H. F. SINK.

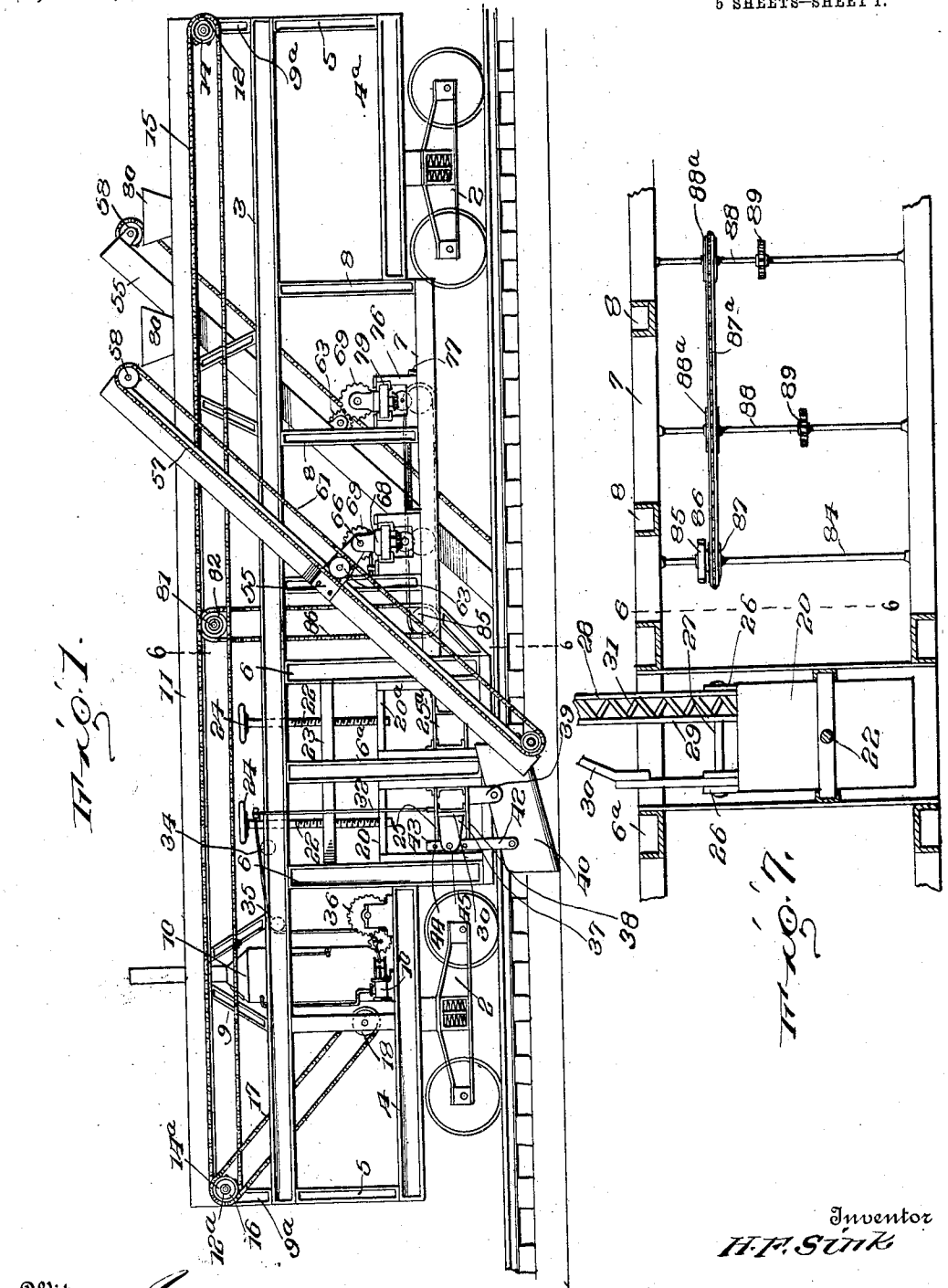
RAILWAY DITCHING MACHINE.

APPLICATION FILED MAR. 9, 1912.

1,081,632.

Patented Dec. 16, 1913.

5 SHEETS—SHEET 1.



Witnesses

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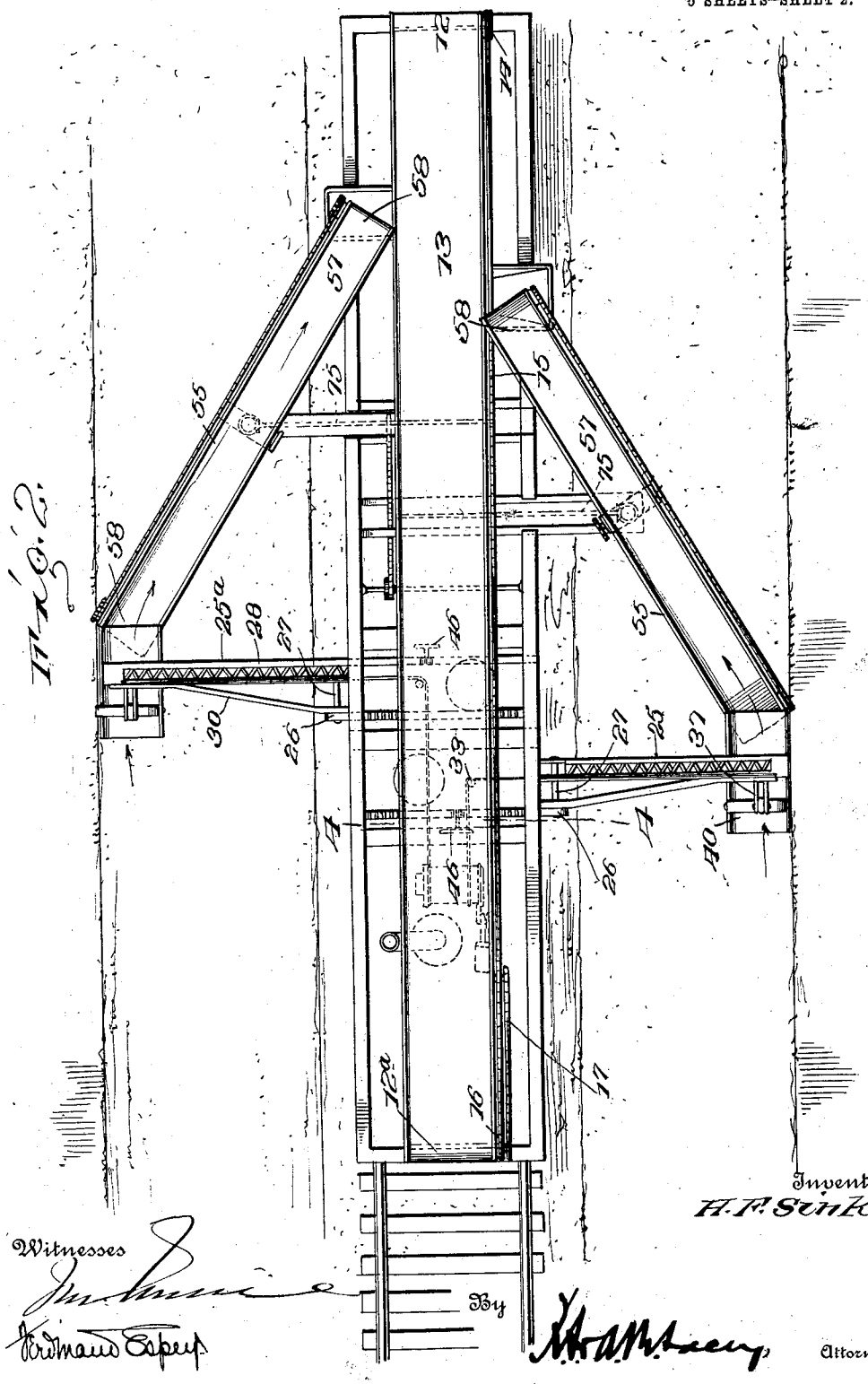

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5 SHEETS—SHEET 3.

Fig. 3.

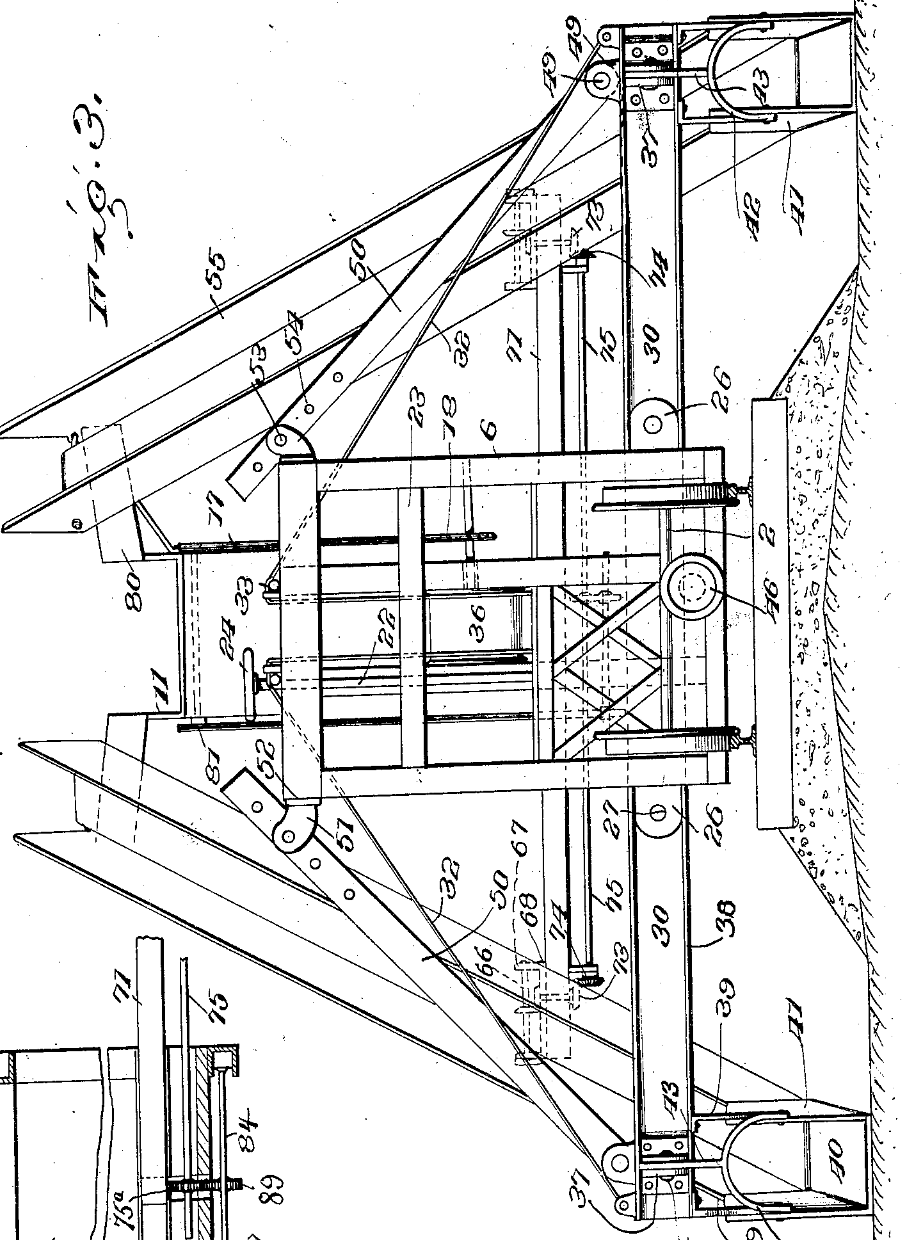
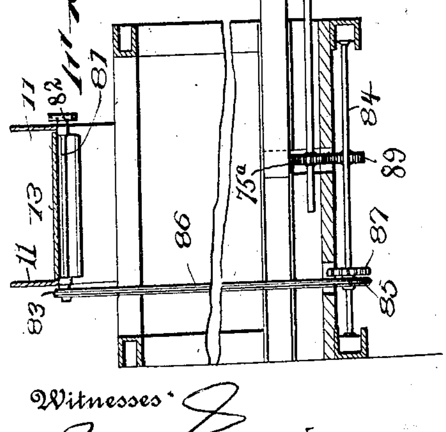


Fig. 6.



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5 SHEETS—SHEET 4.

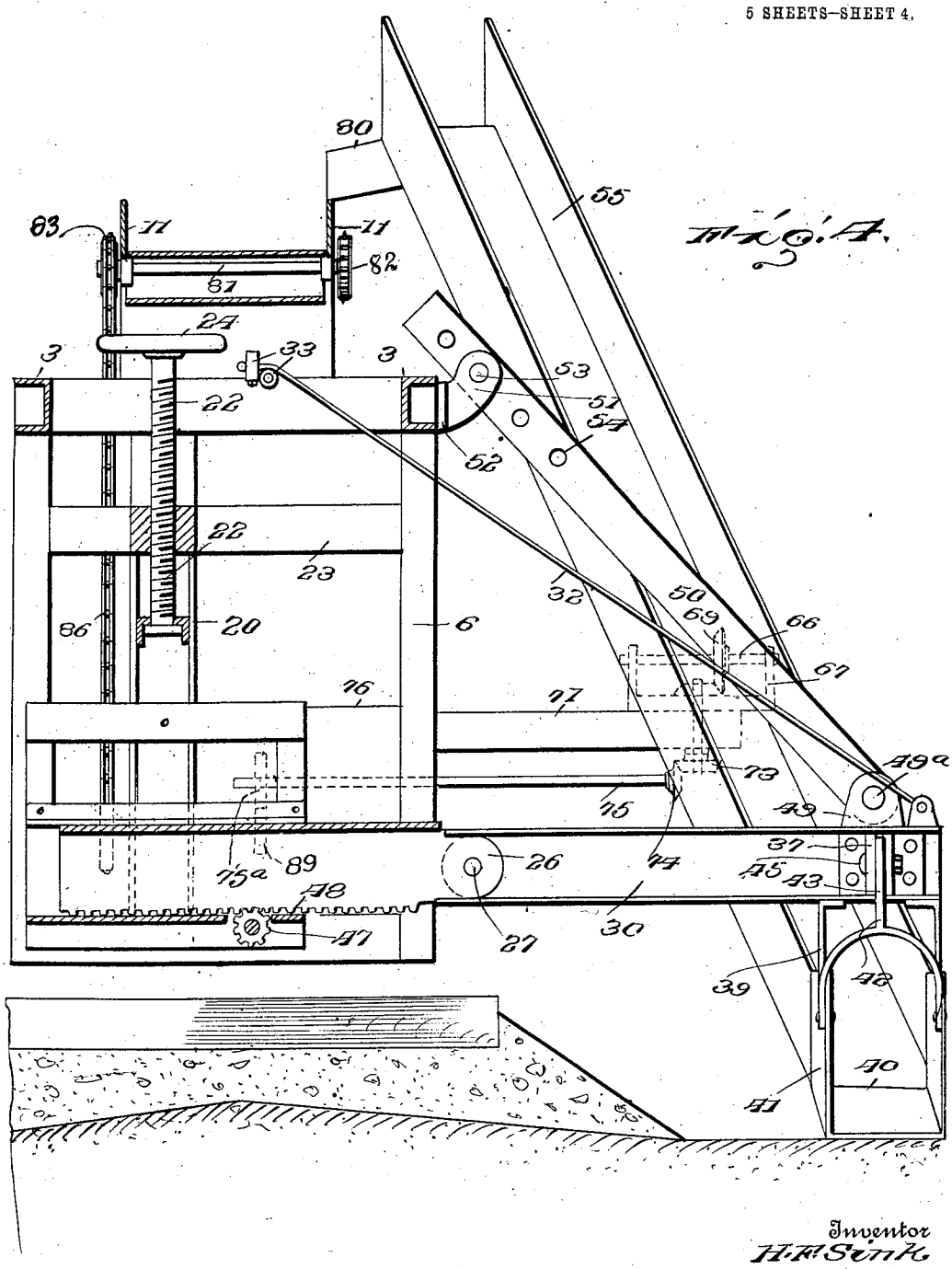

Fig. 4.

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5 SHEETS—SHEET 5.

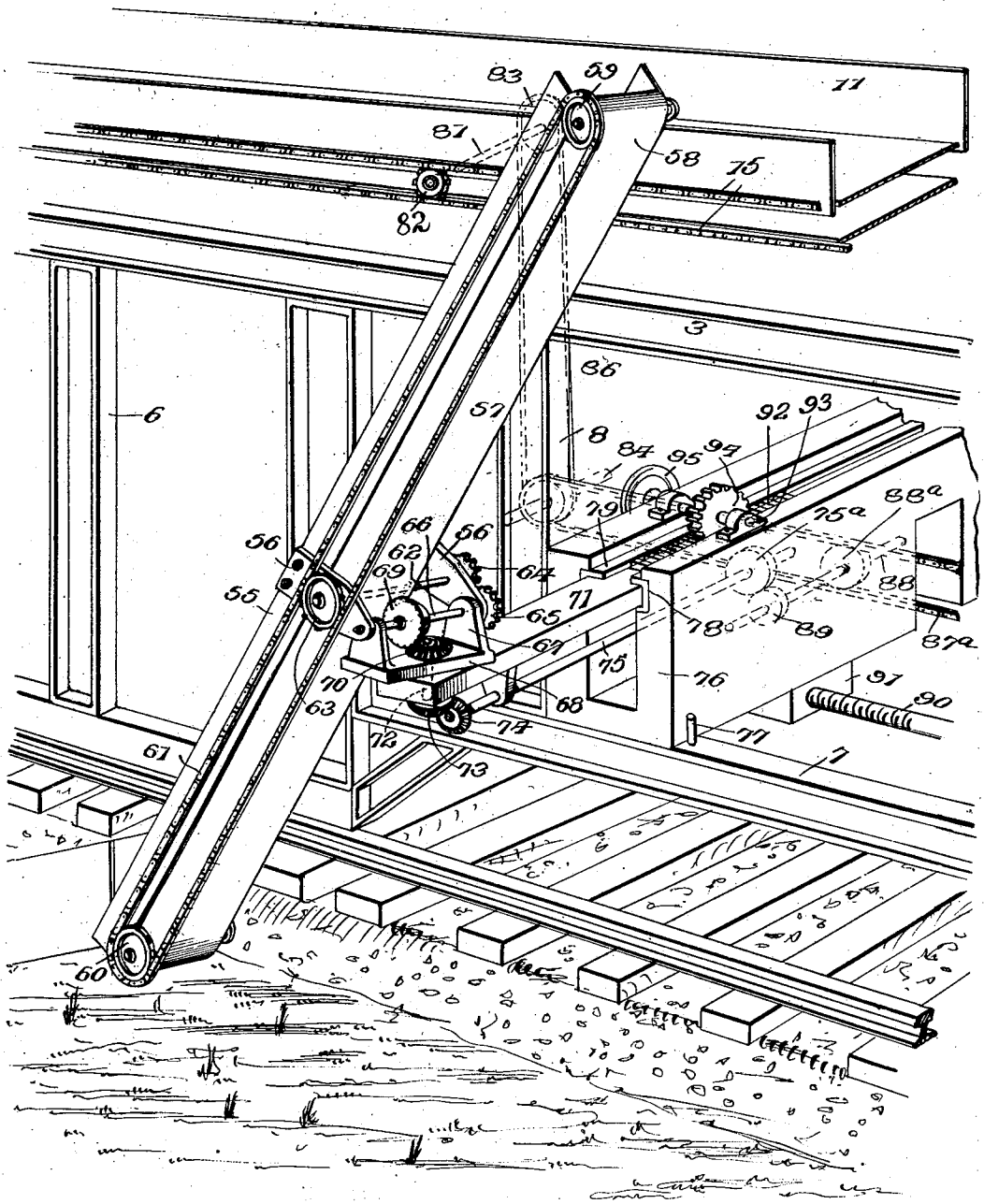

Fig. 5.

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UNITED STATES PATENT OFFICE.

HENRY F. SINK, OF GREENSBORO, NORTH CAROLINA.

RAILWAY DITCHING-MACHINE.

1,081,632. Specification of Letters Patent. Patented Dec. 16, 1913.

Application filed March 9, 1912. Serial No. 682,631.

To all whom it may concern:

Be it known that I, HENRY F. SINK, a citizen of the United States, residing at Greensboro, in the county of Guilford and State of North Carolina, have invented certain new and useful Improvements in Railway Ditching-Machines, of which the following is a specification.

My invention relates to excavating machines, and particularly to machines for excavating trenches, ditches or other cuts beside a railway track.

The primary object of my invention is the provision of a machine of this character which shall be thoroughly efficient for the work to be done, which shall be simple in operation and construction, and in which the excavating shovel shall be positively supported in all of its positions and yet readily adjustable to secure any desired depth of cut.

A further object is to provide improved means for adjustably supporting the excavating shovel and adjustably supporting the elevating conveyer coacting therewith.

A further object is to provide an excavator of this type with a longitudinally extending conveyer for the excavated material, which conveyer shall be capable of running in opposite directions in order that the excavated material may be discharged at either end of the superstructure upon which the conveyer is mounted.

A further object is to provide a machine in which the excavating shovel or scoop is movable inward or outward toward or from the wheel structure on which it is mounted, also movable vertically, and also rotatable in a vertical plane to change the inclination of the shovel.

A further object in this connection is to provide an excavator with shovel supporting members movable bodily outward to project the shovel to any desired extent, or movable upward to a position against the side of the wheel supporting structure.

Other objects will be stated in the following specification.

An embodiment of my invention is illustrated in the accompanying drawings wherein:

Figure 1 is a side elevation of an excavating machine constructed in accordance with my invention. Fig. 2 is a plan view of the machine shown in Fig. 1. Fig. 3 is a front elevation on an enlarged scale of the machine shown in Figs. 1 and 2. Fig. 4 is a fragmentary sectional elevation enlarged of one-half of the excavating machine. Fig. 5 is a perspective detail view of the frame of the machine, the conveyer for carrying excavated material from the shovel to the main conveyer, and the mechanism whereby the secondary conveyer is supported and actuated. Fig. 6 is a fragmentary vertical section on the line 6—6 of Fig. 7 showing the means for driving the auxiliary elevator operating shaft. Fig. 7 is a sectional plan view of a portion of the superstructure showing the means for slidingly supporting the extremity of the shovel supporting beam, and the means for driving the conveyer actuating shafts of the auxiliary conveyers.

Corresponding and like parts are referred to in the following description and indicated in all the views of the accompanying drawings by the same reference characters.

My improved excavating mechanism is supported upon a wheeled superstructure comprising a supporting frame mounted upon trucks 2 and including oppositely disposed, longitudinal beams 3 extending the entire length of the supporting structure, truck supported beams 4 and 4ª at each end of the structure, vertical framing members 5, oppositely disposed, intermediate vertical members 6 extending nearly to the roadbed, longitudinal members 7, vertical supporting beams 8, and diagonal bracing members 9. It will be understood that this structure may be changed in a large variety of ways and yet completely fulfil its function of supporting the excavating apparatus.

Upon the beams 4 at one end of the superstructure is supported a platform, and preferably the engine 10 or other motor for operating the various instrumentalities hereafter referred to, is mounted upon this platform. The engine 10 may be used as a motive power for the excavating machine itself as well as the motive power for the excavating mechanism, or the engine 10 may simply be used for the purpose of hoisting or lowering the shovel beams as hereafter described.

Supported upon the braces 9 and 9ª is a conveyer casing or frame designated 11, and supported on oppositely disposed rollers 12 and 12ª in this casing or frame is an endless conveyer belt 13 which may be slatted or not as may be desired. The rollers 12 and 12ª are driven by means of sprocket wheels 14,

14ª mounted upon the shafts of the rollers 12 and 12ª. Connecting these sprocket wheels 14, 14ª is an endless sprocket chain designated 15. The shaft of the roller 12ª is also provided with a sprocket wheel 16 which is connected by means of a sprocket chain 17 with a sprocket wheel 18 driven from the engine 10 in any suitable manner. It will be understood that I may use either one or a plurality of sprocket chains 17 for driving the endless conveyer, and that I do not wish to limit myself to any specific means for transmitting the movement of the engine to the endless conveyer, nor to any specific form of endless conveyer as various forms might be used as the necessities of any particular case may dictate.

As will be seen from Figs. 1 and 2, the beams 6 support vertically extending guides. Between the forward vertical beams 6 and the middle vertical beam 6ª there is disposed a vertically sliding frame designated 20, and between the rear vertical beams 6 and the intermediate vertical beam 6ª is disposed a frame 20ª which is precisely the same as the frame 20 heretofore described. These frames 20 and 20ª are disposed respectively near one side or the other of the car. The frames 20 and 20ª are approximately rectangular in form and are raised or lowered by means of screw rods 22 which pass down through beams 23 and have screw threaded engagement therewith and carry at their upper ends the hand wheels 24, the lower ends of these screw rods being swiveled in the top beams of the frames 20. By rotating the screw rods in one direction, the frames are raised, and by rotating them in the other direction, the frames are lowered. There is one of these frames 20 or 20ª for each of the shovel supporting beams.

Transversely movable with relation to the frames 20 and 20ª are the oppositely disposed slide beams 25 and 25ª which are suitably spaced from each other, and at their outer ends have projecting ears 26 perforated for the passage of a transverse pivot pin 27. Mounted upon the pivot pin 27 so as to have a pivotal movement in a vertical plane, is the shovel or scoop supporting beam. This beam is a compound beam and composed as illustrated of three separate beams 28, 29 and 30. The beams 28 and 29 are spaced from each other and held in proper rigid relation by means of diagonal bracing struts designated 31. The beam 30 is not as long as the beam 29 but is riveted or bolted thereto and is then outwardly deflected and then extended inward parallel to the inner ends of the beams 28 and 29 as illustrated in Fig. 2. The bolt 27 passes through the three separate elements 28, 29 and 30. Thus the shovel supporting compound beam is thoroughly braced and rendered entirely rigid, the beam 30 forming a brace resisting any rearward movement of the compound beam.

For the purpose of raising and lowering the free end of the shovel supporting beams, I provide the cables 32 which are each attached to the extremities of the shovel supporting beams and pass upward and over sheaves 33 supported in any suitable manner upon the superstructure. These cables 32 pass over sheaves 34 and 35 and then extend downward to a drum 36 which is driven from the engine 10 or other motor.

Attached to the outer end of each of the beams 29 are the spaced ears 37, and attached to the bottom plate 38 of the scoop or shovel supporting beam are the depending ears 39 which are spaced from each other a distance equal to the distance between the sides of the shovel or scoop 40. The scoop 40 is provided with the upwardly extending sides 41 which are pivotally connected to the depending ears 39.

Pivotally attached to the forward end of the sides of the shovel or scoop is the yoke 42 which is provided with the upwardly extending shank 43 which is shiftable between the ears 37. This shank 43 is formed with a plurality of perforations 44 through which a pin 45 passes whereby the shank may be adjusted with relation to the ears 37 and thus permit the forward or cutting edge of the shovel to be raised or lowered and thus regulate the inclination of the cut. It will be seen that the rear end of the shovel projects rearwardly some distance beyond the shovel supporting beam and that the shovel is upwardly and rearwardly inclined so that the rear end of it is spaced from the ground.

As before stated, there are two shovels, one located on each side of the machine, two shovel supporting beams projecting outward from the side of the machine, and two vertically adjustable frames in which the rear ends of the shovel beams are supported, and two transversely adjustable members directly supporting the inner ends of the shovel supporting beams. It will likewise be seen that the beams may be turned up to a vertical position against the sides of the car when the shovel is out of operation, or when the car is traveling, and that they may move up into this vertical position by means of the cables 32 actuated from the drum 36. These cables permit the free ends of the shovel supporting beams to be lowered to any desired position. The shovel supporting beams may be adjusted outwardly or shifted inwardly by operating the hand wheels 46, one for each of the shovel supporting beams, each of which hand wheels carries upon its shaft pinions 47 which mesh with racks 48 formed upon the lower faces of the beams 25 and 25ª. It will also be seen that by operating the screw rods 22, the

shovel may be lifted bodily or lowered bodily so as to secure any desired depth of cut below the level of the track, or to operate on levels below the level of the track.

As a means for holding the shovel by beams rigidly in their adjusted positions, I provide braces which extend upward, one from the outer end of each of the shovel supporting beams, and which are adjustably connected at their upper ends to a portion of the superstructure. Thus in Fig. 4, the shovel supporting beams are shown as provided with the upwardly projecting ears 49 through which passes a pin 49ª, the pin also passing through the upwardly and inwardly extending brace rod 50. This rod passes through ears 51 formed upon a bracket 52 bolted or otherwise attached to the superstructure. A pin 53 passes through these ears. The upper end of the rod 50 is formed with a plurality of perforations 54 through any one of which the pin may pass. This brace 50 holds the shovel down and prevents the shovel and the shovel supporting beam from rising when a cut is made. This brace 50 acts to make the shovel support particularly rigid—a most necessary feature where the shovel or scoop is submitted to great strain as in an excavator of this type.

Extending upwardly and inwardly from each of the shovels is an elevator whereby the material excavated by the shovels will be carried upward and deposited upon the conveyer 13. As illustrated in Figs. 1, 3 and 5, this elevator is pivotally supported at its middle so that the lower end of the elevator may be shifted into proper position behind and below the upper end of the corresponding shovel or scoop without regard to the position of the shovel or scoop, and also so that the elevator may be turned into a vertical or a horizontal position and drawn in against the side of the car when the car is traveling. As illustrated, the elevator comprises a trough 55 provided at its middle with the rearwardly projecting supporting ears 56. Over this trough passes a flexible belt conveyer 57 which at the upper and lower ends of the trough passes over rollers 58. The shafts of these rollers carry upon them the sprocket wheels 59 and 60, these wheels being connected by an endless sprocket chain 61. Mounted in the ears 56 is a transverse shaft 62 carrying at one end the sprocket wheel 63 which meshes with the sprocket chain 61. The other end of this shaft 62 carries upon it a pinion 64 which meshes with the gear wheel 65 mounted upon a shaft 66 supported in upwardly extending bearings 67 mounted upon a rotatable table 68. It will be noted particularly from Fig. 5 that the shaft 66 passes through the lower ends of the ears 56 and hence constitutes a pivot upon which the elevator may be turned in a vertical plane.

Mounted upon the shaft 66 is a bevel gear wheel 69 which meshes with a horizontally disposed bevel gear wheel 70 mounted upon a shaft which passes transversely through the base or platform 68 and downwardly through a supporting beam 71. On the under face of this beam 71 and mounted upon the shaft 72 which passes through the gear wheel 70 is a bevel gear wheel 73 which meshes with a bevel gear wheel 74 mounted upon a shaft 75 which extends transversely of the machine and which is connected with the driving mechanism as will be hereafter stated. The beam 71 is supported in a guide frame 76 which rests solidly upon the beams 7 and which is longitudinally slidable with relation to the superstructure. In its operative position when the trough or conveyer is to be used in connection with the shaft, the frame 76 is shifted to its most forward position against the vertical beams 8 and is held in this position by pins 77 or other detents inserted through the beams 7. Preferably the upper ends of the side walls of the frame 76 are longitudinally grooved as at 78 and within these guiding grooves or tracks are disposed the bushings 79. These embrace the rectangular beams 71 and snugly fit the same but permit the beams 71 to be shifted in or out as may be necessary.

It will be seen that the conveyer or elevator is mounted upon the shaft 66 as upon a horizontally disposed pivot so that the conveyer may be rotated in any desired vertical plane, and that by reason of the fact that the base 68 is pivotally mounted upon the extremity of the beam 71, the elevator may be rotated in any desired horizontal plane. Further that the beam 71 is longitudinally shiftable and hence that the elevator may be shifted out or in nearer to or farther from the side of the supporting structure. Again, it will be seen from Fig. 5 that the elevator and its supporting structure as a whole are longitudinally shiftable with relation to the car platform. By this adjustment, it is possible to cause the lower end of the elevator to be disposed at all times beneath the rear end of the corresponding scoop or shovel so that it will receive the excavated material from the scoop or shovel and carry it upward and deposit it upon the conveyer belt 13. In order to provide for the deposition of the excavated material upon the conveyer belt 13, I have provided as shown in Fig. 3 the laterally projecting hoppers 80 which are supported in any suitable manner from the trough 11 and which extend beneath the upper ends of the conveyers 57

For the purpose of actuating the auxiliary elevators through the medium of the shaft 75, I operatively connect the shaft 75 with the main conveyer chains 15 so that said

shaft 75 shall be driven from the main conveyer chains, which in turn are driven from the engines by means of the sprocket chains as previously described.

Extending transversely across the superstructure and mounted thereon in any suitable manner is a shaft 81 which carries upon it a sprocket wheel 82 over which the upper and lower flights of the chain 15 passes. Also mounted upon the shaft 81 which carries the sprocket wheel 82 is a sprocket wheel 83, and supported in the lower portion of the superstructure and in any suitable bearings upon the beam 7 is a counter-shaft 84 which carries upon it a sprocket wheel 85 connected to the sprocket wheel 83 by means of a sprocket chain 86 whereby power is transmitted from the shaft 81 to the shaft 84. This shaft 84 also carries upon it a sprocket wheel 87. Over this sprocket wheel 87 passes a sprocket chain 87^a which extends longitudinally of the machine and engages with the sprocket wheels 88^a mounted upon the counter-shafts 88, these counter-shafts being disposed immediately below the shafts 75 of the two elevators. Each of the counter-shafts 88 is provided with a spur gear 89 which meshes with a spur gear 75^a on the shaft 75. The shaft 75 is splined or feathered to the spur gear 75^a so that it may longitudinally shift relative to the gear 75^a, the gear wheel being supported in suitable bearings so that it can not have any movement transverse to the superstructure. In order to drive the shaft 75 for the other auxiliary elevator on the other side of the machine, the sprocket chain 87^a passes over the sprocket wheel 88^a corresponding to this elevator, which in turn is mounted upon a shaft 88 having a spur gear 89 meshing with the spur gear 75^a on the corresponding shaft 75. The connections of both of the auxiliary elevators are precisely the same and hence a description of one applies to the other.

When the machine is not in use as an excavator but is either lying idle or is traveling along the railroad, the beams 25 are of course drawn inward to their fullest extent, and the beam which carries the shovel or scoop is raised to a vertical position. The beams 71 which carry the auxiliary elevators are also drawn in to their fullest extent and the elevators extended upward against the side of the superstructure, thus permitting the excavator to pass through tunnels and beneath the superstructure of bridges.

When it is desired to use the excavator, the beams 30 carrying the shovels or scoops on either one or both sides of the machine are shifted outward to any required extent, the beams 30 being lowered to a proper position by means of the drum 36 and the cable 32. When the beam is in the proper position to provide the proper depth of cut, the braces 50 are adjusted in the ears 51 so as to hold the free end of the shovel beam and prevent its rising. It will be understood of course that the inner end of the shovel beam may be raised and lowered to any required extent by means of the screw 22 and that the shovel beam may be projected or retracted to any desired extent by means of the pinion 47 and hand wheel 46. The shovel may be adjusted to a greater or less inclination by means of the link 42 as heretofore described so as to vary the angle of cut. After the shovel beam and shovel have been adjusted, the auxiliary elevators are shifted outward to proper position and rotated until the lower portion of the elevator is immediately beneath the rear end of the shovel, the upper portion discharging into the chute or hopper 80. The machine is now ready for work and in order to be used it is only necessary to drive the car forward, whereupon the shovels will scoop up the earth on each side of the track. This earth will be carried up by the auxiliary elevators and discharged into the main conveyer. This main conveyer it will be obvious may be shifted in either direction by means of suitable clutches connected to the driving shaft of the sprocket wheel 18, and by this means the earth carried up by the auxiliary elevators may be discharged either at the front or rear end of the excavator.

It will be noted that the shovel beams are braced against the strain of cutting, and that the compound beam which supports the shovel is of particularly strong and rigid construction and, furthermore, that the shovel beam is braced from any upward movement by means of the brace 50.

The frame 76 upon which the elevator is supported may be shifted laterally in any suitable manner but as illustrated is shifted laterally by means of a screw 90 operated by a hand wheel, this screw engaging a screw threaded member 91 projecting below the frame 76.

For the purpose of shifting the beams 71 outward or inward, I may provide the upper portion of each beam with the rack teeth 92 and mount upon the upper face of each of the casings 76 a shaft 93 carrying a spur gear 94 which meshes with the rack 92, this shaft being operated by means of a hand wheel 95 or in any other suitable manner.

What I claim is:

1. An excavator of the character described including a wheeled frame, oppositely disposed, laterally projecting shovel supporting members pivotally mounted at their inner ends, said members being laterally slidable on the wheeled frame, and means for laterally sliding said members to adjust the same.

2. An excavator of the character described, including a wheeled structure, a ver-

tically slidable member mounted on the wheeled structure, a shovel supporting beam, members transversely slidable in the vertically slidable member and pivotally connected to said beam, and means for supporting the free end of the shovel supporting beam.

3. An excavator of the character described, including a wheeled structure, vertical guides mounted upon the structure, a vertically shiftable frame movable in said guides, a screw for raising said frame, laterally extending racks mounted in said frame and slidable laterally, gearing whereby said racks may be operated through the frame, a shovel supporting beam pivotally connected to said racks, and means connected to said structure and to the extremity of the shovel supporting beam whereby the free end of the beam may be supported at any desired elevation.

4. An excavator of the character described, including a wheeled structure, vertically and horizontally adjustable shovel supporting beams mounted on the wheeled structure and projecting laterally therefrom, a main conveyer mounted in the upper portion of the structure and extending horizontally therealong, and laterally adjustable auxiliary conveyers supported on each side of the structure and coacting with the shovels and with the main conveyer.

5. An excavator of the character described, including a wheeled structure, oppositely disposed, laterally projecting shovel supporting members mounted on the structure, means for raising and lowering said members, shovels supported on and depending from the outer ends of said members, a main conveyer mounted on the structure, and auxiliary conveyers coacting with the shovels and the main conveyer to carry the excavated material from the shovels to the main conveyer, said auxiliary conveyers being shiftable transversely and rotatable in vertical planes.

6. An excavator of the character described, including wheeled trucks, a superstructure mounted upon the trucks, rolls supported in the upper portion of the superstructure, an endless belt horizontally disposed and mounted upon said rolls extending longitudinally of the superstructure, laterally projecting shovel supporting beams carried by the structure, means for raising and lowering said beams, means for shifting the beams laterally, shovels pivotally mounted upon the ends of said beams, auxiliary conveyers disposed rearward of the shovel supporting beams and pivotally mounted for movement in horizontal and vertical planes and adapted to carry material excavated from said shovels upward and into the main conveyer, and mechanism for operating the main conveyer and the auxiliary conveyers.

7. In an excavator of the character described, a wheeled structure, a laterally projecting shovel supporting member having forwardly projecting ears, a yoke supported upon the under face of said supporting member and engaging the shovel, and a link adjustably connecting the forward end of the shovel with the shovel supporting member.

8. In an excavator of the character described, a wheeled structure, an excavating shovel supported therefrom and projecting laterally, an elevator frame, an endless belt carried on the frame, said elevator frame extending upward from beneath the rear end of the shovel, a laterally slidable supporting member mounted on the frame, a yoke rotatably mounted on the member for movement in a horizontal plane, a shaft forming a pivotal support for the elevator frame, a conveyer actuating shaft mounted on the frame and having gear wheels meshing with the gear wheels on the first named shaft, a bevel gear for operating said first named shaft, a driving shaft supporting on said laterally shiftable member and meshing with said gear wheels, and means on the structure for driving said shaft.

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

HENRY F. SINK. [L. S.]

Witnesses:
A. J. SYKES,
R. E. DALTON, Jr.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."