

No. 728,391.

PATENTED MAY 19, 1903.

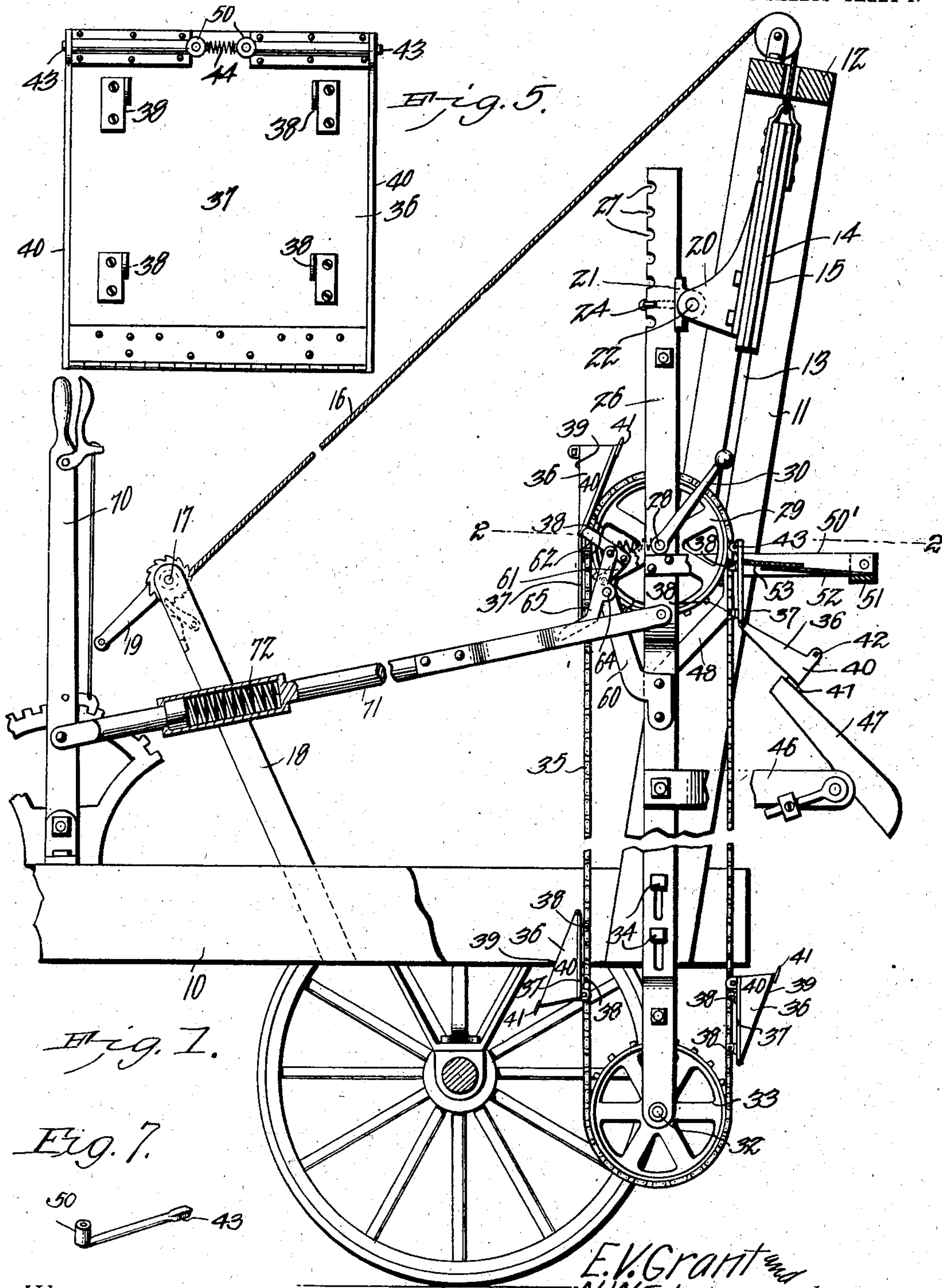
E. V. GRANT & N. W. SHEARS.

EXCAVATOR.

APPLIOATION FILED JUNE 16, 1902.

NO MODEL.

2 SHEETS—SHEET 1.



Witnesses

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2 SHEETS—SHEET 2.

Fig. 6.



Fig. 3.

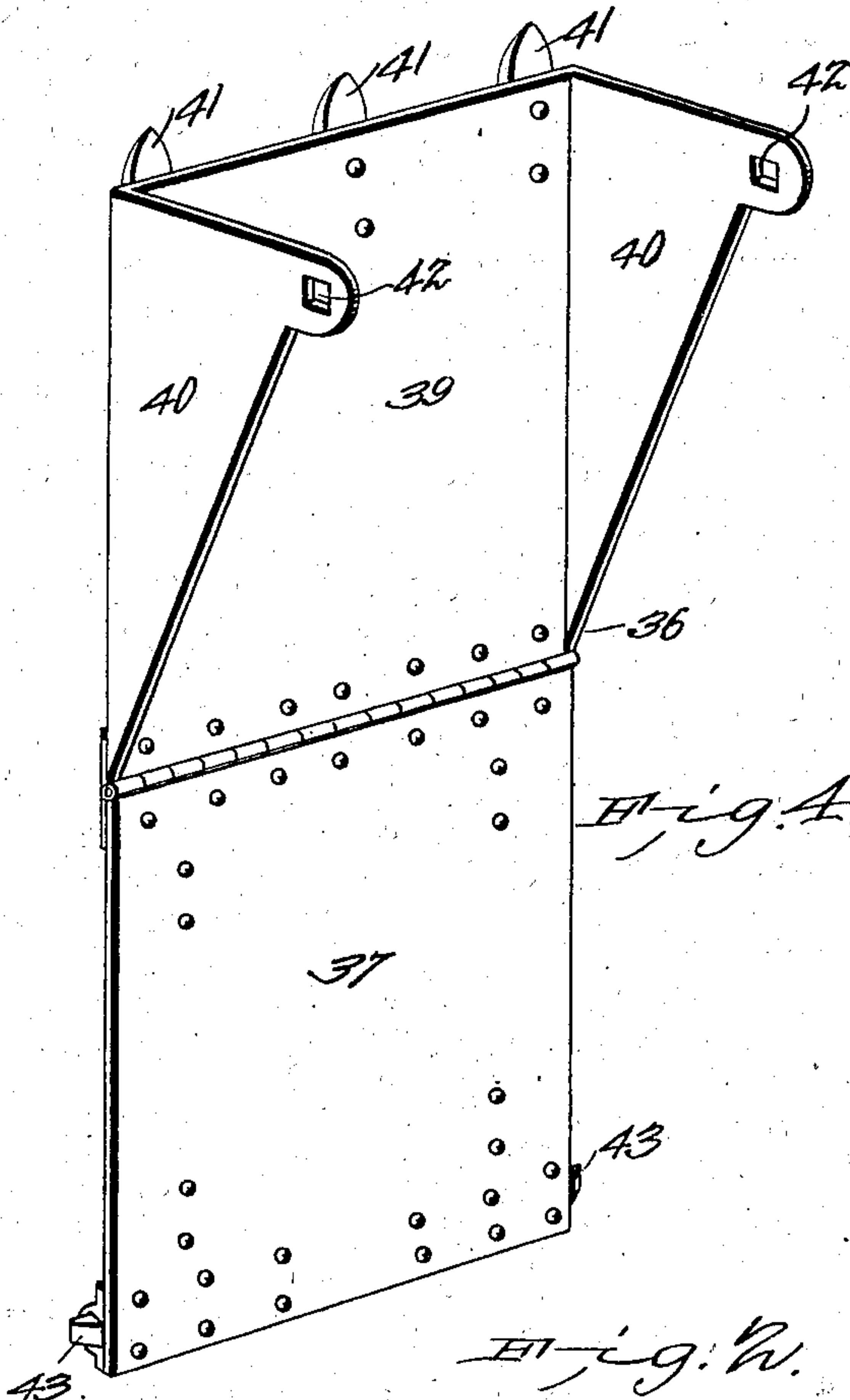
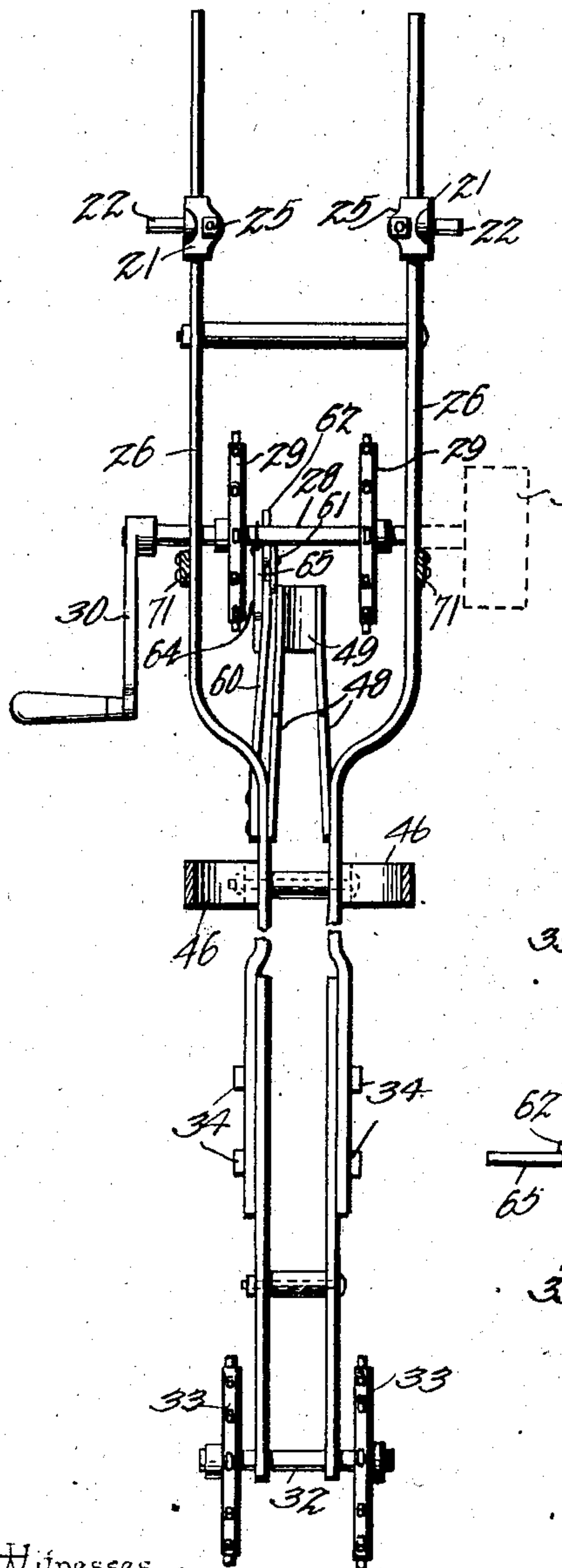
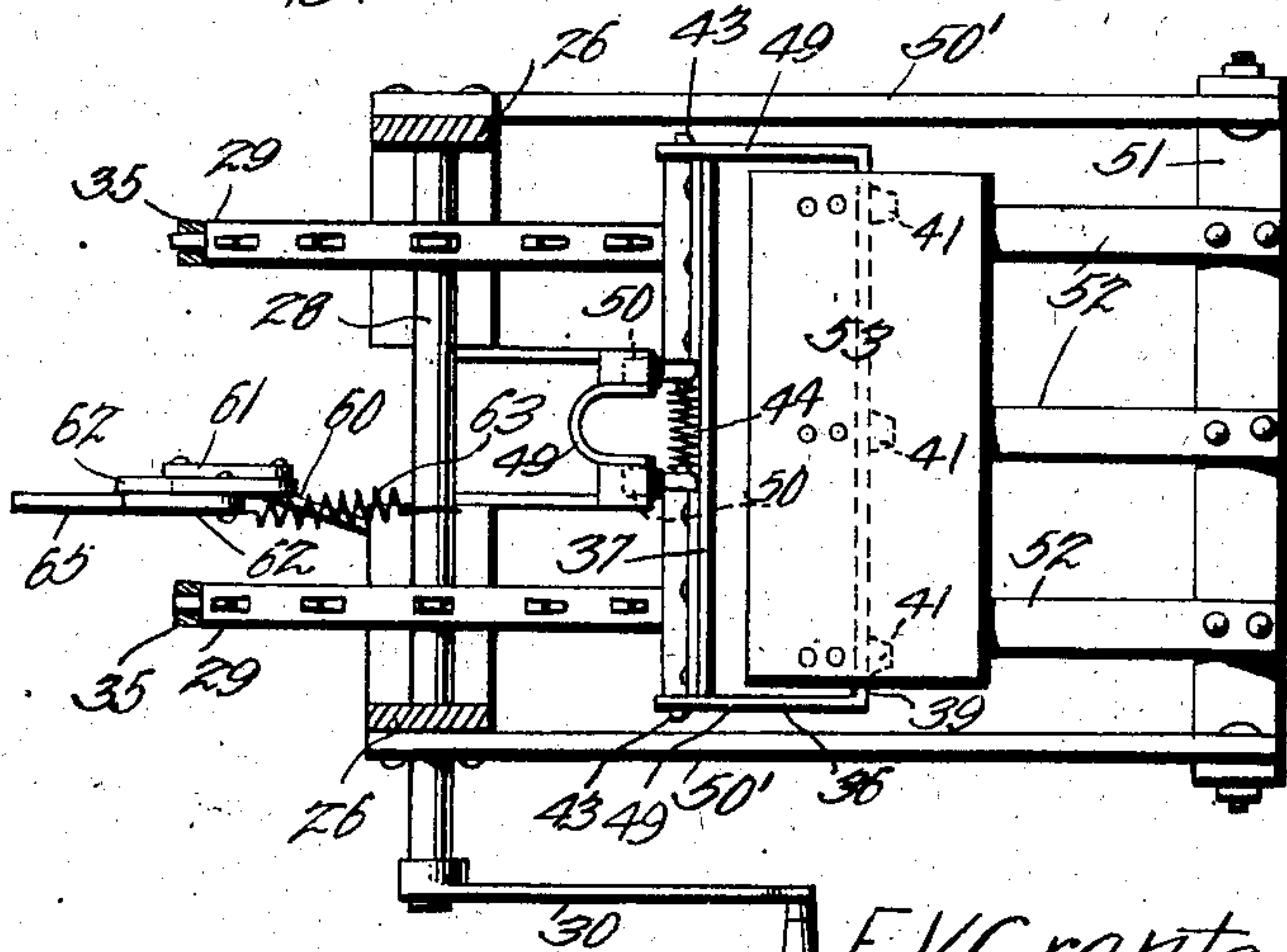


Fig. 4.

Fig. 5.



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UNITED STATES PATENT OFFICE.

EARL VALCHESTER GRANT AND NEWTON WEST SHEARS, OF LOS ANGELES,
CALIFORNIA.

EXCAVATOR.

SPECIFICATION forming part of Letters Patent No. 728,391, dated May 19, 1903.

Application filed June 16, 1902. Serial No. 111,983. (No model.)

To all whom it may concern:

Be it known that we, EARL VALCHESTER GRANT and NEWTON WEST SHEARS, citizens of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Excavator, of which the following is a specification.

This invention relates to certain improvements in excavating devices of that class in which a series of dirt-conveying buckets are mounted on endless chains to convey the material from the excavating-point to a point of discharge.

One of the principal objects of the invention is to provide a device of this character in which the dirt-conveying buckets are rendered self dumping and cleaning, and, further, to provide for the scraping of the buckets after the dumping operation in order to remove any material which may cling thereto.

A further object of the invention is to provide an improved construction of bucket which may be opened automatically at the discharging-point to deliver its contents and closed automatically before returning to the excavating-point.

A still further object of the invention is to provide an excavating-machine adjustable for different classes of work and capable of adjustment in order to bring it into contact with fresh material on either side of or at a lower level than that in which the buckets have been operating.

A still further object of the invention is to provide an excavating device which may be employed for the removal of sand, clay, gravel, or any other material and employed in digging of ditches or canal or other work or for submarine dredging.

With these and other objects in view the invention consists in the novel construction and arrangement of parts hereinafter described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims.

In the drawings, Figure 1 is a side elevation of an excavating apparatus constructed in accordance with the invention and also illustrating one form of supporting-frame which

may be employed to carry the same. Fig. 2 is a sectional plan view of the same on the line 22 of Fig. 1, drawn to a somewhat-larger scale in order to more clearly illustrate the construction. Fig. 3 is a front elevation of the framework of the excavator proper. Fig. 4 is a detail perspective view of one of the buckets in open position, the parts being in the position assumed immediately after passing to the rear run of the endless belts and before the closing movement is effected. Fig. 5 is an elevation of one of the buckets in closed position looking from the rear or belt side of the bucket. Fig. 6 is a detail perspective view of one of the hook-bolts for locking and holding a portion of the frame in adjusted position. Fig. 7 is a detail perspective view of one of the bucket-locking bolts detached.

Similar numerals of reference are employed to indicate corresponding parts throughout the several figures of the drawings.

The operative members of the excavating device may be supported on a frame of any description or character—as, for instance, a traction or other engine, a railway-car, or a dredge—and in the drawings there is shown as a matter of illustration a wheeled frame 10, having uprights 11, connected by a cross-bar 12. The adjacent inner faces of the uprights 11 are provided with grooves 13 for the reception of a vertically-movable cross-head 15, the upper end of which is connected by a flexible rope or chain 16 to a winding-drum mounted on a shaft 17, adapted to bearings in standards 18. The shaft 17 has one or more handled cranks 19 to effect the winding of the drum and the adjustment of the cross-head 15 to any desired position. The uprights 11 may be arranged in a vertical plane and the cross-head have a strictly vertical movement; but it is preferred to arrange the same at a slight angle to the vertical, as indicated in Fig. 1.

To the rear face of the cross-head are connected, by suitable bolts or other securing devices, a pair of lugs 20, to which are pivoted blocks 21, the latter being provided with pivot-pins 22, extending through openings in said lugs, and being further provided with

openings for the reception of the threaded ends of hook-bars 24, having locking-nuts 25. The hook-bars serve as a means of securing the vertical bars 26 of the excavator-frame to the blocks 21, and in the rear face of each of said bars 26 are formed a series of notches 27 to permit vertical adjustment of said bars with relation to the blocks and cross-heads.

The bars 26 are provided with suitable bearings for the reception of a transversely-disposed shaft 28, carrying a pair of sprocket-wheels 29, and on said shaft is secured a crank-handle 30 to permit the operation of the device by hand, or a suitable belt or other driving-wheel 31 may be employed, as indicated by dotted lines in Fig. 3, to permit the operation of the mechanism from any suitable source of power. At a point below the shaft 28 the side bars 26 slightly converge and thence extend in parallel lines to the lower portion of the excavator, being provided at their lower ends with bearings for the reception of a shaft 32, having a pair of sprocket-wheels 33, arranged in the same plane with the sprocket-wheels 29. To permit of proper adjustment, the side bars 26 are adjustable, being made in sections, connected to each other by bolts 34, which will permit of alteration in the length of the bars or the insertion of an additional bar-section when necessary.

Over the upper and lower pairs of sprocket-wheels extend two parallel endless belts 35, formed of connected links in the usual manner and serving to support any desired number of excavating and carrying buckets 36, the number of buckets employed being dependent on the length of the link belts and the character of work. The inner or rear portion of each bucket is formed of a plate 37, having a plurality of lugs or brackets 38, by which it may be secured to the chain-links. To one end of the plate 37 is hinged a front bucket member comprising a plate 39 and angular side wings 40, the whole being preferably formed of strong sheet metal and provided at the cutting edge with a number of pointed teeth 41, adapted to engage with the earth or other material slightly in advance of the edge of the bucket. In handling some classes of material the teeth may be dispensed with and the sharpened edge of the bucket relied upon to cut its way into the material, and in other cases, especially where gravel, rocks, and similar material is to be handled, the front edge of the bucket is provided with a plurality of raking or other teeth, which will loosen the material before the same passes into the bucket. The side wings are provided with rearwardly-extending portions having openings 42 for the passage of laterally-movable locking-bolts 43, adapted to guides on the rear surface of the plate 37 and normally pressed apart by a spring 44 to keep them in engagement with the openings. The ends of the bolts are inclined, as clearly shown in Fig. 4, in order that they may automati-

cally engage in the openings when the front portion of the bucket falls by gravity to assume the closed position.

To the two side bars 26 are secured a pair of forwardly-projecting bars 46, carrying at their outer ends an inclined chute 47, into which the material in the buckets is delivered, the chute being of any desired length and arranged in such manner as to convey the excavated material to a distant dumping-ground or to carts, railway-cars, or other vehicles to be removed. At a point slightly above the arms 46 the bars 26 are provided with a pair of converging arms 48, preferably connected at their upper ends by a cross-bar 49 to prevent spreading. The inner faces of the two arms 46 are spaced for a distance somewhat less than the distance between a pair of anti-friction-rollers 50, mounted on studs carried by the bolts 43, and during the upward travel of the buckets said rollers engage with the adjacent faces of these arms and are drawn toward each other until their outer ends are disengaged from the openings 42 in the side wings of the buckets. This occurs when the buckets are slightly above the upper end of the chute 47, and the weight of the material in said buckets causes the front section of each bucket to drop and deposit the material in the chute. The bucket then travels in open position to the opposite run of the link belt, where it is automatically closed prior to the return to the excavating-point.

To the side bars 26 are secured forwardly-projecting arms 50', connected at their front ends by a cross-bar 51. To the cross-bar are secured a number of plate-springs 52, which carry at their rear end a scraping-blade 53, arranged in the path of movement of the open buckets and serving to remove therefrom any clay or other material which may cling to the inner surface of said buckets, the spring permitting the yielding of the blade should any of the buckets be out of alinement or if the buckets are bent or otherwise damaged.

60 designates an arm secured to one of the bars 26 and carrying at its upper end a pivoted link 61, the outer end of which is pivotally connected to a lever 62, normally held in the position indicated in Fig. 1 by a tension-spring 63. Near the upper end of the arm 60 is a stud 64, carrying a lever 65, the upper end of which is pivotally connected to the lever 62. The lower end of the lever 65 is bent downwardly and rearwardly, such bent portion extending between the two link belts and in the path of movement of the buckets. When an open bucket reaches the position indicated in Fig. 1, the lower end of its rear plate 37 will engage the lower end of the lever 65 and force the same to the rear. At this time the front end of the lever 62 is in engagement with the rear face of the front member of the bucket, immediately above the pivot-point thereof. As the rear run of the link-belts continue their downward movement the inclined lower portion of the lever

65 is forced in the direction of the bars 26, and the lever 62 is given a quick forward movement against the stress of spring 63, the forward member of the bucket being thrown
 5 over with its hinge as a center and assuming the closed position. The closing movement is assisted partly by gravity; but the impulse imparted by the lever 62 is in all cases sufficient to insure the movement of the front section of the bucket to locking position.
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The upper ends of the bars 26 are pivoted on the studs 22, and said bars may be swung to the front or rear to cause the engagement of the buckets at different points without altering the position of the excavator-carrying device. To effect this adjustment, the two bars 26 are connected to an adjusting-lever 70 by means of a rod 71, having a bifurcated end portion for attachment to the two side bars.
 15 The rod 71 is telescopic, its two sections being normally separated for a slight distance by means of a compression-spring 72, so that in the event of the buckets striking a large rock or other unyielding material the frame and buckets as a whole may be permitted a slight rearward movement to avoid breakage. When the supporting-frame is once moved to position, it may be allowed to remain while considerable material is being removed, the cross-head 15 being gradually lowered to permit the buckets to dig deeper into the ground, while the rocking movement of the excavator-frame on the pivots 22 will permit a considerable range of fore-and-aft movement. The
 25 apparatus may be constructed on any scale and of any material and is especially designed for use for comparatively light and rapid work where small power is used, the buckets being designed to take thin shavings of clay or similar material or small quantities of granular material at each operation.
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The apparatus may be employed for conveying grain, coal, and other material as well as for excavating purposes without further modifications than are necessary to meet special requirements.
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While the construction herein described, and illustrated in the accompanying drawings, is the preferred form of the device, it is
 50 obvious that various changes in the form, proportion, size, and minor details of the structure may be made without departing from the spirit or sacrificing any of the advantages of the invention.

55 Having thus described the invention, what is claimed is—

1. The combination with an endless belt and means for driving the same, of a conveying-bucket formed of a number of connected sections, means for opening the bucket at a point of discharge, and means for closing the bucket after leaving the point of discharge.
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2. The combination with an endless belt, of a conveyer-bucket having a hinged section, means for automatically moving said hinged section to open position at a discharging-point, and means for automatically closing
 65

the bucket after leaving the discharging-point.

3. The combination with an endless belt, of a bucket having a rear plate secured to the belt and provided with spring locking-bolts, a front section hinged to the plate and having openings for the reception of said bolts, means for withdrawing the bolts to permit the
 70 opening of the bucket, and means for automatically returning the hinged front section to closed position.
 75

4. The combination with an endless belt, of a conveyer-bucket comprising a rear plate secured to the belt, and a hinged section including a front plate and side wings, the latter being provided with bolt-receiving openings, spring-pressed locking-bolts for engaging said openings, means for effecting the
 80 withdrawal of the bolts to permit the opening of the bucket at the point of discharge, and means for automatically closing the bucket after leaving the point of discharge.
 85

5. The combination with an endless belt, of a conveyer-bucket comprising a rear plate secured to the belt and a front section pivoted to said plate, spring-pressed locking-bolts carried by the rear plate and provided with projecting studs, bolt-engaging means on the
 90 front sections, arms adapted to engage with studs of the locking-bolts to effect the release of the latter and permit the opening of the bucket, and means for automatically closing said bucket.
 95

6. The combination with an endless belt, of a conveyer-bucket formed of a plurality of connected sections one of which is secured to the belt, means for automatically opening one of such sections to permit the discharge of
 100 the contents of the bucket, and a trip-lever operated automatically by the movement of the bucket and adapted to engage with and move the open section of the bucket to closing position.
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7. The combination with an endless belt, of a two-part bucket having one section secured to the belt, means for moving the opposite section to open position to discharge the contents of the bucket, a closing-lever for engaging and moving said open section to closed position, and a trip-lever connected to the closing-lever and disposed in the path of movement of the bucket.
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8. The combination with an endless belt, of a bucket formed of two hinged sections one of which is secured to the belt, means for permitting an opening movement of the opposite section to discharge the contents of the bucket, a closing-lever, a spring normally holding the same in retracted position, a supporting-arm having a linked connection with said lever, and a trip-lever pivoted to the arm and the closing-lever and having its lower end arranged in the path of movement of the bucket
 115 and adapted to effect an initial movement of the opening section of the bucket to close the latter.
 120

9. The combination in an excavator of the

oppositely-disposed parallel bars each formed of a plurality of connected and longitudinally-adjustable sections, shafts carried at the upper and lower ends of said bar, sprocket-wheels arranged in pairs on said shafts, the lower pair of wheels being disposed outside the plane of the supporting-bars and said supporting-bars diverging outwardly beyond the upper pair of wheels, link belts carried by said sprocket-wheels, conveyer-buckets secured to the link belts, each of said buckets comprising a rear plate secured to the belts and a front section hinged to said plate, spring-pressed locking-bolts carried by the rear section and provided with antifriction-rollers, bolt-engaging means carried by the front section, arms carried by the said parallel bars and adapted to engage with the antifriction-rollers to thereby move the bolts to releasing position, and means for automatically closing said buckets.

10. The combination with a vertically-adjustable upper support, of a conveyer-frame pivotally hung thereon, an endless belt and a conveyer-bucket supported by said frame, and means for adjusting the frame with its pivots as a center to bring the buckets into operative relation to fresh portions of the material to be removed.

11. The combination with an upper support, of an excavator-frame pivotally hung thereon and provided with an endless belt and conveyer-buckets, a lever for adjusting the position of the excavator-frame, and a connecting-rod having an intermediate yielding section to permit rearward movement of the frame and buckets in the event of the latter striking an obstruction.

12. The combination with an upper support, of an excavator-frame hung thereon, a chute carried by said excavator-frame, endless belts and buckets carried by the frame,

means for automatically opening said buckets to discharge the contents thereof to the chutes, means for automatically closing the buckets and means for adjusting the frame and its connected parts with the pivots as a center, substantially as specified.

13. The combination with a vertically-adjustable supporting device, of a conveyer-frame pivotally hung thereto, an adjustable connection between the conveyer-frame and its pivots, an endless belt and conveyer-buckets supported by said frame, and means for adjusting the frame with its pivots as a center.

14. The combination with a vertically-adjustable support, of clamping-blocks pivotally connected thereto, a conveyer-frame comprising parallel bars each having a plurality of notches, hook-bolts carried by the blocks and adapted to engage in any one of said notches, and an endless belt and conveyer-buckets supported by said frame.

15. The combination with an endless belt, of an automatically opening and closing conveyer-bucket comprising a number of pivoted members, and a scraper-blade arranged in the path of movement of the members of the bucket when the latter is in open position.

16. The combination with a conveyer-belt, of an automatically-opening bucket comprising a number of pivoted members, and a spring-held scraper-blade adapted to engage with the members of said bucket when the latter is in open position.

In testimony that we claim the foregoing as our own we have hereto affixed our signatures in the presence of two witnesses.

EARL VALCHESTER GRANT.
NEWTON WEST SHEARS.

Witnesses:

JENNIE F. AVERY,
C. H. QUEIN.