W. M. VENABLE.

EXCAVATING APPARATUS.

APPLICATION FILED JULY 30, 1917.

1,360,475.

Patented Nov. 30, 1920.

2 SHEETS—SHEET 1.

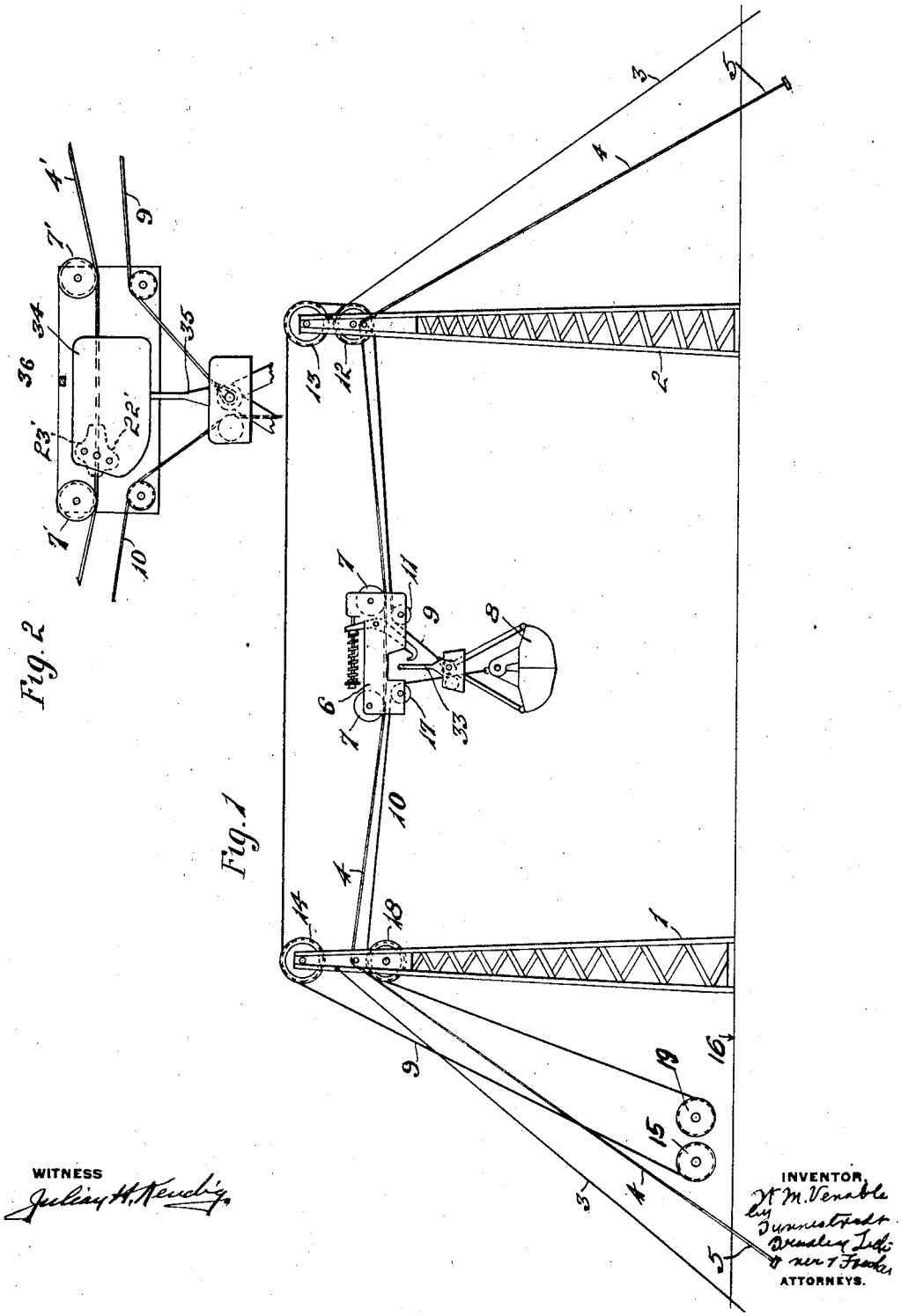


Fig. 2

Fig. 1

WITNESS

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Fig. 4

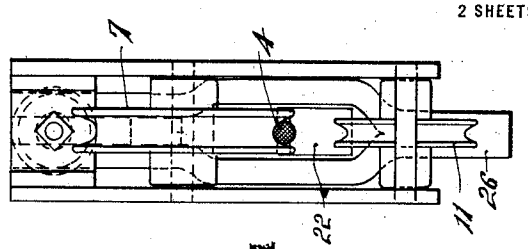



Fig. 3

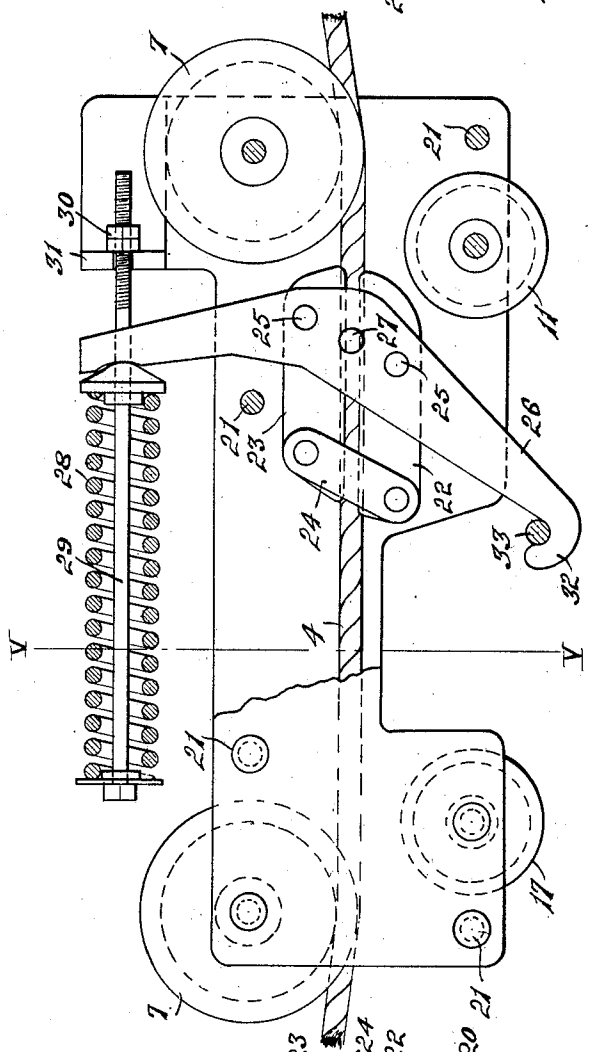
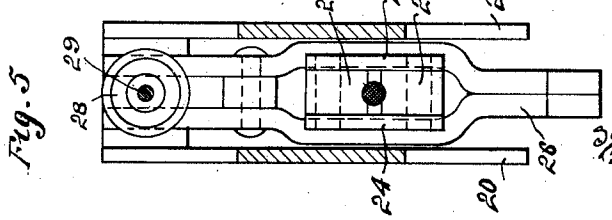



Fig. 5




WITNESS

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# UNITED STATES PATENT OFFICE.

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## EXCAVATING APPARATUS.

1,360,475. Specification of Letters Patent. Patented Nov. 30, 1920.

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*To all whom it may concern:*

Be it known that I, WILLIAM M. VENABLE, a citizen of the United States, residing at Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Excavating Apparatus, of which the following is a specification.

This invention relates to excavating apparatus, and more particularly to that class of excavating apparatus operated upon a cable way stretched between elevated points, and the invention resides particularly in the carriage apparatus for supporting the excavating tools, such as an orange peel or clam shell excavating bucket. Heretofore it has been necessary to use a reversible engine geared to three drums for operating a two-line bucket suspended from a carriage upon a cableway, two drums being necessary to operate the bucket and the third, a reversible drum for hauling the carriage back and forth along the cableway. This invention has for its principal objects, the provision of a cableway carriage for excavating buckets wherein the carriage may be automatically held against movement along the cableway when the bucket is being lowered or raised, opened or closed, and released at the will of the operator by manipulating the lifting line or the opening line, or both; the provision of a carriage for the purpose described that may be shifted back and forth at the will of the operator without the use of the heretofore necessary carriage operating line, but instead, by the usual lifting and opening lines, thereby eliminating an extra reversible drum at the hoisting engine; the provision of a carriage for the purpose set forth wherein the bucket may be raised and lowered, opened and closed, and moved in either direction along the cableway by manipulating two lines secured to separate operating drums, which may be rotated by a non-reversible hoisting engine; and such other objects as may hereinafter appear. Certain embodiments of the invention are illustrated in the accompanying drawings, wherein—

Figure 1 is a diagrammatic elevation showing the complete apparatus, no attempt being made to show the various elements in their proper scale; Fig. 2 is a side elevation of a modified form of carriage with one of the side plates removed; Fig. 3 is a side elevation of the preferred form of carriage with a portion of one of the side plates broken away; Fig. 4 is an end elevation of the carriage shown in Fig. 3; and Fig. 5 is a vertical section on the line V—V of Fig. 3.

Referring to the drawings, and particularly to Figs. 1, 3, 4 and 5, 1 and 2 are towers which may be of any preferred construction placed on opposite sides of the earth or material to be excavated, and are suitably supported by guy wires 3 which are anchored in the earth at a little distance from the base of the towers. 4 is a cableway which is stretched from the top of one tower to another and the ends thereof anchored in the ground in any suitable manner at 5. The cableway 4 is for the purpose of supporting a cableway carriage 6 which is provided with a pair of rollers 7, so that the carriage may be moved back and forth with a minimum of friction upon the cableway. 8 is an ordinary clam shell bucket of the two-line type, that is a bucket that is operated by a lifting cable 9 and a bucket closing cable 10. This bucket is adapted to be suspended from the carriage 6 by means of the cables 9 and 10, the cable 9 being passed over a pulley 11 carried on the carriage 6 and then around a sheave 12 supported upon the upper end of the tower 2, over a pulley 13 also carried on the extreme end of the tower 2, thence over a pulley 14 mounted upon the upper end of the tower 1, thence down to a hoisting drum 15, diagrammatically shown adjacent the ground line 16.

The closing line 10 is passed over a pulley 17 carried by the carriage 6 and thence over a sheave 18 adjacent the upper end of the tower 1, and thence passed around the closing drum 19.

The lifting drum 15 and closing drum 19 may be geared to the usual type of non-reversible hoisting engine, not shown. The drums of the common type of hoisting engine employed are usually frictionally driven through the means of clutch and gear connections with the operating engine, so that either drum may be operated in one direction only by the non-reversible engine, the drums 15 and 19 being so geared to the engine that the drum 15 will be rotated counter-clockwise and the drum 19 rotated clockwise. One drum may remain stationary while the other is being rotated by the engine or vice versa, and depending en-

tirely upon the manipulation of the clutches. The hoisting engine and drums are not illustrated in detail because the apparatus employed is of a well known type.

When the clutch of drum 19 is released the bucket jaws which are held closed by the cable 10, will open, and when the clutch on the drum 15 is released the bucket which is being supported by the lifting cable 9 will be lowered. When the bucket has been lowered with the jaws open, and it is desired to fill the bucket, the clutch of the drum 19 is first thrown in so that it will pull the jaws together and thereby scoop up a load of material. During this operation it is necessary to prevent the carriage 6 from moving toward the left on the cableway 4. Heretofore the carriage has been prevented from moving by a cable secured at one end of the carriage and wound upon a reversible carriage shifting drum. The other end of the cable being passed over a sheave on each tower and secured to the other end of the carriage by holding the reversible drum stationary the carriage was held in operative position upon the cableway. It is the purpose of this invention to provide a carriage that may be held in any desired position on the cableway without the use of this carriage operating drum which necessitated the use of a special reversible engine.

Referring to Figs. 3, 4 and 5, wherein the carriage is illustrated in detail, the carriage consists of a pair of spaced plates 20 between which is mounted the cableway sheaves 7 and the similar bucket sheaves 11 and 17. The plates are secured together by means of the bolts 21. The carriage is provided with a clamping apparatus which is adapted to grip the cable and prevent movement of the carriage along the cable, and this gripping mechanism consists of a pair of parallel shoes 22 and 23 which are pivoted together at one end by means of a pair of links 24 and at the other end by a pair of pivot pins 25 which extend into the sides of the gripping lever 26. The gripping shoes are located so that they straddle the cableway 4 in such a manner that when the gripping lever 26 is rotated counter-clockwise about the pivot 27, the shoes 22 and 23 will separate and release their hold upon the cable 4. When the gripping lever 26 is rotated about the pivot 27 clockwise the gripping shoes 22 and 23 will be drawn together so as to securely clamp the cable 4.

The gripping lever 26 is normally held in the position shown in Fig. 3 by means of a helical spring 28 carried upon an adjustable rod 29 which passes through the upper end of the gripping lever 26 and is secured to the side plates 20 by means of a pair of adjusting nuts 30 which abut against a bridge plate 31 secured to the side plates 20. The tension of the spring 28 may be regulated by manipulation of the adjusting nuts 30. The spring 28 tends to hold the gripping jaws 22 and 23 in contact with the cable 4. The lower end of the gripping lever 26 is provided with a hook 32 which is adapted to receive a bail 33 (Figs. 1 and 3) carried upon the upper end of the excavating bucket. When it is desired to release the gripping shoes from the cable 4 so that the carriage may be shifted along the cableway the bucket is drawn up by means of the cables 10 and 9 so that the bail 33 may be slipped over the hook 32 on the lower end of the gripping lever 26. When the weight of the bucket is transferred to the lever 26, it will rotate the lever counter-clockwise and thereby release the gripping shoes from the cable 4. The carriage may then be moved in any desired direction along the cableway.

The operation of the apparatus is as follows: Assuming that the carriage is located as shown in Fig. 1, above the position where it is desired to fill the bucket, the clutches of the drums 15 and 19 are released so as to pay out cable sufficient to lower the bucket to the ground. Before the lowering of the bucket is started slack is first paid out from the drum 19, thereby causing the bucket jaws to swing open by gravity. The drum 15 is then allowed to feed out the cable 9 until the bucket touches the ground. At this time the carriage remains stationary because it is securely clamped to the cableway by the clamping mechanism just previously described.

After the bucket has reached the ground the clutch of the drum 19 is thrown in so as to wind up the cable 10, thereby first causing the bucket jaws to close and scoop up material within the bucket. After the bucket has been closed the clutch of drum 15 is thrown in which causes the cable 9 to be wound upon the drum thereby raising the bucket. During the raising operation the drum 19 is rotated sufficiently to keep tension on the line 10, so as to hold the bucket closed during this operation. When the bucket has been raised to the position shown in Fig. 1, the cable 10 is held stationary while the cable 9 is pulled slightly so as to pull the bucket to the right sufficient that when it is lowered the bail 33 will engage the hook 32 of the gripping lever 26. When the bucket is in such position a little slack is paid out by the drum 19 permitting the bucket to lower upon the hook 32. As soon as the weight of the bucket rests upon the hook 32 the gripping lever 26 will be actuated to release the gripping shoes from the cable way 4. After this has been done the carriage may be moved in either direction. If it is desired to move the carriage to the right the clutch is thrown in on drum 15 and released sufficient on drum 19 to permit

movement of the carriage, the tension on the cable 10 being maintained sufficient to hold the bucket closed. If it is desired to move the carriage to the left drum 19 is rotated to wind in the cable 10 and slack is paid out by the drum 15.

After the carriage has been moved to the desired position for dumping, both drums are rotated to wind up the cables 9 and 10 so that the bail 33 will be lifted from the hook 32. The instant the weight of the bucket is relieved from the hook the carriage will be held stationary by the gripping shoes 22 and 23, and slack may be paid out on the line 10 to cause the bucket to dump. After the bucket has been dumped it is again placed upon the hook in the manner described and the carriage may then be moved to its original position for recharging the bucket.

In Fig. 1, the bail 33, is shown attached to the head of the clamshell bucket. In practice it may be preferable to attach it elsewhere, as to the hub of the bucket, so that tension on the line 10 may be entirely released when the bucket is supported from the carriage. The attachment of the bail to the bucket necessarily depends upon the design of the particular bucket which is to be operated upon the carriage, and will vary therewith.

A modified form of carriage is illustrated in Fig. 2, wherein the carriage is provided with a pair of cableway rollers 7′ for supporting the bucket upon the cable 4′. In this construction the gripping shoes 22′ and 23′ are pivoted to a pair of counterweight plates 34 which straddle the cable 4′ and which normally tend to hold the gripping shoes in engagement with the cableway 4′.

The bucket is of a similar construction to that previously described with the exception that in place of a bail it is provided with a bumper rod 35. When it is desired to release the carriage the bucket operating cables 9′ and 10′ are wound up upon the operating drums until the bumper rod 35 engages the counter-weights 34. Lifting of a counterweight causes the gripping shoes 22′ and 23′ to separate from the cableway 4′ and thereby permits of movement of the carriage in either direction. The upward movement of the counter-weight 34 is arrested by a suitable stop 36 on the upper edge of the carriage.

It is obvious that many changes may be made in the details of the construction without departing from the spirit of the invention, and the invention is, therefore, not limited to the specific construction herein illustrated and described.

It is also obvious that the releasing or the engaging of the clutch may be operated by other means than the weight or the pressure of the bucket, as for instance, by pulling on a tag line by a man standing near the place where it is desired to lock or release the carriage.

It is also obvious that instead of a cableway to support the bucket, a rail, truss or crane or other suitable support may be used, the bucket locking to said rail instead of to the cable. By the word "cableway" it is intended to include any such support upon which a carriage may be operated in the manner described.

What I claim is:

1. In excavating mechanism, the combination of a track, a bucket, operating means for the bucket, a carriage for the bucket movable on the track, a brake on the carriage adapted to engage the track in any position of the carriage, self actuated means for applying said brake, and means associated with the brake adapted to engage the bucket and, upon such engagement, to release the brake.

2. In excavating mechanism, the combination with a track, of a carriage thereon, an excavating bucket supported from said carriage and provided with means for imparting raising and lowering movement thereto while thus supported, and a device, normally self-actuated, to lock with said track at any desired point whereby to hold said carriage in a fixed position thereon during such movement of the bucket, means on said device adapted to engage the bucket, when in raised position, the device being released by the bucket when so engaged.

3. In mechanism of the character described, the combination with a track, of a carriage therefor, a bucket, bucket operating means, said carriage constructed to support said bucket independently of said means, a movable self-actuated locking device adapted to normally lock said carriage to said track, the locking device being unlocked in the supported position of the bucket, and means for imparting movement to said carriage.

4. Excavating mechanism, comprising a carriage having a bucket engaging member, a support for the carriage along which the carriage is adapted to travel, an excavating bucket, a lifting cable secured thereto and supported on the carriage for elevating and lowering the bucket, a closing cable adapted to close the bucket, supported on the carriage, and means associated with said bucket-engaging member adapted to lock the carriage independently of the bucket against relative movement with respect thereto when the closing cable and lifting cable are being operated to close and lift the bucket, said member actuated by the bucket when in a predetermined position for releasing the carriage for movement on its support.

5. Excavating mechanism, comprising a

carriage, a support for the carriage along which the carriage is adapted to travel, an excavating bucket, a lifting cable adapted to lift and lower the bucket and move the carriage in one direction along the support, a closing cable adapted to close and open the bucket and move the carriage in an opposite direction, and a releasable support engaging means mounted in the carriage for locking the carriage independently of the bucket at any predetermined point along the carriage support, said means constructed and arranged to be released by contact with the bucket.

6. In excavating mechanism, the combination with a track, of a carriage adapted to travel therealong, an excavating bucket, means for operating the bucket and the carriage, means on the carriage for supporting the bucket independently of the operating means, a self-actuated locking device for gripping the track in any desired position of the carriage when the bucket is not so supported, said locking device being disengaged when the bucket is in its supported position.

7. A cableway carriage for excavating buckets comprising a frame having means for operating a bucket therefrom, rollers for supporting the carriage upon the cableway, a self-actuated clamp on the carriage for gripping the cableway in any position of the carriage, and bucket supporting means for releasing the clamp adapted to be directly operated by contact with the bucket.

8. A cableway carriage for an excavating bucket, comprising means for operating a bucket thereon, rollers for supporting the carriage upon the cableway, pivoted clamps for gripping the cableway in any desired position of the carriage, self-actuated means for normally holding the clamps in gripping engagement with the cable independently of the bucket to hold the carriage stationary, and means whereby the clamps are released by the weight of the bucket, said last mentioned means operative independently of the bucket operating means.

9. A load-conveying mechanism comprising in combination, a track, a carriage movable along the track, self-actuated means on the carriage adapted to grip the track in any desired position of the carriage whereby to hold the carriage against movement, and means associated with said gripping means adapted to support the load, said gripping means being released when the load is so supported.

WILLIAM M. VENABLE.