W. G. AND O. R. HUMPHREYS.

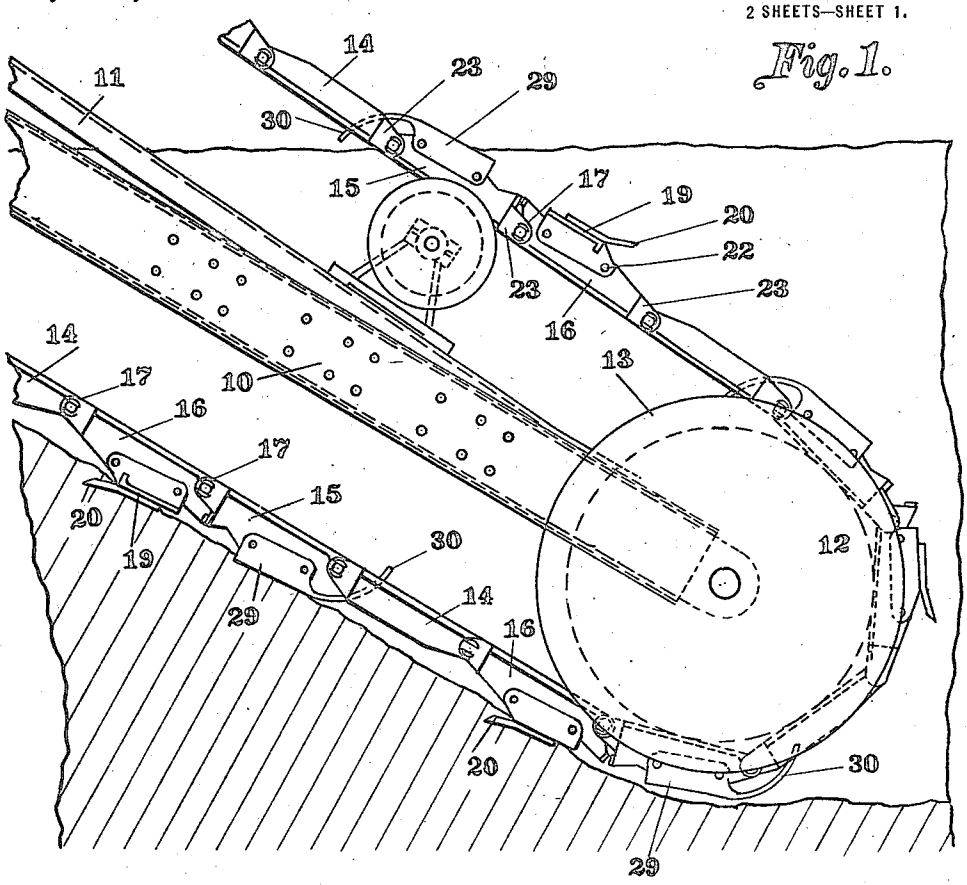
BUCKET CHAIN EXCAVATOR.

APPLICATION FILED JUNE 12, 1920. RENEWED APR. 8, 1922.

1,419,382. Patented June 13, 1922.

2 SHEETS—SHEET 1.

Fig. 1.



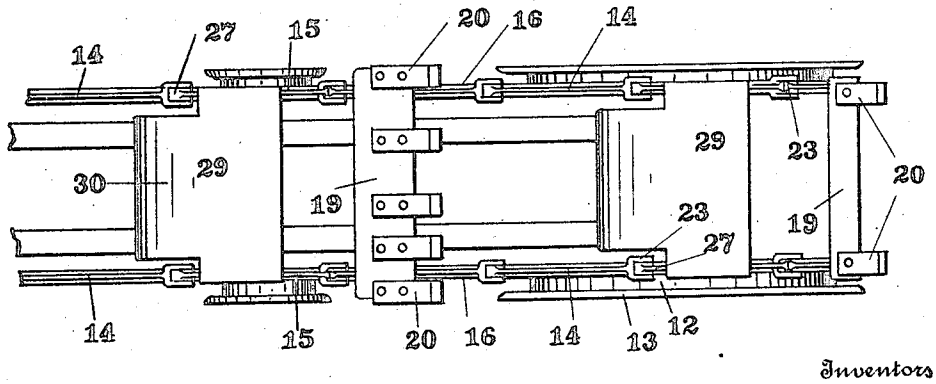


Fig. 2.

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2 SHEETS—SHEET 2.

Fig. 3.

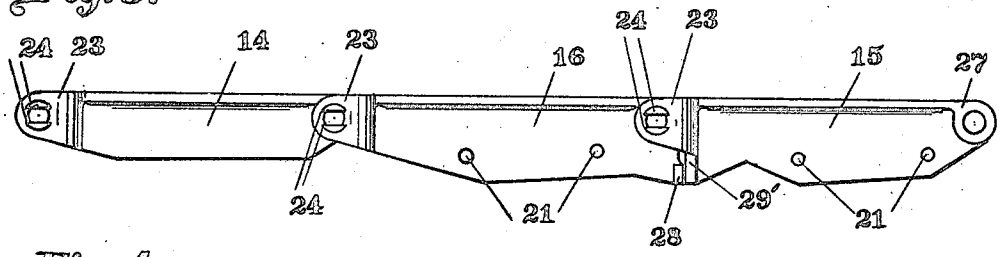


Fig. 4.

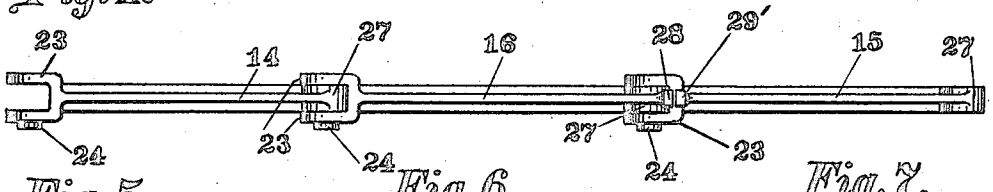


Fig. 5.

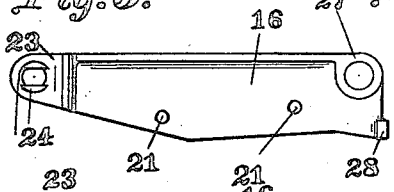


Fig. 6.

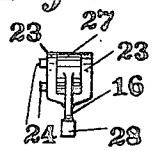


Fig. 7.

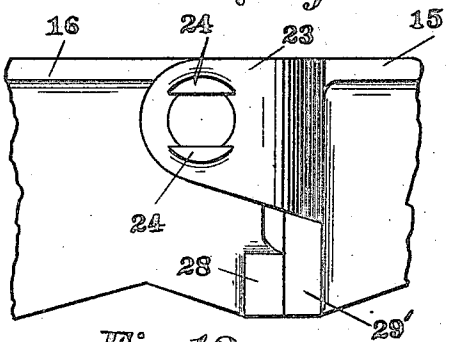




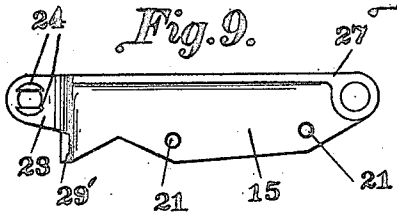
Fig. 8.

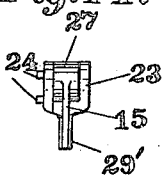
Fig. 11.

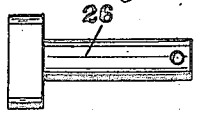
Fig. 12.

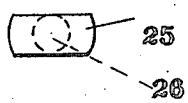
Fig. 13.

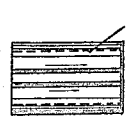
Fig. 9.













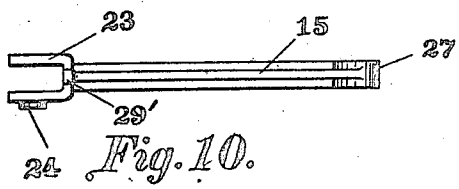


Fig. 10.



Fig. 14.

Fig. 15.

Fig. 16.

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UNITED STATES PATENT OFFICE.

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BUCKET-CHAIN EXCAVATOR.

1,419,382. Specification of Letters Patent. Patented June 13, 1922.

Application filed June 12, 1920, Serial No. 388,433. Renewed April 3, 1922. Serial No. 550,789.

To all whom it may concern:

Be it known that we, WALTER G. HUMPHREYS and OMAR R. HUMPHREYS, citizens of the United States, residing at Omaha, in the county of Douglas and State of Nebraska, have invented certain new and useful Improvements in Bucket-Chain Excavators, of which the following is a specification.

The present invention relates to excavators of that type wherein endless chains with buckets are employed, and more particularly to an excavator for digging trenches and the like.

An object of this invention is to provide an improved endless chain construction wherein the individual units will be maintained in proper alignment and will be held from buckling when the digging points encounter resistance, such as when striking stones and the like during operation of the excavator.

Another object of the present invention is to provide an improved construction of excavator chain wherein the links are interbraced with each other so as to prevent the tilting or buckling of the link which carries the cutting teeth to prevent the tilting of the teeth to such an angle against the obstruction as to cause breakage to the teeth and to the chain.

A still further object of the invention is to provide a simple and economical structure which may be readily embodied in excavators of the present type for rendering the same more efficient and less liable to become disabled during use.

The above, and various other objects and advantages of this invention will in part be described in, and in part be understood from, the following detailed description of the present preferred embodiment, the same being illustrated in the accompanying drawings, wherein—

Fig. 1 is a side elevation of the lower or outer end of an excavator constructed according to the present invention.

Fig. 2 is a fragmentary top plan view of the endless excavator chain having the digging and bucket attachments thereon.

Fig. 3 is a side elevation of a portion of the endless chain.

Fig. 4 is a lower edge view of the same.

Fig. 5 is a detail side elevation of one of the links used particularly for supporting a bucket.

Fig. 6 is an end elevation of the same.

Fig. 7 is a detail enlarged view of the connection between the digging and bucket links, showing the means to prevent buckling of the links incident to obstruction during the digging operation.

Fig. 8 is a bottom edge view of the link shown in Fig. 5.

Fig. 9 is a side elevation of one of the links, used particularly for carrying the bucket.

Fig. 10 is a bottom edge view of the same.

Fig. 11 is an end elevation of the bucket carrying link.

Fig. 12 is a side elevation of one of the pivot pins connecting the links together.

Fig. 13 is a head end view of the same.

Fig. 14 is a side elevation of a bushing for the pivot pin.

Fig. 15 is an end elevation of the bushing.

Fig. 16 is a side elevation of a cotter pin used for holding the pivot pin in place.

Referring to the drawings wherein like parts are designated by similar numerals of reference throughout the several views, 10 designates the boom of a digger or excavator which is supported upon a projection from any suitable operating mechanism common in the art. The boom 10 is supported by a brace 11 as shown, and is provided on its outer end with a relatively large roller or drum 12 which has end flanges 13 forming a way in which the excavator chain of this invention is adapted to run.

The chain is made up of a pair of endless members, and each member is composed of a plurality of series of links 14, 15, and 16 which respectively function as spacers, bucket supports, and tooth or digger supports. The links 14, 15, and 16 are secured together in endwise relation in the chain in the order above mentioned and are connected together by pins 17 which fit in bushings 18 of the split form shown in Figs. 14 and 15, and which extend through the registering apertures formed in the links.

The link 16 is, as shown in Fig. 2, arranged in each side chain section so that the links act in pairs, and the pair of links 16 has riveted or otherwise suitably secured thereto a plate or tooth bar 19 extending across the outer edges of the links 16 and

supporting a plurality of outwardly bent and forwardly projecting teeth 20 adapted to dig into the earth for loosening and lifting the same.

Each link 16 is provided, as best seen in Figs. 5, 6, 7, and 8, with openings 21 therethrough for the reception of rivets 22, shown in Fig. 1, used in securing the cross bar 19 to the link and for firmly bracing the bar from pivoting or canting on the link.

Each link 16 is also provided at its forward end with a forked portion providing ears 23, and the outermost ear 23 has projections 24 providing a boss within which may be seated the head 25 of a pivot pin 26, the head being held from turning by the projections 24.

The pivot pin 26 is adapted to extend through both arms of the fork and to also project through the eye 27 of the next adjacent link 14. The digger link 16 is also provided with an eye 27 adapted to engage between the arms of the fork 23 on the next adjacent link 15 for pivotally connecting the links 15 and 16. The link 16 is provided with a stop 28 in the form of a lateral projection adapted to engage a correspondingly formed projection or stop 29′ which is formed on the lower forward edge portion of the link 15, the stops 28 and 29′ being adapted to abut for limiting the swinging or hinging movement of the links one upon the other.

It will be noted that the stops 28 and 29′ come together when the inner edges of the links are in alignment, and that any force exerted to tilt or cant the link 16 will be transmitted through the stops to the adjacent link 15 and thus the buckling or tilting of the links will be avoided.

The next adjacent link 15 is used for supporting a bucket or scoop 29 which is substantially U-shaped in cross section and extends across the outer edges of the pair of links 15 of the opposed chain sections. The bucket 29 is provided with an inwardly curved tail piece 30 constituting a continuation of the bucket and which is adapted to extend up between the pair of adjacent links 14.

The forward end of each link 15 carries the shoulder 29′ and is of sufficient depth to dispose the shoulder or stop 29′ opposite the shoulder or stop 28 when the links are swung out into straight position. From Fig. 1 it will be noted that the inner edge of the link 15 is arranged at an angle to tilt the scoop or bucket 29 forwardly for digging up the earth loosened by the teeth 20.

The pivot pins 26 connect together the adjacent links and are held in position by cotter pins 31 or any other suitable devices maintaining the pins in their bushings 18.

With reference to Fig. 1, in operation, as the lower leg of the excavator chain is drawn upwardly against the earth, the teeth 20 bite into the earth and loosen it, and the pressure exerted upon the teeth 20 tends to swing the tooth supporting link 16 upwardly about its forward pivot 26. This upward pivoting of the link 16 is arrested by contact of the stops or shoulders 28 and 29′ formed respectively on the links 15 and 16 so that the two links offer a resistance to tilting or buckling of the link 16 under pressure of the digging points 20.

The scoop or bucket 29 follows the digging points so as to remove the loosened earth and carry the same upwardly with the chain. The abutting stops therefore hold the links in proper alignment and prevent the chain from buckling at any time during the operation of the excavator, and particularly when considerable resistance is offered the teeth 20.

We do not wish to be restricted to the size, form, and proportions of the various parts, and obviously changes could be made in the construction herein described without departing from the spirit of the invention, it being only necessary that such changes fall within the scope of the appended claims.

What is claimed is:

1. In an excavator, the combination of an endless chain having links therein, digging teeth carried by a link of the chain, a scoop carried by an adjacent link of the chain and means carried by said links and cooperating to maintain the links in alignment during operation of the excavator.

2. In an excavator, the combination of an endless chain having links pivotally connected to each other, digger teeth on a link of the chain, a scoop on an adjacent link of the chain, and cooperating stops on said links adapted to be brought together during operation of the teeth for holding the link carrying the teeth from buckling under pressure against the teeth.

3. In an excavator, an endless chain including series of links, teeth mounted upon one link of each series, a scoop mounted upon a second link of each series, and cooperating means between the first and second links of each series for maintaining the same in alignment to resist pressure exerted against said teeth.

4. In an excavator, an endless chain comprising series of pivotally connected links, teeth on the first link of each series, a scoop on the second link of each series, stops carried by said first and second links of each series and arranged for abutting engagement when said links are swung into alignment.

5. In an excavator, series of pivotally connected links, a transverse row of digging teeth carried by one link, a scoop carried across the second link, and cooperating means adapted to limit the swinging move-

ments of the links when the latter are drawn out into alignment whereby pressure exerted against the teeth of the first link is resisted by the combined weights of the two links.

6. In an excavator, a plurality of links, each link having a forked end and an eye at its other end with the eye adapted to fit in the fork of an adjacent link, a bushing fitting through the interlocking eyes and forks for pivotally connecting the links together, and a pin detachably extending through the bushing and having a head on one end, the adjacent side of the fork having means for maintaining said head and pin from turning.

7. In an excavator, a pair of links, having interfitting end portions with apertures therethrough, a pin detachably engaging in the apertures and having a flat-sided head, one of the links having a lateral projection adapted to engage the flat side of said head to maintain the pin from turning in the opening, a bushing mounted on the pin and projecting through the links, and a cotter pin detachably mounted upon the free end of the pivot pin for holding the pivot pin in the links and for maintaining the bushing on the pivot pin.

In testimony whereof, we have affixed our signatures in presence of two witnesses.

WALTER G. HUMPHREYS.
OMAR R. HUMPHREYS.

Witnesses:
E. C. STURGES,
ARTHUR H. STURGES.