranged to swing with the crane, and a third conveyer carried by the frame having a stationary portion arranged beneath the rear end of the second conveyer and a pivoted portion for conducting the material to the rear of the machine.

8. An excavator comprising a frame, a crane mounted at one end thereof, a shovel open at its opposite ends operatively carried by the crane, a conveyer secured at its forward end to the shovel, a second conveyer carrying the rear end of the first conveyer and arranged to swing with the crane, a third conveyer carried by the frame having a stationary portion arranged beneath the rear end of the second conveyer and a pivoted portion for conducting the material to the rear of the machine, and a hopper surrounding three sides of the stationary portion.

9. An excavator consisting of a frame, a crane mounted upon one end of said frame, a shovel open at its opposite ends operatively carried by the crane, a conveyer secured at its

forward end to the shovel, a second conveyer arranged to swing with the crane and having two pivoted members, the forward one of which adjustably carries the rear end of the first conveyer, adjustable arms depending from the crane which adjustably support the forward member of the second conveyer, and a third conveyer carried by the frame and adapted to receive and conduct the material from the second conveyer to the rear of the machine.

10. In an excavator, a suitably - mounted frame, a crane mounted thereon, a shovel carried by the crane, a yoke depending from said crane, and a U-shape bar adjustably secured to the lower terminals of the yoke.

11. In an excavator, a frame, a crane pivotally mounted upon the forward portion of the frame, a shovel carried by the crane, a yoke depending from the forward portion of the crane and provided with lugs near its lower terminals, a U-shape bar provided with outturned upper ends, and screws adjustably engaging said ends and the lugs on the yoke.

12. In an excavator, a frame, a crane mounted thereon, a shovel carried by the crane, a yoke depending from the crane and provided with lugs near its lower terminals, a U-shape bar provided with a wide transverse lower portion and outturned upper terminals, loops engaging the overlapping ends of the bar and yoke, and screws adjustably engaging the outturned ends of the bar and the lugs on the yoke.

13. An excavator consisting of a frame, a crane mounted upon the frame, a transverse shaft journaled in the crane, a pinion rigidly mounted upon said shaft, friction-wheels also

rigidly mounted upon the shaft, straps embracing said friction-wheels, bell-crank levers fulcrumed on the crane and connected together and to the opposite ends of the straps, a hand-lever fulcrumed on the lower rear portion of the crane, a connecting-rod secured at its opposite ends to said lever and one of the bell-crank levers, a shovel operatively suspended from the forward end of the crane, and shovel-arms suitably secured to said shovel and provided with rack-teeth for engagement with the pinion.

14. An excavator comprising a frame, a crane mounted at one end thereof, a shovel operatively carried by the crane, a conveyer leading backwardly from the shovel and adapted to swing therewith, a second conveyer arranged to swing with the crane and leading backwardly from the first-mentioned conveyer, and a third conveyer carried by the frame and leading from the second conveyer to the rear end of the machine.

15. An excavator consisting of a frame, a crane mounted near one end thereof, a shovel operatively carried by the crane, and a support depending from the crane in order to carry part of the weight of the latter.

16. An excavator consisting of a frame, a crane mounted near one end thereof, a shovel carried by the crane, and an adjustable support depending from the crane in order to carry part of the weight of the latter.

In testimony whereof I affix my signature in the presence of two witnesses.

JOHN HENRY MILLER.

Witnesses:

M. A. WOGAN,
W. W. WILSON.