

Nov. 15, 1955

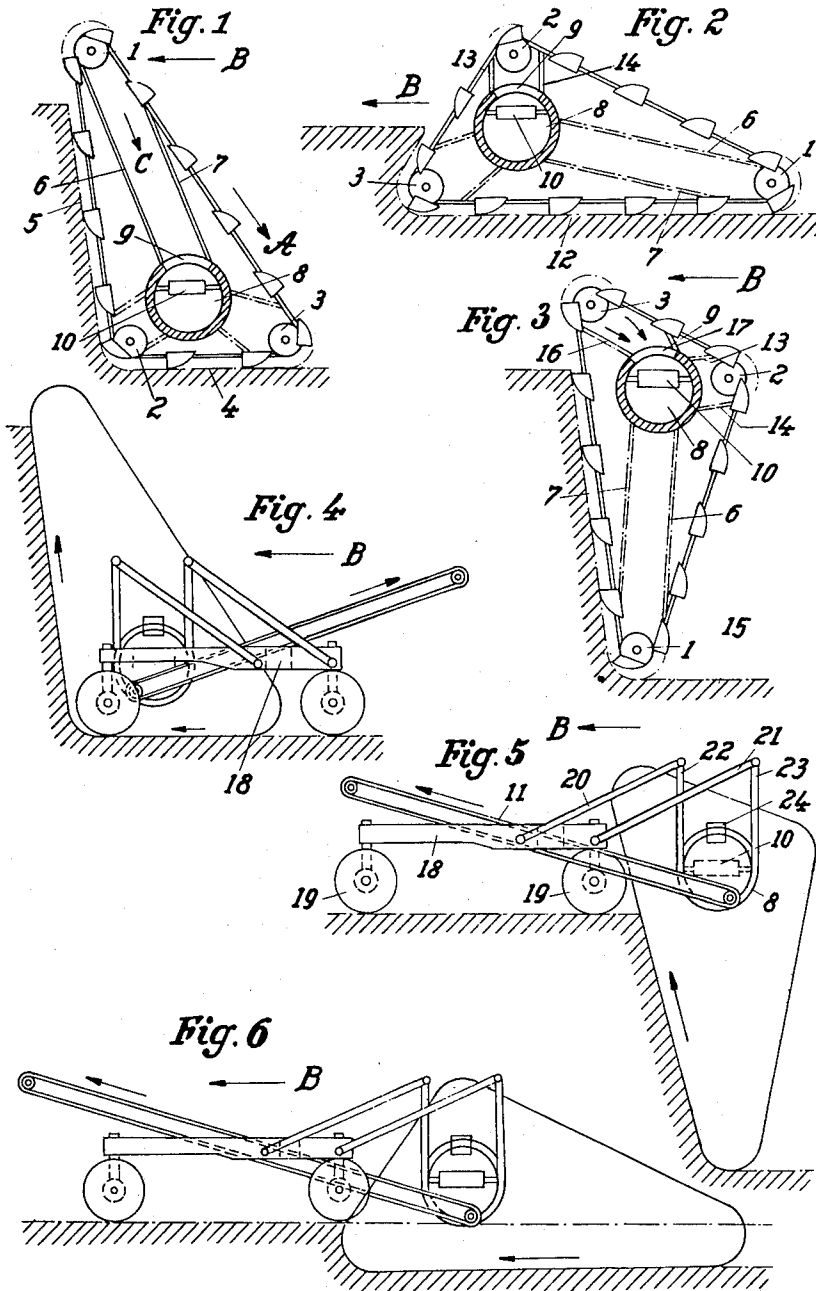
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2,723,473

ENDLESS BUCKET TYPE EXCAVATING MACHINE

Filed Sept. 19, 1951

3 Sheets-Sheet 1



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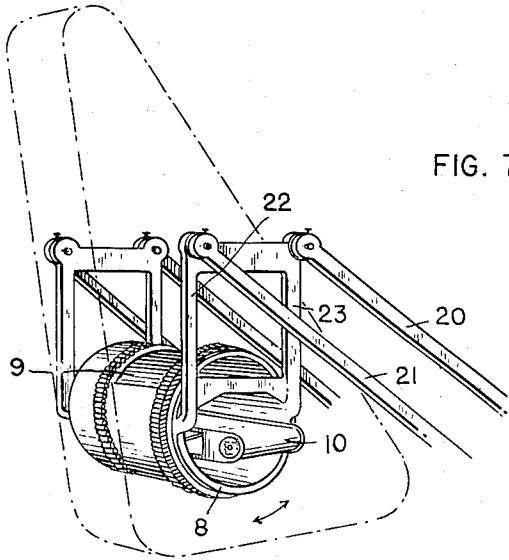


FIG. 7.

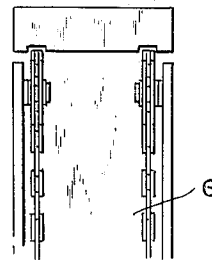


FIG. 8.

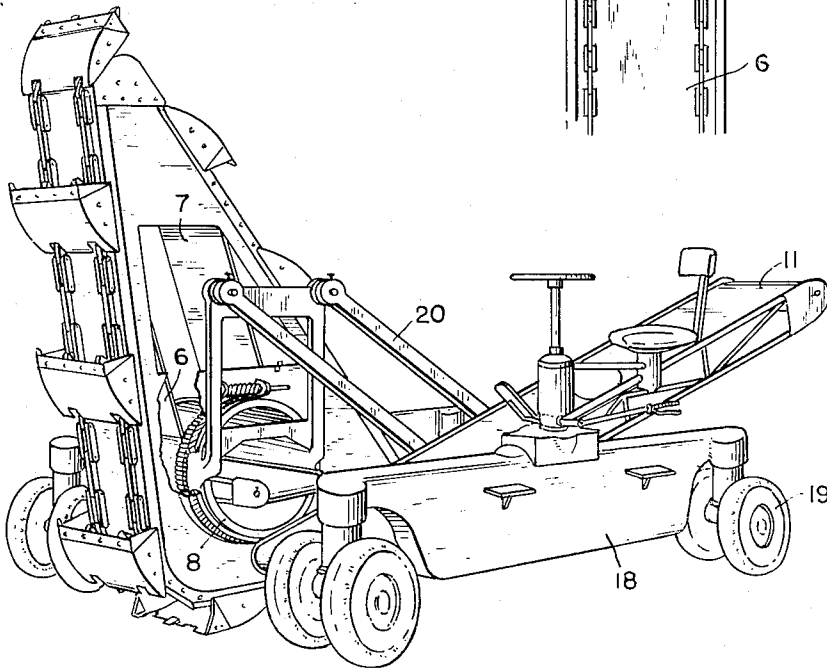


FIG. 9.

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FIG. 10.

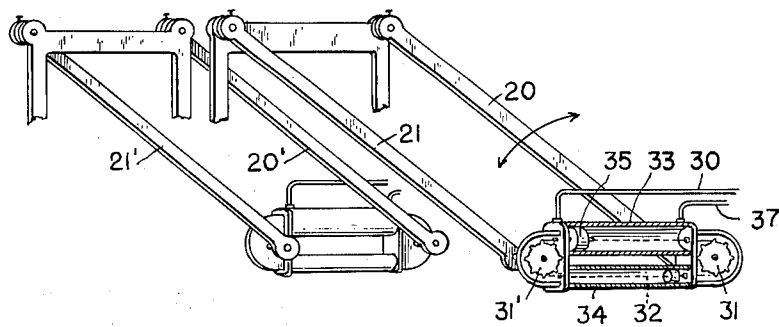
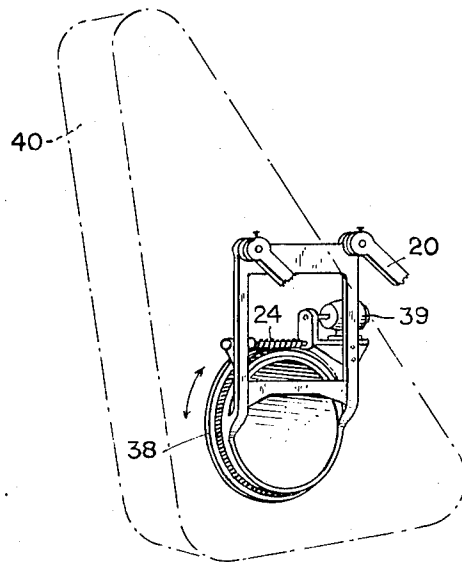


FIG. 11.



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ENDLESS BUCKET TYPE EXCAVATING MACHINE

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Application September 19, 1951, Serial No. 247,311

5 Claims. (Cl. 37—192)

This invention relates to an excavating machine which may also be used for digging ditches.

During building operations, excavators are often used which separate, lift and move away the top soil. Excavators so far known are constructed in such a manner that the frame parts, having guide drums at both ends, rotate a band or chain system to which buckets are attached and that generally one of the two guide drums, at times also both drums, are power-driven. Supporting drums are frequently fixed between the two guide drums.

The present invention relates to an excavating device on which the band or chain system is provided with more than two guide and drive drums so that the frame for the guide drums forms at least a triangular shape.

The excavating device according to the present invention serves the purpose of utilizing, as desired, each one of the excavating surfaces of the triangle as working surfaces. For this purpose, the frame may not only be adjusted according to its vertical or sloping position, but may, furthermore, be arranged so that it can be completely rotated. Therefore, the guide drums at the angles of the triangle make it possible to excavate the earth to be shoveled and transported away so that in carrying out the different operations, that is, in leveling a foundation pit and the excavation of a slope, more than one outside surface of the excavating triangle can be simultaneously used. In the interior of the frame supporting the guide drums, a central device is provided on which the excavated material can be delivered, with the aid of fixed or movable guide screens, which material has been excavated and thrown out by the excavating buckets. From this central device the excavated material can be thrown out laterally by means of a conveyor provided in the central device so that it can be further transported.

One form of the invention is shown in the drawings by way of example in order to more fully explain the invention.

In the drawings, Fig. 1 is a side view partly in section showing the excavating machine in one position of operation.

Figs. 2 and 3 are similar views showing the machine in different positions of use,

Figs. 4 to 6 are diagrammatic views of the machine in three different positions of use,

Fig. 7 is a perspective view showing the details of a conveyor cylinder with its mounting levers,

Fig. 8 is a side plan view of the upper portion of a guide screen,

Fig. 9 is a perspective view of the complete excavator,

Fig. 10 is a perspective view showing the detail of the adjusting mechanism for the excavating conveyor, and

Fig. 11 is a perspective view of a detail.

Fig. 1 shows the machine with three guide drums or pulleys 1, 2 and 3 each provided at a corner of a triangular configuration so that the guide drums with their guide surfaces form the rounded ends of the triangle. The necessary supporting drums or pulleys between the guide drums 1, 2 and 3 for the bucket chain have been omitted

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from the drawing for sake of clearness. The bucket chain travels in the direction of arrow A and the entire excavating machine moves in the direction of arrow B according to the work to be accomplished. In this case the part of the bucket chain moving between the guide rolls 3 and 2, for instance, are adapted to level the soil 4 of a foundation excavation, whereas the part of the bucket chain moving up between the guide drums 2 and 1, Fig. 1, operates on the face 5 of the excavation. From the guide drum 1, guide screens or surfaces 6 and 7 lead to a central device 8 having the shape of a cylindrical casing, the axis of which lies parallel to the rotary axis of each of the guide drums 1, 2 and 3. In the casing of the central device a slot or opening 9 is provided so that the earth thrown out within the range of the guide drum 1, falls down in the direction of the arrow C between the guide surfaces 6 and 7 and reaches a transverse conveyor 10 from which the excavated material reaches a conveyor 11 of the usual construction by means of which it is conveyed out of the machine.

Fig. 2 shows the same machine as Fig. 1 in another operating position. Here, the part of the bucket chain between the guide drums 1 and 3 runs approximately horizontal, so that in this position the excavating machine serves essentially to level the soil surface 12; the advancing direction of the excavator being again shown by the arrow B. The material to be removed from the excavator shown in Fig. 2 takes place under the range of the guide drum 2, the guide screens 13 and 14 taking care that the material falls through the slot 9 into the central cylinder device 8 onto the transverse conveyor 10 provided therein. The guide screens 6 and 7 in this position of the excavator are not used to guide the material since in this position of the excavator no material is handled within the range of the guide drum 1.

Fig. 3 shows the same excavating machine during, for instance, the excavation of a trench of considerable depth wherein the excavator is advanced in the direction of the arrow B and thereby cuts out of the soil 15 a trench of a depth as shown in the drawing with a width equal to the width of the buckets, as may be required. In this case, the soil constituting the excavated material is carried out within the range of the guide drum 3 and the material is guided between the guide screens 16 and 17 through the slot 9 onto the conveyor 10 provided in the cylinder space 8. Since in this position of the excavator no material reaches within the range of guide drum 1, the guide screens 6 and 7 as well as 13 and 14 are not used.

In Figs. 4 to 6 the excavating machine is indicated only by its peripheral contours. As specially shown, the excavating machine is arranged on a chassis or frame 18 with wheels 19, which chassis, if necessary, may have its own driving motor and simultaneously can carry and drive the conveyor 11. On the frame 18 levers 20 and 21 are pivotally mounted so that they can be swung mechanically, hydraulically, pneumatically or manually, as desired. On the cylinder casing surrounding the central device 8 are located the arms 22 and 23 which are pivotally joined to the levers 20 and 21 so that by moving these arms the elevation, the angle and the working surface of the excavating machine can be adjusted according to the work to be accomplished. As a comparison with Fig. 4, the machine can be adjusted to the other side of the frame 18. A locking piece 24 is provided to hold the excavator in the desired position.

Fig. 6 shows the machine in the position similar to Fig. 2.

Fig. 10 shows the swinging movement of the two sets of lever arms 20 and 21 as well as the arms 20' and 21', two being provided on each side of the machine. The lever arms are secured at their lower ends to driv-

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ing wheels 30 and 31 which latter are interconnected by means of a chain 32. This chain 32 is enclosed in an air-tight enclosure in cylinders 33 and 34, of which the upper cylinder 33 is provided with a piston 35 to which the chain is secured. By means of compressed air which is led to the cylinder 33 through pipe 30, the piston 35 may be moved to the left and thereby the lever arms 20 and 21 will be rotated clockwise around their upper end pivots. A pipe 37 is provided on the right-hand side of the cylinder 33 through which the air will be exhausted when the piston moves to the right. If the lever arms 20 and 21 are to be rotated in the opposite direction, then the compressed air will enter through the pipe 37 and the exhaust air will flow out through the pipe 30. The structure connected to the lever arms 20' and 21' will operate in the same manner as just described in connection with the other pair of lever arms.

The part 24, referred to in Fig. 5, relates to a locking piece and specifically comprises a worm 24 as shown in Fig. 11 and this worm meshes with a worm gear 38 in order to lock the latter in an immovable position when the motor 39 is not running. If now the motor 39 is driven in one or the other direction of rotation, the worm 24 will rotate in a corresponding direction and thereby, as shown by the arrow in Fig. 11, the triangular frame and structure 40 is adjusted to the specific position desired, depending upon the work to be accomplished.

What I claim is:

1. An excavating machine comprising a portable frame, two pairs of spaced lever arms pivotally mounted at one end on the frame, a cylinder device arranged with its axis parallel to the horizontal, two further pairs of spaced lever arms each pivotally secured at one end to the other ends of its first-mentioned lever arm and the other end secured to the cylinder device, an endless chain with spaced buckets, and means carried by the cylinder device to mount the endless chain with the spaced digging buckets thereon so that there are at least three sides simulating a triangle, the triangular bucket chain being adjustable rela-

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tive to the cylinder device and the frame so that any desired three sides of the bucket chain may be used for excavating purposes, said bucket chain being adjustable relative to the frame by means of the lever arms so that the bucket chain may be operative for excavation purposes at either end of the frame.

2. An excavating machine according to claim 1, in which the bucket chain may be rotated 360° relative to the axis of the cylinder device.

3. An excavating machine according to claim 1, in which a conveyor belt is provided mounted in the cylinder device to carry away the material excavated by the buckets.

4. An excavating machine according to claim 1, in which a conveyor belt is provided mounted in the cylinder device to carry away the material excavated by the buckets, and in which a second conveyor belt is movably mounted on the frame to remove the excavated material from the end of the first-mentioned conveyor belt.

5. An excavating machine according to claim 1, in which the cylinder device is provided with an opening in the top thereof, and in which means are provided in the cylinder to remove the material falling from the buckets and through the opening in the top thereof.

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