AUTOMATICALLY ANCHORING EXCAVATOR AND CONVEYOR.
UNITED STATES PATENT OFFICE.

EDWIN M. REESE, OF YUMA, ARIZONA TERRITORY.

AUTOMATICALLY-ANCHORING EXCAVATOR AND CONVEYER.


To all whom it may concern:

Be it known that I, Edwin M. Reese, a citizen of the United States, residing at Yuma, in the county of Yuma and Territory of Arizona, have invented a new and useful Automatically-Anchoring Excavator and Conveyor, of which the following is a specification.

An object of this invention is to provide a self-anchoring excavator and conveyor which may be used over a considerable space without the inconvenience of shifting the anchorage and which can be moved from station to station on the plat or tract to be excavated without dismantling; also, to provide an excavator and conveyor which can be readily anchored upon the plat of ground to be excavated and there employed to excavate such plat up to the edge thereof without shifting the anchorage—that is to say, an object of the invention is to provide means for excavating up to the line on which the machine is set.

Another object is to so construct and arrange the anchorage and conveying hoist as to leave the space at the edge of the plat to be excavated free for excavating and loading operations.

A further object is to provide an effective anchorage of minimum weight, thus avoiding inconvenience in moving from place to place.

This invention includes an anchorage placed rearwardly of the conveying hoist and to which said hoist is connected by pivoted thrust-beams of considerable length—twenty feet, more or less, for instance—at the sides of the machine, respectively, thus allowing the anchorage to be placed entirely inside the property-line of the plat of ground to be excavated, while the drum of the conveying hoist may extend over the property-line, said drum being movably mounted on a shaft and cross-beam which connect the free ends of said thrust-beams. The drum is mounted to move up and down and also transversely of the anchorage in order that the digger and scraper may be drawn up a slanting platform or bridge or hoisted at the drum to any desired height for loading wagons or railroad flat-cars with the material excavated from any portion of the plat covered by the anchorage.

Preferably two anchorages and conveying hoists or traction members are provided for each excavating plant, one being set at each side of the plat of ground to be excavated, the plow and scraper being operable from one to the other.

The invention also embraces a novel form of excavating device provided with pivoted plows and scrapers and in which some of the tools are so arranged as to automatically loosen and convey the earth when operated in one direction and to automatically free themselves from the ground on return movement, while others of said pivoted tools are arranged to free themselves when moving in said one direction and to operate at the return movement.

Preferably the thrust-beams which carry the cross-beam and shaft for the drum of the conveying hoist are triangular in end elevation, each end of the anchorage being formed of a triangular frame and said frames being connected by cross-beams at their tops, thus leaving the space between the end frames and below the drum free from any obstruction, the object of this being to allow the excavating device to loosen and remove the surface of the ground directly to the property-line without placing any portion of the machine on adjoining property.

The drums may be respectively operated by any suitable motor carried by the frames or resting on the ground and connected with the drums, respectively, by means of friction-clutches, belts, or other reversing means.

The end frames are preferably made of triangular form in order to allow a large up-and-down movement of the drum and to afford the best anchorage to resist the thrust of the conveying drum at different heights above the ground-level. The frame may be constructed of wood or metal and its parts bolted together, so as to be conveniently knocked down and erected again.

Another object of the invention is to provide an anchorage having a large ground plan without obstructing much of the ground-space, so that the machine can be anchored with anchor-stakes or like anchors that may be easily removed when it is desired to move the structure.

Another object of the invention is to construct the machine so that the stress on the anchorage will be approximately horizontal, and this, together with the large ground plan of the anchorage, causes the stress component tending to raise the anchors to be very slight.
Another object of the invention is to provide an excavator of superior character for excavating canals and making long cuts where the width of the cut is comparatively small, and with this and other objects in view the anchorage is arranged to run on tracks extending parallel with the axis of the drum of the conveying-hoist, so that when the machine is in position with one anchorage on the bank the other anchorage may be lowered into the cut as the work proceeds until the cut has been made to the required depth at that station, and then the anchorage can be moved along the proposed cut to the next station, and so on until the work is completed. For this purpose each anchorage-frame may be provided with truck-wheels.

The accompanying drawings illustrate the invention.

Figure 1 is an elevation of a complete excavator and conveyer as the same appears on the ground ready for operation, the truck-wheels being omitted, as they may be removed when the machine is anchored. Fig. 2 is a plan view of the same with the truck-wheels in place. Fig. 3 is an end elevation of a single anchorage and hoist ready for moving. Fig. 4 is an enlarged detail elevation of the conveying-drum and its mountings. Fig. 5 is a plan view of the same. Fig. 6 is a detached detail of a truck-wheel with its mountings. Fig. 7 is a longitudinal section of the digger and scraper excavating device as it appears on the ground in operation. Fig. 8 is an end elevation of the digger and scraper. Fig. 9 is a plan view of the same. Fig. 10 is an enlarged fragmental detail perspective of one of the anchors and attachment thereof. Fig. 11 is an enlarged side elevation of a single conveying-hoist and anchorage-frame, showing the truck-wheels in place thereon. Fig. 12 is an elevation of the power side of a single hoist and anchorage-frame, the anchors being omitted. Fig. 13 is a plan of the same. Fig. 14 is a fragmental side elevation with loading-bridge in place.

Shaft 5 rotates in bearings 8 on the free end of a pivoted drum-carrying frame formed of cross-beam 7 and two thrust-beams 9, 9', which are pivoted at their lower ends to the anchorage-frame at 10. 7' is a slide on said cross-beam, provided with arms 7'' for moving the drum 4 along the shaft. 6 designates connections for moving the slide along the cross-beam 7, thus to shift the drum 4 along the shaft.

Pulleys 11 and belts 12 serve as means to convey the power from a motor, as a gasoline-engine (indicated at 13) mounted on the frames 1, respectively. Any suitable power-transmitting means may be employed. In the arrangement shown belt 6 is straight and belt 7 is crossed, forming with the shift 14, a well-known reversible system.

15 is an adjusting-pulley mounted, by means of a slide 16, carried by a swinging beam 17, pivoted at 19 to frame 1. Said adjusting-pulley is connected to the motor by belt d. 18 is a line connected with slide 16 for raising and lowering the adjusting-pulley to tighten and loosen the belts. By this arrangement the belts may be kept tight at all positions of the hoisting-drum.

20 designates braces on the triangular frame 1 to stiffen the same at the top of the frame 1, where they will not be in the way. At the top of the frame and extending rearwardly are beams 21, which support at their ends block and tackle 22-23. The tackles 23 are broken in the view to avoid confusion; but it is to be understood they may be secured to thrust-beams 9 and 9' or fastened in any other suitable manner. The tackle may be operated by hand or by any other convenient means, such as by winding the same around the hoist-shaft 5 and then operating the hoist. By operating the 95 tackle 23 the free ends of thrust-beams 9 and 9' and the drum 4 may be raised to any desired height.

On the corners of the anchorage are mounted anchor-stakes 25, one at each corner, which serve to hold the triangular frame stationary on the ground. Referring to Fig. 10, 26 is a block fastened to the sill 27 of the anchorage and provided with a slot 28, through which passes the anchor-plate 29, which has in it a series of holes 30 for the reception of a pin 31, that passes underneath plate 32 for the purpose of keeping the anchor-stakes extended the desired distance below the framework of the anchorage. The anchor-plate 29 is formed in a fish-tail 33 at its lower end to facilitate sinking into the ground. Fastened to it at the lower end at right angles is a second fish-tail plate 34 to increase the stability of the anchorage. The anchor-stakes are of considerable length, so that the lower end thereof may be sunk by the weight of the anchorage to a considerable depth in the earth and allow enough of the anchor-stakes to project above the ground, so that, if necessary, the anchorage-frame may remain at or be raised to a considerable height above the ground and there be supported on the anchor-stakes.

On the side of the anchorage-frame I have shown posts 35, which serve to hold hinge-buts 36. Frame 37 of truck 38 has on it companion hinge-buts 36', which are adapted to fit the butts 36 and to be held in place thereon by removable hinge-bolts 39.
When it is desired to move the anchorage, the anchorage-frame will first be raised and the truck-wheels 38 attached, one at each corner, and the anchor-stakes are then drawn up, the pins 31 withdrawn and applied above instead of below the blocks 26. Then the anchorage may be rolled over the ground with ease. Arriving at the desired place, the pins 31 are withdrawn, the anchor-stakes lowered to contact with the ground, the pins again restored to the position shown in the drawings, and the truck-wheels removed, whereupon the anchor-stakes will sink into the ground under the weight of the anchorage.

It is to be noted that the anchorages 1 are each provided with two legs h i, constructed and arranged to straddle the ground to be excavated, leaving the surface space between the legs open and free for the operation of the excavating device, and that the feet of said legs are parallel with each other and are long and narrow, having small lateral extension and considerable extension front and rear, so as to afford large frictional footing with or without the anchor-stakes 25.

Between the two conveying-hoists and attached thereto by the cable 3 is the excavating device comprising a digger and scraper 2, which is arranged to be reciprocated over the ground between the hoists and is shown in enlarged detail in Figs. 7, 8, and 9. Said digger and scraper is provided with plows 40 40', and the shanks 41 41' of which are pivoted on shafts 42 42', respectively, above the plows. The plows 40 and 40' are reversely and independently mounted, so that when the scraper-shell 50 moves in one direction the plows 40 will come into operative position and the plows 40' will be thrown out of such position, and vice versa on a reverse movement of said shell, the action being automatic, as herein-after explained. Beams 43 and 44 serve as stops, respectively, to keep the plows from turning beyond a vertical position when in use and to keep them from reversing too far when the digger and scraper is being moved back over the field. Scraper 45 is mounted on 40', the shanks pivoted on shaft 47, similarly to the mounting of the several plows. The movement of the scraper is limited in the same manner as that of the plows—by stops formed by beams 48 and 49. Plows 40 40', with their mountings, and scraper 45, with its mountings, are all carried inside a shell 50, closed at the sides and open at front and back, which serves as a retainer to hold the excavations as they are conveyed off the ground. In Fig. 7 the excavating device is shown with the plows and scraper in operative position while said device is being drawn in the direction indicated by the arrow. On the back side of the tools 40 40' 45' (viz., the plows and scrapers) are heels 51, which catch into the soil on the forward movement and throw the tools into the position shown in full lines.

When the excavator is drawn back, the tools automatically throw into the position shown in dotted lines and run on the heels 51. On the sides and bottom of the scraper-shell 50 are runners 52, which support the shell while the excavator is being drawn over the ground. Bars 53 extend across the ends of the shell 50 and at their ends are turned into eyes 54, to which cable 3 is attached.

In practice to set the machine, the frame being erected and being supported off the ground-surface by the truck-wheels 38, the anchor-stakes 20 are then lowered to the surface of the ground. The pins 31 are then placed in the appropriate holes 30 in the anchor-stakes, and the wheels 38 are then removed. Thereupon the anchor-stakes are sunk into the soil by the weight of the frame. By alternately operating the motors 13 the scraper and digger is conveyed to and fro across the plat, thus excavating and conveying material to one side underneath the conveying-drum 4 of the hoist. As the work proceeds the conveying-drums will from time to time be simultaneously shifted along shafts 5 by connections 6, thus causing the digger and scraper to shift to excavate new ground until the whole area between the two anchorages has been excavated to the required depth.

Suitable means (not shown) may be applied to give required friction between the drum and the cable wound thereon, and forms of traction members other than the drum may be employed without departing from this invention.

56 Designates movable hangers for the shaft 5, the same being provided with boxes 57 and sliding independently of each other on the cross-beam 7 of the thrust-frame to support the shaft 5, along which the boxes slide, so as to support the shaft close to the drum and intermediate of the boxes 8 therefor. The hangers and boxes are conventionally shown and may be of any suitable form.

When the excavation between the legs h i of frames 1 has been completed, the truck-wheels may then be replaced and adjusted to support the anchorage and frame, which will then be moved to where the anchor-stakes will be set, and the excavation continued, as before. Thus by successive movements of the anchorages the work may be continued over any extent of territory. The distance between the anchorages may be made as long as desired-within practical limits, thus making the travel of the excavator as long as possible, and thereby reducing the expenditure of time on any given undertaking.

For the purpose of loading cars or for putting the material into a bin for loading wagons, it sometimes becomes desirable to raise the conveying-hoist to a considerable height, possibly greater than is provided for by the sim-
ple raising of the free ends of the thrust-beams. In such case the outer end of the anchorage may be raised above the ground and supported by the anchor-stakes at a greater height than the inner end.

When the thrust-beams are raised, they may be fixed in their elevated position by any suitable means, as pins (not shown) inserted in holes 55.

It is to be understood that skids (not shown) or other devices may be substituted for the track-wheels for the purpose of moving the frames 1 as the work proceeds.

Various changes of construction may be adopted without avoiding the invention.

In Fig. 14 a sloping bridge 66 is shown in position for loading a flat-car. (Not shown.) It is to be understood that the width, height, and length of the bridge may vary according to requirements.

The plows and scraper are detachable by removing their respective shafts, and in some cases the plows 40 and 40' may be used without the scraper, and in other cases one set of plows 40 or 40' may be used alone or with the scraper only. The plows 40 and 40' are mounted reversely of each other, so that when the digger and scraper moves in one direction plows 40 operate and plows 40' are inoperative, and vice versa.

By means stated the reversely-pivoted tools are caused to operate on the ground in alternation at the alternate reverse movements of the digger and scraper.

What I claim is:

1. An excavator and conveyor comprising a pair of conveying-hoists each of which has a drum and means for adjusting the same up and down, and an excavating device between said hoists and operatively connected to said drums.

2. An excavator and conveyor comprising a pair of hoists having adjustable drums and anchorages therefor, and an excavating device between and operatively connected to the adjustable drums of said hoists.

3. In an excavator and conveyor, an excavating device provided with pivoted tools, some of which are arranged to operate in one direction and others of which are arranged to operate in the other direction, and means for moving said device on the ground in one and the other direction to cause the reversely-arranged pivoted tools to operate on the ground in alternation.

4. An excavator and conveyor comprising a digger and scraper provided with pivoted tools, and hoists respectively connected to the forward and rear ends of said digger and scraper.

5. An excavator and conveyor, comprising a shell, and reversely-operating tools mounted pivotally in said shell, and means for moving the shell on the ground in one and the other direction.

6. In an excavator and conveyor, a digger and scraper comprising a shell provided with runners, and tools pivotally mounted comprising diggers in combination with a pivotally-mounted scraper, and means for moving the same on the ground in one and the other direction; said diggers being reversely arranged so that one will operate in one direction and the other will operate in the other direction.

7. An excavator provided with pivotally-mounted tools comprising diggers in combination with a pivotally-mounted scraper, and means for moving the same on the ground in one and the other direction; said diggers being reversely arranged so that one will operate in one direction and the other will operate in the other direction.

8. A conveying-hoist comprising an anchorage, thrust-beams pivoted on said anchorage, and a hoist mounted on said beams.

9. A conveying-hoist comprising an anchorage, thrust-beams pivoted on said anchorage, and a movable hoist and reversing means therefor, said hoist being mounted on said thrust-beams.

10. In a conveying-hoist, an adjustable anchor provided with a crossed lower end.

11. A conveying-hoist comprising thrust-beams pivotally secured to anchorage and a conveying-drum mounted on the free ends of said thrust-beams.

12. A conveying-hoist comprising thrust-beams pivoted to anchorage and spaced apart by a beam at their upper ends, said ends being free to move up and down, a conveying-drum carried by said free ends, and means to raise and lower the free ends of said thrust-beams.

13. A conveying-hoist comprising thrust-beams pivotally anchored at one end and carrying a transverse shaft on their free ends, a drum on said shaft provided with means for shifting longitudinally of said shaft; and means to operate said drum.

14. A conveying-hoist comprising spaced thrust-beams pivotally secured to an anchorage, a frame on said anchorage provided with means for raising and lowering said thrust-beams, and a longitudinally-movable conveying-drum mounted on and between said beams.

15. A conveying-hoist comprising spaced thrust-beams pivotally secured to an anchorage, a conveying-drum mounted on and between said thrust-beams and the drum mounted on them.

16. In an excavating apparatus, in combination, two adjustable traction members, an excavating device adapted to reciprocate horizontally between said members, said excavating device being provided with soil-moving attachments adapted to automatically assume an operative position when the excavator moves toward one, and an inoperative position when the excavator moves toward the other traction member, and means operatively connecting said excavating device with said traction members.

17. In an excavating apparatus, in combi-
In an excavating apparatus, in combination, a horizontally-movable excavator, a connection for moving the same, a frame, a drum mounted thereon, for said connection to wind upon, means for supporting said drum and raising and lowering the same, an adjusting-pulley, a slide on which said pulley is mounted, an adjusting-beam carrying said slide and pivoted to swing toward and from said drum, a motor, and flexible connections operatively connecting said pulley with said drum and motor.

23. In an excavating apparatus, in combination, an excavator adapted to reciprocate over the surface of the ground, and means for reciprocating said excavator, said excavator being provided with a scraper and plows adapted to automatically assume operative position during one reciprocation of the excavator, and to automatically assume inoperative position during the other reciprocation thereof, said scraper being mounted in a position behind the plows during the 70 reciprocation in which said scraper and plows operate.

24. An excavating apparatus provided with an anchorage having two legs and constructed to straddle the ground to be excavated.

25. An excavating apparatus provided with an anchorage having two legs, the feet of which are parallel with each other and are long and narrow, said legs being arranged to straddle the ground to be excavated.

26. An excavating apparatus provided with an anchorage having two legs, the feet of which are parallel with each other and are long and narrow, and anchors at front and rear of said legs.

In testimony whereof I have hereunto set my hand, at Los Angeles, California, this 17th day of July, 1905.

EDWIN M. REESE.

In presence of—
JAMES R. TOWNSEND,
JULIA TOWNSEND.

It is hereby certified that in Letters Patent No. 821,743, granted May 29, 1906, upon the application of Edwin M. Reese, of Yuma, Arizona Territory, for an improvement in "Automatically-Anchor Excavators and Conveyors," an error appears in the printed specification requiring correction, as follows: In line 46, page 4, the word "joints" should read hoists; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 3d day of July, A. D., 1906.

E. B. MOORE,
Acting Commissioner of Patents.
nation, an excavating device adapted to be drawn upon the ground, and traction means for operating said excavating device, said device provided with a soil-moving attachment, said attachment having a head adapted to enter the soil and thereby throw said attachment into operative position.

18. In an excavating apparatus, in combination, two traction members, an excavating device adapted to reciprocate horizontally between said members, and a flexible connection operatively connecting said excavating device with said members, a drum being provided for said connection to pass over and means for raising and lowering said drum.

19. In an excavating apparatus, in combination, an excavating device adapted to be drawn over the ground, a flexible connection secured to said excavating device for drawing the same, a drum for said connection to pass over, a horizontal rotary shaft on which said drum is slidably mounted to rotate therewith, means for rotating said shaft, and means for supporting said shaft and raising and lowering the same.

20. In an excavating apparatus, in combination, an excavating device adapted to be drawn over the ground, a flexible connection secured to said excavating device for drawing the same, a drum for said connection to wind upon, a horizontal rotary shaft upon which said drum is slidably mounted to rotate therewith, pivoted thrust-beams having their free ends secured to said shaft, means for swinging said beams on their pivots, and means for rotating said drum.

21. In an excavating apparatus, in combination, a horizontally-movable excavating device, a flexible connection secured to said excavating device, for moving the same, a drum for said connection to wind upon, a horizontal shaft upon which said drum is mounted, vertically-movable means upon which said shaft is mounted, a frame supporting said movable means, a motor, and reversible means operatively connecting said motor with said shaft.

22. In an excavating apparatus, in combination, a horizontally-movable excavator, a connection for moving the same, a frame, a drum mounted thereon, for said connection to wind upon, means for supporting said drum and raising and lowering the same, an adjusting-pulley, a slide on which said pulley is mounted, an adjusting-beam carrying said slide and pivoted to swing toward and from said drum, a motor, and flexible connections operatively connecting said pulley with said drum and motor.

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24. An excavating apparatus provided with an anchorage having two legs and constructed to straddle the ground to be excavated.

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[Seal.]

E. B. MOORE,

Acting Commissioner of Patents.