

No. 635,047.

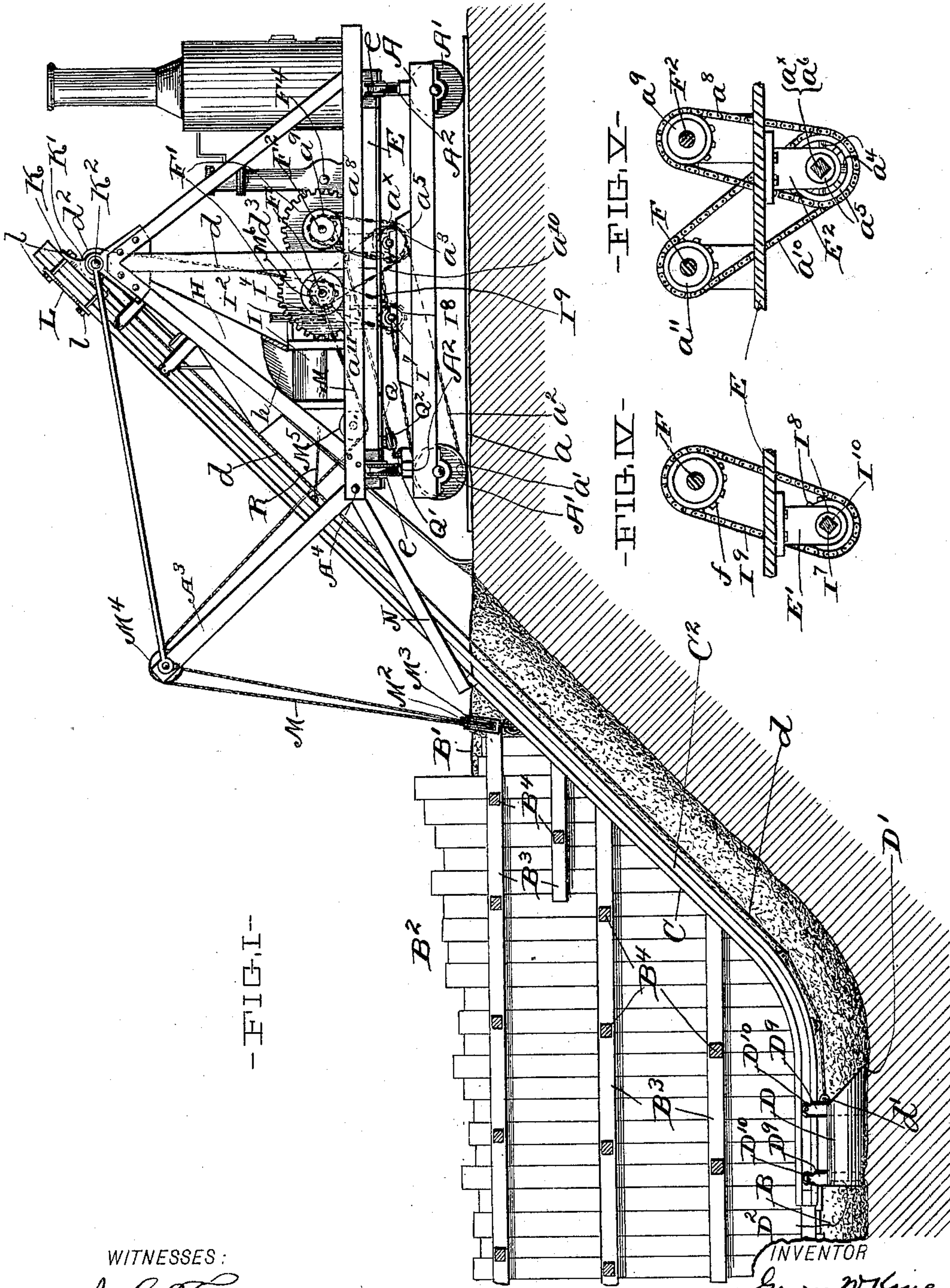
Patented Oct. 17, 1899.

G. W. KING.
EXCAVATOR.

(Application filed Aug. 23, 1897.)

(No Model.)

3 Sheets—Sheet 1.



WITNESSES:

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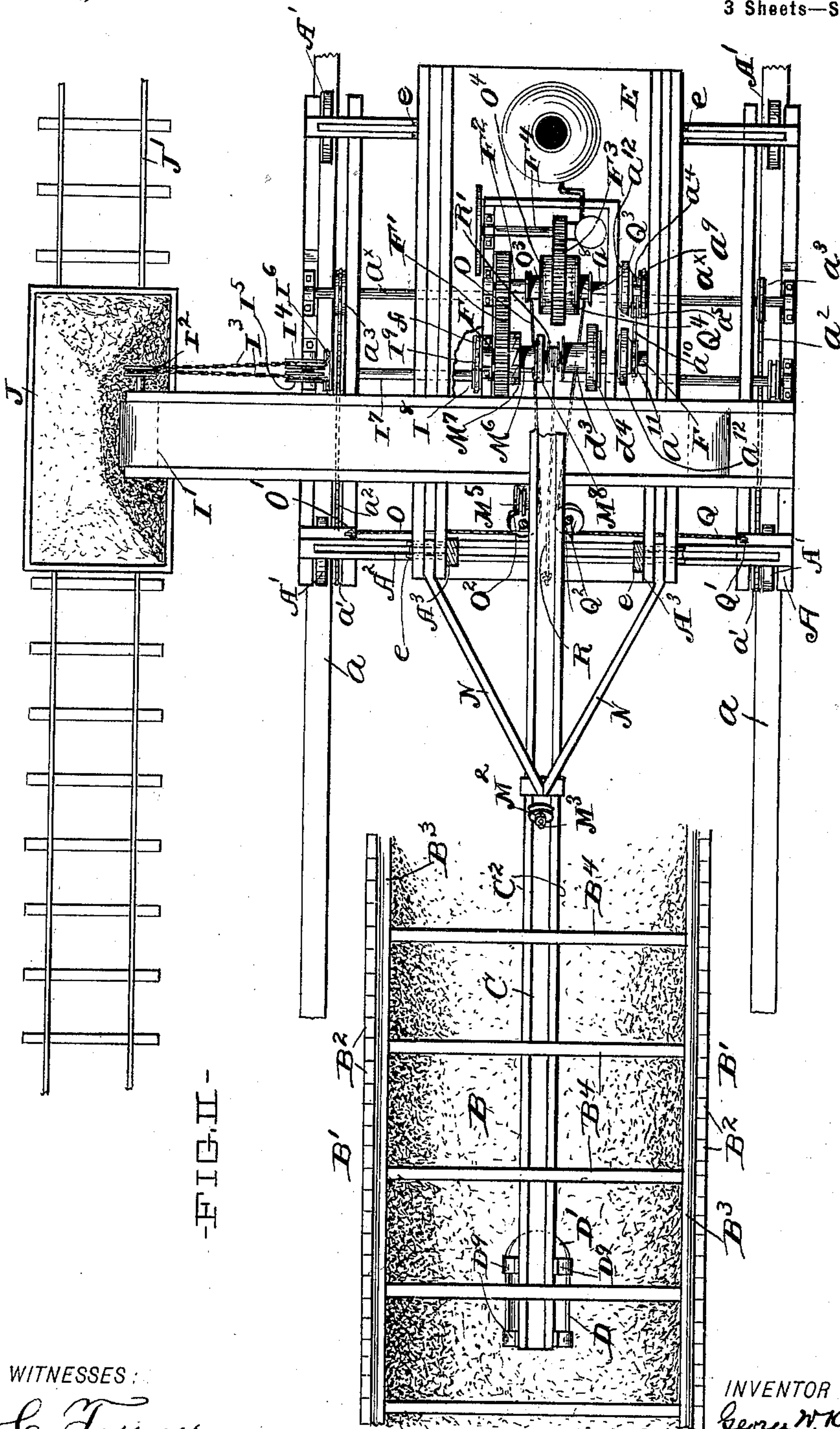
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3 Sheets—Sheet 2.



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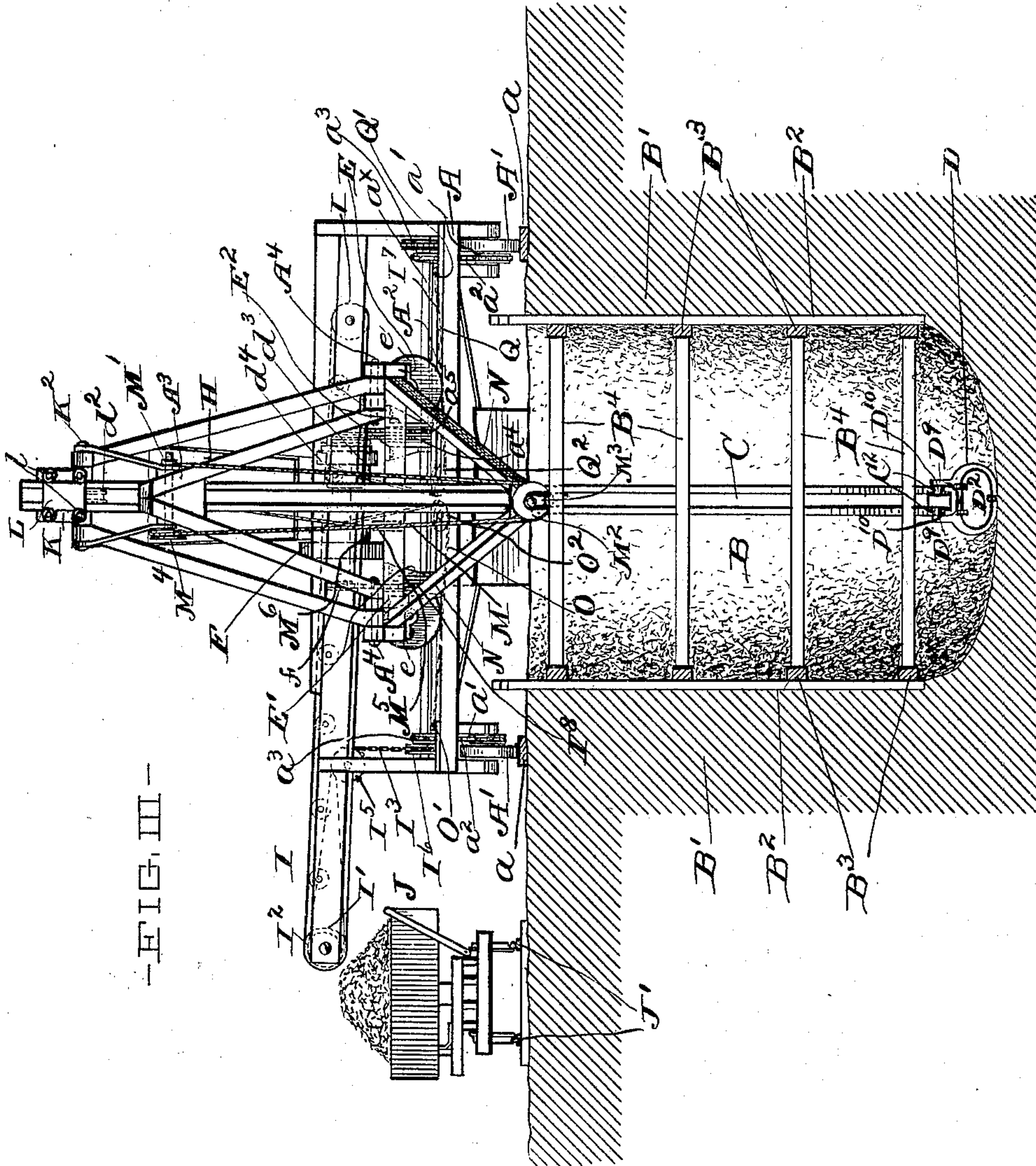


FIG. III—

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GEORGE W. KING, OF MARION, OHIO.

EXCAVATOR.

SPECIFICATION forming part of Letters Patent No. 635,047, dated October 17, 1899.

Application filed August 23, 1897. Serial No. 649,229. (No model.)

To all whom it may concern:

Be it known that I, GEORGE W. KING, of Marion, Marion county, Ohio, have invented certain new and useful Improvements in Excavators; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same.

My invention relates to improvements in excavators; and it pertains more especially to a trenching-machine designed to dig deep narrow trenches required in laying subterranean sewers, water-pipes, &c.

The invention consists, primarily, in providing the excavator with a platform or framework that is movable laterally and supports the shovel-guiding beam or track, the apparatus employed in actuating the shovel along said track, and the apparatus employed in effecting the other adjustment or adjustments of said track.

My invention consists also in certain novel and meritorious features of construction and combinations of parts hereinafter described, and pointed out in the claims.

In the accompanying drawings, Figure I is a side elevation of an excavator embodying my invention. In this figure the trench that is being dug by the machine is shown in central longitudinal section. Fig. II is a top plan of portions of the machine, the trench that is building, &c. The upper portion of the shovel-guiding track and other members that are supported from the laterally-movable framework are broken away or removed in this figure for the purpose of more clearly showing the operating machinery. Fig. III is a front end elevation of the machine, and this figure shows the trench in transverse section and shows a car on a track at the left-hand side of the excavator for receiving the material from the excavator. Fig. IV is illustrative of the manner of supporting sprocket-wheel I⁸ and the operative connection between the said wheel and shafts I⁷ and F. Fig. V is illustrative of the manner of supporting sprocket-wheels a⁴ a⁵ and the operative connection between the said wheels and shafts a^x, F, and F².

Referring to the drawings, A designates a horizontally-arranged platform or frame that

is provided with wheels A', that engage the rails of a track a. Said rails are arranged parallel with and at opposite sides, respectively, of the line of the trench B made by the machine. Each end of platform A in the case illustrated is provided with two wheels A' A', that are mounted upon different rails, respectively.

B designates the side walls or side banks of the trench, and B² represents upright planks or sheet-piling that are placed against said walls or bank. B³ designates timbers that are placed against said planks or piling within the cut and extend horizontally across the planks or piling and longitudinally of the cut, and B⁴ represents cross-braces that extend transversely of the trench and that engage at one end a timber B³ on the one side and engage at the opposite end a timber B³ upon the opposite side. Said cross-pieces B⁴, it will be observed, therefore brace apart the two walls of piling, and the upright planks or piling B², timbers B³, and cross-pieces B⁴, it is obvious, prevent the earthen walls or banks of the cut from caving in.

An excavator should, in order to render its use desirable and successful in digging deep and narrow trenches, occupy as little space as possible in the head of the trench being made, so that it will not interfere with the placing of the required number of cross-pieces or members employed in supporting the piling as close as possible to the head end wall of the trench. The head end wall of the trench is worked, preferably, on a slope, (shown in Fig. I,) so as to avoid caving in of the said end wall. The head end wall of the trench preferably slopes, therefore, downwardly and inwardly from the forward end of the frame or platform A, that is placed just beyond or in advance of the trench, and the track upon which the excavator is mounted and movable leads from said end of the trench in the direction in which the trench is to be extended. The excavator's portion that extends into the trench comprises a track-forming shovel-guiding beam C, that is arranged, preferably, parallel or approximately parallel with the aforesaid sloping end wall of the trench and adjusted at such a distance from said wall as to accommodate the operation of the excavating-shovel between the beam and

wall. Said beam is long enough to render it capable of extending from near the trench's bottom upwardly and rearwardly a suitable distance above platform A. The excavating-shovel D is arranged longitudinally of and capable of moving along the under side of said beam. The shovel is held in connection with the beam in any approved manner that will not interfere with its movement along the beam. The shovel is arranged, furthermore, to excavate in the direction of platform A, and hence has its forward end, that faces in the direction of the said platform during the shovel's excavating stroke, provided at its lower extremity with the cutter or scraper D'. The rear or opposite end of the shovel is provided with a door or gate D², that is hinged at the top to the shovel's body portion and is held closed and opened in any approved manner. The shovel is provided, preferably, with any suitable number of upwardly-extending arms D⁹, provided at their upper ends with rollers D¹⁰, engaging a way or ways C² formed in and extending longitudinally of the beam C. Hence the shovel is guided by the beam C during the shovel's independent movements.

Apparatus for actuating the shovel along the shovel-guiding beam or track is provided, and comprises, preferably, a cable d , (see Fig. I,) that is attached at one end, at d' , to the upper portion of the forward end of the shovel, and thence is guided upwardly and rearwardly along the under side of the beam to and over a sheave d^2 , that is arranged vertically and longitudinally of the machine and is supported from the laterally-adjustable framework E, that is movable laterally upon platform A, and is provided with wheels e , that engage the rails A² of a track formed upon and extending transversely of platform A—that is, the laterally-movable structure E in the case illustrated is provided at its forward end and also at its rear end with two wheels e , that are arranged a suitable distance apart and engage one of the rails A². From sheave d^2 cable d leads downwardly to and in under and operatively engages a suitably-operated winding-drum d^3 . This drum, that is shown more clearly in Fig. II, is loosely mounted upon a suitably-driven shaft F, that is arranged horizontally and transversely of and is suitably supported from the laterally-movable structure. Said shaft is intergeared, as at F', with a shaft F², supported from structure E at the rear of and parallel with shaft F, and shaft F is intergeared, as at F³, with the engine-shaft F⁴, that is borne by said structure E. A clutch d^4 of any approved construction is employed for establishing and interrupting operative connection between said drum d^3 and shaft F, and the drum is operatively connected with the shaft for winding up the engaging cable, and thereby effecting the upward stroke or excavating stroke of the shovel. The downward or idle stroke of the shovel is generally effected by gravity,

because the inclination of the shovel-guiding track is generally sufficient to enable the bucket's weight to lower the shovel when the hoisting-drum is operatively disengaged from the shaft and free to pay out the engaging cable. A brake (not shown) for holding the shovel at any point of its movements and for retarding its movement is preferably provided.

The shovel-guiding beam is supported from the laterally-movable structure E in any approved manner. In the case illustrated said beam has bearing at its upper end upon the forward side of a plate K, (see Fig. I,) that upon its lower and rear side is provided with a rearwardly and downwardly projecting sleeve K', that is mounted or journaled upon a pin K², that is arranged horizontally and transversely of the upper end of structure E. The upper end of the beam is detachably clamped to said plate or bearing in any approved manner, and the clamping device preferably employed for the purpose indicated comprises a plate L, extending transversely of the forward and upper side of the beam and arranged forward and above bearing K. The beam is clamped between plate L and bearing K by bolts l , applied in any approved manner. By loosening the nuts the beam is rendered free to be adjusted endwise, and the beam is secured in the desired longitudinal adjustment upon retightening the nuts. The endwise adjustment of the beam accommodates the excavation of trenches having different depths, respectively.

The shovel-guiding beam, in addition to its bearing at its upper end, has preferably a support at or near its central portion, and said additional support consists, preferably, of a suitably-applied cable M, (see Figs. I and III,) that is fixed at one end, at M', to the upper end of an upright forwardly-inclining frame A³, that straddles beam C and is secured at its lower end or ends to the forward end of structure E by pins A⁴, arranged horizontally and transversely of the machine. Cable M forms primarily, however, a beam-hoisting cable, and the latter leads from point M' downwardly to and over a sheave M² of tackle whose block or strap M³ is suitably attached to the beam's central portion, and thence leads upwardly to and over a sheave M⁴, that is supported from frame A³ in suitable proximity to point M'. Said sheave M⁴ is arranged vertically and longitudinally of the machine, and the beam-hoisting cable leads from said sheave downwardly and rearwardly to and in under a sheave M⁵, (see Fig. I,) that is arranged vertically and longitudinally of the machine and supported from the forward lower portion of structure E, and the cable leads thence to and over and operatively engages a winding-drum M⁶, that is loosely mounted upon shaft F. A clutch M⁷ (see Fig. II) of any approved make is employed for controlling operative connection between the drum and shaft. The shovel-guiding beam,

therefore, when it is desired to raise it from the head end wall of the trench, is moved in the direction indicated by winding a portion of cable M upon drum M⁶. The weight of the beam and the load that may be carried by it will be sufficient to lower the beam by gravity when the drum is free to pay out the engaging cable. A brake-band or brake M⁸, applied to drum M⁶ in any approved manner, is provided (see Fig. III) for arresting or retarding the movement of said drum and engaging cable, and the shovel-guiding beam is straddled forward of structure E by a vertically-tilting frame N, that slopes somewhat downwardly from structure E and has its weight bearing upon the beam and is instrumental in preventing outward displacement of the beam during the shovel's excavating stroke. Frame N is secured at its rear end or ends to the forward end of structure E, preferably by the horizontal pins A, employed in attaching frame A³ to the said structure. Said frame's outer end rests loosely upon beam C, so that it can slide upon the said beam and tilt vertically, as required in the movements of the said beam toward and from the head end wall of the trench.

To accommodate the formation of trenches having different widths, respectively, structure or framework E, that carries the shovel-guiding beam and the apparatus employed in the operation of the shovel, is adjustable or movable laterally, as already indicated, and the apparatus employed in the lateral movements of said framework comprises, preferably, two suitably-operated cables O and Q, (see Fig. II,) instrumental in actuating the framework laterally in opposite directions, respectively. Cable O is fixed at one end, as at O', to the forward end of one side of the platform A, thence leads to and over a sheave O², supported from and centrally of the forward end of the movable structure E, and thence leads rearwardly to and in under and operatively engages a winding-drum O³, that is loosely mounted upon shaft F². A clutch O⁴ of any approved construction is employed for controlling operative connection between the said drum and the shaft. Cable Q is fixed at one end to the forward end of the opposite side of platform A, thence leads to and over a sheave Q², that is supported from the central portion of the forward end of the structure E, and thence leads rearwardly to and in under and operatively engages a winding-drum Q³, that is loosely mounted upon shaft F². A friction-clutch Q⁴ of any approved form is employed for controlling operative connection between the said drum and the shaft. It will of course be understood that when one of said cables is performing its function the drum engaging the other cable is rendered free, if not already so, to pay out the engaging cable.

The laden excavating-shovel when at the end of its excavating stroke discharges or has its contents ejected therefrom in any ap-

proved manner, and the door or gate at the rear or discharging end of the shovel is of course opened by hand or in any other approved manner preparatory to the discharge of the shovel's contents. A hopper H, (see Fig. I,) that is supported from the movable structure E, is arranged to receive the material discharged from the shovel and has at its lower end an outlet h, arranged to discharge upon a suitably-driven endless belt I, supported from platform A and arranged transversely of structure E and extending to and overhanging a car J, (see Fig. II,) placed upon track J' for the purpose of receiving the material conveyed by said belt from the hopper. A chain-pulley I² (see Fig. II) is operatively connected with the positively-driven belt-engaging roller I'. An endless chain I³ leads over said pulley and from the latter inwardly to and over two sheaves I⁴ I⁵, arranged side by side and supported from platform A, and the chain leads from said sheaves to and in under a chain-pulley I⁶, that is operatively mounted upon a shaft I⁷, that is arranged horizontally and transversely of platform A below the movable framework E and is supported from said platform. A sprocket-wheel I⁸ is operatively mounted upon shaft I⁷ and operatively connected by means of a chain I⁹ with a sprocket-wheel j, that is operatively mounted upon shaft F. The hub of sprocket-wheel I⁸ has a square hole I¹⁰, that (see Fig. IV) conforms to and through which a square portion of shaft I⁷ extends, and said sprocket-wheel is therefore operatively and slidably mounted upon the shaft. Sprocket-wheel I⁸ is, however, carried by hangers or brackets E', (shown also in Fig. III,) that depend from and are rigid with the movable framework E, and hence said wheel when the framework is moved laterally slides on the shaft, and consequently operative connection between the conveyer and the operating machinery is not interrupted during the movements of the said movable structure E.

Apparatus for propelling the excavator along the track a, upon which it is mounted, comprises, preferably, the following: two chain-pulleys a' a', operatively connected with the different forward wheels A' A', respectively; chains a², operatively connecting said pulleys with chain-pulleys a³, that are operatively mounted upon a shaft a^x, arranged transversely of and supported from platform A at any suitable point between the forward and rear wheels of the platform; two sprocket-wheels a⁴ a⁵, (see also Fig. V,) operatively mounted upon said last-mentioned shaft that has a square portion a⁶ extending through correspondingly square holes in each of said sprocket-wheels a⁴ a⁵; a chain a⁸, operatively connecting sprocket-wheel a⁵ with a sprocket-wheel a⁹, that is loose upon shaft F², and another chain a¹⁰, that operatively connects sprocket-wheel a⁴ with a sprocket-wheel a¹¹, loose upon shaft F. Sprocket-wheels a⁴ a⁵ are carried by hangers or brackets E², (see

Figs. III and V,) that depend from and are rigid with the movable framework E, and consequently the said sprocket-wheels a^4 a^5 slide endwise of the shaft that supports it, when the said framework E is moved laterally without interrupting or interfering with the operative connection of the said wheels a^4 a^5 with the driving sprocket-wheels. Each driving sprocket-wheel a^9 and a^{11} is provided with a clutch a^{12} (see Fig. II) of any approved construction and employed for controlling operative connection between the respective wheel and the shaft that supports and drives the said wheel. Shafts F and F², it will be observed, rotate in opposite directions, respectively, and consequently the excavator is propelled upon track a in the one or the other direction, according as wheel a^9 or wheel a^{11} is rendered operative.

A cable R, (see Fig. II,) employed to pull inwardly upon beam C, and thereby cause the cutter D' of the shovel to enter the earth to the desired depth, is provided and attached to the beam, preferably near the forward end of structure E, and thence leads inwardly or rearwardly to and operatively engages a winding-drum R', that is loosely mounted upon shaft F and operated in any approved manner.

What I claim is—

1. An excavator of the character indicated, having a framework movable laterally of the machine, an upwardly and downwardly extending endwise-adjustable track-forming beam, the excavating-shovel held in connection with and movable endwise of said beam, the said shovel and beam having the arrangement required to render the shovel capable of excavating in the direction of the framework, means for securing the beam in the latter's desired longitudinal adjustment, and the said securing means and the beam and shovel being supported from the said framework, substantially as and for the purpose set forth.

2. An excavator of the character indicated, having a framework movable laterally of the machine, a shovel-guiding track, the excavating-shovel held in connection with and movable endwise of the said track, the said shovel and track having the arrangement required to render the shovel capable of excavating in the direction of the framework, apparatus for actuating the shovel along the track, and the track and shovel-actuating apparatus being supported from the said framework, and a conveyer that is stationary relative to the movable framework and has the arrangement required to render it capable of receiving the shovel's contents and convey the same from the machine.

3. In an excavator of the character indicated, having a framework movable laterally of the machine, a shovel-guiding track, the excavating-shovel held in connection with and movable endwise of the said track, the said shovel and track having the arrangement required to render the shovel capable of exca-

vating in the direction of the framework, apparatus for actuating the shovel along the track, a hopper arranged to receive the contents of the shovel and having an outlet, the said hopper, track and shovel-actuating apparatus being supported from the said framework, and a suitably-operated endless belt arranged to receive the material from the hopper and being stationary relative to the movable framework, substantially as set forth.

4. An excavator of the character indicated, having a longitudinally-movable platform A, the framework or structure E mounted upon and movable transversely of the said platform, a shovel-guiding track, the excavating-shovel held in connection with and movable endwise of the said track, the said shovel and track having the arrangement required to render the shovel capable of excavating in the direction of the framework, apparatus for actuating the framework, and the said track and shovel-actuating apparatus being supported from the said framework, substantially as and for the purpose set forth.

5. In an excavator of the character indicated having a longitudinally-movable platform A, the framework or structure E mounted upon and movable transversely of the said platform, a shovel-guiding track, the excavating-shovel held in connection with and movable endwise of the said track, apparatus for actuating the framework, and the said track and shovel-actuating apparatus being supported from the framework, an endless belt suitably supported from the aforesaid platform and arranged to receive the material discharged from the shovel, a suitably-operated shaft supported from the movable framework, another shaft supported from the platform and operatively connected with the belt, a wheel operatively and slidably mounted upon the last-mentioned shaft and operatively connected with the first-mentioned shaft, and the said wheel being movable with the aforesaid movable structure, substantially as and for the purpose set forth.

6. An excavator of the character indicated, having a platform A, the framework or structure E mounted upon and movable transversely of the said platform, a shovel-guiding track, the excavating-shovel held in connection with and movable endwise of the said track, apparatus for actuating the movable framework, the said track and shovel-actuating apparatus being supported from the said framework, a suitably-operated shaft arranged transversely of the machine and supported from the movable framework, another shaft arranged transversely of the machine below the said framework and supported from the relatively stationary platform, a wheel operatively and slidably mounted upon the lower shaft and operatively connected with the upper shaft, and the said wheel being carried by the movable framework, a pulley operatively connected with the belt, another pulley operatively mounted upon the lower

shaft, two guide-sheaves arranged side by side above the said last-mentioned pulley and supported from the platform, and a cable leading over the belt-pulley, over the two 5 guide-sheaves and in under the pulley below the said sheaves, substantially as and for the purpose set forth.

7. In an excavator of the character indicated, the combination with a platform A, and 10 a framework E mounted upon and movable transversely of the said platform; of two suitably-operated winding-drums supported from the said framework, two guide-sheaves supported from the movable structure, a cable 15 attached to the platform and leading thence to and over one of the said sheaves to and operatively engaging one of the drums, and another cable attached to the platform and leading thence to and over the other sheave 20 and thence to and engaging the other drum, and the arrangement of the cables and guide-sheaves being such that the movable structure shall be shifted in the one or the other direction according as the one or the other 25 drum is actuated in the direction required to wind up the engaging cable, substantially as set forth.

8. An excavator of the character indicated, having a longitudinally - movable wheeled 30 platform A, a framework or structure E mounted upon and movable transversely of the said platform, a shovel-guiding track, the excavating-shovel held in connection with and movable endwise of the said track, appa-

ratus for actuating the framework, and the 35 said track and shovel-actuating apparatus being supported from the said framework, a suitably-operated shaft supported from the movable framework, another shaft supported from the platform and operatively connected 40 with wheels of the aforesaid platform, a wheel operatively and slidably mounted upon the last-mentioned shaft and operatively connected with the first-mentioned shaft and the said last-mentioned wheel being movable with 45 the aforesaid laterally - movable structure, substantially as and for the purpose set forth.

9. In an excavator of the character indicated, the combination with a suitably-supported shovel-guiding beam extending below 50 and forward of the machine's framework and inclining upwardly and rearwardly, of a bearing for the beam's upper portion, and the said bearing being capable of tilting in a vertical plane and longitudinally of the machine, and 55 a frame straddling and bearing down upon the beam at the latter's forward side and tiltable in the direction required to accommodate the adjustment of the beam circumferentially of the axis of the aforesaid bearing, 60 substantially as set forth.

In testimony whereof I sign this specification, in the presence of two witnesses, this 24th day of April, 1897.

GEORGE W. KING.

Witnesses:

W. R. WADDELL,
C. H. DORER.