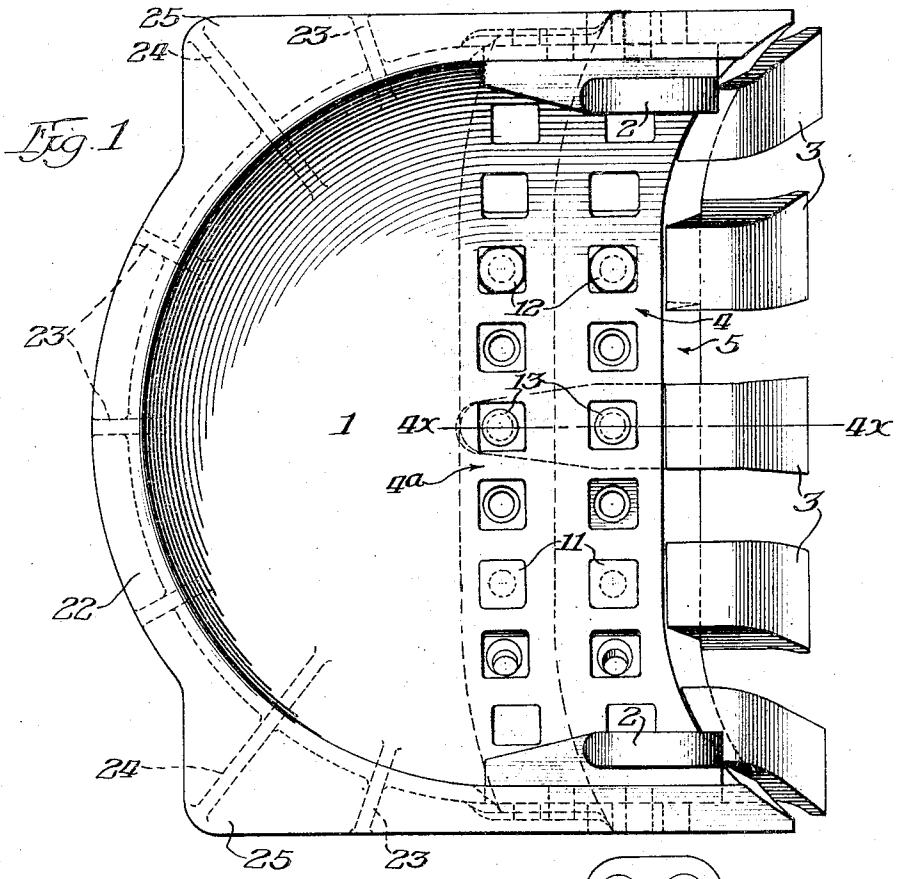
Aug. 9, 1927. 1,638,099

C. RORABECK

ENDLESS CHAIN EXCAVATOR BUCKET WITH DIGGING TEETH

Filed Oct. 27. 1924 2 Sheets-Sheet 1

Fig. 1



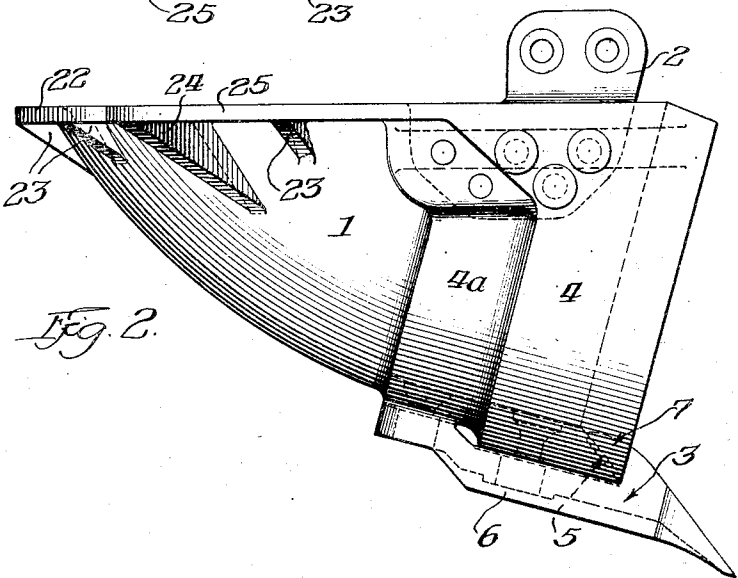


Fig. 2.

Witness:
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Inventor:
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Aug. 9, 1927. 1,638,099

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ENDLESS CHAIN EXCAVATOR BUCKET WITH DIGGING TEETH

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Fig. 3.

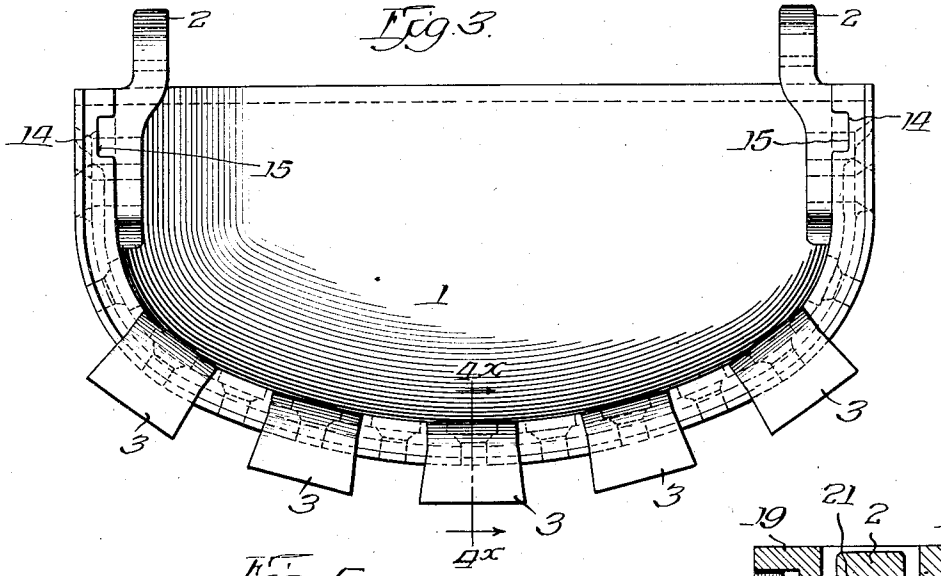


Fig. 5.

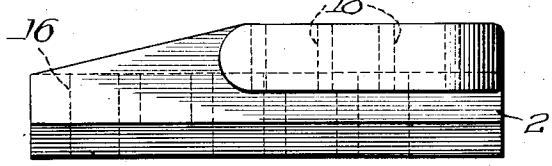
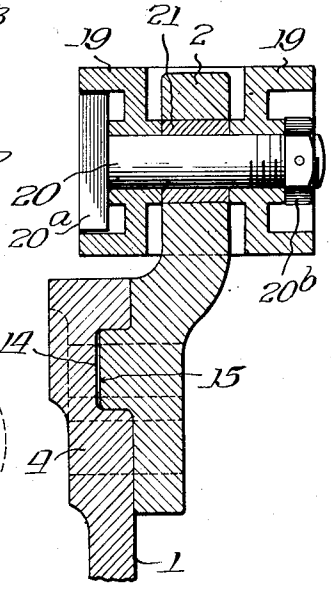


Fig. 7



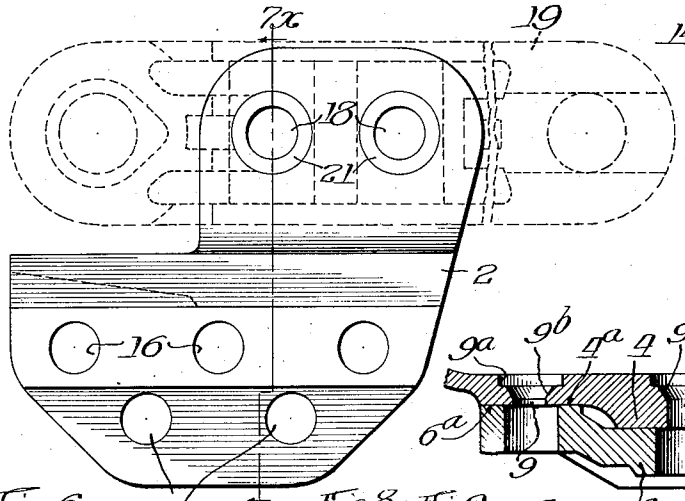


Fig 6.

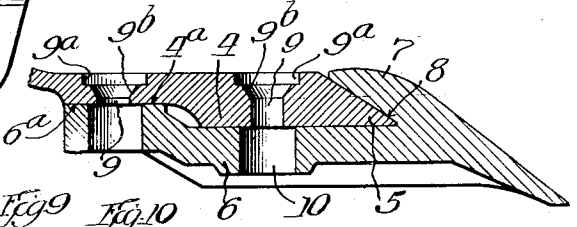


Fig. 4

Fig. 8

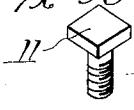


Fig 9

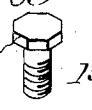


Fig. 10



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Patented Aug. 9, 1927. 1,638,099

UNITED STATES PATENT OFFICE.

CLAUDE RORABECK, OF CHICAGO HEIGHTS, ILLINOIS, ASSIGNOR TO AMERICAN MANGANESE STEEL COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF MAINE.

ENDLESS-CHAIN EXCAVATOR BUCKET WITH DIGGING TEETH.

Application filed October 27, 1924. Serial No. 745,988.

This invention relates to excavating buckets mounted on endless chains traveling around guides in a manner to bring the buckets successively into position to pick up a load of material to be elevated, and then to a position at which they dump such material; and particularly to endless chain buckets of the type in which hangers are employed for suspending each bucket from the chain, and teeth are mounted upon the forward edge of the bucket to increase the digging efficiency.

One object of the invention is to provide a construction of bucket of the type described, which can be produced with a minimum of metal, preferably by the art of casting, but which will be of increased strength, particularly where stresses mainly occur in the operation of the bucket, and in which the means employed for strengthening the bucket will likewise serve as a more effective mounting for the suspending hangers or for the digging teeth, or for both the hangers and the teeth. Accordingly, one feature of the invention consists in constructing the body of a bucket of the kind described with a strengthening belt at its forward margin, which affords increased thickness in the section of the bucket and provides a stronger digging portion as well as an improved mounting for digging teeth; one feature incident to the preferred embodiment of this portion of the invention consisting in reducing the thickness of the body of the bucket rearwardly from its aforesaid thickened margin by a plurality of stages developing steps or offsets which increase the security of attachment of the teeth. Another feature incident to the preferred embodiment of this part of the invention consists in continuing the thickening belt of the forward margin of the bucket not only across the bottom of the bucket or portion which receives the digging teeth, but up the sides of the bucket as well, where it may be suitably enlarged in the direction in which the bucket travels, and transversely to the direction of load imposed upon the hangers, and utilizing the more substantial dimension thus provided for a more secure attachment of the hangers, namely, by providing the resultant thick sides of the body portion and the hangers that are secured thereto, with a tongue and groove interlock transverse to the plane of the hanger, and therefore adapted to relieve the securing rivets of shear that would otherwise be imposed by the bucket load; and the interlocking tongues and grooves being extended in the direction of the length of the bucket so as to insure the rivets against shearing stresses due to tipping moment of the hanger, particularly when each hanger is designed for a two-point suspension upon the endless chain.

Another object of the invention is to strengthen the bowl portion of a bucket of the kind described, and particularly one which is provided with a thick strengthening belt around its forward margin, and thereby enable the production of the bucket with a relatively thin bowl and compensate in a measure for the increased weight necessarily involved in strengthening the digging portion of the bucket. Accordingly, another feature of the invention consists in constructing the bucket with a deep marginal flange around its upper edge, preferably exterior thereto and in a horizontal plane, so that the bowl of the bucket will be strengthened against flexure that might ultimately lead to cracking; this flange being suitably braced relatively to the bowl through the medium of brackets that are preferably integral therewith; and said flange being increased in depth at the quadrants of the bowl or sectors thereof that are intermediate of its side and rear walls; and this strengthening flange being preferably merged at its forward ends with the thickening belt.

Still another object of the invention is to provide an improved construction of digging tooth which may be advantageously assembled with the body of a bucket constructed as above described; and to this end, another feature of the invention consists in providing digging teeth with attaching shanks conforming substantially to the stepped under face of the bucket, and with holes through which it may be riveted or bolted to the bucket; also a jaw extending upwardly and rearwardly from said shank and developing therewith a wedge-shaped seat to receive the beveled forward edge of the bucket; the effect being, in the preferred design of this part of the invention, to locate the face, through which the rear end of the toothed

shank meets the under face of the bucket, in a plane that is above that of the apex of the bevel and wedge-shaped seat, thus fixing the radial moment of the forward end of the tooth in a path that is toward the beveled face of the bucket, and therefore less liable to impose strain upon the rivets under the load of digging.

Other features of the invention relate to bushings introduced into the eyes of the hangers through which they are suspended from the chains, and the special form of countersink whereby any bolt hole is adapted to receive bolts with variously designed heads in securing the teeth to the bucket, as will be fully described hereinafter.

In the accompanying drawings—

Figures 1, 2, and 3 are, respectively, a top plan view, a side elevation, and a front end view of a bucket embodying the several features of the present invention.

Figure 4 is a detail view showing the assembly of the digging tooth with the bucket, the parts being shown in section on the line $4^{\times}$—$4^{\times}$ of Figures 1 and 3.

Figures 5 and 6 are, respectively, a top plan view and a side elevation of one of the hangers, a chain link from which the hanger is suspended being shown in dotted lines in Figure 6.

Figure 7 is a section on the line $7^{\times}$—$7^{\times}$ of Figure 6, but with the section of the chain link shown in full lines.

Figures 8, 9, and 10 are views representing three conventional forms of bolt, for the reception of which any of the tooth-attaching openings in the body of the shovel are especially designed.

1 represents the bowl, 2 the hanger, and 3 the digging teeth of a shovel, a plurality of which are commonly mounted upon an endless chain for the purpose of picking up and elevating subdivided material, but it is to be understood that while the several features of the invention are intended primarily for and will be described as used in a bucket for this particular purpose, the invention may be applied to other digging and conveying receptacles where the several parts will perform equivalent functions.

The bowl 1 is provided on its forward or digging margin with an integral strengthening belt 4 of such dimension as to materially thicken the section of the body of the bowl at this point and provide a beveled lip 5 for engagement with the teeth 3. Teeth 3 are constructed with rearwardly extending attaching shanks 6, and upwardly and rearwardly extending jaws 7 forming with said shanks a V-shaped seat 8 to receive the beveled lip 5. Shanks 6 may be secured to the forward thickened portion of the bowl 1 by any suitable means, but this is preferably accomplished by means of bolts passing through the openings 9 in the bowl and elongated openings 10 in the shank. In order that the openings in that one of the members which is to receive the head of the bolt will receive any one of several conventional types of bolt, for instance, the plow bolt 11 shown in Figure 8, the machine bolt 12 shown in Figure 9, or the carriage bolt 13 shown in Figure 10, the opening 9 is provided with a square countersink 9^{a} of sufficient size to take either the square head 11, or the hexagonal head 12, and also with a beveled countersink 9^{b} that will take the frusto-conical head 13, and inconvenience and loss of time, due to procurement of special bolts in the remote places in which machines of this type are used, are thus avoided.

The reinforcing belt 4 is reduced in thickness rearwardly by stages, thereby not only avoiding abrupt change from the thickest portion of the relatively thin wall of the bowl 1, but also providing a seat 4^{a} for the rear end of the attaching shank 6; and to meet said seat shank 6 is provided with an upwardly offset portion 6^{a}, thus bringing the meeting faces of the body portion of the bucket and the rear end of the attaching shank in a plane that is above the plane of a substantial portion of the bevel 5, and causing the downward swinging moment of the tooth, induced by the digging action, to assume a path that intersects said portion of the bevel and, correspondingly, stresses imposed upon the attaching bolts.

Strengthening belt 4 extends downwardly across the bottom of the bowl 1 and up the sides as well, thus greatly stiffening the arch of the bowl in the direction to resist spreading of the sides under digging action, and at the same time lending strength to the upper portions of said sides where hangers 2 are to be attached. In availing of the extra metal thus provided at the point of attachment of the hangers 2, said hangers and the side walls of the bowl are provided, one with a groove 14 and the other with a tongue 15 fitting said groove and thus interlocking the body member and supporting member together in a direction to take the vertical load of the shovel, so that rivets introduced through the openings 16, 17 for the purpose of resisting lateral displacement of the hangers will be substantially relieved of shearing stresses. Tongue and groove joint 14, 15, is elongated in the direction of the longitudinal axis of the shovel so as to extend rearwardly from the bolt holes 18 of the hanger a distance that will be ample to resist turning moment of the hanger relatively to the bucket, and thus relieve the hanger attaching rivets from shearing stresses that might develop from turning moment of the hanger in its own plane. Preferably, the rivet holes 16 pass through the tongue 15 and the bottom of the groove 14, while holes 17 are so positioned

that rivets passing therethrough can brace the thinner portion of the hanger 2 and the thicker portion of the side wall.

19 represents a known construction of chain link composed of two spaced members between which the hanger 2 is intended to be introduced, and to which said hanger is secured by suitable means, such, for instance, as a bolt 20 having a head 20^a at one end by which it is kept from turning in the link and hanger, and a nut 20^b at the other end by which it is held from displacement; and, inasmuch as friction of the bolt is thus limited to its bearing in the hanger 2, each hole 18 which receives a bolt 20 is lined with a bushing 21 that terminates flush with the outer face of the hanger, is kept from axial displacement by the overlapping faces of the link members 19, and is readily removable when worn and thereby avoids discarding expensive parts before the entire bucket has served its purpose.

While the construction of bucket body thus far described insures a very rugged digging portion at the front of the bucket, and, by rigidly spacing the sides, largely resists flexing stresses in the rear portion of the bowl, particularly at the quarter sectors where said stresses are greatest, it has been found desirable to stiffen the entire upper margin of the bucket, and to that end, the present invention provides around said margin an exteriorly presented horizontal stiffening flange 22 that merges at its forward end with the strengthening belt 4, and is braced relatively to the bowl 1 by suitably distributed brackets 23, 24; moreover, said flange 22 is designed with shoulders 25 that greatly increase the depth of the flange adjacent the quarter sectors of the bowl, for which reason, those brackets 24 which are located beneath said shoulders are correspondingly enlarged.

I claim:

1. In a link chain bucket conveyor, the combination of a link, a hanger having a two-point suspension on said link which fixes the hanger against angular motion relatively to the link, and a digging bucket suspended by said hanger from said link; said hanger and bucket having a tongue and groove interlock in a plane transverse to the plane of suspension and extended in the direction of the length of the bucket horizontally beyond the attachment of the hanger to the link.

2. An excavating bucket having at its forward end a strengthening belt extending up the sides of the bucket and providing thickened upper forward marginal portions of the bucket, said thickened portions extending rearwardly from said belt and formed with elongated horizontal grooves, and hangers for suspending said bucket riveted to said thickened portions and having tongues entering said grooves; some of the rivets passing through said tongues and the bottoms of the grooves.

3. An excavating bucket having at its forward margin a strengthening belt extending to the upper forward corners thereof and having a horizontal strengthening flange extending around its upper margin and merging with said belt.

4. An excavating bucket having at its forward margin a strengthening belt extending to the upper forward corners thereof and having a horizontal strengthening flange extending around its upper margin and merging with said belt; said flange being increased in depth at the quadrants of the bucket.

Signed at Chicago Heights, Illinois, this 13th day of October, 1924.

CLAUDE RORABECK.