No. 777,204. PATENTED DEC. 13, 1904.

J. HELM.

EXCAVATING MACHINE.

APPLICATION FILED JAN. 19, 1904.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.

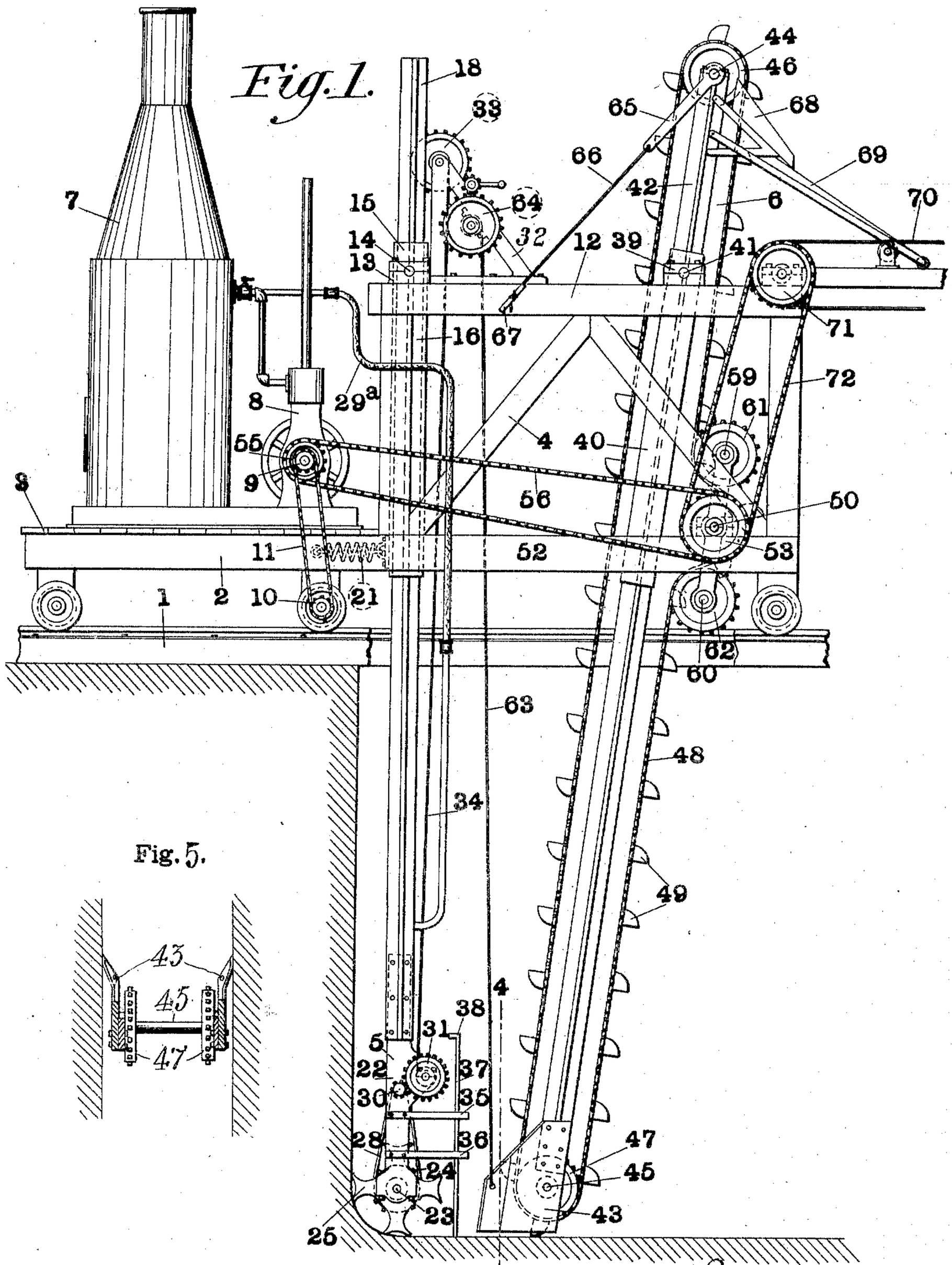

Fig. 5.

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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 3.

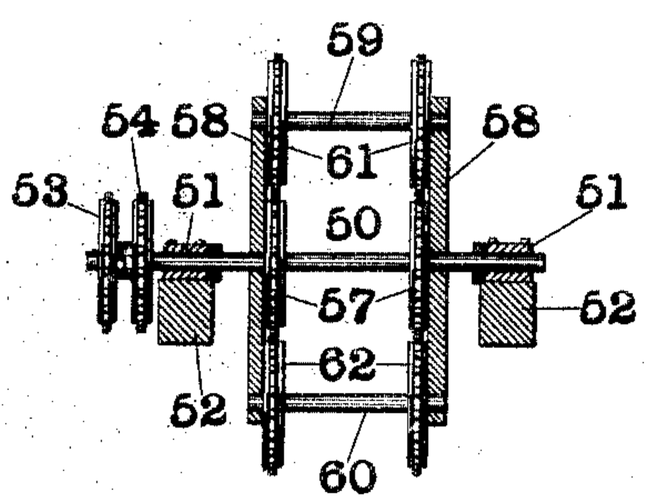


Fig. 6.

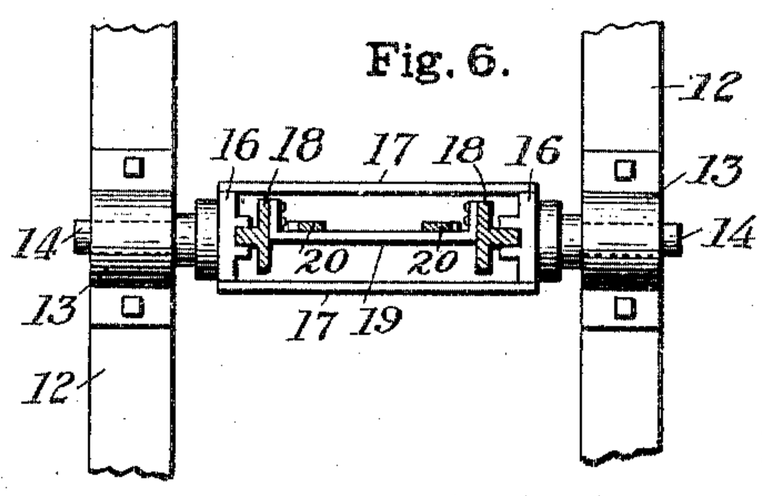
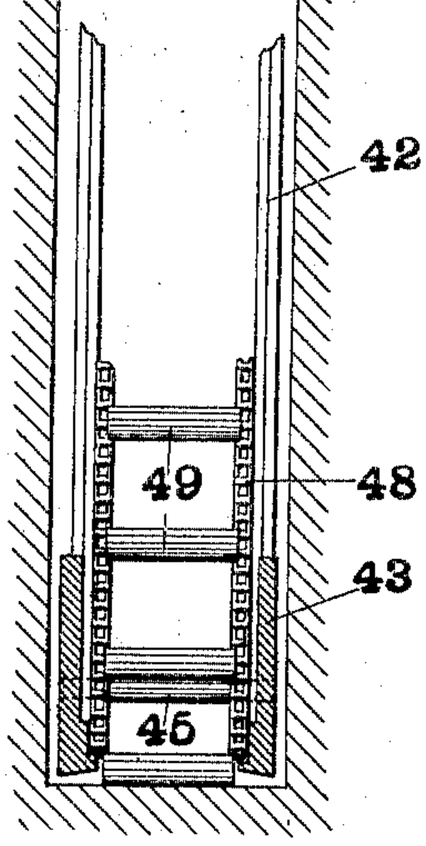


Fig. 4.



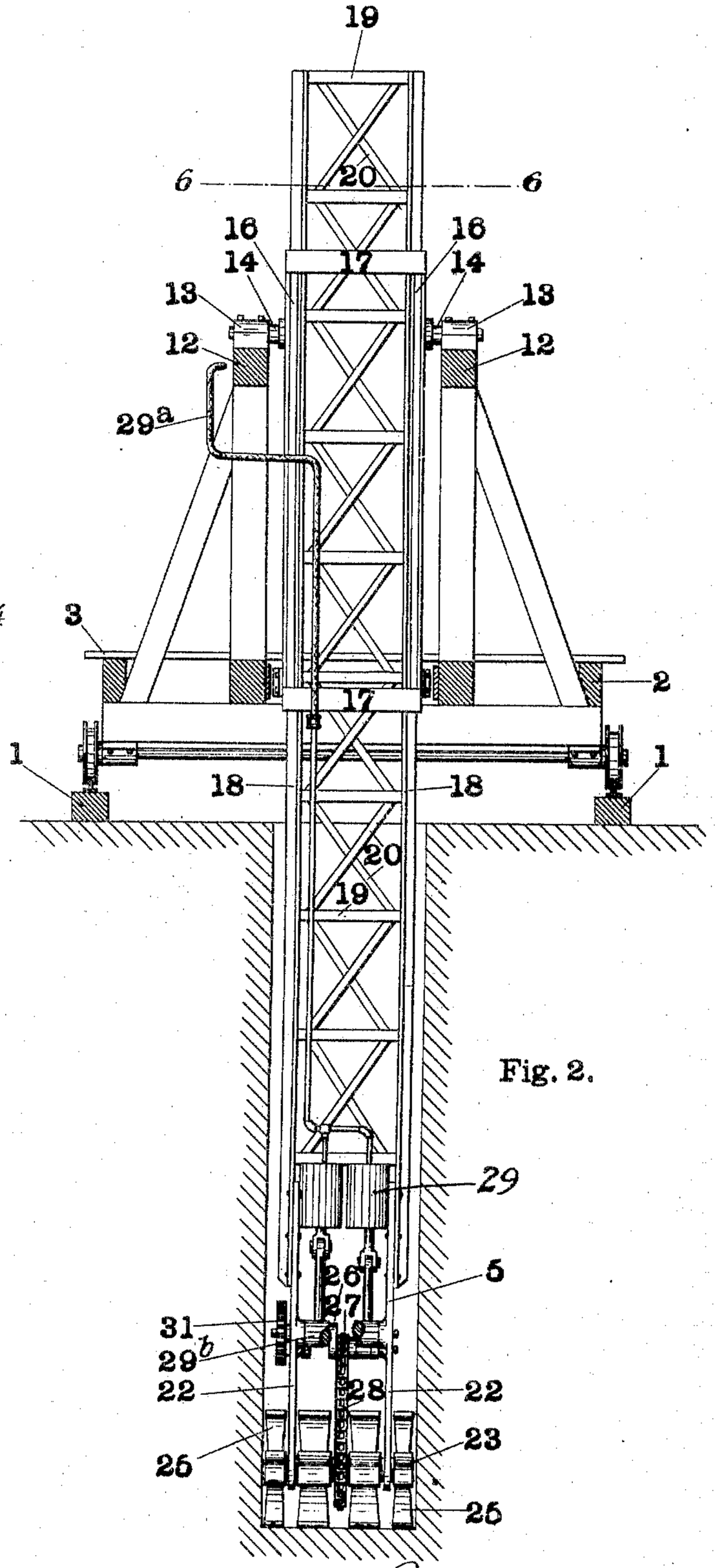


Fig. 2.

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No. 777,204. Patented December 13, 1904.

UNITED STATES PATENT OFFICE.

JOHN HELM, OF ST. LOUIS, MISSOURI.

EXCAVATING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 777,204, dated December 13, 1904.

Application filed January 19, 1904. Serial No. 189,681. (No model.)

To all whom it may concern:

Be it known that I, JOHN HELM, a citizen of the United States, and a resident of the city of St. Louis, and State of Missouri, have invented a new and useful Improvement in Excavating-Machines, of which the following is a specification.

My invention relates to excavating-machines, and especially to excavating-machines for cutting trenches; and its principal objects are to simultaneously dislodge the earth through which a trench is to be cut and carry it away, to provide a machine capable of use in cutting trenches of varying depth without detaching or adding parts, to provide a machine that automatically raises and lowers the dislodging mechanism as the earth is dislodged, to provide a machine capable of operation both during the ascent and descent of the dislodging mechanism, and other objects hereinafter more fully appearing.

In the accompanying drawings, forming a part of this specification, and wherein like symbols refer to like parts wherever they occur, Figure 1 is a side view of my trench-cutting machine in position. Fig. 2 is a view of the dislodging mechanism and the frame. Fig. 3 is a fragmentary detail of the adjustable sprocket-frame for the primary conveyer. Fig. 4 is a fragmentary section on the line 4 4 of Fig. 1. Fig. 5 is a horizontal sectional view through the lower end of the conveyer. Fig. 6 is a fragmentary view upon the line 6 6 of Fig. 2 of the drawings, parts below the trunnions being omitted.

A railway 1 is laid along the course of the trench to be cut. Upon this runs a wheeled truck 2, having upon one end a platform 3 and on the other end a frame 4 for the dislodging mechanism 5 and conveying mechanism 6. An upright steam-boiler 7 and engine 8 are arranged upon the platform 3. The engine 8 is provided to drive the truck 2 and the conveying mechanism 6. A sprocket-wheel 9 is mounted on the shaft of the engine 8 to coöperate with a clutch thereon. A second sprocket-wheel 10 is mounted on one axle of the truck 2, and the two sprockets are connected by a sprocket-chain 11.

Upon the upper beam 12 of the frame 4 are bearings 13. In these bearings are journaled trunnions 14 upon a guide-frame 15 for the dislodging-mechanism frame. The said guide-frame 15 consists of channeled side bars 16 and tie-bars 17. The dislodging-mechanism frame consists of the side bars 18, tie-bars 19, and brace-bars 20. Thus the dislodging mechanism is mounted for both reciprocating and oscillating movement. A spring 21 is connected at one end to the truck 2 and at the other end to the guide-frame 15 and tends to hold the dislodging mechanism 5 in a substantially vertical position and up to its work.

Plates 22 are mounted upon the lower ends of the side bars 18 to provide bearings for the rotating parts of the dislodging mechanism. On the lower ends of the plates 22 a cutting-shaft 23 is journaled, to which a sprocket-wheel 24 and cutters 25 are rigidly secured. The cutters are each eight-pointed, the points being arranged in pairs arranged at angles of ninety degrees to each other and the points of each pair extending in opposite directions. A cutter is thus provided that is equally efficient for either direction of rotation. Above the cutters a crank-shaft 26 is journaled in the plates 22, upon which is mounted a sprocket-wheel 27, connected with the sprocket-wheel 24 on the cutter-shaft 23 by a sprocket-chain 28. An engine 29 of any desired type is mounted on the frame and connected with the crank-shaft 26. The engine may be reversed, and thus the cutters may be driven in either direction. A flexible steam-pipe 29^a connects the engine with the boiler 7.

A drum 29^b is journaled in the plates 22 near the crank-shaft 26. Gear-wheels 30 31 are mounted on the crank-shaft 26 and drum-journal, respectively, and mesh with each other. A frame 32 is mounted on the beams 12 of the frame 4 and supports a manually-operated winding-drum 33. A rope or cable 34 connects the two winding-drums 29^b 33. When the machine is in operation, the winding-drum 33 is locked against rotation and acts simply as an anchor for the rope 34. The winding-drum 29^b is, however, rotated simultaneously with the cutters 25, and thus the dislodging mechanism is gradually raised or lowered as the earth is removed in the

path of the cutters. The manually-operable drum 33 is provided so that the frame may be raised and lowered at times when the engine is not running. The gearing between the crank-shaft 26 and drum 29^b and cutter-shaft 23, respectively, is such that the cutters rotate in opposite directions during the ascent and descent of the dislodging mechanism.

Guide-bars 35 36 project rearwardly from the plates 22 and slidingly support an apron 37. Ears 38 are provided at the upper end of the apron 37 to prevent its passing through the guides. When the dislodging mechanism is raised, the apron slides down until the ears rest upon the top bar 35. The earth dislodged by the cutters strikes upon the apron 37 and falls to the bottom of the trench instead of being thrown into the conveyer and fouling the conveyer chain and frame.

The primary conveyer is mounted so as to be vertically and angularly adjustable. Bearings 39 are mounted on the top beams 12 of the frame 4. A guide-frame 40, of a construction similar to the guide-frame 15, has trunnions 41 journaled in the said bearings 39. In the guide-frame 40 there is mounted a conveyer-frame 42, constructed like the dislodging-mechanism frame except that it is provided with bearings at its ends. At the bottom it is provided with forwardly-extending flaring plates 43, which direct the loosened earth inwardly. In the bearings shafts 44 45 are mounted, carrying sprocket-wheels 46 47, upon which run the conveyer-chains 48, supporting the buckets 49. A shaft 50 is mounted in bearings 51 upon the bottom beam 52 of the frame 4. At the outer end of this shaft two sprocket-wheels 53 54 are mounted. The sprocket-wheel 53 is connected with a sprocket-wheel 55 on the engine-shaft by means of a sprocket-chain 56. Intermediate the bearings two sprockets 57 57 and bars 58 58 are mounted, the former rigidly, the latter loosely. In the upper and lower ends of the bars 58 shafts 59 60, bearing sprocket-wheels 61 62, respectively, are journaled. The conveyer-chains 48 pass down in front of the sprockets 61, around behind the sprockets 57, and down in front of the sprockets 62. Thus a driving mechanism is provided which will change inclination with change of inclination of the conveyer-frame 42, the frame for the driving-sprockets being pivoted in the bearings 51, as described above. The conveyer-frame is raised and lowered by means of a rope or cable 63, which is attached to the lower end of the conveyer-frame 42 and to a manually-operable winding-drum 64. A link 65 is pivotally mounted at the top of the conveyer-frame 42. A rope 66 is connected to said link 65, drawn taut and secured to a T 67 on the beam 12. By means of the two ropes 63 66 the conveyer-frame 42 is held in position. A fixed spill-apron 68 is secured to the top of the conveyer-frame 42. A second spill-apron 69, which is located below the fixed spill-apron 68, is pivotally connected to the conveyer-frame at one end and slidably engages a horizontal bar of the distributing conveyer-frame at its other end. The primary conveyer 6 always rests upon the bottom of the trench. The means for vertical adjustment is provided so that the machine may be used to cut trenches of varying depths without any necessity for the addition or removal of parts.

A distributing-conveyer 70 is arranged to receive the material discharged from the primary conveyer 6. It is driven by means of a sprocket-wheel 71 and sprocket-chain 72 from the sprocket 54 described above. This conveyer may lead back to a part of the trench that is ready to be filled up or to a dump, as desired.

Obviously the machine admits of considerable modification within the scope of my invention, and therefore I do not wish to be limited to the specific construction shown and described. While sprocket-and-chain transmission-trains have been shown, it is obvious that any other form of transmission-train could be substituted.

What I claim is—

1. An excavating-machine comprising a frame, dislodging mechanism pivotally mounted in said frame, and means to yieldingly hold said dislodging mechanism to its work.

2. An excavating-machine comprising a frame, a guide-frame pivotally mounted therein, and dislodging mechanism reciprocatingly mounted in said guide-frame.

3. An excavating mechanism comprising a frame, a guide-frame pivotally mounted therein, a spring yieldingly connecting said frames to hold said guide-frame in a substantially vertical position, and dislodging mechanism reciprocatingly mounted in said guide-frame.

4. An excavating-machine comprising a frame, dislodging mechanism pivotally and reciprocatingly mounted in said frame, means to automatically reciprocate said dislodging mechanism when said dislodging mechanism is actuated, and means to yieldingly hold said dislodging mechanism to its work.

5. An excavating-machine comprising a frame, dislodging mechanism reciprocatingly mounted therein and comprising rotary cutters and means to rotate said cutters, and means to simultaneously reciprocate said dislodging mechanism.

6. An excavating-machine comprising a frame, dislodging mechanism reciprocatingly mounted in said frame and comprising reversible rotary cutters and means to rotate said cutters, and means to simultaneously reciprocate said dislodging mechanism, said means being arranged to automatically reciprocate said dislodging means in opposite directions for opposite directions of rotation of said cutters.

7. An excavating-machine comprising a frame, dislodging mechanism reciprocatingly

mounted therein and provided with a frame and actuating means thereon, a winding-drum on said dislodging-mechanism frame operatively connected to said actuating means thereon, a manually-operable winding-drum on said frame, and a rope attached at its opposite ends to said drums.

8. An excavating-machine comprising a frame, dislodging mechanism mounted therein, and conveying mechanism comprising a conveyer-frame and an endless conveyer thereon, said conveyer-frame being reciprocatingly mounted in said frame.

9. An excavating-machine comprising a frame, dislodging mechanism mounted therein and provided with reversible rotary cutters and conveying mechanism arranged to convey away material dislodged by said cutters and reciprocatingly mounted in said frame.

10. An excavating-machine comprising a frame, a motor thereon, conveying mechanism comprising a conveyer-frame and an endless conveyer thereon, said conveyer-frame being reciprocatingly and pivotally mounted on said frame, and means operatively connecting said motor and conveyer in all positions of the latter.

11. An excavating-machine comprising a frame, a guide-frame pivotally mounted therein, a conveyer reciprocatingly mounted in said guide-frame and provided with a conveyer-chain, and a sprocket-frame pivotally mounted on said frame and provided with sprockets for said conveyer-chain.

12. An excavating-machine comprising a frame, a conveyer reciprocatingly and pivotally mounted therein and provided with a frame and forwardly-extending flaring plates at the bottom of said frame to turn the material to be conveyed inwardly.

13. An excavating-machine comprising dislodging mechanism provided with a rotary cutter having a plurality of teeth with oppositely-extending cutting edges whereby the cutter may be rotated in either direction.

14. An excavating-machine comprising a frame, a guide-frame pivotally mounted therein, dislodging mechanism reciprocatingly mounted in said guide-frame and provided with actuating means, means to raise and lower said dislodging mechanism operatively connected to said actuating means, a second guide-frame pivotally mounted in said frame, a conveyer reciprocatingly mounted in said second-mentioned guide-frame and arranged in position to convey away the material dislodged by said dislodging mechanism.

Signed at St. Louis, Missouri, this 12th day of January, 1904.

JOHN HELM.

Witnesses:
WM. P. CARR,
J. B. MEGOWN.