No. 744,490. PATENTED NOV. 17, 1903.

W. COLE.

EXCAVATING MACHINE.

APPLICATION FILED MAR. 9, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

FIG. 1

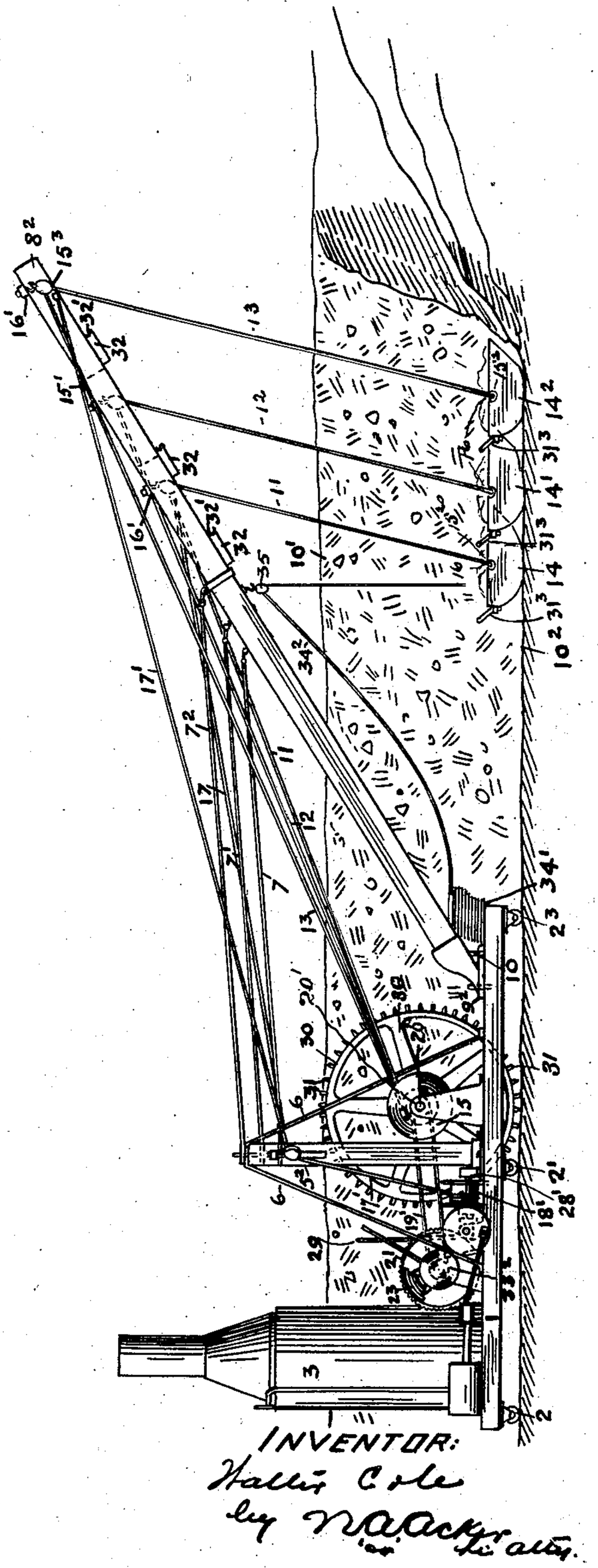
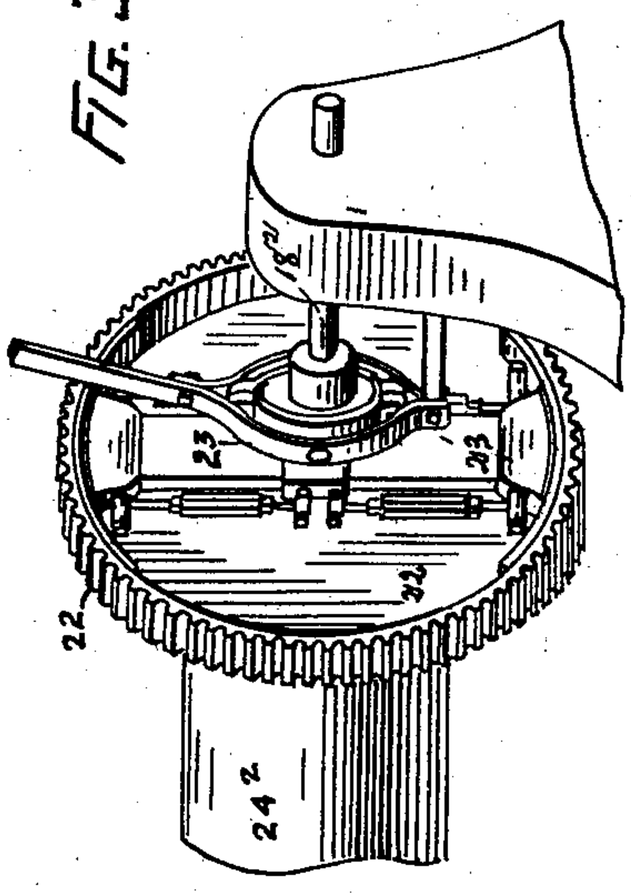


FIG. 2



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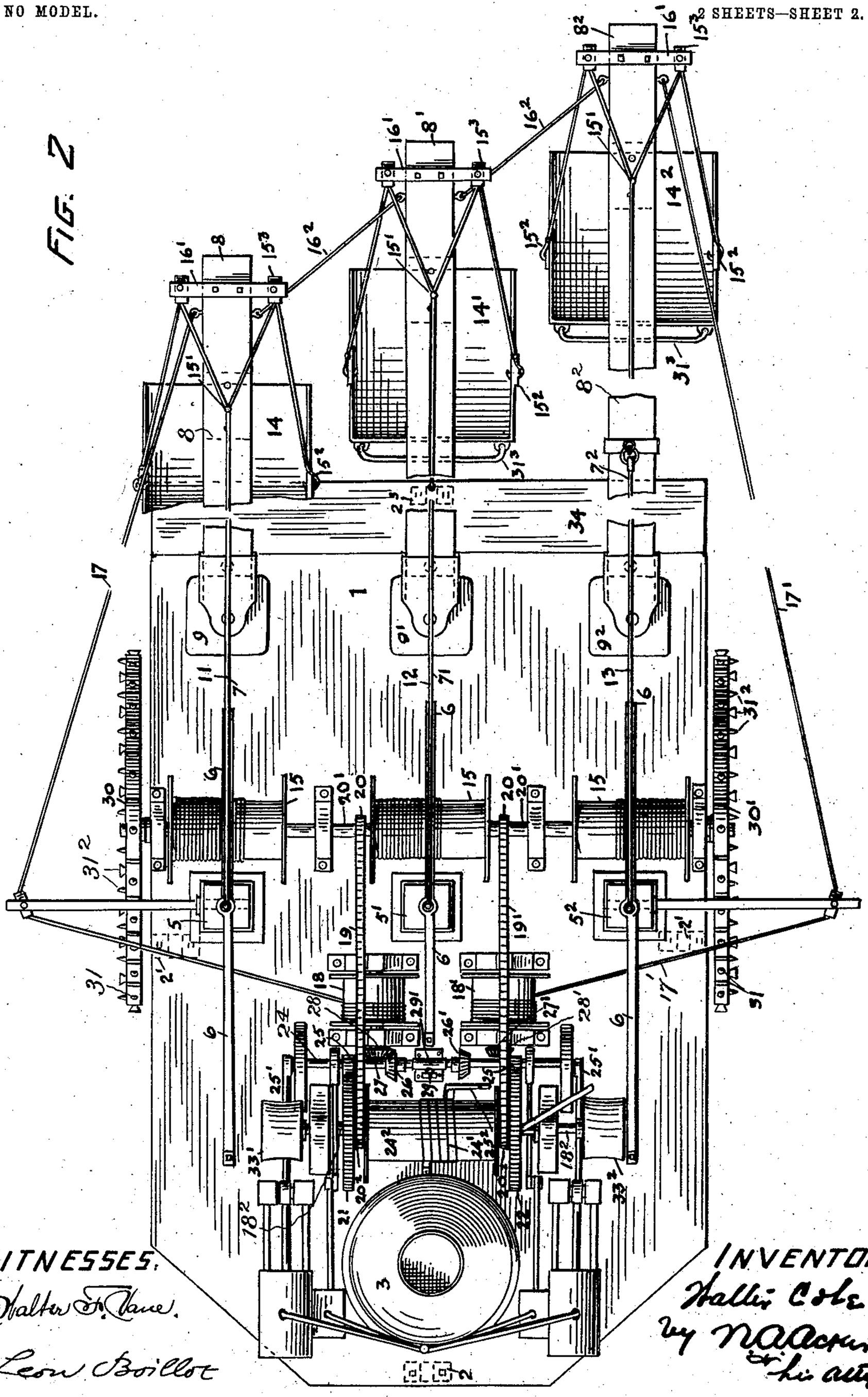
NO MODEL. 2 SHEETS—SHEET 2.

FIG. 2



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No. 744,490. Patented November 17, 1903.

UNITED STATES PATENT OFFICE.

WALTER COLE, OF SAN FRANCISCO, CALIFORNIA.

EXCAVATING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 744,490, dated November 17, 1903.

Application filed March 9, 1903. Serial No. 146,947. (No model.)

To all whom it may concern:

Be it known that I, WALTER COLE, a citizen of the United States, residing at the city and county of San Francisco, State of California, have invented certain new and useful Improvements in Excavating-Machines; and I do hereby declare the following to be a full, clear, and exact description of the same.

The present invention is designed more particularly for the excavating of irrigating ditches or trenches, during the cutting of which is formed one of the side walls or embankment for the ditch or trench, which wall or embankment is constructed of the material removed from the line of cut. The machine is thus essentially of use in the construction of the ditch or trench through hillside or mountainous territory, where the outer or lower wall of the trench or ditch must be built up or constructed during the work of excavation.

To comprehend the invention, reference should be had to the accompanying sheets of drawings, wherein—

Figure 1 is a side view of the apparatus, the same being illustrated as working within a partially-cut ditch or trench. Fig. 2 is a plan view of the mechanism disclosed by Fig. 1 of the drawings, and Fig. 3 is an enlarged detail view of the operating mechanism for the hoist-drums.

The numeral 1 indicates any suitable style of a supporting-platform or base-frame for the apparatus, the same being mounted upon the propelling-rollers 2 2′ 2^3. These rollers rest upon the bottom of the trench or ditch being excavated. Upon the supporting-platform or base-frame 1 is located, near the rear thereof, the operating-engine 3, which is used to operate the various devices employed in connection with the excavating apparatus. Near the forward end of the said platform or base-frame is secured the uprights 5 5′ 5^2, which uprights are arranged crosswise of the platform or base-frame an equidistance apart. These uprights are held rigid by means of the anchor-rods 6, which run from the top of the uprights to the platform or base-frame. From said uprights extend the supporting-cables 7 7′ 7^2, which cables at their outer ends connect, respectively, with the swinging arms 8 8′ 8^2. These arms are arranged at an inclination, the lower end of the said arms being pivoted to the plates 9 9′ 9^2, secured to the platform or base-frame 1, near the forward end thereof. Each swinging arm is braced near its bottom by means of a depending stud 10, which bears upon the face of the plates 9 9′ 9^2, Fig. 1 of the drawings.

Each swinging arm projects a distance beyond the forward end of the platform or frame 1, the arms varying in length, so that the outer end of each when they are swung at a right angle to the platform or frame 1 will reach laterally the same distance relative to the side wall 10′ of the embankment of the ditch or trench 10^2 being formed.

Three haulage or hoist cables 11 12 13 are employed to operate the cutting or excavating buckets 14, 14′, and 14^2. These cables work, respectively, over the arms 8 8′ 8^2, each cable being attached to a hoist-drum 15. Said cables from the point 15′ are divided, so to say, so that from said point 15′ each cable runs as two cables. The lower end of these cables are connected by hooks 16 to rings 15^2, projecting from the sides of each bucket. The double-cable portion of the haulage-cables works through pulley-blocks 15^3, suspended from the cross-piece 16′, attached to the outer end of each swinging arm, Fig. 2 of the drawings.

In order that the arms 8 8′ 8^2 may swing in unison, each arm is united to the other by means of the connecting rods or brace 16^2.

To swing the arms 8 8′ 8^2 laterally toward and from the side embankment being constructed, the guy-cables 17 17′ are employed. One of the cables is attached to the outer end of arm 8 and the other cable to the outer end portion of the arm 8^2. These cables are attached to and operate by the guy-drums 18 18′.

The hoist-drums 15, which operate the hoist-cables 11 12 13, are driven from the cross-shaft 18^2 by means of the sprocket-chains 19 19′, which work over the sprocket-wheels 20, secured to the drum-shaft 20′, and the sprocket-wheels 20^2, secured to the cross-shaft 18^2. To the said cross-shaft 18^2 the clutch-gears 21 22 are loosely mounted, which are thrown into locked engagement with the said shaft by means of the clutch mechanism 23, Fig. 3 of the drawings. These gear-wheels 21 22 mesh with and are driven from

the drive-shaft 24 by means of the pinions 25, secured to the said shaft. This shaft 24 is driven by the engine-pistons 25′ in the usual manner.

Upon the drive-shaft 24 the pinions 26 26′ are slidably mounted. These pinions engage, respectively, with pinions 27 27′, secured to the projecting end of the guy-drum shafts 28 28′. The pinions 26 26′ are moved in and out of mesh with the pinions 27 27′ by means of the lever 29, which actuates the slide-sleeve 29′, connecting the pinions 26 26′. When the pinions 26 and 27 are in mesh, the guy-drum 18 is thrown into operation, while when the pinions 26′ and 27′ are in mesh the guy-drum 18′ is placed into operation.

By means of the band-brake 24′, which acts upon the brake-drum 24^2, the cross-shaft 18^2 is held locked against movement, when the gears 21 22 are released from the said shaft. The band-brake is controlled by lever 25^2, the releasing of the band-brake permitting the weight of the excavating-buckets to unwind the hoist-cables.

To the outer ends of the drum-shaft 20′ outside of the platform or frame 1 the trimming-wheels 30 30′ are attached. These wheels are employed to trim or dress the cut side walls of the ditch or trench. Said trimming-wheels are provided with a series of projecting cutting teeth or knives 31 and laterally-projecting teeth or blades 31^2. These blades or cutting projections dress or trim the side walls and bottom side edges of the ditch or trench, the wheels carrying the cutting teeth, blades, or projections for trimming or dressing the walls being rotated by the operation of the drum-shaft.

As the drums 15 are driven in one direction they serve to wind up the haulage-cables, causing the excavating-buckets 14 14′ 14^2, which are held at a slight inclination by workmen within the trench or ditch so as to present their cutting edge to the surface of the ground, to be drawn against the surface of the earth. The earth as cut by the buckets enters and fills the same. When the buckets reach approximately the position indicated by Fig. 1 of the drawings, each bucket will be loaded with earth to be removed. By this time the haulage-cables will exert almost a direct upward pull, as the buckets stand relatively directly beneath the outer end of each swinging arm, which raises the buckets clear of the line of work. As the buckets are raised their full upward distance the handle 31^3 of each bucket bears against a tilting block 32, secured to the under face of each swinging arm, until the bucket-handle 31^3 engages with the hooked end 32′ of said block. The guy-drum 18 is then thrown into operation so as to draw inward the guy-cable 17 in order to swing outward the swinging arms and place the excavating-buckets with their loads immediately above the line of dump or side of the ditch or trench. The moment the swinging arms have been brought into proper position the releasing mechanism for the hoist-drums is thrown into operation to release the haulage-cables. As released the weight of the loaded excavating-bucket acts against the handle locked to the tilting blocks and causes same to act as a hinge to permit the swinging over of the loaded buckets. As the outer end thereof swings downward each bucket dumps its load, which material serves in the construction of the outer side wall 10′ of the trench or ditch. With the dumping of the buckets the operator or engineer releases the guy-drum 18 and throws into operation the guy-drum 18′, thereby causing the guy-cable 17′ to be wound upon its drum 18′ in order to draw the swinging arms inward or to their original position over the line of work and permit of the buckets being lowered for another cut.

It will be understood that during the work of excavating the workmen hold the buckets in proper position by means of the handles 31^3. As the buckets are lowered within the trench or ditch each workman draws the same as near to the front edge of the platform or frame 1 as possible, the purpose being to make a long cut before the buckets reach the position set forth in Fig. 1 of the drawings.

The platform or frame 1 is about twenty feet in width, and the swinging arms pivoted thereto are arranged a distance of about five feet apart. It is required that the bucket suspended from each of the arms when the said arms are swung over the side embankment deposit their loads in the same line. For this reason the middle and outer arms, which are farther from the embankment than the inner arm, are required to be longer than the inner arm and to differ in length as between themselves. The inner arm projects beyond the front of the platform or base about ten feet, the middle arm extending fifteen feet or five feet beyond the inner arm, while the outer arm extends twenty feet beyond the platform or frame or five feet over the middle arm.

As the excavating of the trench or ditch approaches a distance equal to the projection of the shortest projecting arm the entire apparatus is moved forward, so as not to delay the work of excavation. This may be done in any suitable manner. A convenient mode of propulsion for the apparatus is to insert an anchor a distance ahead of the line of work and attach haulage-ropes thereto, which ropes may be wound upon the gipsies 33′ 33^2. Such is a mere suggestion as to a simple means for propelling the apparatus forward.

It ofttimes is required that blasting be resorted to during the work of excavating. Owing to the close proximity of the apparatus to the work being done, it is desirable to protect the machinery from liability of being damaged by the explosion of the dynamite or powder used during blasting. For this purpose a metallic apron is employed, which consists of a series of sections 34, hinged to

each other so as to be foldable one upon the other. These sections in length equal the width of the platform or frame 1, to which the lowermost section 34′ is secured immediately below the swinging arms. From the upper section extend the cables or ropes 34^2, which work through pulley-blocks 35, depending from the under face of each swinging arm. To raise the apron in order to protect the machinery, it is only required to pull upon the cables 34^2, when the sections will gradually unfold and be raised similar to a Venetian blind, thus forming an inclined metallic shield or wall for the forward end of the machine. By simply releasing the cables 34^2 the sections will lower and fold one upon the other.

Having thus described the invention, what is claimed as new, and desired to be protected by Letters Patent, is—

1. In an apparatus of the described character, the combination with the platform or base-frame, of a series of swinging arms pivoted to the said platform or base and projecting therefrom at an inclination, a hoist-cable working over each swinging arm, excavating-buckets attached to the hoist-cables, means for raising and lowering the hoist-cables, and mechanism whereby the arms are swung outward and inward.

2. In an apparatus for the described purpose, the combination with the platform or base, of a plurality of projecting arms pivoted at one end to the base or platform, a hoist-cable working over each arm, an excavating-bucket attached to the outer end of each hoist-cable, mechanism whereby the hoist-cables are raised and lowered, device carried by each arm for engaging with the excavating-buckets when raised their full distance, and means whereby the pivoted arms are swung toward and from the side embankment or wall of the ditch or trench.

3. In an apparatus for the described purpose, the combination with the base or platform, of a series of swinging arms pivoted thereto at their lower end, each arm projecting at an inclination beyond the forward end of the said base or platform, a hoist-cable working over each arm, an excavating-bucket attached to the lower end of each hoist-cable, mechanism mounted upon the base or platform for raising and lowering the hoist-cables and swinging the series of arms toward and from the side embankment of the ditch or trench, and a foldable protecting shield or apron secured to the forward end of the base or platform, said shield or apron being designed to protect the operating mechanism from damage during blasting.

4. In an apparatus of the described character, the combination with the base or platform, of a series of arms pivoted at their lower end to the same and projecting therebeyond at an inclination, operating mechanism mounted upon the base or platform, and a foldable shield or apron arranged to be opened in advance of the swinging arms to protect the operating mechanism against damage during the operation of blasting within the line of work.

5. In an apparatus of the described character, the combination with the base or platform, a series of forwardly-projecting arms pivoted thereto, a hoist-cable working over each arm, an excavating-bucket attached to the lower end of each hoist-cable, mechanism mounted upon the base or platform for raising and lowering the hoist-cables and swinging the arms toward and from the side embankment, and trimming means arranged at the sides of the base or platform, said means being actuated during the raising and lowering of the hoist-cables.

In witness whereof I have hereunto set my hand.

WALTER COLE.

Witnesses:
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D. B. RICHARDS.