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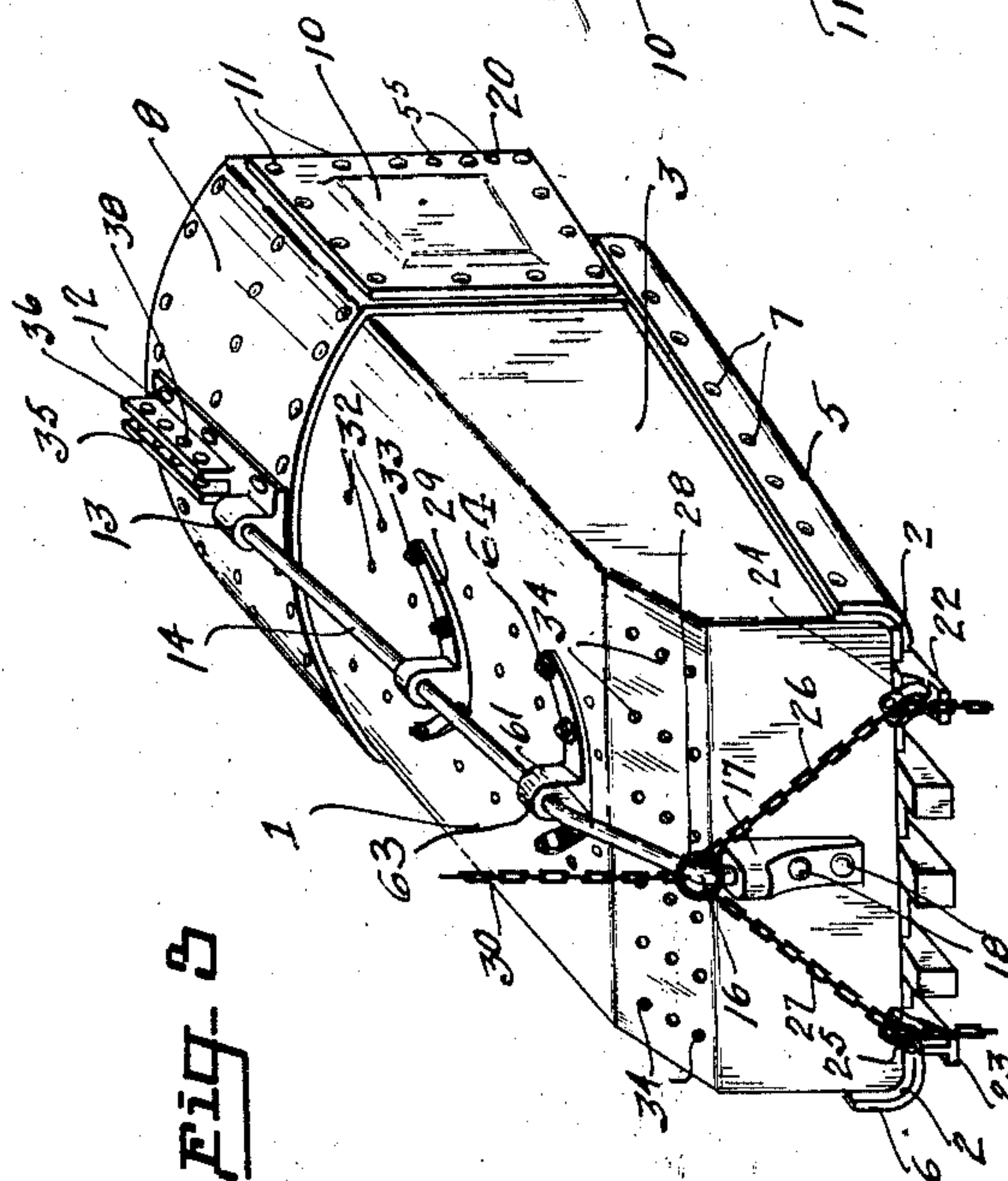
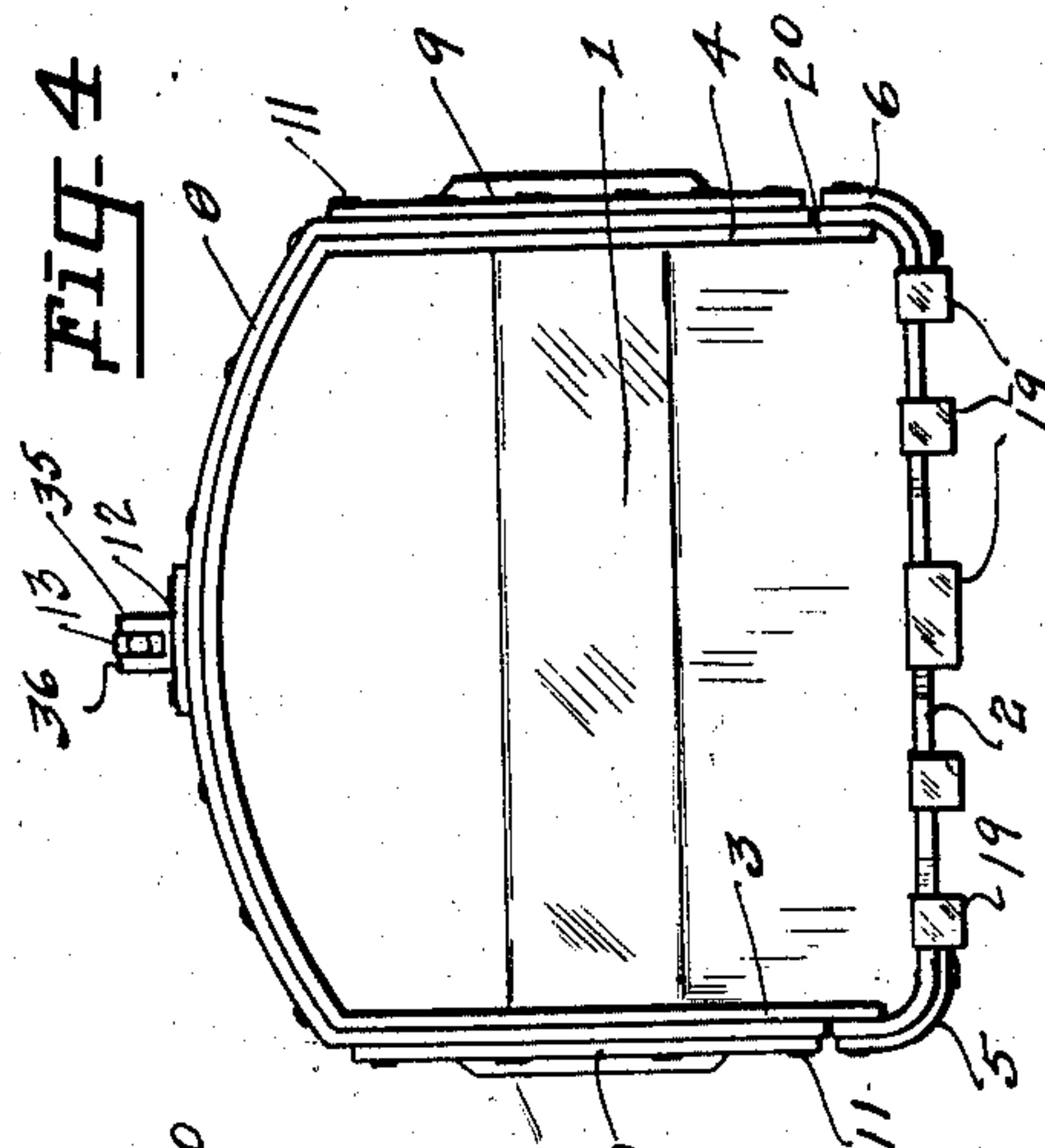
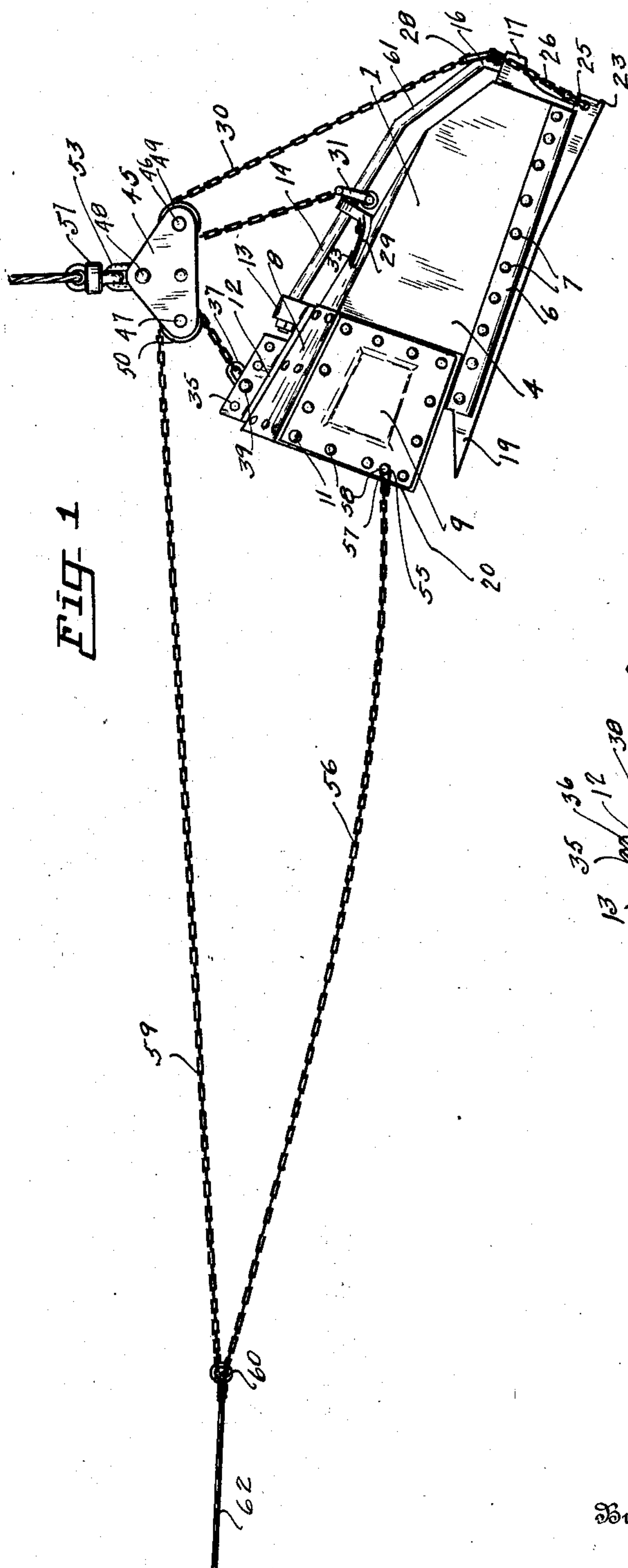
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1,777,626

EXCAVATION MACHINE

Filed Aug. 6, 1928

3 Sheets-Sheet 1



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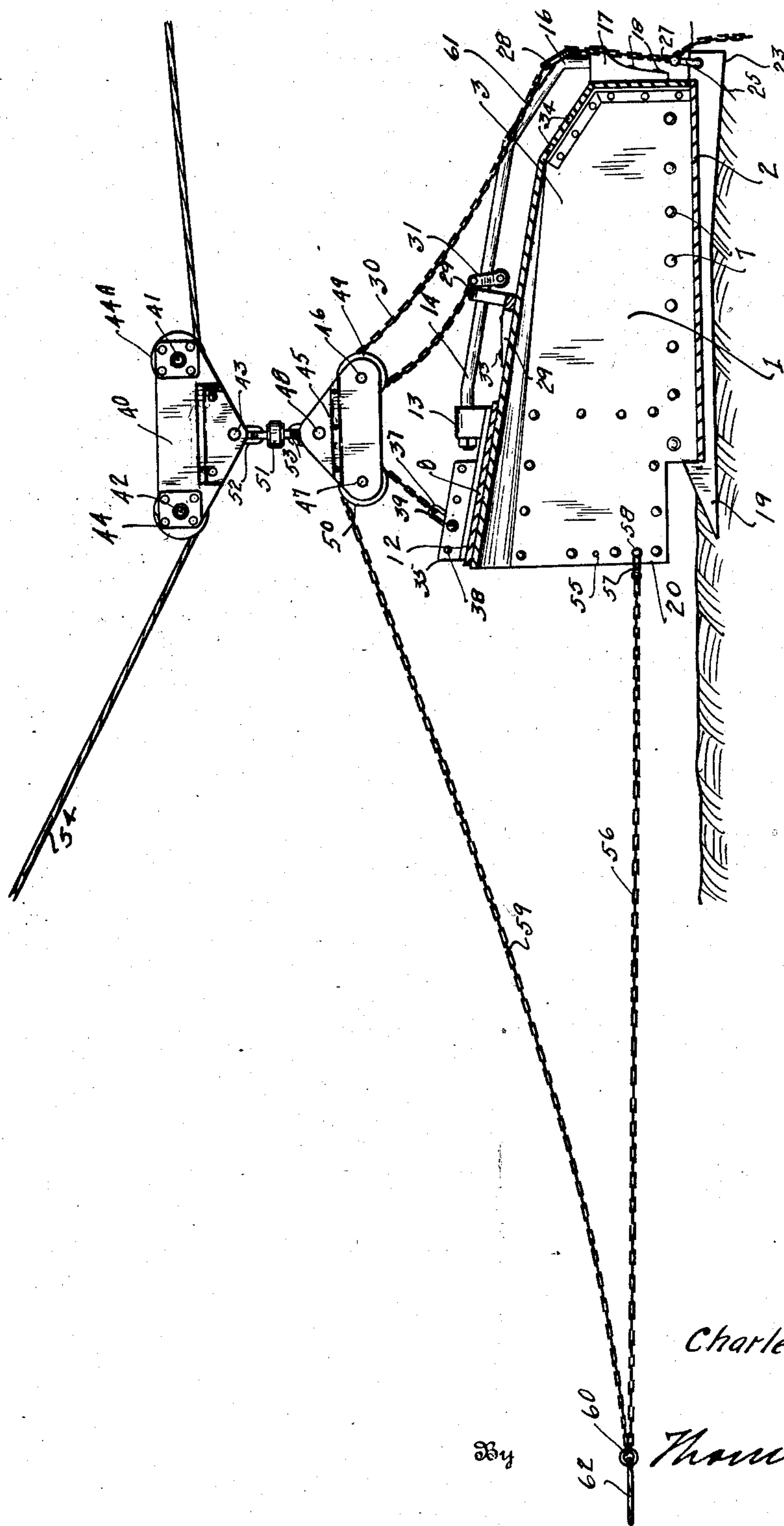


FIG. 2

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3 Sheets-Sheet 3

Fig 5

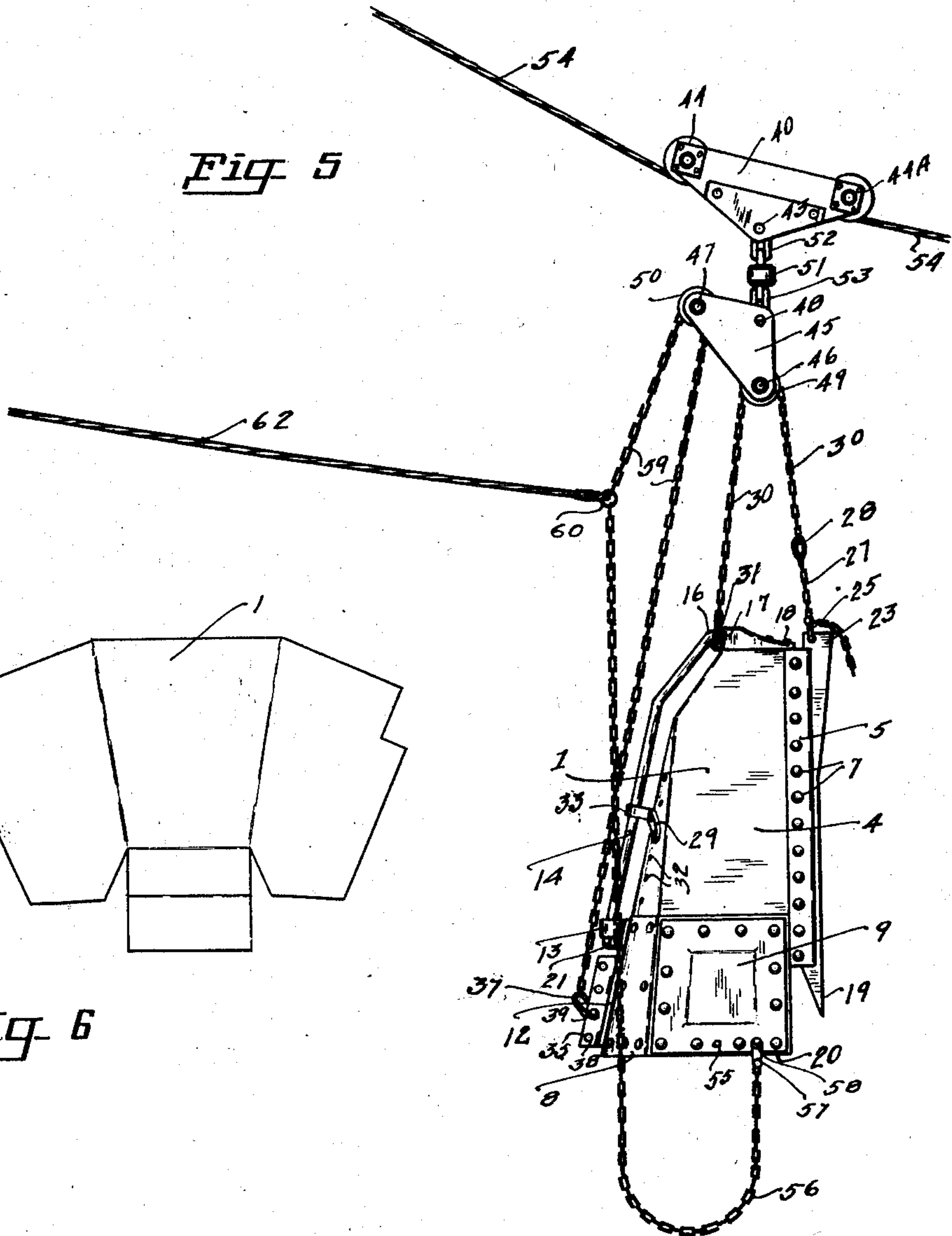
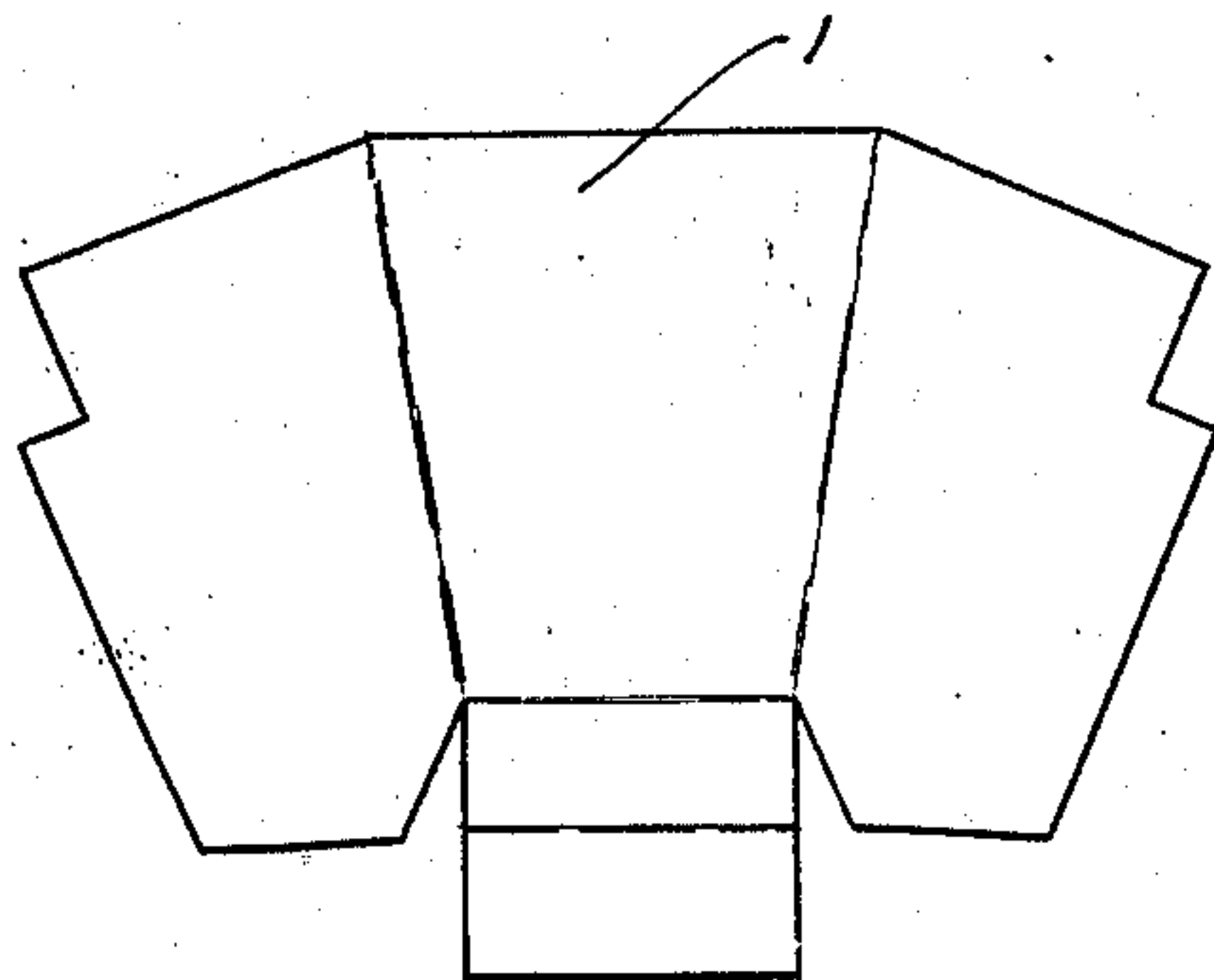


Fig 6



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UNITED STATES PATENT OFFICE

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EXCAVATION MACHINE

Application filed August 6, 1928. Serial No. 297,785.

My invention relates to the device patented in my United States Patent Number 1,522,078 issued January 6, 1925, upon an excavating machine.

My present invention relates to improvements in excavating machines in which an excavating bucket is transported along an adjustable slack line cable and wherein the bucket is operated from a remote control station, the bucket being operated in alternate direction without the use of trip lines, or other hand manipulating lines; the same may also be used in conjunction with booms and other derrick equipment of the stationary or portable type.

The primary purpose of my present invention is a simplified construction of buckets having no projections, extending from either of the side walls and the bottom both inside and outside, that would tend to interfere with the mechanical, rapid and efficient handling of the bucket itself.

A further object of my present construction consists of a bucket that is entirely enclosed on all sides, and one end. The body portion may be made of a single sheet of metal formed and shaped to create a bucket that requires a minimum of labor and material in the construction of the same.

A further object of my invention consists in providing drainage and weep holes in the closed end to facilitate filling and dumping thereby preventing the trapping of air, or water, within the closed bottom during the filling operation and to prevent the forming of a vacuum within the closed end during the dumping operation.

A further object of my invention consists in providing a construction that imparts a maximum dumping force to the bucket caused by the releasing of the main drag, or haul line when the bucket is being released for dumping.

And still further objects of my invention reside in the construction that is self-cushioning when the bucket is being stopped for return for filling or digging.

Still further objects of my invention consist in a construction that permits of the dumping of the bucket at any location in its

travel, and at any speed without the use of tripping cones, unlatching devices, and any other unlocking and tripping devices.

A further object consists in a construction that will automatically dump when the pulling pressure is released from the main drag line.

Still further objects reside in a superposed carriage disposed between the traveler carriage and the drag line bucket that permits of a tilting of the carriage in the dumping process that gives added shock to the bucket in the dumping that increases the cleaning action.

In my new and improved construction the dumping action is accomplished through the action of gravity upon the bucket, when the pull is released to the main drag, or haul line.

A still further and most important object of my device consists in placing the control of the bucket at all times in the immediate control of the engineer, without the use of trips, latches and other mechanical devices and by the placing of adjusting devices in the various lines and upon the device itself, the bucket may be adapted to a very large range of uses.

And still further objects consist in providing means whereby solid shocks are eliminated, to the hoist, to the slack line and to the other mechanisms, thereby increasing the length of life of the device and eliminating the shut downs that are incident to such devices where solid shocks periodically occur during each cycle of operation.

And still further objects of my invention reside in the building of a frame that may be reinforced with renewable parts without destroying the frame itself.

And still further objects of my invention reside in providing swivels within the suspending lines and bridles to afford a greater flexibility to the supporting and haul lines.

And still further objects of my invention consists in having an adjustable bracket positioned along the traveler bar.

A still further object of my device resides in the fact that I can raise the filled bucket in a vertical line from the point of digging.

Still further objects of my device consist in a construction that permits of a maximum casting of the bucket during the return of the same to the digging position, thus giving
 5 a maximum of digging and casting range to the device. This is especially true where the same is being used as a circle drag line excavator.

Still further objects of my device consist
 10 in a construction that permits of a circumventing of boulders during the digging operation. This may be accomplished by the tightening of the skyline, and the slackening of the main haul line.

With these and incidental objects in view, the invention consists in certain novel features of construction and combination of parts, the essential elements of which are set forth in the appended claims, and a preferred form of embodiment of which is hereinafter shown with reference to the drawings which accompany and form a part of this specification.

In the drawings:

25 Fig. 1 is a side elevation of the assembled bucket shown supported, and out of digging position.

Fig. 2 is a sectional, side elevation of the mechanism illustrated in Fig. 1 and illustrating the bucket in digging position.

Fig. 3 is a rear, perspective view of the bucket.

Fig. 4 is a front, end view of the bucket.

Fig. 5 is a side view of the bucket, illustrated in dumping position.

Fig. 6 is a diagrammatical lay-out of the plate from which the body portion of the bucket is to be made.

Like reference characters refer to like
 40 parts throughout the several views.

I preferably form the body portion 1 of my device of a single plate made substantially as illustrated in the diagrammatical lay-out illustrated in Fig. 6, from which I
 45 form the top, sides and rear walls of the body portion 1 of my device. I place a removable reinforcing bottom plate 2, across the bottom of the body portion and upturn the same at oppositely disposed edges and
 50 secure it to the side walls 3 and 4 of the body portion. Reinforcing corner plates 5 and 6, are secured at the oppositely disposed lower edges of the bucket and suitable fastenings 7 extend through the corner
 55 plates 5 and 6, the bottom plate 2 and through the side walls 3 and 4 of the body member 1.

The character and service for which devices of this kind are required is of the most rugged kind and it is necessary to make
 60 the same strong and durable.

Heretofore it was the general custom in drainage work and in most digging operations where substantial yardages are to be moved to use steam shovels and the like.
 65 Higher speeds are required under present

conditions and many times buckets are to be used in places and positions in which steam shovels and floating dredges are not justified. It is also necessary in drainage operations to have an outer surface of the bucket structure practically free from projecting surfaces.

In my new and improved construction, I place a hood plate 8 about the open end of the bucket and secure the same to the body
 75 member 1, by any suitable fastening means. Cheek plates 9 and 10 being disposed at oppositely disposed sides of the front end of the bucket. Fastening 11, fastens the cheek plate to the hood and side walls of the body
 80 member, thus forming the device of rigid construction. A central front traveler bar bracket 12, is disposed on top of the hood 8, having a lug 13, upwardly extending at the rear end of the traveler bar bracket, into
 85 which the front end of the traveler bar 14 is secured. The traveler bar 14 rearwardly extends from the bracket 12 and in spaced relation with the body portion of the bucket; the rear end 16 of the same, terminating in
 90 a supporting bracket 17, secured to the rear wall of the bucket, by suitable fastenings 18.

Removable teeth 19 are secured to the bottom of the bucket. I have found best results obtain wherein the points of the teeth 19 are
 95 substantially in the rear of the front edge 20 of the bucket.

Means are provided for placing a tension and maintaining a tension in the traveler bar by threading the forward end of the same
 100 and placing an adjusting threaded nut 21 thereupon. Shoes 22 and 23 rearwardly extend from the bottom surface of the bucket into which shackles 24 and 25 are secured. Secured to the shackles 24 and 25 are rear
 105 suspension chains 26 and 27, the chains forming a bridle by being connected at their one end to a ring 28. An adjustable bracket 29 is secured to the upper surface of the body
 110 element 1 of the bucket and is slidable relative to the traveler bar 14, and acts as a stop for the sliding link 31 disposed upon one end of the rear fulcrum chain 30. Positioning
 115 holes 32 are disposed in spaced relationship within the body element 1, through which fastenings 33 are placed for fixedly positioning the bracket 29. Weep and drainage holes
 120 34 are disposed within the rear wall of the body element 1, which permits the bucket being filled with solids and liquids without the trapping of air or liquids therein. These weep end drainage holes also prevent the forming of a vacuum during the operation
 125 of removing the semisolids therefrom, especially during the dumping of heavy clays and gumbo formations. Upwardly extending side walls 35 and 36 are formed on the upper surface of the bracket 12; the same being disposed in spaced relation with each other to permit the passing of the link 37 therebe-
 130

tween; suitable fastening holes 38 being formed in registerable alignment through which a suitable fastening 39 passes to secure the link 37 fixedly relative to the sidewalls.

I form a slack line carriage 40 of side plates having cross pins 41, 42 and 43 extending thereacross and sheaves 44 and 44A are disposed about the pins 41 and 42 and I form a bucket carriage 45 of side plate members having pins 46, 47 and 48 extending thereacross with sheaves 49 and 50 disposed upon the pins 46 and 47. I place a coupling swivel 51 between the carriages 40 and 45 and having links 52 and 53 disposed at oppositely disposed ends of the swivel through which the pins 43 and 48 pass to connect the carriages with the swivel structure. This permits of a flexibility between the respective carriages.

The slack line 54 upon which the carriage 40 travels is preferably secured to a drum of a hoisting machine, not here shown, so that the slack line 54 may be raised and lowered relative to the path of travel over which the bucket is to be manipulated. The primary purpose of doing so is to raise the bucket in a digging operation over and clear of any obstruction that may be encountered in the line of travel of the bucket over which it can not be pulled in normal work. A plurality of holes 55 are disposed in the forward walls of the bucket structure to which the bridle chain 56 is indirectly attached, the bridle chain being secured to the shackles 57 carrying shackle bolts 58. The shackle bolts 58 are adapted to engage in holes 55 for the purpose of raising and lowering the line of pull of the bridle chain 56 to adapt the bucket to different digging conditions. The center haul line 59 is secured at one end to a hitching link 60 and at its oppositely disposed end to the link 37 the same passing over the sheave 50. The bucket during the filling operation, is supported on the ground, thus leaving the center line 59 and the rear fulcrum line 30 in a relatively slack condition with the entire strain being carried upon the bridle line 56. The continual application of pulling pressure to the bridle line 56 maintains the bucket in a substantially horizontal condition even though the slack line 54 may have raised the bucket clear of the supporting ground by the placing of the same in suspension through the supporting line 30 and center line 59 in which position the sliding link 31 is in intimate contact with the adjustable bracket 29. When the pulling pressure is released from the bridle line 56 and the main drag line 62 the bucket plunges with the open end downward, as illustrated in Fig. 5, and the sliding link 31 passes along the traveler bar 14. A change of direction is created within the downward path of the bucket by the sliding link 31 engaging the sloping portion 61 of the traveler bar 14;

the bucket being further shocked by the engagement of the sliding link 31 with the supporting bracket 17 into which one end of the traveler bar 14 engages. This occurs with the bucket in a substantially vertical position.

The primary purpose of the change in direction 61 disposed within the traveler bar 14 is to shock the bucket during the dumping operation. This greatly aids in the cleaning of the bucket when sticky materials are being handled. As a shovel and drag line engineer of years of experience, I believe this to be generically new as I know of no drag line bucket wherein the bucket can be given a plurality of shocks in a single dumping operation. This is especially true without the necessity of raising or lowering the bucket or any portion of the bucket to impart a shocking action to the bucket and to the load to be dumped.

The return of the bucket down the slack line to the point of digging occurs immediately upon the releasing of the pressure upon the main haul line 62. When the bucket has descended along the slack line 54 to the approximate position of digging the pressure is applied to the main haul line 62 and the bucket is righted to digging position. In buckets, as heretofore constructed, a solid shock would be imparted to the slack line 62, and to the hauling mechanism, during the righting of the bucket. In the construction that I have here outlined, a very gentle shocking occurs since the bucket is held in a suspended position as illustrated in Fig. 5, so that instead of shocking the mechanism the righting of the bucket to a substantially horizontal position occurs in an even and orderly manner.

In certain classes of digging and more especially where my new and improved bucket is to be used in conjunction with a boom of the digging machine instead of with a slack line support, it may be found undesirable for the bucket to be shocked forcibly by the link 31 traveling the full length of the traveler bar. To prevent the undue shocking of the bucket during the dumping and righting operation of the bucket after the same has been dumped, I place a secondary stop 63 and adjustably position the same relative to that of the traveler bar, the same being fastened to the body of the bucket by suitable fastenings, as bolts or rivets 64. The fastenings are placed within the holes 32 disposed in the top side of the shell of the bucket. The link 31 may be placed between the stops 29 and 63, or at either side of either of the stops thereby limiting the travel of the link 31 in either direction upon the traveler bar.

While the form of mechanism herein shown and described is admirably adapted to fulfill the objects primarily stated, it is to be understood that it is not intended to confine the

invention to the one form of embodiment herein shown and described, as it is susceptible of embodiment in various forms, all coming within the scope of the claims which follow.

What I claim is:

1. In a device of the class described, the combination of a bucket made of a single piece of material to form the top, bottom side and rear end walls, a one piece reinforcing element removably secured to the bottom side and rear end walls, reinforcing corner plates running longitudinally of the lower meeting edges of the side and bottom walls, a one piece hood plate disposed about the forward end of the body member, cheek plates disposed about the forward end of the body member and secured to its sides and the hood plate, a traveler bar bracket running longitudinally of the bucket and in spaced relation with the top and rear end wall of the bucket, means for securing the traveler bar under tension to the body of the bucket and an adjustable bracket slidably positioned upon the traveler bar.

2. In a device of the class described, the combination of a bucket made of a single sheet of material to form the top, bottom side and rear end walls of the bucket, a one piece reinforcing element secured to the bottom of body member, a hood plate disposed about the forward end of the body member and secured thereto, digger teeth running longitudinally of the outside of the lower surface of the body member, adjusting haul line supporting holes disposed at the front end of each side of the cheek plates secured to side of body member, supporting brackets disposed at the front and rear of the body member, a traveler bar connecting the brackets and disposed in spaced relation with the body of the bucket, means for maintaining the traveler bar under tension, and an adjustable bracket slidably positioned upon the traveler bar and means for removably securing the adjustable bracket to the body of the bucket.

3. In a device of the class described, the combination of a bucket, a traveler bar disposed in spaced relation with the top of the bucket, and running longitudinally of the bucket, means for securing the traveler bar to the bucket, means for maintaining the traveler bar under tension, rearwardly extending shoes with eyes disposed therethrough, said shoes secured adjacent the bottom of the bucket, an adjustable bracket slidably positioned upon the traveler bar and means for securing the adjustable bracket in adjusted position relative to the body of the bucket, and means for securing a center line to the forward end of the adjustable bracket to which the traveler bar is secured.

4. In a device of the class described, the combination of an excavator bucket, composed of top, bottom, two sides and an end wall to form an enclosed open ended bucket,

digger teeth removably secured to the bottom of the bucket, a traveler bar running longitudinally of the center line of the top side of the body of the bucket and in spaced relation with the top side wall of the bucket, an adjustable bracket slidably disposed upon the traveler bar, brackets for securing the traveler bar relative to the body of the bucket, and rear suspending elements and a center line secured to the bucket.

5. An excavating machine in combination, a slack supporting cable, a carriage having supporting wheels disposed upon the cable, a cross pin disposed at the lower edge of the carriage, a coupling swivel depending from the cross pin, and a second carriage depending from the lower end of the coupling swivel, and an excavator bucket supported by flexible elements passing over sheaves disposed within the depending carriage.

6. An excavating machine in combination, a slack supporting cable, a carriage having supporting wheels traveling upon the slack cable, a second carriage depending from the first cable with a swiveling coupling disposed therebetween, sheaves disposed within the second carriage, a center line passing over one of the sheaves and a rear fulcrum supporting element passing over the other of the sheaves disposed within the carriage depending from the swiveling coupling, and an excavator bucket supported by the center line and the rear supporting fulcrum elements.

7. An excavating machine in combination, a slack supporting cable, a pair of traveling carriages connected with each other by a swiveling coupling disposed therebetween and supported by the slack line the depending carriage having a front sheave and a rear sheave, an open ended excavator bucket, a bridle line secured to the front end of the bucket, a center line passing over the front sheave of the depending bucket carriage secured to the front end of the bucket, and a rear fulcrum chain secured at its one end to the rear end of the bucket and at its front end to a traveler bar, and passing over the rear sheave of the suspended bucket carriage between its ends.

8. In a device of the class described, the combination of an open ended excavator bucket, a traveler bar bracket and lug disposed on the upper side of the body of the bucket and a supporting bracket disposed on the rear wall of the bucket, a traveler bar disposed between the brackets and in spaced relation with the body of the bucket, a sliding link disposed upon the traveler bar and an adjustable bracket positioned upon the traveler bar, said adjustable bracket limiting the travel of the sliding link upon the traveler bar.

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