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MULTI-BUCKET TRENCH EXCAVATOR WITH CHAIN SIDE CUTTERS

Filed Feb. 11, 1963

Fig. 1.

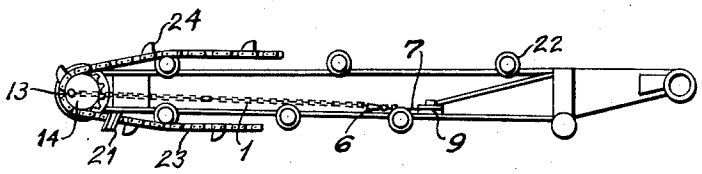


Fig. 2.

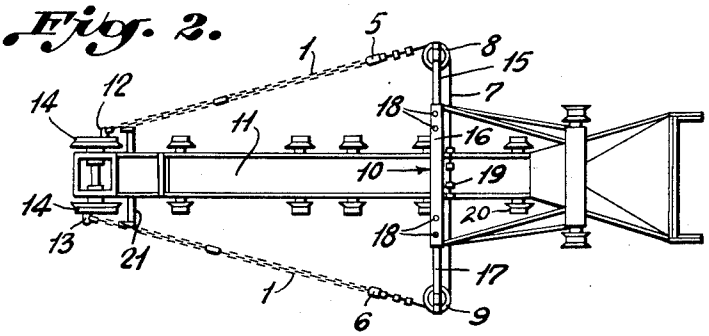


Fig. 3.

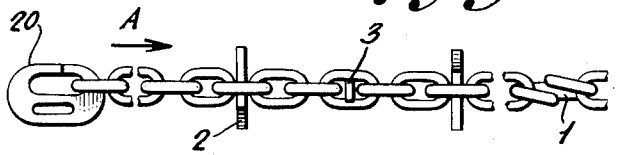
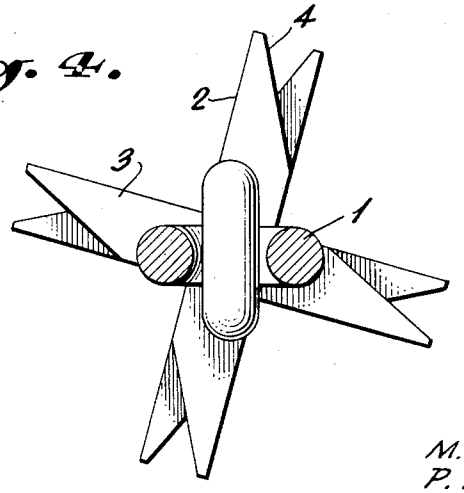


Fig. 4.



INVENTORS
M. M. KISELEV
P. A. PODZIGUN

BY Glascock, Downing & Seebold

ATTORNEYS

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MULTI-BUCKET TRENCH EXCAVATOR WITH CHAIN SIDE CUTTERS

Mikhail Mikhailovich Kiselev and Pavel Antonovich Podzigun, both of Dmitrov, U.S.S.R., assignors to Dmitrovsky Excavatorny Zavod

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This invention relates to the digging of sloping wall trenches by means of multi-bucket excavators and to the designs of working members in these excavators and more exactly, to the manner of separating the earth from the massif to form sloping trench walls, as well as to the equipment designed for implementation of these ways of digging.

It is known that for digging sloping-wall trenches multi-bucket excavators are widely used, the working members of which separate the earth from the massif by cutting.

In particular, this method is utilized for separation of the earth from the massif to form sloping trench walls. Slope-forming devices used for this type of digging require heavy costly construction and also require considerable power to operate.

Such slope-forming devices frequently use screw conveyors, mounted horizontally or in an inclined position on the working member of the multi-bucket excavator.

The principal purpose of this invention is to provide a new machine using a multi-bucket excavator for cutting sloping wall trenches.

In addition, the purposes of this invention are:

To operate the devices designed for slope forming by the mechanism of the excavator itself;

To create a simple and readily detachable device to form trench slopes;

To ensure the possibility of changing the angle of slope of the trench;

To ensure the possibility of changing the depth of the trench to be cut.

Other peculiarities of the invention and objects thereof will become quite clear from the following description and the claims.

For better comprehension of this invention a detailed description of one of the possible versions of construction is given with reference to the attached drawings.

FIG. 1 is a side elevational view of the working member of the multi-bucket excavator with part of the bucket conveyor broken away.

FIG. 2 is a plan view of the excavator shown in FIG. 1 with the bucket conveyor removed.

FIG. 3 illustrates the sawing chain.

FIG. 4 is a transverse sectional view of the sawing chain looking in the direction of arrow A in FIG. 3.

As may be seen from FIGS. 1 and 2 the working member of the multi-bucket excavator is provided with a slope forming device made in the form of chains **1** provided with cutters **2** and **3** (FIG. 3). The cutters **2** and **3** are fastened to the chain in perpendicular directions and extend through the links of the chains to project on both sides of the latter. As shown in FIG. 4, the tapering parts **4** of every other cutter are disposed in opposite directions. The manner of fastening the cutters to the chains ensures an effective excavation and does not require any particular orientation of the chains during mounting of the cutters thereon.

The chains **1** are fastened by their ends **5** and **6** (FIGS. 1 and 2) to the rope **7** engaging the pulleys **8** and **9** secured to the beam **10** mounted on the frame **11** of the bucekt conveyor.

Trained over sprocket wheels **14** and rollers **22** are chains **23** which carry buckets **24** to provide a bucket conveyor.

The chains **1** are fastened by their other ends to the crank pins **12** and **13** fitted in bearings eccentrically mounted on the driven sprocket wheels **14** of the bucket conveyor. Eccentric disposition of the crank pins as well as the angular displacement of one pin 180 degrees with respect to the other pin on the sprocket wheels and running of the rope **7** (connecting the chains **1**) around the pulleys **8** and **9** ensures reciprocal motion of the chains **1** when the sprocket wheels **14** rotate. The beam **10** is made up of telescoping tubes **15**, **16**, **17** which provides for changing the angle between the chains and thereby serves to decrease or increase the angle of their slope with respect to the longitudinal axis of the frame **11** depending upon the nature of the soils to be excavated, that is, upon the chosen angle of slope of a given trench. Fixation of the tubes **15** and **17** in several possible positions relative to the tube **16** is provided by pins or other suitable means inserted into the holes **18**.

Tension in the chains **1** is effected by the rope **7** which is, for this purpose, made up of two sections secured together by detachable clamps **19**.

The chains **1** are of the sectional type which permits adjustment of the length as the depth of the trench being excavated changes. To this end connecting links **20** (FIG. 3) are inserted into the chains.

A detachable beam **21** is mounted on the frame **11** of the bucket conveyor. This beam **21** serves to engage the walls of the trench to prevent vibration or other undesirable movement of the working member of the excavator due to the sawing effect of the chains **1**.

Slope formation takes place simultaneously with the operation of the bucket conveyor of the excavator due to the slope-sawing action by the cutters **2** and **3**. At the same time the separated earth falls into the trench and is fed by the excavator buckets to the dump conveyor. It is to be noted that the excavator and slope forming apparatus of this invention moves longitudinally of the trench during excavating operations.

Although the present invention has been described in accordance with the preferable way of its realization it is clear that alterations and variations may be introduced without any deviation from the very essence and scope of the invention. Such alterations and variations will not be considered to surpass the bounds of the scope of the invention and the claims presented below.

What we claim is:

1. An excavating apparatus comprising an elongated frame, transversely spaced axially aligned sprockets rotatably mounted on the outer end of said frame, rollers rotatably mounted on the inner end of said frame, endless chains trained over said sprockets and rollers, buckets carried by said chains, said chains and buckets providing an endless conveyor, a cross member mounted on said frame adjacent the inner end, an idler pulley rotatably mounted on each end of said cross member, a flexible member trained over said pulleys, a crank pin on one of said sprockets, a second crank pin on the other of said sprockets, said second crank pin being angularly displaced 180 degrees with respect to said first crank pin, an earth cutting chain having one end pivotally connected to said first crank pin and the opposite end connected to one end of said flexible member and a second earth cutting chain having one end pivotally connected to said second crank pin and the opposite end connected to the other end of said flexible member, whereby upon operation of said conveyor said first and second earth cutting chains will simultaneously reciprocate in opposite directions and upon lowering of the outer end of said frame a trench will be excavated with the side walls of the trench being cut at an angle depending upon the distance between said pulleys.

2. An apparatus as defined in claim 1 in which said cross member is adjustable to vary the spacing between said pulleys and in which the length of said flexible member is adjustable, whereby the inclination of said cutting chains may be varied to vary the angle of the side walls of the trench.

3. An apparatus as defined in claim 1, in which spaced detachable connecting links are provided in said cutting chains to facilitate adjustment of the length of such chains.

4. An apparatus as defined in claim 1 in which means is provided on the outer end of said frame for engaging the walls of the trench to prevent vibration and undesirable movement of said frame.

5. An apparatus as defined in claim 1, in which said cutting chains are provided with spaced cutting elements comprising bars extending through the chain links and projecting on opposite sides thereof, adjacent bars being angularly displaced with respect to each other.

6. An apparatus as defined in claim 5, in which the opposite ends of each bar are oppositely tapered.

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