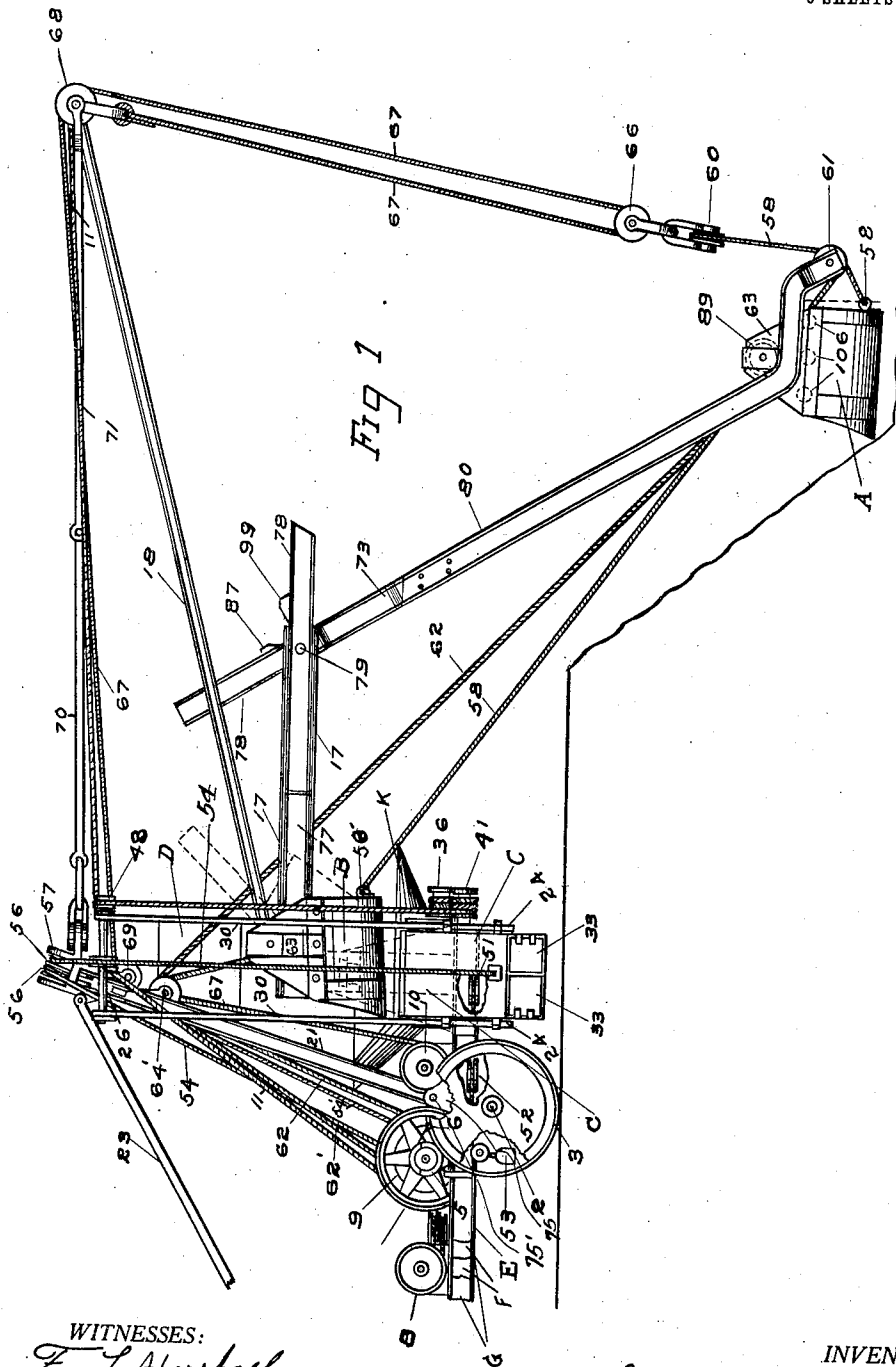


1,058,945.

A. L. BURNS.
EXCAVATING MACHINE.
APPLICATION FILED JAN. 18, 1911.

Patented Apr. 15, 1913.

6 SHEETS—SHEET 1.



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A. L. BURNS.
EXCAVATING MACHINE.
APPLICATION FILED JAN. 16, 1911.

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6 SHEETS—SHEET 2.

1,058,945.

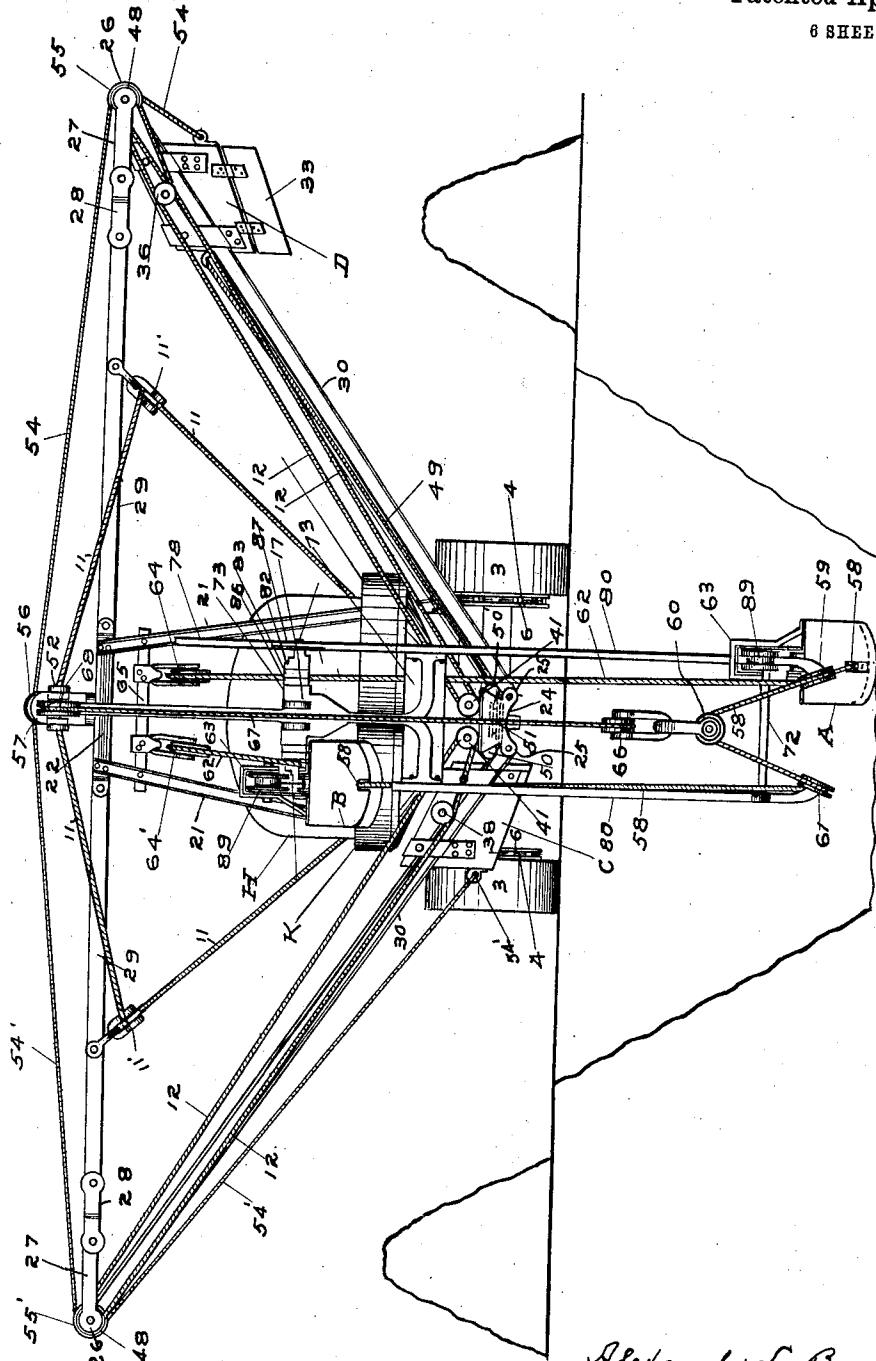


Fig 2

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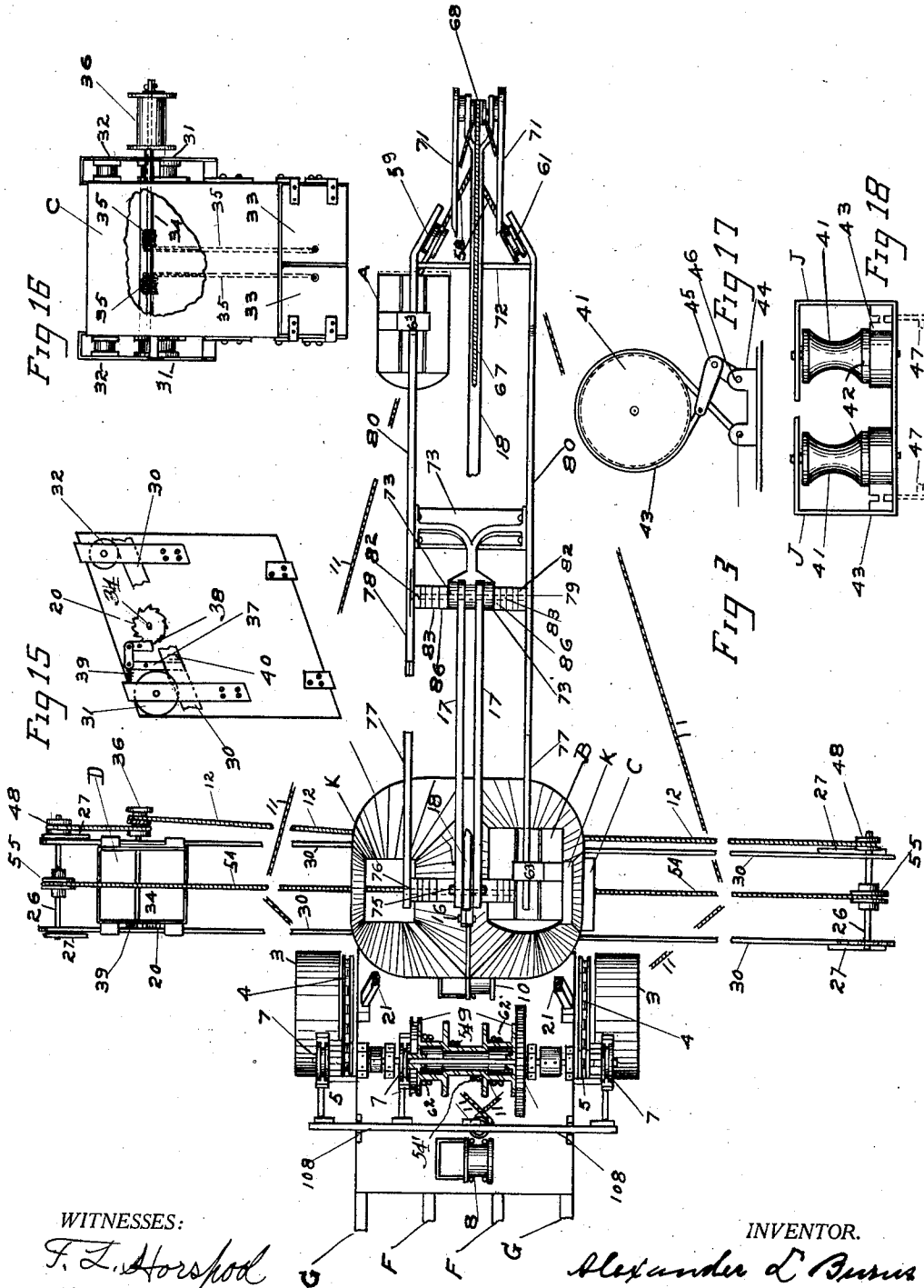
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1,058,945.

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6 SHEETS-SHEET 3.



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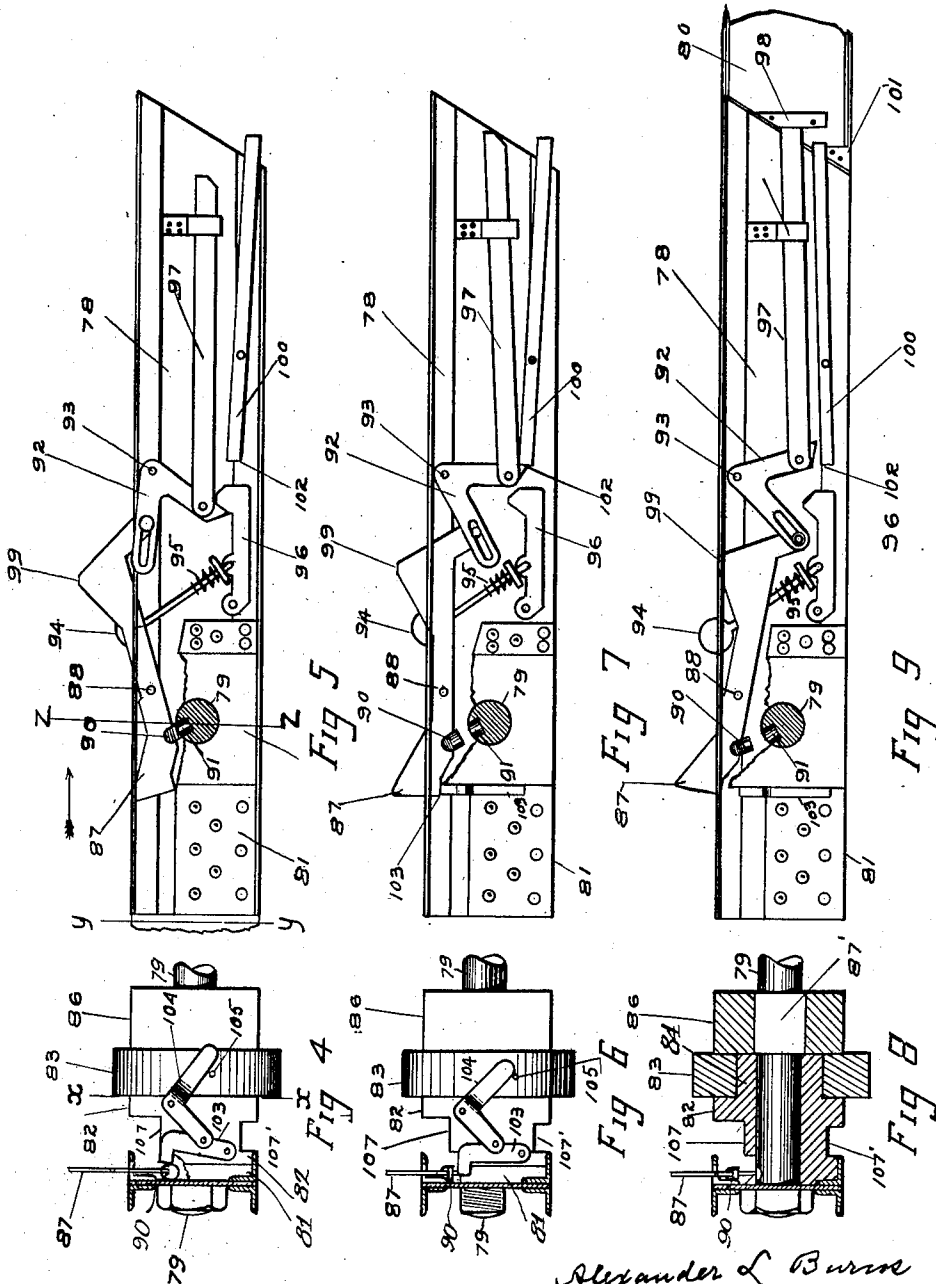
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6 SHEETS—SHEET 4.



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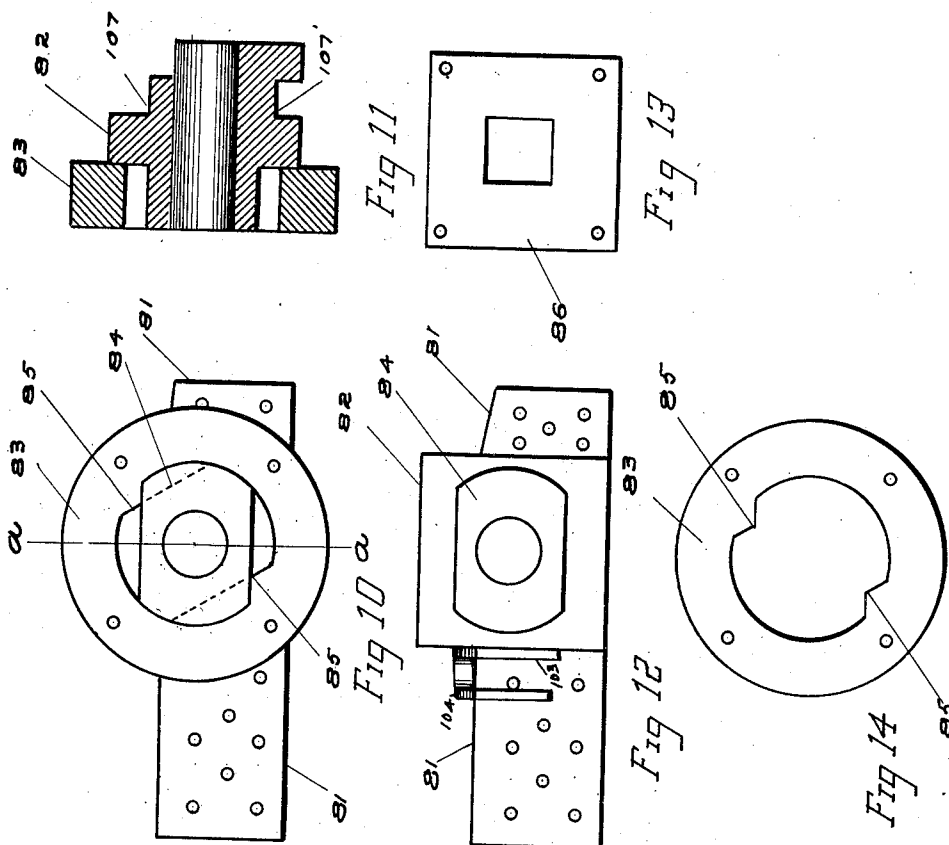
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1,058,945.

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APPLICATION FILED JAN. 16, 1911.

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6 SHEETS—SHEET 5.



WITNESSES

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1,058,945.

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EXCAVATING MACHINE.
APPLICATION FILED JAN. 16, 1911.

Patented Apr. 15, 1913.

6 SHEETS-SHEET 6.

Fig. 20.

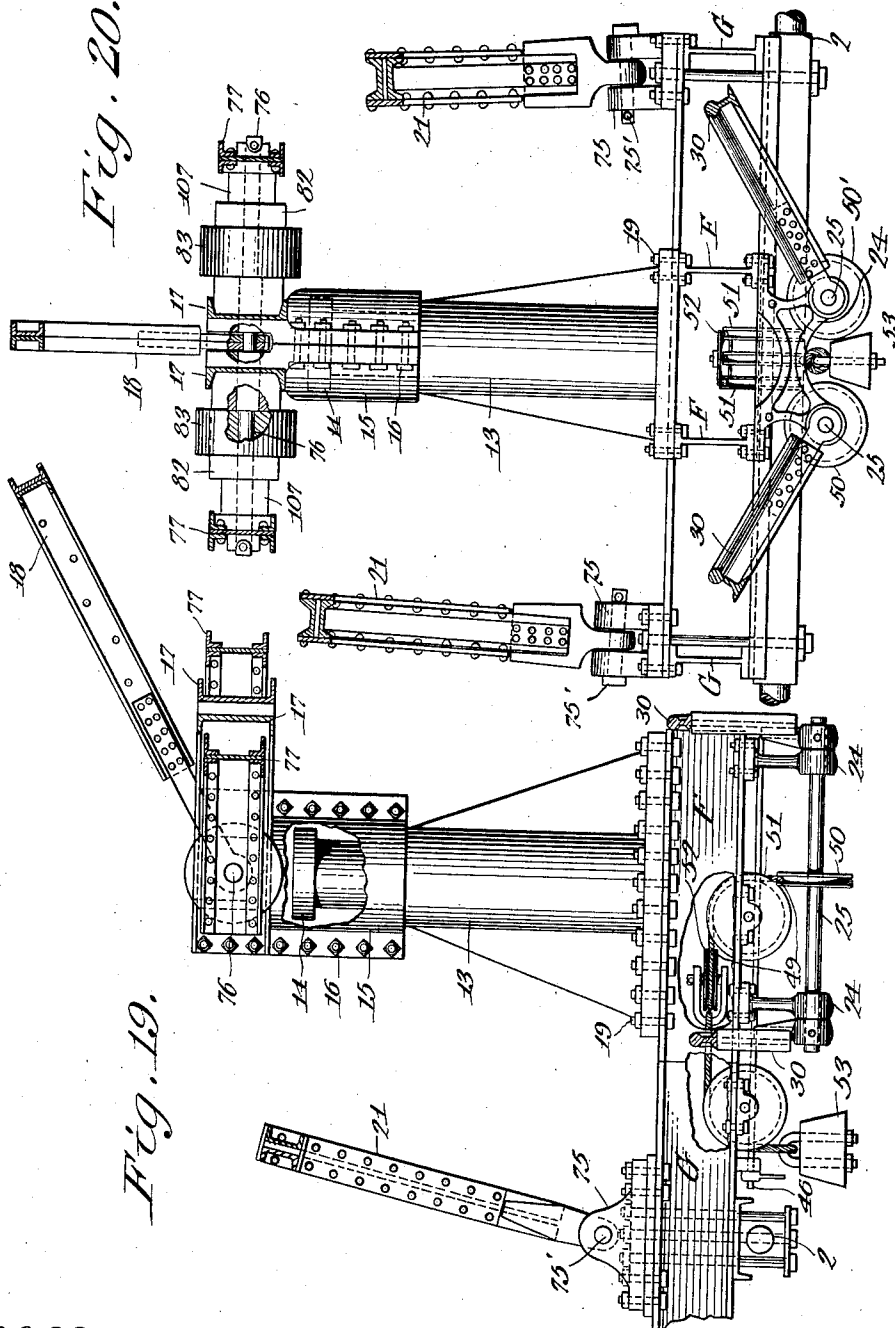


Fig. 19.

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UNITED STATES PATENT OFFICE.

ALEXANDER L. BURNS, OF SALT LAKE CITY, UTAH.

EXCAVATING-MACHINE.

1,058,945.

Specification of Letters Patent.

Patented Apr. 15, 1913.

Application filed January 16, 1911. Serial No. 603,002.

To all whom it may concern:

Be it known that I, ALEXANDER L. BURNS, a citizen of the United States, residing at Salt Lake City, in the county of Salt Lake and State of Utah, have invented certain new and useful Improvements in Excavating-Machines, of which the following is a specification.

The purpose of my invention is to provide a machine with which to excavate and dig canals and ditches in soil and other material which does not need blasting, and one that is easily manipulated and whose mechanical movements are rapid and exact. These objects I accomplish with the machine illustrated in the accompanying drawings, in which similar letters of reference indicate like parts throughout the several figures.

Figure 1 is a side elevation, parts of the truck cut away. Fig. 2 is a front elevation. Fig. 3 is a plan, parts cut away. Fig. 4 is an enlarged section of one of the bucket tracks, showing a side elevation of the locking members. Fig. 5 is an enlarged side elevation of a portion of one of the bucket beams, with the pivot shaft sectioned on line *x x* Fig. 4 with the guard ring removed. Fig. 6 is an enlarged section of one of the bucket beams on line *y y* Fig. 5, with the locking lever normal as shown in Fig. 7. Fig. 7 is an enlarged side elevation of a portion of one of the bucket beams, with the locking lever normal and guard ring removed. Fig. 8 is an enlarged vertical section of the locking members on line *z z* Fig. 5, the pivot shaft not sectioned. Fig. 9 is an enlarged side elevation of a portion of one of the bucket beams, the locking levers as set when bucket is digging. Fig. 10 is an enlarged elevation of the tipping guard members. Fig. 11 is an enlarged section of the tipping guard members on line *a a* Fig. 10. Fig. 12 is an enlarged elevation, ring removed. Fig. 13 is an enlarged elevation of the anchor of one of the tipping guard members. Fig. 14 is an enlarged elevation of one of the locking rings. Fig. 15 is a side elevation of one of the cars. Fig. 16 is an end elevation of one of the cars, parts cut away. Fig. 17 is an end elevation of one of the friction drums. Fig. 18 is a plan of the friction drums. Fig. 19 is a side elevation of the pintle, and connections parts cut away. Fig. 20 is an end elevation of same parts cut away.

My machine consists, with other parts, of

two digging buckets A and B made to run on beams, which are adapted to be turned or swung from one end so that the buckets may dig canals of different widths; two cars C and D adapted to run between tracks, one end of which tracks may be raised or lowered; one track to the left and one to the right side, and practically at right angles to the digging part of my machine; with a wheeled truck E on which is carried the power and to which the digging and dumping parts of my machine are attached. On the axles of the wheels are mounted the four I-beams, the inside ones F and the outside ones G, of the truck, and the axle 2 of the rear wheels 3 is in engagement with the main power of the machine by means of the sprocket wheels 4 engaging, when so desired, with the sprocket wheels 5. Sprocket chains inclose these wheels, and the said wheels are thrown into and out of engagement by the clutch 7 which is moved by the lever 108. On said I beams F is mounted the car or housing H in which housing is stationed the power driven drums 8, 9 and 10. On the said drum 8 is wound the cables 11 which control the lateral movements of the bucket beams. The two inner I beams F extend farther to the rear of the truck than the two outer ones to form a base or support for the pintle 13 which pintle is firmly bolted thereon by bolts 19. The upper portion of said pintle 13 is formed as a pivot pin 14 and on which the bucket beams swing, said beams being made up of the three sections 77, 78 and 80. Said pin 14 is inclosed by the bracket swivels 15 bolted together by bolts 16 and to which bracket swivels are bolted the ends of the bucket beam supports 17; the upper portions of said bracket swivels are spaced apart forming a channel or groove, within which is pivoted one end of the bucket boom 18 by the shaft 76, which shaft allows the said bucket boom 18 to be raised or lowered, and the bracket swivels turning on said pin 14 allow the bucket beams, supports 17, and boom 18 to be swung to the right or left, so that the canal may have any width as desired within the length of said beams. To the said I beams G is pivoted by means of the bearings 75 and pivot pins 75' the feet of the braces 21, said braces are held together at their upper ends by the cross tie 22, to which cross tie is hingedly attached the front brace 23. On the under side of the said I beams F and at

the rear end, is attached the car track bases 24 to which bases the car tracks are pivoted one on each side by the pins 25. The outer and upper ends of said tracks are held together by the shaft 26 on which is pivoted the links 27, one on each end of the shaft, and to which links are pivoted the clevis 28 and they in turn are pivoted to the cross tie 22 by the links 29.

10 The car tracks are each a rectangular frame, consisting of two reaches 30, on the sides of the rectangle, and the pin 25 at the lower end and the said shaft 26 at the top or outer end. Within these rectangular frames are made to operate the cars, one on each side of the machine. On the side of each of the cars are fitted two carrying wheels 31 and 32, the said wheel 31 being of larger diameter than said wheel 32, to maintain nearer a horizontal position for said cars. The bottom 33 of each car is in two pieces each hinged to the side adjacent thereto. Mounted near the top of the car is a shaft 34 on which is wound a portion of the dump chains 35, one end of each of which is attached to the inner side of the bottom sections 33. The purpose being to open and close the bottom of each car by revolving the said shaft 34. On one end of said shaft 34 is the pulley 36, on which is wound a portion of both ends of cable 12. On the other end of said shaft 34 is the ratchet wheel 20. Pivoted on the side of each car is the trip lever 37 which trips a pawl 38, said pawl engages the teeth of said ratchet wheel 20. A spring 39 on the upper end of said pawl 38 maintains such engagement except when the pawl is tripped by the lever 37. Said lever 37 is made to trip the said pawl by the car carrying said lever 37 against the lug 40 on the inside of the track 30, which lug 40 may be placed at the point where it is desired to dump the car.

45 On the end of the truck (preferably to the I beams F) are attached two pulley drums 41 mounted within a bracket J, see Fig. 18; on each of which drums is wound a plurality of turns of the medial portion of its cable 12. Said pulley drums 41 have provided on one end of each a friction flange 42 on which the friction band 43 engages. One end of said band is attached to the base plate 44 and the other end to one arm of the rocking shaft 46, the shaft 46 is turned by the foot lever 47 which is one arm of said shaft 46. When friction is applied by one of the said bands 43, to one of the said pulley drums 41, sufficient to stop the rotation, the movement of the car toward or from said pulley drums 41, will wind up or unwind the chain 35 on the shaft 34, provided the ratchet on said shaft is out of engagement with the pawl 38. The purpose being that when both ends of the said cable 12 are firmly fastened to opposite flanges of said pulley 36 and each end of said cable having been passed a number of turns around said pulley and one portion of the cable is then passed over a sheave 48 which is secured to the car track near its outer end and the medial portion of said cable 12 is given several turns around said pulley drums 41, any travel of the car on its track will turn its particular pulley drum 41 and its sheave 48. Then with the bottom 33 down and the car moving in or toward the truck, if the operator should move said foot lever 47 and its connections and thereby apply the friction belt 43, thus stopping the rotation of the pulley drum 41, the cable 12 would stop its travel, and the shaft 34 would revolve and wind up the chains 35 and this would close the bottom 33 of said car. When the bottom is closed the operator removes the friction of the band 43 and allows the said pulley drum 41 to rotate. A cable 49 is attached at its ends to the inner end of each car and is passed over the sheave 50, then over sheave 51 then around the weight sheave 52 and back over another sheave 51 and down over another sheave 50' to the inner end of the other car. The weight 53 and sheaves insure that the empty car will remain under the hopper until the bucket dumps its load into this car, and permit the other car to travel while the dumping takes place. One end of cable 54 is attached to the outer end of one of the cars and said cable is then passed over sheave 55 secured at the outer end of the track on said shaft 26, then over sheave 56, secured to member 57 which is firmly bolted to the cross tie 22. Said cable is then secured to the center section of the said drum 9. After passing said cable 54 several turns around the smaller section of said drum it is then fastened to one flange of said drum. Another cable 54' is likewise fastened to the outer end of the other car, then over the sheave 55' (which is carried by the shaft 26 at the outer end of the other track) then over another sheave 56' which is also carried by the said member 57, then down to and after being passed the same number of turns around the center section of said drum 9, but in the opposite direction of the other cable 54, is fastened to the other flange of said section of said drum. One end of a cable 58 is fastened to the outer end of the bucket A, the said cable is then passed over the sheave 59 which is carried by and at the end of the beam 80 on which that bucket is made to operate, then over a pulley 60 which is carried by the bucket boom 18, then down to and over the sheave 61 which is carried by and at the end of the other bucket beam 80, then fastened to the outer end of the other bucket B.

One end of the cable 62 is fastened to the member 63 which member is securely fastened to the upper edges of the bucket A, said cable is then passed over a sheave 64 pivotally suspended from a cross tie 65; the said cable is then passed several turns around one of the outer sections of the said drum 9 and fastened to the flange of said section. A similar cable 62' has one end fastened in like manner to the flange of the other outer section of said drum 9, and is passed several turns around said section of said drum in the opposite direction to the said cable 62 and is then passed over the sheave 64' which sheave is pivotally suspended from said cross tie 65; and that end of this cable 62' is then secured to the member 63' on the other bucket B. As will be readily observed when the said drum is revolved one bucket will be drawn in while the other will be allowed to be drawn out. The cables 62 and 62' draw the buckets in while the cable 58 draws them out. The cables 62 and 62' are always kept taut by the pull of the cable 58 passing over the suspended sheave 60. This sheave is carried by the pulley 66 which said pulley is carried by the cable 67. This cable 67 has one end fastened to the outer end of the bucket boom 18 and is then passed through the said pulley 66 and back over the sheave 68 which is carried by and at the outer end of said boom 18. The said cable is then passed over the sheave 69 which sheave is carried by the member 57. The said cable is then fastened to the drum 10. The purpose of this drum and its cable 67 is to control the position of the buckets in the pit as to the depth at which they are filled. Said boom 18 is supported from its outer end by the tie rod 70 and clevis 71. Said tie rod 70 is secured to said member 57.

The bucket beams on which the buckets are operated consist of two built up I shaped beams formed alike except that near the outer end, one is bent to the right and the other to the left. They are each constructed of a slab of steel to which is riveted angle irons forming the I shape. These I shaped beams are spaced apart and except at their outer ends as described above are parallel and are held together by the brace 72 near their outer ends and by the web-shaped member 73 and shaft 79 in their medial portions and the shaft 76 at their inner ends. Each of said bucket beams is cut into three parts or sections. The inner section 77 is pivoted on the said shaft 76 and may be tilted as shown in dotted lines Fig. 1, to dump the bucket when said bucket is on that part of its beam. The middle sections 78 of said bucket beams are pivoted on the shaft 79 and may be made to tilt and assume the position shown on the back beam Fig. 1 or the untilted position as shown in the front beam same figure. One

portion of said beams is supported by the said bucket beam supports 17, one end of which is firmly bolted to the upper portions of said bracket swivels 15, and at all times they are in the same horizontal plane of the housing H of my machine. The said shaft 76 has two square sections thereon a part of which sections are inclosed within said supports 17 and hold said shaft in position for the pivoting thereon of the said inner sections 77 of said beams. Said supports 17 are spaced apart at their inner ends by said bracket swivels 15, and at their outer ends by a portion of the web-shaped member 73. The said shaft 79 has four square sections thereon two of which are inclosed by the outer ends of said supports 17 and thereby hold the said shaft in position for the pivoting thereon of said web-shaped member 73, and the said middle sections 78 of said bucket beams. The outer sections 80 of said bucket beams are each firmly bolted to said web-shaped member 73 on the sides thereof; and on their outer end portions, but not quite to that portion which is bent toward each other is formed an upward bend. The purpose of which is to give direction to the bucket at the time it is being filled and to give it a scoop motion.

On the inner side of each of the sections 77 and 78 of each of the bucket beams, is bolted a bracket member formed of three different shaped parts, a lateral part 81 through which the bolts are fitted to hold it to the beams, a square part 82 (at right angles thereto intended as a side bearing for a ring 83) which has a channel 107 and 107' cut therein to allow the flanges of the bucket wheel to pass, and a center bearing 84 for said ring. The sides of said center bearing 84 are cut off to engage V-shaped lugs 85 inwardly extended from the opening of said ring. Said ring is bolted to a square anchor 86 which anchor is fitted on the squared section 87' of said shafts 76 and 79, for the purpose of preventing the said ring from turning on the shaft. The said center bearing 84 bolted as it is to the inner side of said bucket beams will allow the section of said beam to be tilted as far as the said V-shaped lugs 85 will permit, as shown in dotted lines Fig. 10. A similar member 81 is bolted to the inner side of each of the medial sections 78 of said bucket beams through which member 81 the said shaft 79 is journaled. The top of the square part 82 of said member is cut away to allow a trip lever 87 to move. Said trip lever is fulcrumed by the pin 88 to the inner side of said middle section 78 of said beams, and is tripped by the rolling thereover of the wheel 89 of the bucket. Said lever has a depending lug 90 secured on one end portion which lug seats in a hole 91 cut in the top of the said shaft 79 to lock said shaft from axial motion while said lever is

in the position as shown in Fig. 5. On the other end of said lever 87 is pivoted one arm of a bell crank lever 92 by the pin 93. And at the side of said lever 87 in a vertical slot in the said middle section of said beam is made to operate a release plunger 94 carrying a spiral spring 95. Said plunger 94 has pivoted on its lower end a dog 96 which engages in certain position the other arm of said bell crank lever. To this arm of said bell crank lever 92 is pivotally secured one end of a lock bar 97 the other end of said lock bar 97 is made to engage a catch 98 securely fastened on the outer end section 80 of said bucket beams. A bucket wheel located at and rolling in the direction of the arrow Fig. 5, will roll over the ball end of said plunger 94, push the dog down and release the engagement of the lower arm of the bell crank lever 92 and permit said wheel to engage the end of the trip lever 87 at 99. Said bucket wheel is during this time in contact with lever 87. This will tip the beam until lever 100 engages a lug 101 on the outer portion 80 of said beam. This engagement will lower the other end 102 of said trip lever 100 from its locking engagement with said bell crank lever 92. This permits said bell crank lever to move on its fulcrum and allows said lever 87 to assume the position shown in Fig. 9 and said motion of said bucket wheel continued, will move said lever 87 to the position shown in Fig. 7 and the bell crank lever will move the said lock bar 97 into engagement with said catch 98 and lock these two sections of said beam together. The tripping of said lever 87 as shown in Fig. 9 will have raised the lug 90 from its engagement in the hole in said shaft 79 and this having permitted the member 81 to revolve on said shaft, the middle section 78 of said beam will be tilted so that the said section 78 and the outer section 80 will be in the position of the back beam in Fig. 1, and the bucket will have clear track to reach the position of the bucket in the figure. When the bucket is pulled up the incline of said beam the upper wheel 89 of the bucket will strike the said lever 87 on the part that is observable on this beam in said Fig. 1, this will trip the said lever 87 to the position shown in Fig. 7 and withdraw the said lock bar 97 from the catch 98. The position of all of the other members is shown in Figs. 6 and 7. In tilting the middle section of the beam to the horizontal position and in position to lock with the inner section 77 of the beam, as shown in the front beam Fig. 1, which tilting is caused by the bucket wheel 89 catching on the said lever 87 when said lever is prevented from being lowered by the point of lever 103 being thereunder as shown in Fig. 6, the said tilting turns said section 78 of the beam on the shaft 79 which causes the arm of a bell crank lever 104 to hit the lug pin 105 which is in-

serted in the periphery of said ring 83. This motion has withdrawn the point of said lever 103 from under said lever 87; this allows said lever 87 to be depressed and the lug 90 on the bottom thereof to enter the said hole 91 in the said shaft 79 and thus locking said section from tilting in either direction until said lug is removed by the reverse movement of said bucket wheel on said beam as heretofore described. A continuation of the pull on the cable 62 attached as it is to said bucket A will draw the bucket onto the inner section 77 and tip the said inner section of said beam and the bucket thereon to the position shown in dotted lines Fig. 1. The said web-shaped member is journaled on the said shaft 79 which will allow the portions of said beams from said shaft to their outer ends to be raised or lowered by the raising or lowering of the bucket boom 18 and allow me to dig in a canal at any depth within the length of the beams from said shaft outward and to near a right angle to the bucket supports. Said angle being determined or governed by the angle of the V-shaped lugs 85 in the said ring 83. Likewise the extent to which the said inner section of the said beams may be tilted when dumping the bucket, is determined by the angle of said lugs in the ring on shaft 76.

The buckets are alike except that each engages its beam from the outside. Each has a bucket member 63 secured to the top thereof and in which member is carried the wheels. The upper wheel 89 journaled in said member 63 rolls on the top and the flanges thereof engage the edges of angle iron parts of said beam see Fig. 2. The lower wheels 106 three in number are likewise journaled in said member 63 and roll on the bottom of and their flanges engage the edges of the bottom side of said beam.

In the operation of my machine, with one bucket in the pit ready to fill, the other bucket will have dumped its load into its car as shown in Fig. 1. The car of the other bucket is at the outer end of its track and has dumped its load. I then turn the power driven drum 9 to wind up cable 62 and unwind cable 62'. This will fill the bucket in the pit and return the other bucket to the pit. The said turning of said drum 9 will also wind up cable 54' and unwind cable 54 and draw the loaded car D out upon its track and dump it, and return the other car C to the inner end of its track where it will have received its load. To guide the falling dirt from the buckets to the cars a hopper K is provided for each side.

Having thus described my invention I desire to secure by Letters Patent, and claim:—

1. An excavating machine consisting of a wheeled truck, power driven drums mount-

ed thereon, braces having one end pivoted to said truck and their upper ends secured together by a cross tie, a member 57 secured to said cross tie, a pintle secured on the rear of said truck, two built up and sectioned beams pivoted on said pintle, a bucket made to operate on each of said beams and adapted to fill when being drawn toward said truck.

2. An excavating machine consisting of a wheeled truck, power driven drums mounted thereon, a pintle mounted on the rear of said truck, two built up and sectioned beams pivoted on said pintle, a bucket adapted to be run on each of said beams and to fill when being drawn toward said truck, a cable the ends of which are fastened to the bottoms of said buckets and passing over a suspended sheave, a pulley, another cable inclosing said pulley and having one end fastened to a boom and the other end around one of said power driven drums.

3. An excavating machine consisting of a wheeled truck, power driven drums mounted thereon, a pintle mounted on the rear of said truck, two built up and sectioned beams pivoted on said pintle, buckets adapted to run on said beams and to fill and to dump when being drawn toward said truck.

4. An excavating machine consisting of a wheeled truck, power driven drums mounted on said truck, a pintle mounted on said truck, two built up beams, having three sections in each, pivoted on said pintle, buckets on said beams adapted to fill and dump when being drawn toward said truck, and car tracks pivoted to said truck, a car on each of said tracks, a hinged bottom in said cars, chains fastened to said bottom, a shaft carried on each car, a drum on one end and a ratchet wheel on the other end of said shaft, a pawl and a lever pivoted on each of said cars, two pulley drums mounted on said truck at the side of said tracks, a cable fastened to the drum on each of said cars and inclosing one of said pulley drums, means to stop the rotation of said pulley drums, and other cables secured to said cars and to one of said power driven drums.

5. An excavating machine consisting of a wheeled truck, power driven drums mounted thereon, a pintle mounted on the rear of said truck, two beams adapted to pivot laterally on said pintle, each of said beams

being formed in three sections and adapted to tilt and lock by the friction of the bucket thereon, and buckets operated on said beams.

6. An excavating machine consisting of a wheeled truck, power driven drums mounted thereon, a pintle mounted on the end of said truck, beams pivoted on said pintle, each of said beams consisting of three sections, means to lock said sections together, and buckets adapted to operate on said sectioned beams.

7. An excavating machine consisting of a wheeled truck, power driven drums mounted thereon, beams pivoted to said truck, each of said beams consisting of three sections, means to lock said sections together, and buckets operated on said beams.

8. An excavating machine consisting of a wheeled truck, power driven drums mounted thereon, beams pivoted to said truck each of which beams is formed in three sections, means to lock and unlock said sections, and buckets operated on said beams.

9. An excavating machine consisting of a wheeled truck, power driven drums mounted on said truck, severed beams pivoted on said truck each of said beams adapted to be set with the sections at different angles, means to lock said sections when set, and buckets operated on said beams.

10. An excavating machine consisting of a wheeled truck, power driven drums mounted thereon, severed beams one section of which is pivoted to said truck, means to lock said severed sections of each beam together, and buckets operated on said beams.

11. An excavating machine consisting of a truck, power driven drums mounted thereon, severed beams one section of which is pivoted to said truck, the other sections of each beam adapted to be locked at various angles to said first section, means to lock and unlock said sections, buckets on said beams adapted to move said locking means and to fill and dump when being drawn toward said truck, tracks pivoted to said truck and cars made to operate on said tracks.

In testimony whereof I have affixed my signature in presence of two witnesses.

ALEXANDER L. BURNS.

Witnesses:

SAM RANEY,
ALBERT MAYERS.