

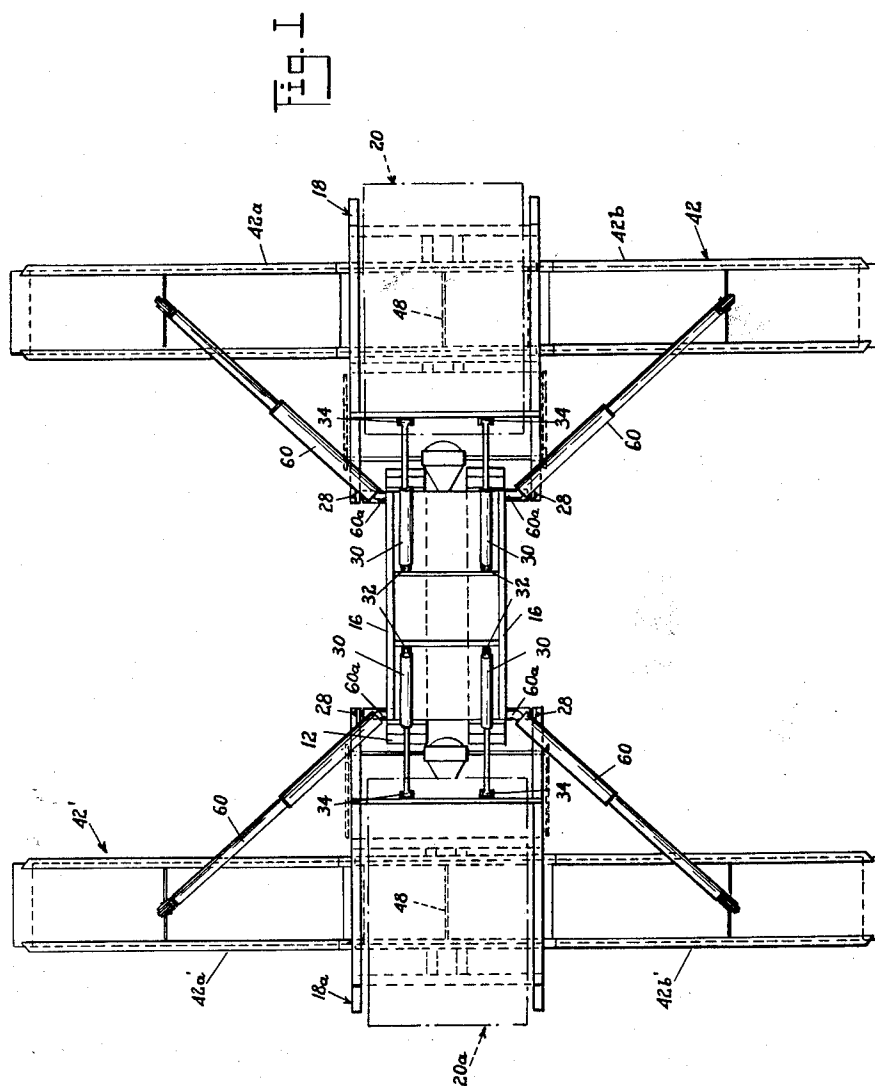
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V. S. PENOTE  
EXCAVATING MACHINE

3,196,562

Filed March 16, 1962

2 Sheets-Sheet 1



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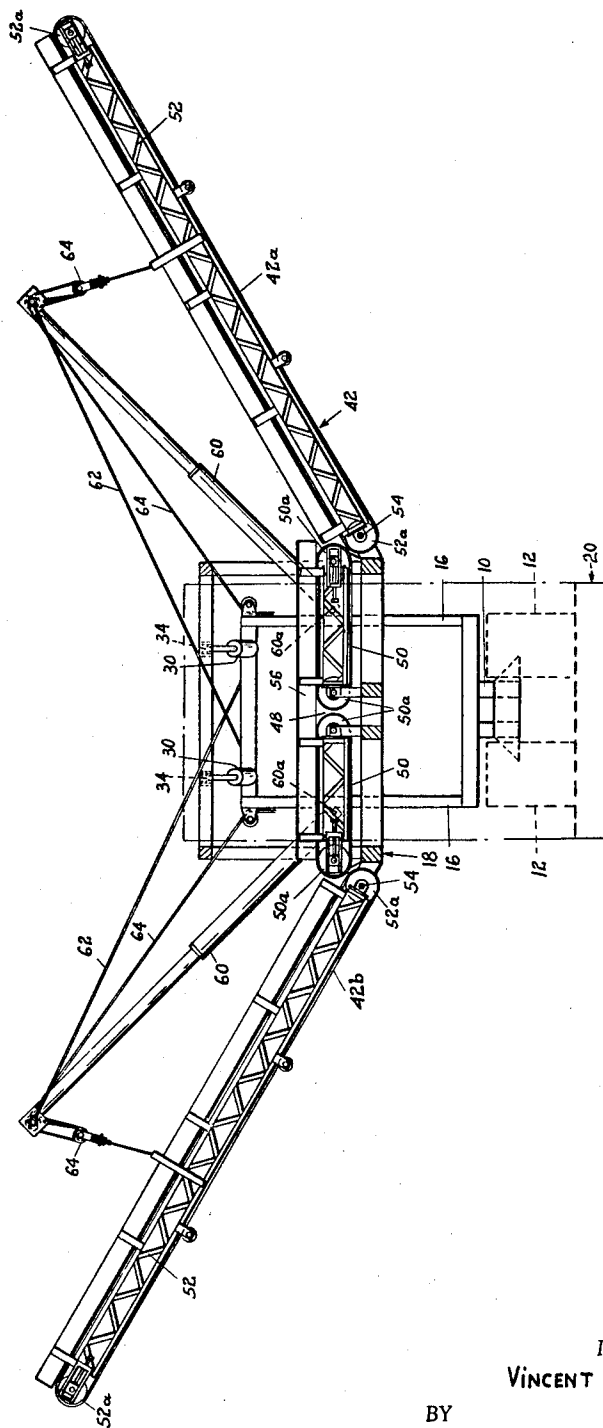
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Fig. 2



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**EXCAVATING MACHINE**  
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This invention relates in general to excavating machines, and more particularly to a mobile excavating machine having a movable endless digging unit mounted thereon, with discharge conveyor means extending transversely of the digging unit, and with the machine being adapted for excavating trenches or the like.

Conventional excavating machines of the general type with which this invention is concerned generally comprise a mobile chassis which supports a power unit thereon, and a boom or frame mounted digging unit on one end of the chassis, with the digging unit and associated boom being usually adjustable in a generally vertical plane, to provide for varying the depth of the excavation. There is usually provided a powered discharge conveyor mechanism extending transversely through the digging unit and supported on the digging unit boom, for receiving excavated material from the digging unit and discharging it to a side of the excavation. Such discharge conveyor mechanism may include an outer conveyor section which is pivoted with respect to the digging unit boom, for movement in a generally vertical plane, for adjusting the height of the discharge end of such conveyor section with respect to ground level, and thus provide for unloading of the excavated material from the conveyor into different height trucks or like vehicles, which are adapted to receive the excavated material as the machine moves along the ground and digs the trench. Such outer conveyor mechanism section is conventionally supported by a jib or crane having a block and tackle cable system coacting therewith, for so moving the outer conveyor section in said vertical plane.

In present day practice, the digging capacity of such endless digging unit type of excavating machines has been materially increased over that of past machines, and one recent arrangement of accomplishing this higher digging capacity, has been to increase the size, and the number of digging units mounted on the machine's chassis. This increased digging capacity of the machine presents problems in connection with handling the excavated material from the digging unit or units of the machine.

The present invention provides a mobile excavating machine having an endless digging unit mounted thereon, with discharge conveyor means extending transversely of the digging unit, laterally to both sides thereof, and with such conveyor means including a pair of preferably separately powered conveyor mechanisms, whereby one of the conveyor mechanisms may discharge to one side of the digging unit and the other conveyor mechanism may discharge to the other side of the digging unit. Such an arrangement provides an excavating machine which can not only out-produce and expeditiously discharge a much greater volume of material, as compared to conventional excavating or trenching machines, but also a machine which has much greater flexibility as concerns the discharging operations of the machine, and of the excavated material from the digging unit into vehicle or vehicles, such as trucks, traveling along with the machine.

Accordingly, an object of the present invention is to provide a novel excavating or trenching machine having an endless digging unit mounted thereon, and with the latter incorporating a plurality of discharge conveyor units projecting to the sides of the digging unit.

Another object of the invention is to provide a mobile excavating machine having an endless digging unit

mounted thereon, with discharge conveyor mechanism extending transversely of the digging unit, and with such discharge mechanism comprising a pair of conveyor units extending from the digging unit laterally to opposite sides of the latter, and with such conveyor units being in material transferring relation at their inner ends and including power means for selectively driving said units in either lengthwise direction thereof, whereby excavated material from the digging unit may be simultaneously discharged to opposite sides of the digging unit, or only to a selected side of the digging unit.

A still further object of the invention is to provide an excavating machine including a discharge conveyor mechanism of the above type, wherein each of the conveyor units is comprised of a least two sections, one of the sections being disposed substantially within the confines of the digging unit and the other of the sections being pivoted with respect to the first mentioned conveyor section, for adjusting the elevation of the outer discharging end of said other conveyor section with respect to ground level.

Another object of the invention is to provide a discharge conveyor mechanism for an excavating machine having an endless digging unit, which discharge mechanism provides for selectively discharging the excavated material from the digging unit to both sides of the digging unit at the same time, or so only one side of the digging unit.

A still further object of the invention is to provide an excavating machine having an endless digging unit mounted thereon with discharge conveyor mechanism coacting with said digging unit for receiving excavated material therefrom, and with such discharge conveyor mechanism providing for much greater flexibility in the discharging operations as compared to heretofore known arrangements.

Other objects and advantages of the invention will be apparent from the following description taken in conjunction with the accompanying drawings wherein:

FIG. 1 is a top plan, generally diagrammatic illustration of an excavating machine having a plurality of digging units mounted thereon to provide a high digging capacity machine, one of the digging units being mounted on the forward end of the machine and another of the digging units being mounted on the rearward end of the machine, and with each of the digging units having associated therewith the novel discharge conveyor mechanism of the invention;

FIG. 2 is a partially sectioned, end elevational view of the excavating machine of FIG. 1 and more or less diagrammatically illustrating the discharge conveyor mechanism of the invention.

Referring now again to the drawings, there is illustrated an excavating machine broadly comprising a main frame or chassis 10 supported on suitable traction mechanism, such as for instance tractor treads 12, and having a main power plant or internal combustion engine (not shown) supported on the chassis frame. Mast structure 16 is mounted adjacent each end of the chassis frame, for supporting a respective boom frame 18, 18a adjacent the opposite ends of the chassis. Endless, preferably bucket equipped digging units 20, 20a are movably mounted on the respective boom frame and in any conventional or suitable manner. Each boom frame may be pivoted, as at 28, to the respective mast structure on the machine chassis, for movement in a generally vertical plane, and which provides for varying the depth of excavation of the respective digging unit and in a manner known in the excavating art. Pivoting of the boom frame in said generally vertical plane with respect to the respective mast structure may be accomplished by means of double acting, fluid powered, reciprocal motor unit or units 30, pivotally coupled as at 32 to the mast structure and pivotally attached as at 34 to the respective boom frame. Reference may be had to the copending United States patent ap-

plication of Vincent S. Penote, Serial No. 179,331 filed Mar. 13, 1962, now Patent No. 3,157,956, for a more detailed discussion of the structural arrangement per se of the above excavating machine.

Each digging unit 20, 20a may have a transversely extending discharge conveyor mechanism 42, 42' projecting therethrough and to opposite sides of the associated digging unit, for receiving the excavated material from the buckets of the digging unit, and discharging such excavated material to areas disposed laterally of the machine, and into, for instance, automotive type trucks moving along with the machine, or the excavated material might be discharged right onto the ground area on opposite sides along the excavation being dug.

Now in accordance with the instant invention, each conveyor mechanism of an associated digging unit comprises a pair of discharge conveyor units 42a, 42b or 42a', 42b' supported on the boom frame of the respective digging unit, and disposed in material transferring relation at their inner ends, as at 48. Each conveyor unit may comprise an inner section 50 having a pair of drums 50a at each end thereof and about which is looped an endless conveyor belt in the conventional manner, and an outer section 52 of considerable length as compared to the inner section, and pivoted to the respective boom frame, as at 54, adjacent the outer end of the respective inner conveyor section, for angular movement in a generally vertical plane, thereby providing for adjusting the height of the outer discharging end of the outer conveyor section 52 with respect to ground level. The outer section of each conveyor unit may include end drums 52a in a generally similar arrangement as the corresponding inner section. It will be noted that each inner section of each conveyor unit extends approximately half way across the transverse width of the associated digging unit, with the inner ends of the inner sections being almost abutting for material transferring relation. The side plate structure 56 of the inner conveyor sections may be continuous, as shown, and extend for the full width of the associated digging unit. The inner and outer sections of each conveyor unit 42a, 42b, 42a', 42b' are power driven, as by means of conventional, reversible, fluid powered, rotary motor units, operatively coupled to associated drums of the respective conveyor section, so that each section of each conveyor unit may be driven in both lengthwise directions.

Reference may be had to United States Patent No. 2,941,411, issued June 21, 1960 to Fred R. Wilhelm et al., which discloses a mechanism suitable for power driving the conveyor sections. It will be seen, therefore, that with such an arrangement, the excavated material being discharged from the buckets of the associated digging unit and onto the inner conveyor sections 50 may be discharged from a single side of the excavating unit by driving the inner conveyor sections 50 in the same lengthwise direction, or may be discharged to both sides of the excavating unit by driving the inner sections and associated outer sections of each conveyor unit in opposite lengthwise directions. Accordingly, the discharging operation can be effected into trucks moving along with the excavating machine on both sides of the excavating machine, and on both sides of each digging unit of the machine, or the excavated material can be discharged to a single side of the machine, or to alternate sides of the respective digging units on the machine. Moreover, the front digging unit (e.g. 20) may discharge into trucks either on both sides or on only one side of the digging unit, while the rear digging unit (e.g. 20a) may discharge onto the ground on both sides of the digging unit, or on only one selected side, or even vice versa. This greatly increases the flexibility of the discharging operations, and considerably improves the facility of the excavating machine to adjust to varying excavating and discharging conditions, as found in the environmental setting in which the excavation is being carried out.

There is preferably provided a jib 60 for each conveyor unit, preferably pivoted to the machine chassis as at 60a, for angular movement in a generally vertical plane, and maintained in position by a cable or chain 62 in the conventional manner. Each jib may be axially extendible and may have a coacting block and tackle arrangement 64 associated therewith, for supporting the outer discharge conveyor section of each conveyor unit, and thus adjusting the height of the outer discharge end thereof with respect to ground level.

With the type of excavating machine shown, which is a high capacity excavator, it will be seen that with the plurality of digging units and with the plurality of conveyor units associated with each digging unit, the excavating and discharging operations of the machine are greatly facilitated, since the excavated material can be discharged from both sides of both digging units or from single sides, or alternate sides of the digging units, and thereby making a very convenient and flexible arrangement for excavating large quantities of material and discharging said material into convenient locations, such as for instance automotive type vehicles traveling along with the excavating machine, resulting in a reduction of the problems connected with maintaining the material receiving vehicles in material receiving relation with the excavating machine.

From the foregoing description and accompanying drawings it will be seen that the invention provides a novel excavating machine having an endless digging unit movably mounted thereon, with a conveyor mechanism extending transversely of the digging unit, and to opposite sides thereof, and with such conveyor mechanism including a plurality of conveyor units, which are actuable to discharge excavated material from the digging unit to both sides of the digging unit, or to only one side thereof, thereby greatly increasing the flexibility of the discharging operations of the machine, and providing for expeditious handling of such discharged material in a high capacity excavating machine.

The terms and expressions which have been used are used as terms of description and not of limitation, and there is no intention in the use of such terms and expressions of excluding any equivalents of any of the features shown or described, or portions thereof, but it is recognized that various modifications are possible within the scope of the invention claimed.

I claim:

1. In a mobile excavating machine having a chassis, traction mechanism supporting said chassis for movement along the ground, a boom frame projecting generally longitudinally from each end of said chassis, an endless digging unit movably mounted on each boom frame for digging operations in a generally vertical plane, each boom frame being pivotally supported on said chassis for swinging movement in a generally vertical plane for varying the depth of excavation of the respective digging unit, power means for selectively pivoting each boom frame, other power means for simultaneously driving said digging units, and a discharge conveyor mechanism mounted on each of said boom frames and extending transversely through the respective digging unit, each of said conveyor mechanisms comprising a plurality of generally elongated conveyor units disposed in generally end-to-end relation and extending laterally to opposite sides of the respective digging unit, each conveyor unit comprising an inner section mounted on the respective boom frame and an outer section pivoted for movement in a generally vertical plane and with respect to said inner section, the last mentioned plane being disposed generally perpendicularly to the first mentioned plane, said outer section being of a considerably greater length than the length of the associated inner section, means for selectively pivoting said outer conveyor section in its said vertical plane, said inner sections of said conveyor units of each conveyor mechanism, at the inner

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ends thereof, being disposed in material transferring relation, and power means for selectively driving each of said conveyor sections of each conveyor unit in either lengthwise direction, whereby excavated material from both digging units may be simultaneously discharged to opposite sides of the respective digging unit, or to only one selected side thereof, and at a selected elevation with respect to the machine.

2. A mobile excavating machine in accordance with claim 1 wherein each of said conveyor inner sections commences substantially at the longitudinal vertical center plane of the respective digging unit and each of said conveyor outer sections is pivoted to the respective side of the respective boom frame, below the outer end of the respective conveyor inner section.

3. A mobile excavating machine in accordance with claim 2 wherein said means for selectively pivoting each conveyor outer section of each conveyor unit in its said vertical plane comprises a jib pivoted to the machine chassis and jutting angularly outwardly therefrom in overlying relation to the respective conveyor outer section,

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and flexible means coacting between the respective jib and the respective outer conveyor section for raising and lowering the respective outer conveyor section in its said vertical plane.

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