Nov. 23, 1943. E. J. WILSON 2,335,166

TRENCHER BUCKET DIGGING UNIT

Filed April 26, 1943

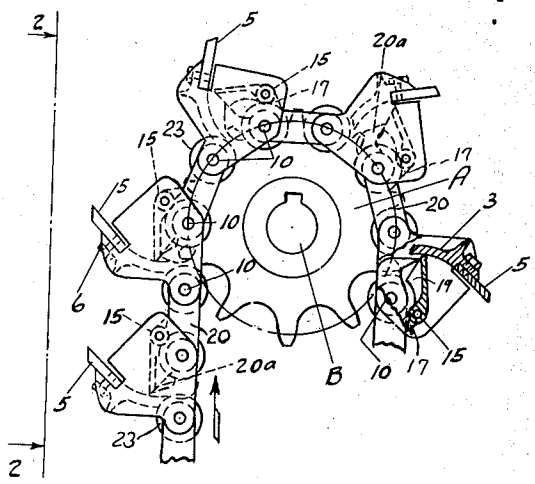


Fig. 1.

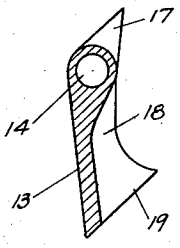


Fig. 3.

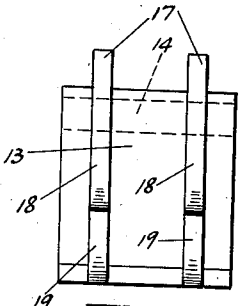


Fig. 4.

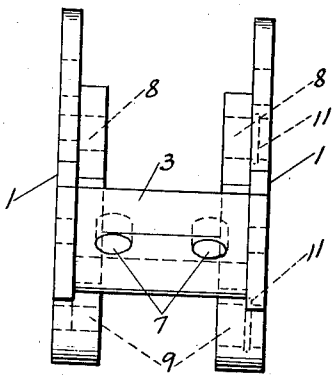


Fig. 5.

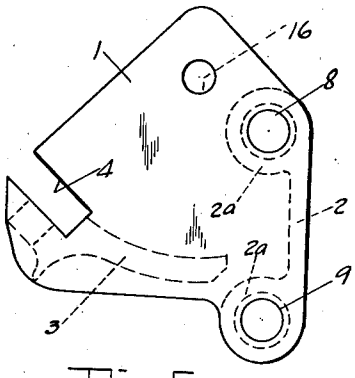


Fig. 6.

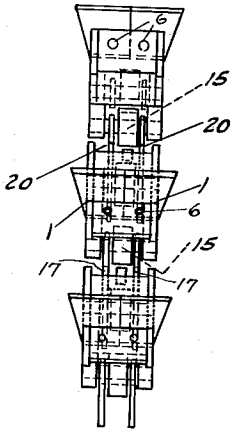


Fig. 2.

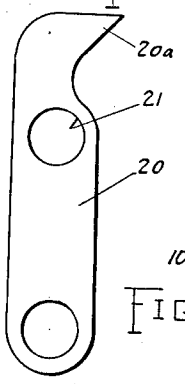


Fig. 7.

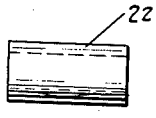


Fig. 8.

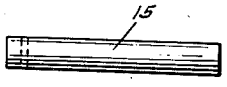


Fig. 9.

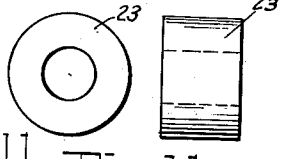


Fig. 11. Fig. 11a

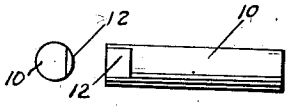


Fig. 10. Fig. 10a.

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TRENCHER BUCKET DIGGING UNIT

Edwin J. Wilson, Indianapolis, Ind., assignor to Hetherington & Berner Inc., Indianapolis, Ind., a corporation

Application April 26, 1943, Serial No. 484,628

6 Claims. (Cl. 37—83)

The purpose of this invention has been to devise a novel construction of endless digging bucket unit such as is commonly used in conjunction with trenching machines of the type employed ordinarily for the digging of trenches.

The endless digging chain or excavating unit of the invention comprises, as usual, a series of connecting digging buckets, and the invention hereof involves primarily certain provisions for cleaning or ejecting the material which is dug by the buckets, therefrom, when the buckets reach their delivery or discharge position in the movement of the endless unit.

In the carrying out of the invention it is contemplated to provide a series of digging buckets equipped with the usual digging instrumentalities and each embodying a back or cleaner plate arranged to sweep over the surface of the bottom of a particular bucket in order to eject the dug materials from the bucket and especially advantageous when such materials are of a nature tending to adhere to the bucket instead of gravitating out of the same when discharging.

The bucket members of the digging unit are connected together by connecting and actuating links which, according to the invention, make up a part of the endless chain structure of the unit, and additionally coact with the movable back or cleaner plates of the buckets to control the action of the latter to move them to a position permitting materials to enter and be carried in the bucket and to positions gradually ejecting and discharging such materials positively from the bucket.

A full understanding of the invention will be had upon reference to the following description and accompanying drawing, in which—

Figure 1 is a fragmentary view of the upper portion of an endless digging unit embodying the invention, illustrating generally in side elevation the various bucket and link parts, one of the buckets however being shown in section to bring out more clearly the mounting of its back or cleaner plate. In this view the various angles of movement of the back or cleaner plate are depicted being automatically effected by variation in the angular disposition of the bucket links and actuator links.

Figure 2 is a view in elevation of the parts shown in Figure 1, looking in the direction of the arrows on the line 2—2 of Figure 1.

Figure 3 is a vertical sectional view of a back or cleaner plate for one of the buckets.

Figure 4 is a side view of the member illustrated in Figure 3.

Figure 5 is a view showing particularly the unit casting or body of the bucket member or link of the endless digging unit.

Figure 6 is a view looking at the bucket member of Figure 5 at right angles to the illustration of Figure 5.

Figure 7 is a side view of one of the actuator and connecting links.

Figure 8 is a detail view of one of the bushings for the rollers carried by the pivot pins connecting the bucket and actuating links.

Figure 9 is a view of the pivot pin mounted in spaced side portions of the bucket member or link and supporting the bucket member or cleaner plate.

Figures 10 and 10*a* are end and side views of the pivot pin that connects the actuating links to the bucket members or links.

Figures 11 and 11*a* are end and side views of one of the bearing rollers intermediate the bucket and actuating links of the digger chain.

Describing the invention specifically, and referring to the drawing, A denotes the upper sprocket generally carried at the upper end of the boom of an endless digger unit for trenching machines. The sprocket A is keyed to a suitable shaft B for drivingly operating the digger chain or unit which passes around the sprocket according to conventional practice.

The digger chain unit itself is made up of what may be termed bucket links, and actuating links which connect the bucket links together in a chain-like arrangement. The so-called bucket links are made up as a single unit, so to speak, whereas the actuating links are two in number intermediate each bucket link or body. The bucket links or members comprise the spaced sides 1 formed with rib portions 2 on their inner faces at the inner edges thereof and with bosses 2*a* at the upper and lower ends of the ribs 2. The sides 1 of the bucket member are connected rigidly together by a bottom or cross member 3 cast integrally with the sides 1, preferably, and said sides, which are likewise formed with slots 4 leading inwardly from their outer lower edge portions for receiving a blade or blades 5, two of which are preferably used, are reinforced by the ribs 2. The blades 5 are held in place by the slots 4 and in transverse relation to the body of the bucket member by means of screw bolts 6 which pass through openings 7 leading through the outer portion of the bottom member 3 and intersecting the slots 4 intermediate their ends.

Transverse openings 8 and 9 are formed in the sides 1 and bosses 2*a* thereof as seen best in Fig-

ures 5 and 6, there being a pair of openings 8 in transverse alignment and a pair of openings 9 in transverse alignment. These openings receive the pivot pins 10 held from endwise displacement rightwardly from the openings 8 as seen in Figure 5 by means of split lock rings 11. Flats 12 are milled on one end of each pivot pin 10 for engagement with the left-hand one of each of the openings 8 and 9 as seen in Figure 5, so as to prevent turning of said pins 10.

Carried by the bucket member and intermediate the sides 1 thereof is the back plate or cleaner member 13 having a transverse pivot opening 14 therein and supported by the pivot pin 15, see Figure 9, which passes through openings 16 in the sides 1 of the bucket member. In this manner the back or cleaner plate 13 is pivotally supported to have pivotal movement swinging on the pin 15 intermediate the sides 1 of its respective bucket member.

The lower edge of the cleaner member 13 of course swings upon an arc conforming with the arc of the upper surface of the bottom member 3 before described and relatively close thereto. Said cleaner member 13 is likewise equipped at its upper end with spaced cam projections 17 which extend above the pivot opening 14 and are formed by rib-like sections 18 on the inner side of the cleaner plate. The said rib-like sections 18 at their lower portions are curved outwardly to provide the secondary cam projections 19 for purposes to be hereinafter descsribed.

Figures 1, 2 and 7 show the projections of actuating links 20 which are disposed in spaced relation, are arranged at the ends thereof between the side members 1 of adjacent bucket link members of the endless digger unit, and are pivotally connected to such adjacent bucket members by means of the pivot pins 10 previously described which pass through openings 21 of said actuating links 20. Surrounding the pivot pins 10 are bushings 22 which maintain the actuating links 20 in properly spaced positions. At one end of each link 20 is formed a cam member 20*a*, these members of two spaced adjacent links designed to cooperate with the edge portions of the secondary cams 19 of a cleaner plate 13 adjacent thereto, for compelling a swinging movement of said cleaner plate with ejecting action thereof as the links 20 assume certain angularity in relation to the bucket members or links of the endless digger unit. Additionally, the outer edge portions of the links 20 are designed for cooperation with what will be termed the tail cam 17 of a cleaner plate, and are in substantial alignment with the rib-like formations 18 with which the cams 17 and 19 are provided.

For facilitating a free frictional cooperation between the parts of the endless digger unit and the sprocket A, as well as the lower sprocket of the unit, not shown, bearing rollers 23 are carried by the pivot pins 10 and directly contact the recess of the sprocket A between the teeth thereof during the rolling moving engagement of the endless digger unit around the sprocket. The rollers 23 are directly mounted upon the bushings 22 and disposed between the spaced actuating links 20 that connect with the pins 10 whereby to in turn establish the connections between the various bucket members or links.

The operation of the parts of the endless digger unit which has been above described is as follows and will be understood best by reference to Figures 1 and 6.

Referring to the lowermost bucket member or link at the left in Figure 1, it will be seen that since the endless chain structure is moving in the direction of the arrow in said figure, said bucket member is rising as it moves upwards toward the sprocket A. It will be presumed that this member has performed its digging function when it previously reached the lower end of the boom supporting the digger chain unit and is filled with excavated material by reason of the action of the digging blades 5. In the vertical rising position of the bucket member the cleaner plate 13 is virtually in a vertical position with the lower end of the cams 19 thereof contacting the lowermost portion of the actuating cams 20*a* of the links 20. When the bucket member reaches a point nearly at the vertical line of the axis B of the sprocket A, the actuating links 20, which previously were in substantial alignment with the pivot openings 8 and 9 of the bucket member below same, begin to angle rightwardly in relation to the bucket member, thus shifting the cams 20*a* outwardly and causing them to ride along the lower edges of the cams 19 with the effect of pushing outwardly on the cleaner member 13 to eject the excavated material between the sides 1 of the bucket member therefrom. As seen at the upper right portion of Figure 1, the ejecting operation is nearly completed by reason of the position of the cleaner plate 13. Then, as the bucket member and links 20 just below the same complete their movement around the sprocket A, the portions of the bucket member in line with the pivots 10 or the openings 8 and 9 commence to align with the links 20 as viewed from the side. As this particular movement takes place, the tail cams 17 on the cleaner plate are pushed outwardly by the outer edge portions of the links 20, thereby tending to shift the cleaner plate pivotally inwardly toward the bottom member 3 of the bucket member. In other words, the relative movements of the cleaner plate, the bucket member, and the actuating links 20 take place as an incident to the assumption of angular relative positions of the bucket members and links 20 to cause the ejecting movement of the plate. The restoring movement of the cleaner plate to its non-ejecting or bucket filling position is effected by the relative movement of the bucket members and the links 20 in the direction of alignment and the final alignment thereof by the coaction of the tail cams 17 and outer edge surface of the links 20.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States, is:

1. An endless digging unit for trenching machines, comprising, in combination, bucket link members, actuating link members connecting the bucket link members, pivot means connecting said members, digging elements carried by the bucket link members, the bucket link members each comprising a bottom member and a cleaner plate movably mounted relatively thereto, and cam means carried by the actuating link members cooperative with the cleaner plate of an associated bucket link member for moving the cleaner plate to and from ejecting positions.

2. An endless digging unit for trenching machines as claimed in claim 1, in which the cam means comprise an end cam member formed on each actuating link member for moving a cleaner plate of an adjacent bucket link member to eject material from the latter.

3. An endless digging unit for trenching machines as claimed in claim 1, in which the cam

means comprise an end cam member formed on each actuating link member for moving a cleaner plate of an adjacent bucket link member to eject material from the latter, cam means on the cleaner member cooperative with said end cam members of the actuating link members, and other cam means on the cleaner plate cooperative with the actuating link members to engage the latter to move the cleaner plate to non-ejecting position.

4. An endless digging unit for trenching machines, comprising, in combination, a sprocket wheel, a digging chain unit extending around said sprocket wheel and interengaged therewith and including bucket link members and actuating link members, pivot means connecting said bucket link and actuating link members, the actuating link members connecting the bucket link members together, and the bucket link members comprising each a bottom portion and a cleaner plate pivotally mounted to swing toward and on the bottom portion, each cleaner plate having spaced end cams at its opposite ends, the actuating link members adjacent to a bucket member having end projecting cams to cooperate with the cams at one end of the cleaner plate to push the cleaner plate away from the bottom portion aforesaid, and the outer edge portions of the actuating link members cooperating with the other cam members of the cleaner plate for restoring the cleaner plate to a normal position adjacent to the bottom portion of the bucket link.

5. An endless digging unit for trenching machines as claimed in claim 4, in which the pivot means comprises pivot pins pivotally connecting the actuating link members to the bucket link members, and sprocket recess engaging rollers mounted on said pivot pins.

6. An endless digging unit for trenching machines as claimed in claim 4, in which the pivot means comprises pivot pins pivotally connecting the actuating link members to the bucket link members, sprocket recess engaging rollers mounted on said pivot pins, and bushings surrounding the said pivot pins intermediate the actuating link member connections therewith to maintain the latter in spaced position.

EDWIN J. WILSON.