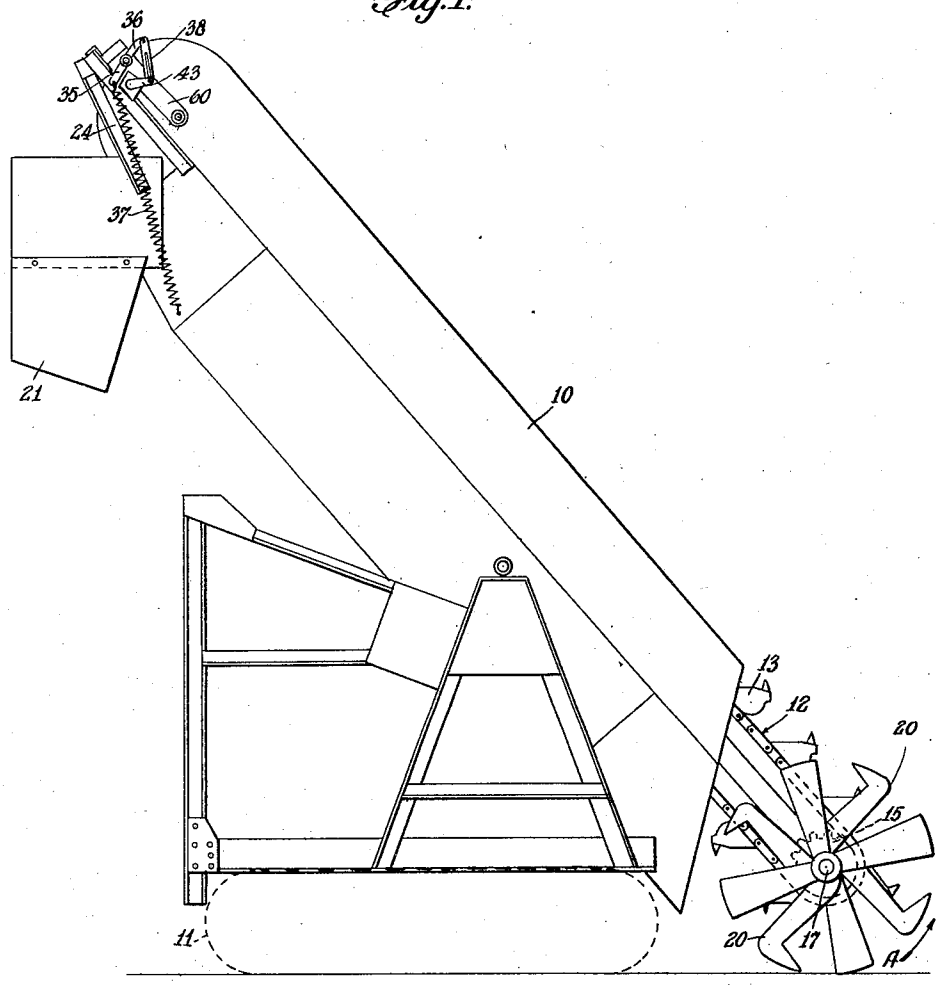
April 12, 1932. W. H. BOSWORTH 1,853,717

BUCKET CLEAN-OUT MECHANISM FOR CONVEYERS

Filed March 4, 1931 5 Sheets-Sheet 1

Fig. 1.



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BUCKET CLEAN-OUT MECHANISM FOR CONVEYERS

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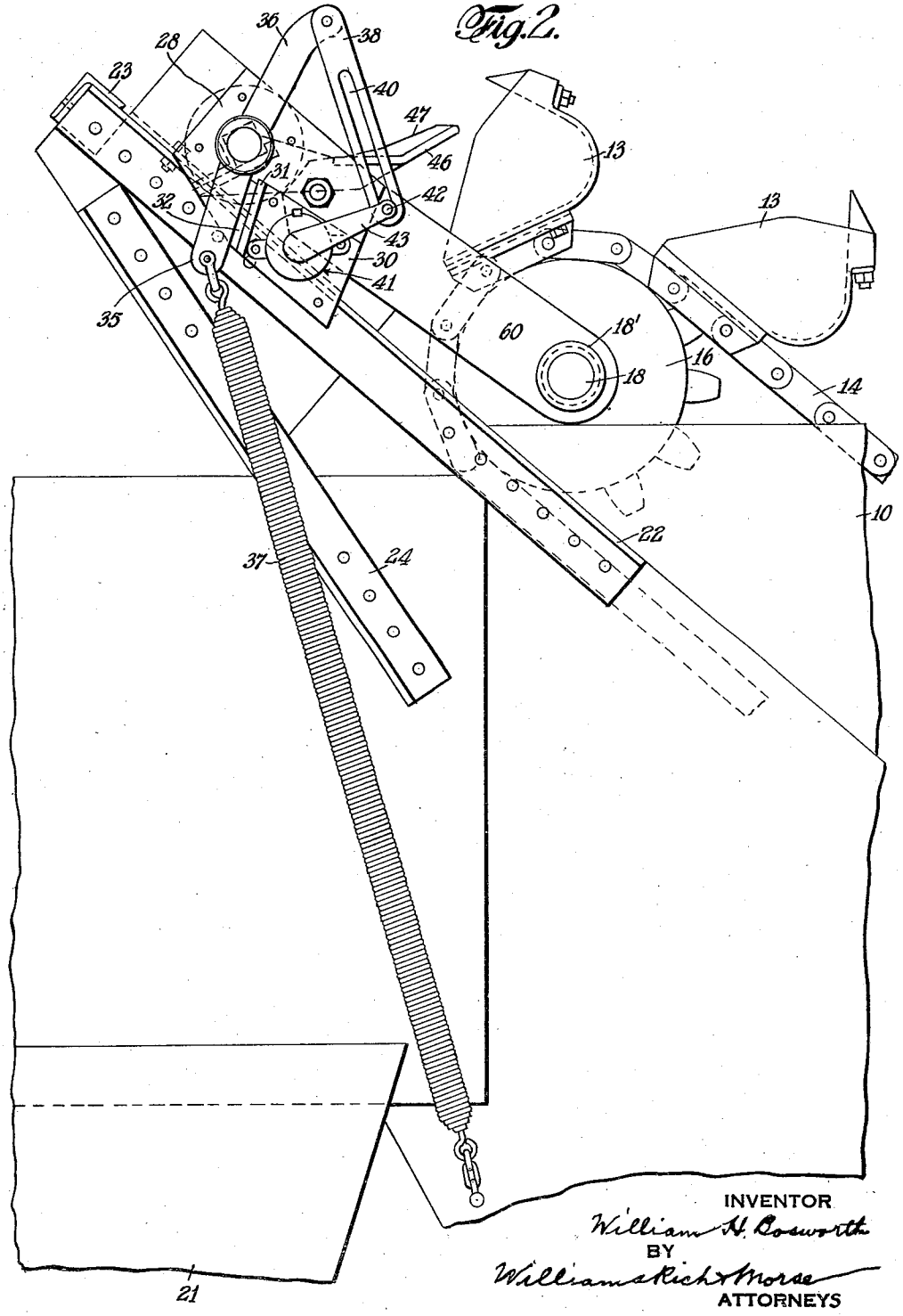
Fig. 2.



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BUCKET CLEAN-OUT MECHANISM FOR CONVEYERS

Filed March 4, 1931 5 Sheets-Sheet 3

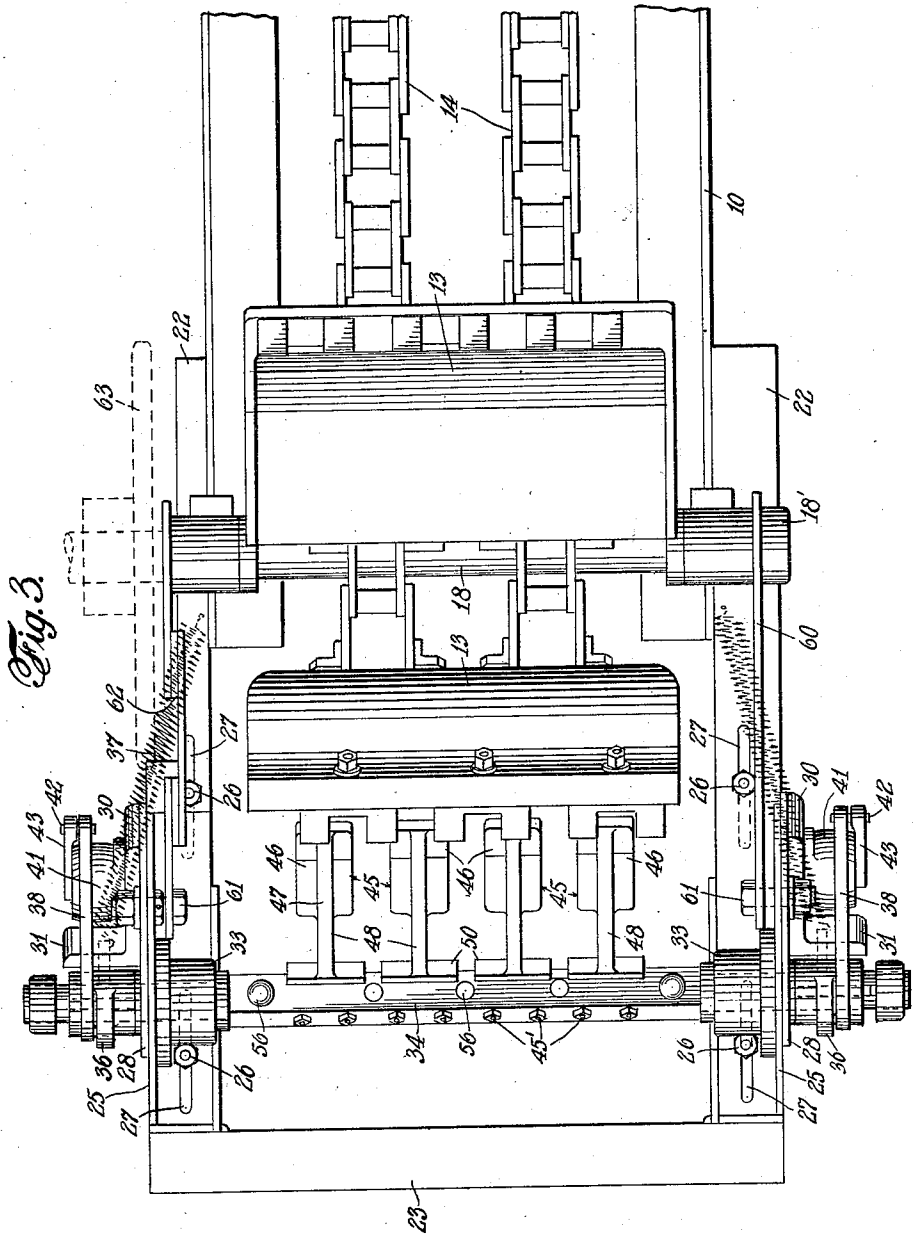

Fig. 3.

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BUCKET CLEAN-OUT MECHANISM FOR CONVEYERS

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Fig. 4.

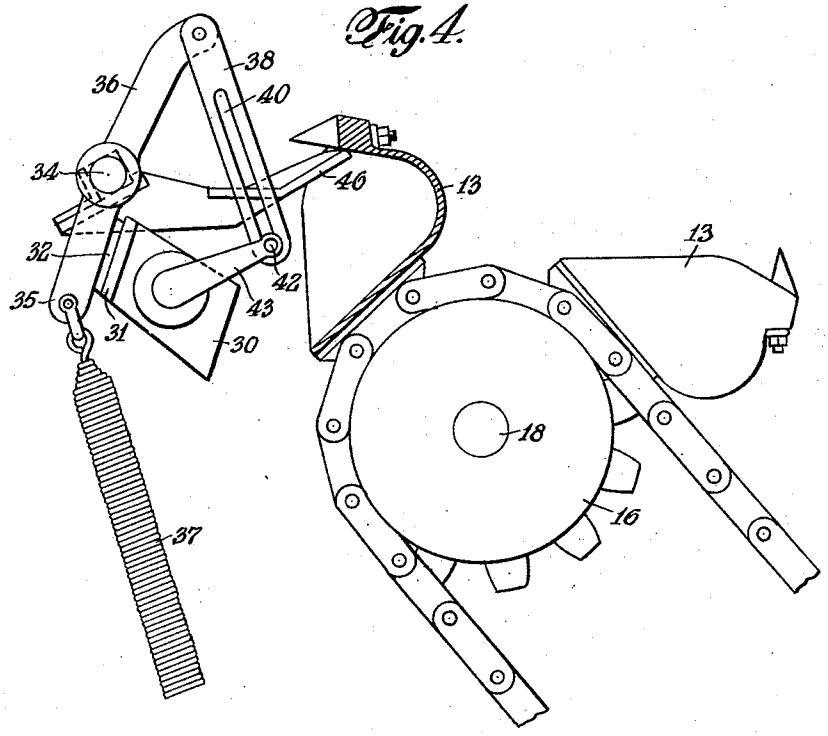
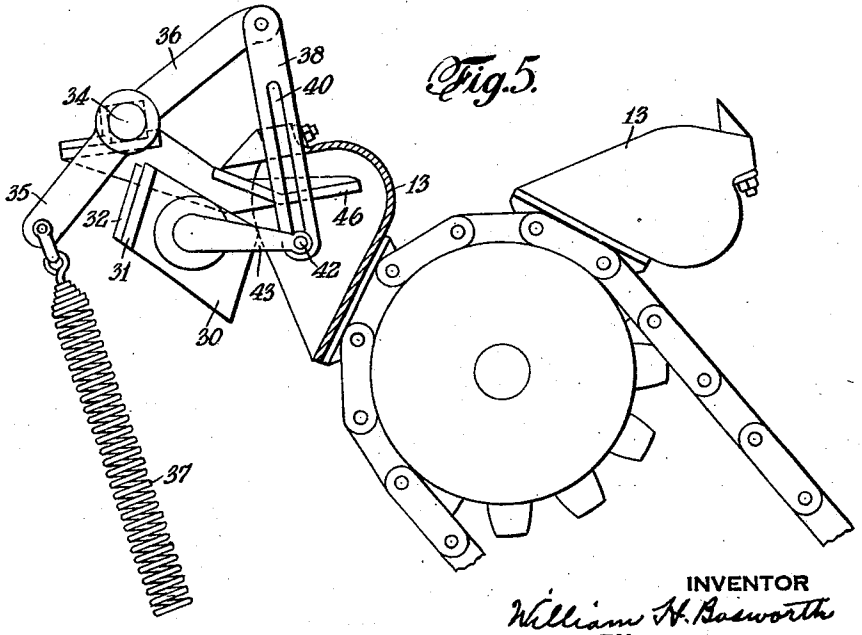


Fig. 5.



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BUCKET CLEAN-OUT MECHANISM FOR CONVEYERS

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Fig. 6.

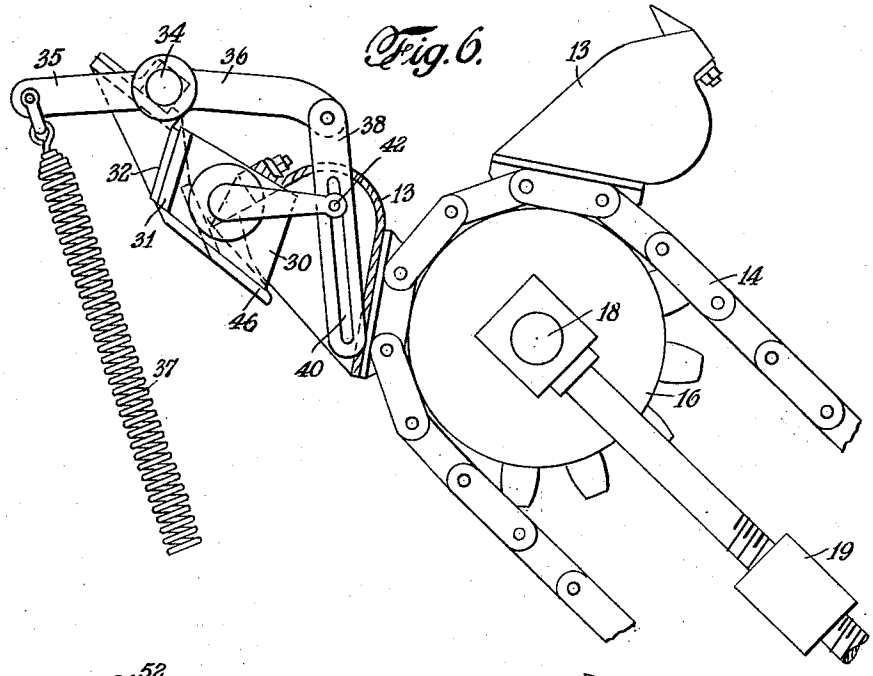


Fig. 7.

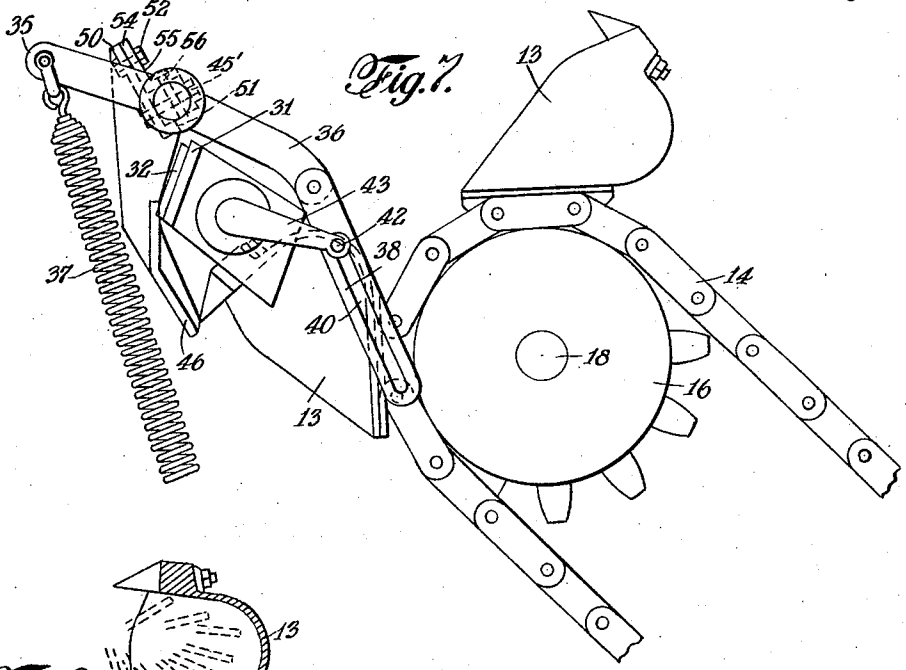
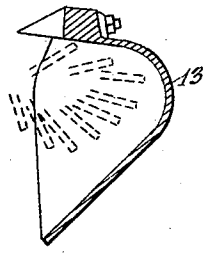


Fig. 8.



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UNITED STATES PATENT OFFICE

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BUCKET CLEAN-OUT MECHANISM FOR CONVEYERS

Application filed March 4, 1931. Serial No. 520,003.

This invention relates to bucket clean-out mechanism for conveyers, and is herein shown in connection with an excavator of the type described in United States Patent No. 1,790,810, granted February 3, 1931, to Raymond C. Haiss, Wagon loader and excavator.

In the handling of sticky masses of material, such as certain kinds of mud, the buckets of a bucket conveyer become clogged with the material, which, due to its adhesive nature is held within the buckets, instead of discharged by gravity or by centrifugal force and gravity, at the discharge end of the conveyer, with the result that the operation of the conveyer is impaired.

The general object of this invention is to provide a simple, reliable and effective means for automatically removing the material from the buckets at the discharge end of the conveyer so as to successively condition the buckets for reception of the material at the pick-up end of the conveyer.

Other objects and advantages of the invention will become apparent when taken in connection with the accompanying drawings, in which—

Fig. 1 is a side view of an excavator of the bucket-conveyer type, having the clean-out mechanism embodying this invention associated therewith; Fig. 2 is an enlarged view, showing in elevation the clean-out mechanism with the cleaning fingers thereof positioned to be received by a bucket as it approaches cleaning position; Fig. 3 is a plan view of the mechanism as viewed from above in Fig. 2 and at right angles to the bucket conveyer; Fig. 4 is a view in elevation of certain elements of the clean-out mechanism and showing the relation of the cleaning fingers to a bucket as they are engaged by such bucket at the beginning of the clean-out operation; Figs. 5, 6 and 7 are similar views, but showing the cleaning fingers in advanced positions corresponding, respectively, to the advanced positions of the bucket; and Fig. 8 is a diagrammatic view showing the path that the cleaning fingers describe with respect to a bucket during a cleaning operation.

Loaders or excavators of the type above-mentioned include a frame or boom 10, adjustably mounted on a traction device 11, by which the machine may be propelled from place to place and moved at slow speed toward and into the material to be loaded or excavated, there being a power unit such as an internal combustion engine, not shown, employed as a driving means for the traction device as well as the bucket conveyer 12. This conveyor 12 includes a plurality of buckets 13, carried by a pair of chains 14, passing over pairs of sprockets 15 and 16, respectively, the former of which are secured to the immediate portion of a shaft 17 suitably journalled to the lower end of the frame or boom 10 and the latter of which are carried by a head shaft 18 which is mounted in the usual manner for adjustment longitudinally of the boom by adjusting means 19, whereby the conveyer chains 14 may be tightened as desired. It will be understood that the driving connection between the above-mentioned power unit and the conveyer chains 14, which drive the shaft 17, is such that this shaft is rotated in the direction of the arrow A in Fig. 1, whereby the material to be loaded or excavated is loosened by a plurality of picks 20 carried by the shaft 17 and whereby such loosened material is moved toward and into the path of the buckets 13 to be there picked picked up by such buckets and carried to the discharge end of the conveyer where it is released ordinarily under the action of gravity and deposited in a loading hopper or chute 21 carried by the boom 10.

To the upper ends of the sides of the frame or boom 10, are connected a pair of supports 22, such as angle irons, the upper flanges of which are disposed in a plane parallel to the plane in which the head shaft 18 may be adjusted longitudinally of the boom 10 by the adjusting means 19. These supports are connected together at their outer ends by a transverse frame member 23, and are reinforced, for the sake of rigidity, by a pair of angle brackets 24 suitably connected thereto and to the sides of the frame 10. On the upper flange of the supports 22, are mounted a pair of angle bearing plates 25, the lower flange of each of which rests upon the upper flange of the re-

spective supports 22. The bearing plates 25 are held for longitudinal adjustment on the respective supports 22 by a plurality of bolts 26, which extend through the upper flange of the supports 22 and through elongated openings 27 formed in the lower flange of the bearing plates. Secured to the vertical flange of each of the bearing plates 25, is a gusset plate 28 which extends below the upper flange of the respective supports 22. To each of the gusset plates 28, is secured an angle abutment plate 30, the outwardly projecting flange 31 of which carries a rubber cushioning element 32, the function of which will hereinafter more clearly appear. Mounted in each of the bearing plates 25, is a suitable bearing 33 in which is journalled a transverse shaft 34, the intermediate portion of which is square in cross-section, and the opposite ends of which project beyond the respective bearing plates and are provided with a pair of substantially diametrically opposed arms 35 and 36, the former of which are connected to tension springs 37 which are anchored to the sides of the frame 10. Each of the arms 36 is pivotally connected to a link 38, having an elongated slot 40, which affords a lost-motion connection between the respective arms 36 and a pair of shock-absorbers 41, of a conventional "dead beat" type, connected to the abutment plates 30, the lost-motion between the arms 36 and the shock-absorbers being afforded by reason of the fact that the connecting pins 42, by which the links 38 are connected to the torque arms 43 of the shock-absorbers, are slidable within the respective slots 40.

Secured to the squared portion of the transverse shaft 34 and intermediate the bearings 33, are a plurality of clean-out fingers 45 which are disposed in an aligned relation and are spaced from each other. Each of these fingers includes a spade-like end portion 46, adapted to enter the successive buckets at a tangent to a circle struck from the center of the head shaft 18 and intersecting the buckets at the point of clean-out-finger contact therewith as such buckets are presented to the clean-out fingers. This relation of the clean-out fingers to the buckets, at the time the buckets are presented to the clean-out fingers, is necessary in order to insure a head-on contact between the entering ends of the fingers and the load in the bucket, it being understood that were the fingers unduly pitched forwardly of their normal position (Fig. 2), they would be subjected on their rear faces to the influence of the bucket load and would be pushed out of the way by the contents of the bucket without being given an opportunity to perform the function for which they are intended. The spade-like end portion 46 of each finger is reinforced along its back by a rib 47, extending longitudinally thereof and terminating in a shank portion 48 which is formed integral with a connector plate 50 disposed at right angles thereto and provided with a shoulder 51. The connector plates 50 are adapted to engage one of the flat faces of the square shaft 34, whereas the shoulders 51 of the respective connector plates are adapted to engage an adjacent face of such shaft as shown most clearly in Fig. 7. These clean-out fingers are detachably connected to the shaft 34 by a plurality of of bolts 45', which pass through the connector plates 50 and the shaft, and by a plurality of bolts 52, which pass through the rear of the connector plates and through the outwardly projecting flange 54 of an angle iron 55, which extends substantially throughout the length of the squared portion of the shaft 34 and is connected to the same by rivets 56, which pass through that shaft and the other flange of the angle iron 55.

Inasmuch as the clean-out fingers 45 are adapted to be engaged by the buckets and to enter the same as the buckets move about the sprockets 16 at the discharge end of the conveyer, it follows that the above-mentioned normal tangential relation of each such finger to the aforementioned circle, which is concentric with the head shaft 18, must be maintained for any and all adjustments of such shaft that may be effected by the adjusting means 19; and it also follows that the center of the shaft 34, carrying such fingers, must be maintained at a given distance from the center of the head shaft 18 for any and all adjustments thereof. To these ends the shafts 18 and 34 are connected together by a pair of connector links 60 which insure the movement of the shaft 34 in a direction corresponding to and of an extent equal to the movement of the shaft 18, the two shafts being at all times maintained in fixed parallel planes by reason of the parallel relation of the upper flanges of the supports 22 to the plane of adjustment of the shaft 18. These connector links 60 are pivotally mounted on the adjustable bearings 18' in which the shaft 18 is journalled, and are pivotally connected to the bearing plates 25 by bolts 61, which pass through the vertical flanges of the respective bearing plates 25 and the gusset plates 28 secured thereto, it being noted that the link 60 appearing at the left in Fig. 3 is cut away or recessed, as shown at 62, so as to provide a notch through which may pass one reach of a driving chain, not shown, which is employed in the type of loader or excavator herein shown for driving the conveyer 12 through the sprockets 16, the shaft 18 and a driving sprocket 63 secured to one end of that shaft.

Preparatory to adjusting the shaft 18, and hence the sprockets 16 thereon, the bolts 26 are loosened so as to permit the bearing plates 25, carrying the bearings 33 in which the

transverse shaft 34 is journalled, to move longitudinally on the supports 22 in one direction or the other. If the shaft 18 is moved in a direction to tighten the conveyer chains 14, the bearing plates will be caused to correspondingly move, and this is also true if the shaft is adjusted in a direction to loosen the conveyer chains 14, the distance between the shafts 18 and 34 being thus maintained the same for all positions of adjustment that may be assumed by the shaft 18. After having adjusted the shaft 18, the bolts 26 are tightened, thereby locking the bearing plates 25 to the supports 22.

In operation, the buckets 13 collect at the pick-up end of the loader or conveyer the material to be handled and carry it along the upper reach of the conveyer chains to the discharge end of the conveyer. As the buckets 13 successively move over the sprockets 16, the clean-out fingers 45 are engaged by the inner wall of the bucket at the forward end thereof. By reason of this engagement, the clean-out fingers, together with the shaft 34, move about the axis of the latter against the tension of the springs 37, and in so moving they sweep through the bucket from one position to another in a path indicated diagrammatically in Fig. 8, thus removing from the successive buckets any material that may, because of its adhesive nature, fail to fall from the buckets by gravity alone as they pass over the sprockets 16 into dumping position. During such time as the clean-out fingers sweep through the respective buckets, the torque arms 43 of the shock-absorbers 41 move from their positions shown in Fig. 4 to their positions shown in Fig. 7, the connecting pins 42 of the respective torque arms being permitted to move, in the meantime, from the lower ends of the slots 40 of the connector links 38 to the other end thereof. As the successive buckets are disengaged from the clean-out fingers 45, the transverse shaft 34 is rotated by the springs 37 in a reverse direction, thus retracting the clean-out fingers. This reverse movement of the shaft 34 is unrestrained during such time as the connector pins 42 of the torque arms 43 move throughout the length of the slots 40 of the connector links 38, but as these pins reach the outer end of the slots 40 an operative connection is established between the torque arm 43 and the connector links, with the result that the shock-absorbers become effective to decelerate the return movement of the shaft, which is finally and positively limited to its position shown in Fig. 2 by engagement of the arms 35 with the rubber cushioning elements 32, against which such arms normally rest.

What is claimed is:

1. A clean-out mechanism for a bucket conveyer comprising a pivotally mounted clean-out finger adapted to be actuated by the bucket and to penetrate and sweep through the bucket during such actuation, tension means for resisting the sweeping movement of said finger and for returning the same to its normal position upon completion of such movement, and shock-absorbing means for resisting the return of said finger to its normal position.

2. A clean-out mechanism for a bucket conveyer comprising a pivotally mounted clean-out finger adapted to be actuated by the bucket and to penetrate and sweep through the bucket during such actuation, tension means for resisting the sweeping movement of said finger and for returning the same to its normal position upon completion of such movement, shock-absorbing means for resisting the return of said finger to its normal position, and connecting means between said finger and said shock-absorbing means operable to render said shock-absorbing means effective during only a part of the return movement of said finger.

3. The combination with a chain bucket conveyer including an adjustable head shaft carrying a pair of sprockets over which the conveyer chains operate, and means for adjusting said shaft longitudinally of the chain reaches; of a bucket clean-out mechanism comprising a support, a shaft rotatably and adjustably mounted on said support, a clean-out finger secured to the second shaft and adapted to be actuated by a bucket of the conveyer and to penetrate and sweep through the bucket during such actuation, a connection between said shafts for automatically maintaining the latter at a given distance from the former while adjustment of the former is being made, tension means for resisting the sweeping movement of said finger and for returning the same to its normal position upon completion of such movement.

4. The combination with a chain bucket conveyer including an adjustable head shaft carrying a pair of sprockets over which the conveyer chains operate, and means for adjusting said shaft longitudinally of the chain, reaches; of a bucket clean-out mechanism comprising a support, a shaft rotatably and adjustably mounted on said support, a clean-out finger secured to the second shaft and adapted to be actuated by a bucket of the conveyer and to penetrate and sweep through the bucket during such actuation, a connection between said shafts for automatically maintaining the latter at a given distance from the former while adjustment of the former is being made, tension means for resisting the sweeping movement of said finger and for returning the same to its normal position upon completion of such movement, and shock-absorbing means associated with the second-named shaft and automatically movable therewith upon adjustment of such

shaft and adapted to resist the return movement of said finger to its normal position.

5. The combination with a chain bucket conveyer including an adjustable head shaft carrying a pair of sprockets over which the conveyer chains operate, and means for adjusting said shaft longitudinally of the chain reaches; of a bucket clean-out mechanism comprising a support, a shaft rotatably and adjustably mounted on said support, a clean-out finger secured to the second shaft and adapted to be actuated by a bucket of the conveyer and to penetrate and sweep through the bucket during such actuation, a connection between said shafts for automatically maintaining the latter at a given distance from the former while adjustment of the former is being made, tension means for resisting the sweeping movement of said finger and for returning the same to its normal position upon completion of such movement, shock-absorbing means associated with the second-named shaft and automatically movable therewith upon adjustment of such shaft and adapted to resist the return movement of said finger to its normal position, and connecting means between the second-named shaft and said shock-absorbing means operable to render said shock-absorbing means effective during only a part of the return movement of said finger.

6. The combination with a chain bucket conveyer including a head shaft mounted for adjustment transversely of itself in a given plane and carrying a pair of sprockets over which the conveyer chains operate, and means for adjusting said shaft in said plane longitudinally of the chain reaches; of a bucket clean-out mechanism comprising a support, a shaft mounted on said support for adjustment transversely of itself in a plane parallel to the plane of adjustment of said head shaft, a clean-out finger secured to the second shaft and adapted to be actuated by a bucket of the conveyer and to penetrate and sweep through the bucket during such actuation, a connection between said shafts for automatically maintaining the latter at a given distance from the former while adjustment of the former is being made, and tension means for resisting the sweeping movement of said finger and for returning the same to its normal position upon completion of such movement.

7. The combination with a chain bucket conveyer including a head shaft mounted for adjustment transversely of itself in a given plane and carrying a pair of sprockets over which the conveyer chains operate, of a bucket clean-out mechanism comprising a support, a shaft mounted on said support for adjustment transversely of itself in a plane parallel to the plane of adjustment of said head shaft, a clean-out finger secured to the second shaft in a fixed normal relation to the path of travel of the conveyer buckets over said sprockets and adapted to be actuated by a bucket of the conveyer and to penetrate and sweep through the bucket during such actuation, means for simultaneously adjusting said shafts transversely of themselves, and means for maintaining a fixed relation between said shafts and for maintaining said normal relation of said finger to the path of travel of the conveyer buckets about said sprockets during simultaneous adjustment of said shafts.

In testimony whereof, I have signed this specification.

WILLIAM H. BOSWORTH.