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H. E. SATRE

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EXCAVATING AND CONVEYING MACHINE

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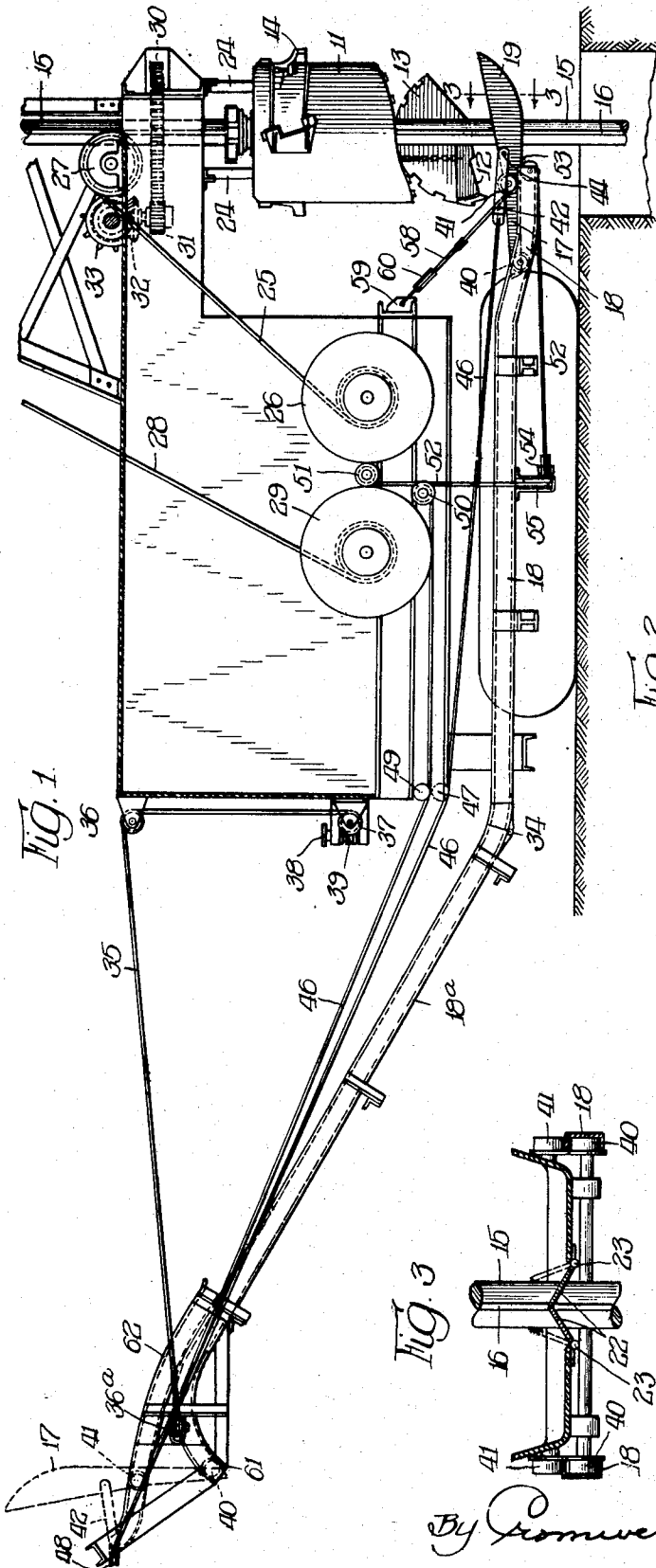


Fig. 2

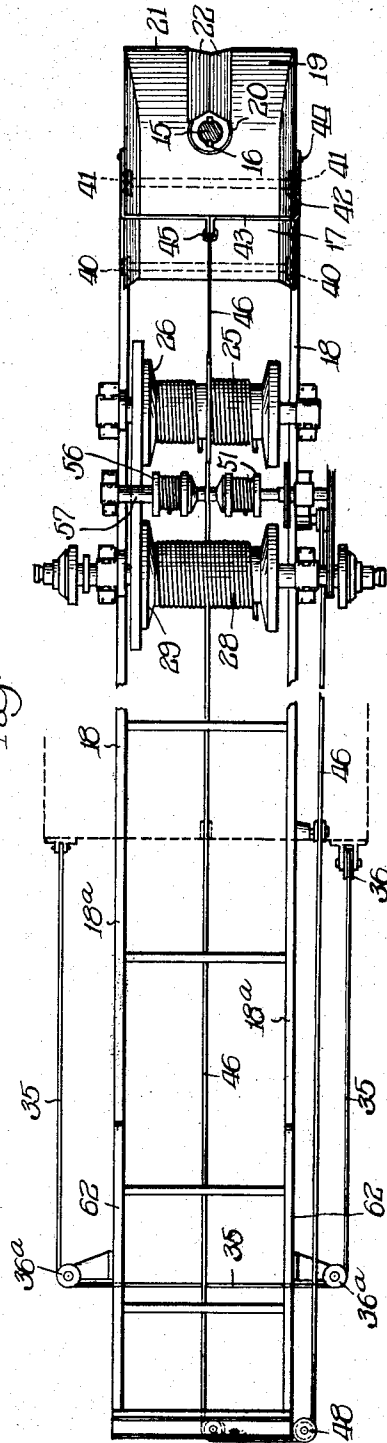
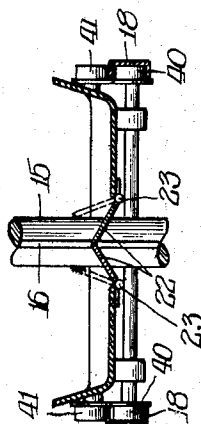


Fig. 3



Inventor:
Hilmar E. Satre,
By *Cornwell, Greish & Warren*
attys.

UNITED STATES PATENT OFFICE

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EXCAVATING AND CONVEYING MACHINE

Hilmar E. Satre, Chicago, Ill., assignor, by mesne assignments, to Spencer, White & Prentiss, Incorporated, New York, N. Y., a corporation of Connecticut

Application May 5, 1934, Serial No. 724,131

6 Claims. (Cl. 255-21)

The present invention pertains to excavating, hoisting, dumping and conveying apparatus, the several parts adapted for cooperative operation, particularly in the digging of deep holes of varying diameter extending from the surface down to bed rock in constructing caissons or pillars.

By my invention efficiency of such apparatus is greatly enhanced from the standpoints of speed of operation, saving of manual labor, economy of time consumed in the several operations, the utilization of a single power unit for motivating the several operations, and avoidance of necessity for suspending one while performing another.

A further advantage is attained in that all the several operations of digging, hoisting the excavated materials, dumping and conveying to a remote point of disposal, and lining the hole is accomplished without laborers entering the excavation and being subjected to danger of personal injury from cave-in, gas, falling objects or otherwise.

In order that the invention may be readily understood a typical embodiment of apparatus involving the invention is hereinafter described with reference to the accompanying drawing; it being understood that the invention may be embodied in other varied structural forms without departure from the essence thereof, wherefore the invention is not to be restricted other than as required by the prior art.

In the drawing,

Fig. 1 is a side elevation of the machine assembly in operative position;

Fig. 2 is a top plan view; and

Fig. 3 is a vertical section on the line 3-3 of Fig. 1.

This application constitutes an improvement upon mechanism set forth in my copending application Serial No. 724,129 which has for its object the performance of similar functions.

The characteristic features entering into the machine assembly are the boring auger or bucket 11 provided with bottom cutters 12 carried by hinged lower doors 13 and with side cutters or reamers 14. The construction in detail of the boring auger 11 forms no essential part of the present invention, being set forth and claimed in a copending application directed thereto. Suffice it to say that the loosened soil enters the interior of the bucket through bottom and side openings and is periodically hoisted when filled in order that the excavated material may be dumped and the auger returned for further boring and removal of material.

Rotary movement is imparted to the auger and

it is guided in its progress by a lead shaft 15 provided upon diametrically opposite sides with keys 16 which engage corresponding keyways in the auger whereby to permit of relative axial movement of the two while preventing relative angular movement and thus forcing the auger to rotate with the lead shaft. This shaft forms no essential part of the present invention, being set forth and claimed in a copending application.

It will be understood that the lead shaft 15 is not removed from the hole until the digging operation is completed, the same advancing downwardly by reason of rotary motion imparted thereto supplemented by its own weight and built up in sections at its upper end as the digging progresses, but that the auger is periodically elevated along the lead shaft to empty its load of excavated material.

When the auger reaches a position above the surface of the ground the skip car 17 upon the conveyor frame 18 with its apron 19 is projected beneath the bucket. The apron 19 in its bottom is provided with a central aperture 20 adapted to receive within its confines the lead shaft 15 and the skip bottom between the aperture 20 and the edge 21 consists of plates 22 hinged at 23 to swing upwardly. The outer edges of these hinged plates are cut away to present a recessed relation to the general edge 21 of the skip and the inner edges are correspondingly cut away to form the outer confines of the aperture 20. This is most clearly shown in Fig. 2 taken in connection with Fig. 3.

The arrangement just described permits of the skip being moved to the right, as shown in the drawing, and the contact of the hinged plates 22 with the lead shaft 15 causes these plates to lift temporarily to the dotted line position shown in Fig. 3, clearing the lead shaft 15, after which they drop to the position shown in full lines in said figure, constituting the bottom of the skip about the lead shaft.

Thereafter, slight continued upward movement of the auger 11 causes the hinged doors 13 to be tripped by contact of the latching mechanism with the abutment posts 24 thus permitting the doors to drop and the load of excavated material to be deposited in the apron 19.

Thereupon the skip being moved to the left by operation of the car 17 on the conveyor frame, the excavated material resting upon the hinged plates 22 is temporarily shifted laterally as these plates move to the upward position shown in dotted lines in Fig. 3 to clear the lead shaft 15. Immediately thereafter the plates drop to the

position shown in full lines in Fig. 3 and the load having cleared a position beneath the auger the latter again descends into the hole and resumes the boring operation while the material deposited in the apron 19 upon the car 17 is being transported to a point of deposit remote from the hole.

By reference to Fig. 1 of the drawing it will be seen that the auger 11 is suspended by companion cables 25 wound upon drums 26 and traversing pulleys 27 whereby the said auger may be elevated and lowered, the attachment of the two cables to the auger being at diametric points whereby to prevent tilting under unequal load which might cause binding upon the lead shaft 15. Likewise it will be observed that the lead shaft 15 is suspended by a cable 28 traversing a pulley, not shown, and wound upon the drum 29 where- not shown, and wound upon the drum 29 where- by the lead shaft may be fed into the excavation as the digging progresses and removed therefrom when the work is complete, ready for depositing the concrete. This lead shaft is rotated by a suitably driven gear 30 splined upon the lead shaft 15 and driven by pinions 31 and 32 and a sprocket 33 connected in any approved manner with a source of power.

The conveyor, best shown in Fig. 1, comprises in general a frame formed of the side members 18 of inwardly opening channel section. These side members are preferably formed in multiple and hingedly connected at 34 whereby one of the sections being horizontal the other may be inclined as may be desired by means of a cable 35 attached to the housing of the machine at 36 and extending about sheaves 36a carried by the elevated portion of the conveyor frame to the drum 37 driven by a hand wheel 38 through a worm 39. In this way the discharge end of the conveyor may be adjusted to adapt the delivery to the growing height of the dump.

The car 17 is carried by two sets of wheels 40 and 41, the former set at one extremity of the car and the latter intermediate the longitudinal dimensions of the car short of the apertured apron portion previously referred to. The wheels 40 travel within the confines of the channel frame 18 while the wheels 41 travel upon the top of the said channel. Links 42 forming the branches of a yoke 43 are pivoted to the apron portion of the car at 44 and this yoke has attached thereto at 45 a cable 46 which extends over idler pulleys 47 through a sheave 48 at the outer extremity of the hinged portion of the conveyor frame and thence returns by way of the idler pulley 49 and the pulley 50 to the drum 51. Another cable 52 is attached to the car at 53 and extends by way of the sheaves 54 and 55 to the drum 56. These drums are mounted upon a driven shaft 57 with suitable clutch mechanism whereby they can be driven in alternation.

A guide rod 58 leads from the end of the horizontal portion of the conveyor frame to a fixed connection at 59 with the machine structure and is provided with a turnbuckle 60 whereby to provide for the support and possible adjustment as to height of that end of the conveyor frame which bears the weight and impact of the earth deposited in the apron of the car when the auger 11 is discharged.

The operation of the device, subsequent to the discharge of the material into the skip car apron as previously described is as follows: The drum 51 being driven by the shaft 57 and the drum 56 running idly, the cable 46 passing around the sheave 48 draws the loaded skip car to the left along the horizontal and up the inclined portion

of the frame until it approaches the end thereof, whereupon the wheels 40 guided in the channel 18 of the frame travel along the curved path to the point 61 at which point the channel is closed. In the meantime the wheels 41, coincidentally with the downward turning of the wheels 40, enter a channel guide 62 and the wheels 40 being held stationary by the closed end of the channel at 61, the continued pull exerted through the links 42, causes the upending of the skip car 17 as shown in dotted lines in Fig. 1 whereby the material is thrown upon the dump. Thereupon the drum 56 is clutched to the shaft 57 and the drum 51 is released, which results in the return of the empty car to a position above the excavation and beneath the auger 11 which has by this time ascended with another load of excavated material.

I claim:

1. In an excavating machine, the combination 20 with a digging device for digging and dumping excavated material, and a lead shaft therefor, of a conveyor device including a car movable along a track to and from a position beneath the elevated digging device, said car having an aperture 25 to embrace the shaft and a slot extending from the aperture to the edge of the car, plates hinged at the opposite sides of the slot to swing from a meeting position with their edges in contact and enclosing the shaft within the aperture to 30 an upwardly inclined angle with their edges separated to permit entry of the shaft into the aperture as the car is advanced beneath the digging device.

2. In an excavating machine, the combination 35 with an earth auger for digging and dumping excavated material, and a lead shaft therefor, of a conveyor device including a car movable along a track to and from a position beneath the elevated earth auger, said car having a centrally located aperture to embrace the shaft and a slot 40 extending from the aperture to the edge of the car, plates hinged at the opposite sides of the slot to swing from a meeting position at a slight upward angle with their edges in contact and enclosing 45 the shaft within the aperture to a sharply inclined upward angle with their edges separated to permit entry of the shaft into the aperture as the car is advanced beneath the earth auger.

3. In an excavating machine, the combination 50 with a digging device for digging and dumping excavated material, and a lead shaft therefor, of a conveyor device including a car movable along a track to and from a position beneath the elevated digging device, said car when beneath the 55 elevated digging device occupying a position above the open mouth of the excavation against the entry thereto of material discharged by the digging device.

4. In an excavating machine, the combination 60 with a digging device for digging and dumping excavated material, and a lead shaft therefor, of a conveyor device including a car movable along a track to and from a position beneath the elevated digging device, said car constructed to 65 receive and embrace the lead shaft when beneath the elevated digging device whereby to close the open mouth of the excavation against entry of material discharged from the digging device.

5. In an excavating machine, the combination 70 with a digging device for digging and dumping excavated material, and a lead shaft therefor, of a conveyor device including a car movable along a track to and from a position beneath the ele- 75

vated digging device, said car slotted in line with the longitudinal axis to embrace the lead shaft whereby to close the open mouth of the excavation against entry of material discharged from the digging device.

5 6. In an excavating machine, the combination with digging and dumping devices, of a conveyor for the excavated material including a single pair of channeled track members, a skip car with a
10 set of wheels guided in the track channels and

another set riding upon the track exterior to the channels, said track disposed in relation to the excavation to support the car over the open mouth of the excavation and beneath the dumping device, means for propelling the car along the track, and means adjacent the terminal portion of the track for stopping the forward wheels while permitting the rear wheels to progress, whereby the car will be up-ended to discharge its load.

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