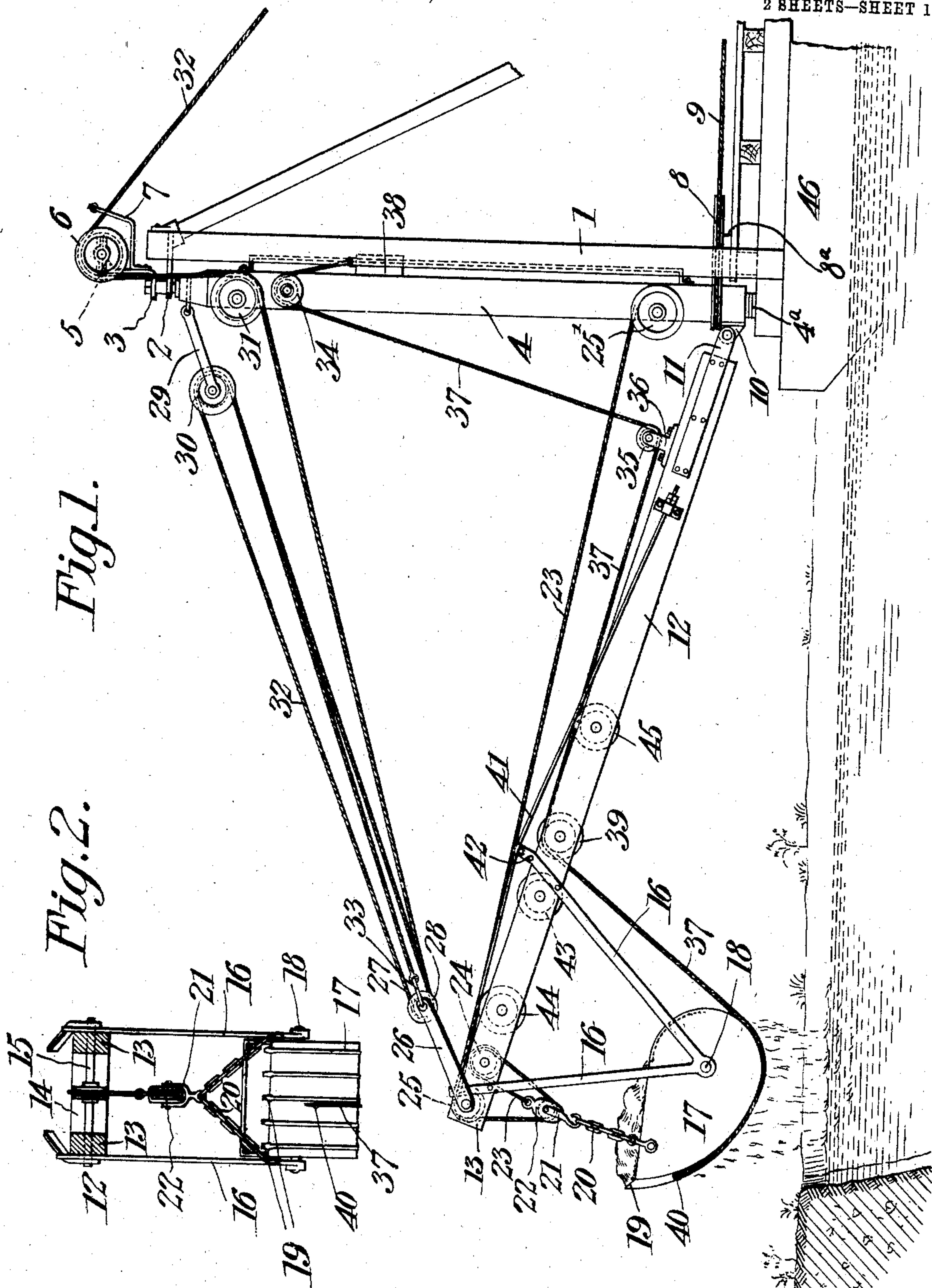


No. 864,180.

PATENTED AUG. 27, 1907.

G. J. MILLER,
EXCAVATING MACHINE.
APPLICATION FILED NOV. 21, 1906.

2 SHEETS—SHEET 1.



WITNESSES:

E. H. Stewart
Arthur D. Lawson

Gustaf J. Miller, INVENTOR.

By *C. A. Snow & Co*
ATTORNEYS

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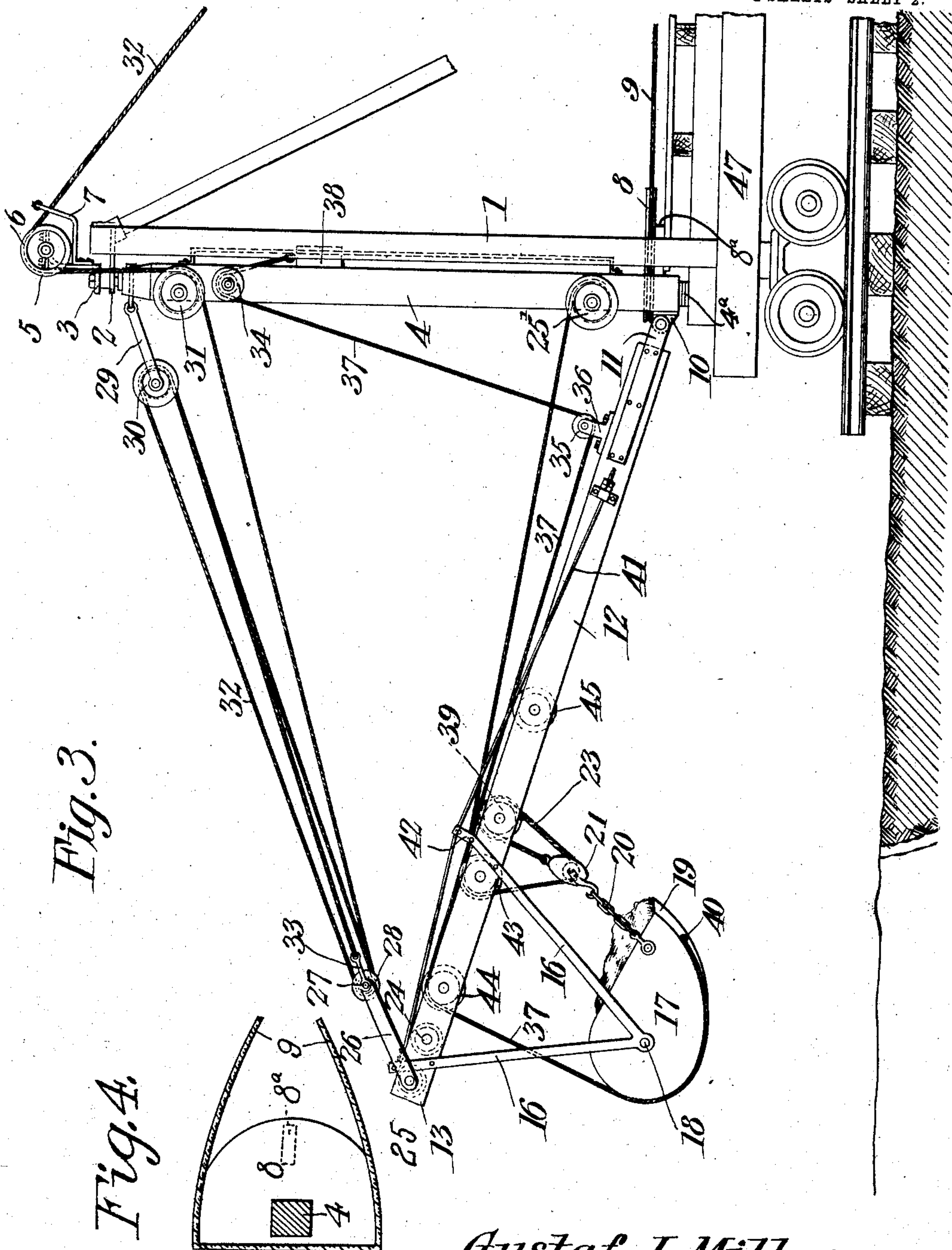


Fig. 3.

Fig. 4.

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E. J. Hunt
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UNITED STATES PATENT OFFICE.

GUSTAF J. MILLER, OF DULUTH, MINNESOTA.

EXCAVATING-MACHINE.

No. 864,180.

Specification of Letters Patent.

Patented Aug. 27, 1907.

Application filed November 21, 1906. Serial No. 344,480.

To all whom it may concern:

Be it known that I, GUSTAF J. MILLER, a citizen of the United States, residing at Duluth, in the county of St. Louis and State of Minnesota, have invented a new and useful Excavating-Machine, of which the following is a specification.

This invention relates to excavating machines of that type utilizing a swinging boom and a bucket.

The object of the invention is to provide a bucket which is disposed below the boom and is mounted to swing on an axis extending through the bucket at a point removed from the center of gravity thereof so that said bucket will automatically discharge its contents when released from holding means provided for it.

A still further object is to provide a bucket which can be reversed so as to work toward or away from the platform of the machine so as to meet various conditions found in excavating.

With the above and other objects in view the invention consists of certain novel features of construction and combinations of parts which will be hereinafter more fully described and pointed out in the claims.

In the accompanying drawings is shown the preferred form of the invention.

In said drawings: Figure 1 is a side elevation of portions of an excavator and showing the present improvements embodied therein, said excavator being illustrated in position upon a scow preferably employed for ditching in marshy regions; Fig. 2 is a section through the outer end of the boom and showing the bucket and tackle in elevation; Fig. 3 is a view similar to Fig. 1 but showing the apparatus mounted upon a truck and the bucket reversed so as to follow the truck during the excavating operation; and Fig. 4 is a section through the beam and showing the actuating device in plan.

In illustrating the present invention it has not been deemed necessary to show the mechanism for actuating the various cables because it is of course understood that any desired apparatus may be employed for this purpose.

The mast of the apparatus is shown at 1 and has an outwardly extending bracket 2 at the upper end thereof in which is rotatably mounted a trunnion 3 extending upward from an upright beam 4 the lower end of which bears upon the base of the machine as shown at 4^a. The trunnion 3 carries a bracket 5 in which is mounted a sheave 6. An angular guide 7 extends from the bracket and is adapted to hold a cable upon the sheave 6 as will be hereinafter more fully set forth. An actuating device in the form of a semi-circular disk 8 having a groove in its curved edge is secured to the beam 4 and a cable 9 is fastened to the device and is located within the groove. By pulling upon this cable in opposite directions the beam 4 can be swung upon its pivot 4^a. This actuating device 8 travels upon a support 8^a dis-

posed thereunder. An ear 10 extends from the lower portion of beam 4 and pivoted thereto are heavy connecting bars 11 which are fastened to opposite faces of the boom 12. This boom is made up of parallel beams 13 as shown particularly in Fig. 2 said beams being secured together at intervals in any desired manner as by means of spacing blocks 14 and coupling bolts 15. Hangers 16 extend downward from the side faces of the boom near the outer end thereof and are arranged at acute angles to each other and extend to opposite sides of a bucket 17 which is open at the top and which has trunnions 18 extending from its sides at points removed from the center of gravity, said trunnions bearing within the hangers 16 at their points of conjunction. The forward edge 19 of the bucket constitutes a shovel for digging into the dirt, etc. in the path thereof and a chain 20 is connected to the sides near this digging edge 19 and is fastened to a yoke 21 which embraces a block 22. This block has one end of a cable 23 fastened to it and said cable is looped over a sheave 24 within the end portion of the boom and then extends under the block 22 and then over a sheave 25 within the end portion of the boom from which point said cable 23 extends rearwardly to a drum 25' upon the beam 4 which is adapted to be rotated in the manner hereinbefore described. Arms 26 are pivotally connected to the upper ends of the beams 13 and these arms converge as shown particularly in Fig. 2 and are connected by a bolt 27 upon which is mounted a sheave 28. Links 29 are pivotally connected to the upper end of the beam 4 and journaled between them is a sheave 30. Another sheave 31 is journaled in the upper portion of the arm adjacent and in rear of the sheave 30. The hoisting cable 32 extends through the guide 7 heretofore referred to then over the sheave 6 and under the sheave 31 to sheave 28 then extends over the sheave 30 and back under the sheave 28 and then over the sheave 30 once more, the end of said cable being fastened by means of a rod 33 with the arms 26. This cable is adapted to be pulled by any suitable mechanism for the purpose of raising or lowering the boom 12. A sheave 34 is journaled within the upper portion of the beam 4 directly below the sheave 31 and another sheave 35 is journaled in a bracket 36 arranged upon the boom near its inner end. A cable 37 extends over the sheave 34 and under the sheave 35 one end of said cable being provided with a weight 38 while the other end extends over a sheave 39 in the boom 12 and then under the bucket 17, it being secured in said bucket near the front or cutting edge thereof, as shown at 40.

A suitable truss 41 is secured upon the boom for the purpose of bracing it, the upper end of the rear hangers 16 constituting the intermediate standard of the truss as shown at 42. Besides the sheaves within the boom which have already been referred to a pair of sheaves

43 and 44 is located within the boom between the sheaves 24 and 39 and another sheave 45 is disposed within the boom between the sheave 39 and the inner end of said boom. These sheaves are for the purpose hereinafter more fully set forth.

As heretofore stated the apparatus may be mounted on a scow 46 when the excavating is carried on in marshes, etc., but where allowable the apparatus can be disposed upon a truck as shown at 47 in Fig. 3. It will also be understood that with this last arrangement the bucket can be disposed in rear of the truck 47 so as to enable the bucket to dig toward the truck. Of course to procure this result the bucket must be reversed between the hangers 16 as shown in Fig. 3 in which case the cable 23 is looped around the sheave 39 instead of the sheave 24 and is extended over the sheave 43 instead of sheave 25. The dumping cable 37 is also placed upon the sheave 44 instead of the sheave 39, otherwise the positions of the parts will remain unchanged and the operation is the same.

When it is desired to operate the machine the boom 12 is lowered by letting out the cable 32 and the bucket 17 will be moved downward into the excavation and brought to a proper position by means of the cable 23. The beam is then raised so as to cause the bucket to dig into the soil and after the boom has been brought to a predetermined position the cable 23 is let out and the weight 38 as well as the weight of the material within the bucket will cause the bucket to swing upon its trunnions so as to discharge its contents by gravity. Importance is attached to the fact that the hangers 16 are perfectly straight from end to end this being permissible in view of the fact that the bucket 17 is of the same width as the boom. Said hangers can therefore be subjected to considerable longitudinal strain without becoming bent.

The preferred form of the invention has been set forth in the foregoing description but I do not limit myself thereto as I am aware that modifications may be made therein without departing from the spirit or sacrificing the advantages thereof, and I therefore reserve the right to make such changes as fairly fall within the scope of the claims.

What is claimed is:

1. In a machine of the character described the combination with a boom, and means for swinging the same in a vertical plane; of parallel hangers depending from opposite faces of the boom, a bucket hung between the hangers,

means for swinging the bucket into and supporting it in an upright position, and gravity operated means for inverting the bucket when said supporting means are removed.

2. In a machine of the character described the combination with a boom, and means for swinging the boom in a vertical plane; of parallel hangers suspended from the boom and rigidly connected thereto, a bucket mounted to swing between the hangers, tackle upon the boom and connected to one end of the bucket for pulling it into and holding it in an upright position, and weighted means for automatically inverting the bucket when the bucket is relieved from its tackle support.

3. In a machine of the character described the combination with a boom, and means for swinging the same; of straight parallel hangers rigidly connected to and suspended from the boom, a reversible bucket suspended between the hangers and mounted to rotate, tackle for moving the bucket into and supporting it in an upright position, weighted means for automatically inverting the bucket when relieved of its tackle support, and means within the boom for supporting the tackle and the weighted means when the bucket is in its normal or reversed position.

4. In a machine of the character described the combination with a boom, and means for swinging the same; of converging hangers rigidly connected to the boom and extending upward therefrom, said hangers being connected at their lower ends, a reversible bucket hung between the connected ends of the hangers, sheaves upon the boom, tackle mounted upon the sheaves and connected to one end of the bucket to swing said bucket into and to support it in an upright position, a truss arranged upon the boom and including the upwardly projecting portions of one of the hangers, and means for swinging the boom, said means being connected to the upwardly projecting end of the boom.

5. In a machine of the character described the combination with a boom, and means for swinging the boom; of converging hangers rigidly connected to the boom and extending upward therefrom, said hangers being connected at their lower end, a reversible bucket hung between the connected ends of the hangers, sheaves upon the boom, tackle mounted upon the sheaves and connected to one end of the bucket to swing said bucket into and to support it in an upright position, a truss arranged upon the boom and including the upwardly projecting portions of one of the hangers, means for swinging the boom, said means being connected to the upwardly projecting end of the boom, sheaves within the boom, a cable mounted thereon and extending under the bucket, said cable being secured to the bucket adjacent the open end, and a weight secured to said cable for automatically inverting the bucket when relieved of its support.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses:

GUSTAF J. MILLER.

Witnesses:

JOHN H. BRIGHAM,
M. A. KEELEY.