

No. 863,319.

PATENTED AUG. 13, 1907.

G. M. & C. N. SCHNELL.  
DITCH DIGGING MACHINE.  
APPLICATION FILED APR. 20, 1907.

2 SHEETS—SHEET 1.

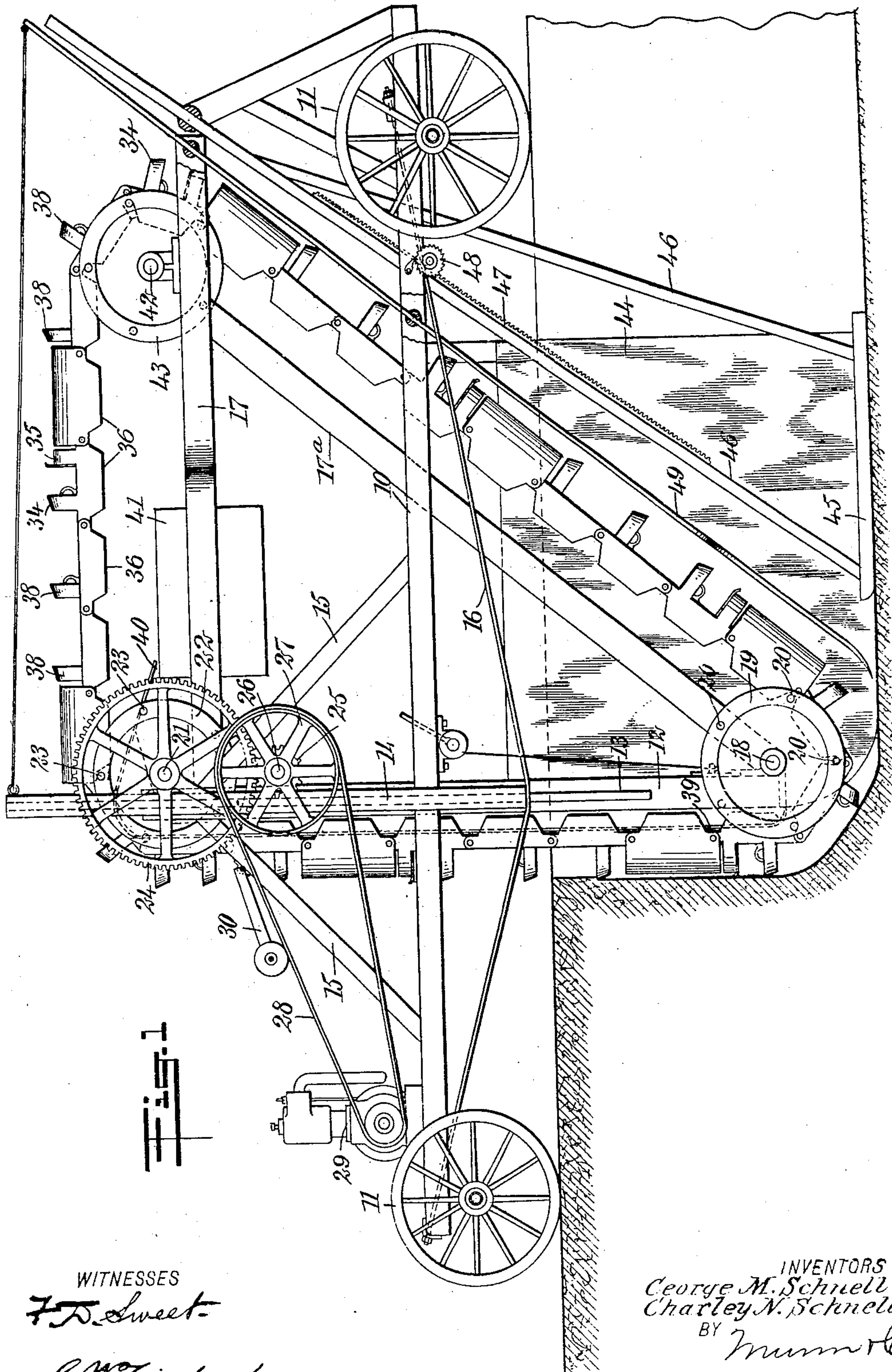


Fig. 1

WITNESSES  
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*C. M. Fairbank*

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*George M. Schnell*  
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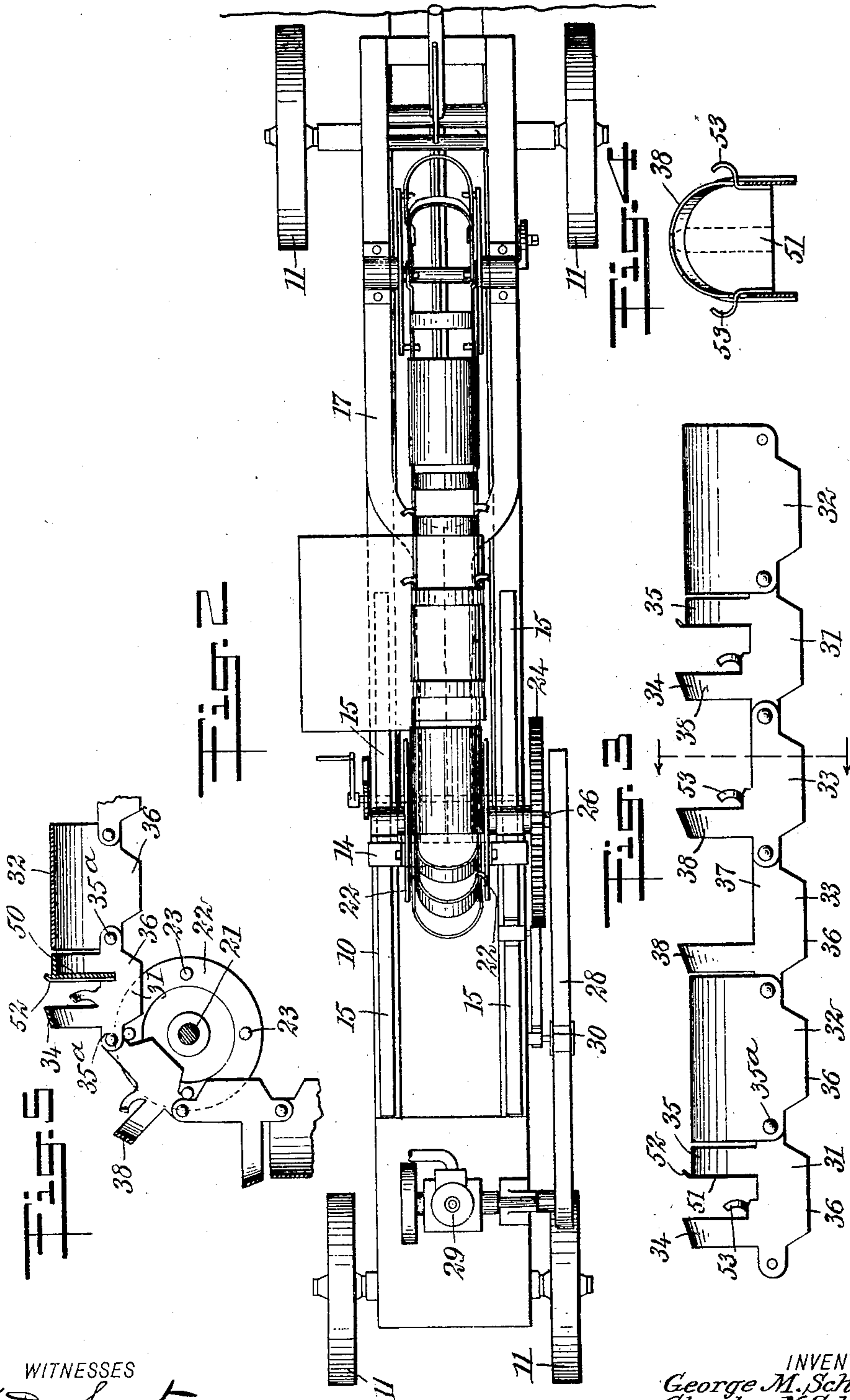
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# UNITED STATES PATENT OFFICE.

GEORGE MAT SCHNELL AND CHARLEY NICKLES SCHNELL, OF KELLOGG, IOWA.

## DITCH-DIGGING MACHINE.

No. 863,319.

Specification of Letters Patent.

Patented Aug. 13, 1907.

Application filed April 20, 1907. Serial No. 369,390.

To all whom it may concern:

Be it known that we, GEORGE MAT SCHNELL and CHARLEY NICKLES SCHNELL, both citizens of the United States, and residents of Kellogg, in the county of Jasper and State of Iowa, have invented a new and Improved Ditch-Digging Machine, of which the following is a full, clear, and exact description.

This invention relates to certain improvements in machines for digging ditches or trenches, and more particularly to that type of machine which is provided with an endless chain supporting buckets, which as the machine is moved along are operated to remove the soil to any required depth, thus forming a continuous trench adapted for use as a drain or for any other similar purpose.

The invention consists in certain features of constructions and combination of parts, all of which will be fully set forth hereinafter and particularly pointed out in the claims.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures, and in which

Figure 1 is a side elevation of our complete ditch digging machine; Fig. 2 is a plan view thereof; Fig. 3 is a side elevation of a series of buckets shown upon a somewhat larger scale; Fig. 4 is a transverse section of the parts shown in Fig. 3; and Fig. 5 is a section through the operating sprocket wheel and the series of buckets in operative engagement therewith.

In our improved ditch digging machine we provide a frame 10 of any suitable form or character and supported at one or both ends by wheels 11. Supported within the frame and vertically adjustable in respect thereto we provide a second frame 12, having outwardly extending flanges 13 on the opposite sides thereof which engage within guideways 14 on the sides of the main frame 10, whereby the vertically movable frame 12 is guided and held in the proper position in relation to the main frame. Any suitable mechanism, as, for instance, a drum and cable, may be provided for raising and lowering the frame 12. The guideways are rigidly secured to the main frame and held against lateral movement by suitable braces 15 in engagement with the main frame 10 upon opposite sides thereof. To aid in supporting the guideways we may, if desired, provide suitable tie-rods 16 having their ends secured to the ends of the main frame and their intermediate portions in engagement with the lower ends of the guideways. Extending rearwardly from the guideways above the main frame and substantially parallel thereto, we provide an upper frame 17 supported by the braces 15 or by the guideways and having its rear end supported by braces 17<sup>a</sup> extending down to the lower end of the frame 12.

The vertically movable frame 12 serves to support at its upper and lower ends the sprocket wheels over

which the series of buckets travel, and also to support means whereby one or both of the sprocket wheels may be rotated. As shown, we provide a shaft 18 at the lower end of the vertically movable frame 12, and upon this shaft are mounted two oppositely disposed wheels 19 each having short studs or projections 20 arranged about the periphery and extending parallel to the shaft 18. These studs are adapted to engage with the series of buckets in a manner hereinafter described. At the upper end of the vertically movable frame we provide a shaft 21 serving to support two wheels 22, similar to the wheels 19 and provided with studs or projections 23 similar to the studs or projections 20 upon the lower wheels. The shaft 21 is also provided with a gear wheel 24 meshing with a pinion 25 on a shaft 26 supported adjacent thereto, and any suitable means are provided for rotating this last mentioned shaft. As shown, we provide a pulley 27 connected by a belt 28 to a suitable engine 29 mounted upon the main frame. As the shaft 26 is supported upon the vertically movable frame and the engine is supported upon the main frame, we provide any suitable means, as, for instance, a belt tightener 30, whereby the power may be transmitted from the engine to the shaft irrespective of the elevation of the latter.

In our improved construction the buckets and the chain are formed integrally, the buckets being pivotally connected together and so constructed as to be engaged by the projections of the wheels which operate the same. In constructing the combined chain and buckets, we provide a plurality of members, each of three different types, 31, 32 and 33. The members of the type 31 are formed of a piece of sheet metal curved to semi-cylindrical form and having two curved bar portions 34 and 35. The former of these portions is expanded to form an inclined cutting edge, while the latter is provided with a bottom 50 which serves to form a shallow bucket. The bottom 50 may, if desired, be provided with a reinforcing strip 51 terminating in a cutting or scraping point 52. The two curved portions 34 and 35 are connected by longitudinal side bars, each of which is provided with an extension 36 that serves to engage between the studs 23 of the operating wheels to cause the movement of the chain of buckets. For reducing the resistance of the sides of the buckets with the sides of the ditch or channel being dug, we may, if desired, provide the members with outwardly curved cutting knives 53 adjacent the ends of the cutting curved portion 34.

The members of the type 32 are preferably provided with a single outer curved semi-cylindrical wall lying in alignment with the curved portion 35 above referred to and serving to form the main side walls of the bucket. These members are also provided with extensions 36 of the same size and relative location as the extensions upon the last mentioned type, whereby firm engage-



ment of the buckets with the operating wheels may be secured.

The members of the type 33 are provided with longitudinally disposed side bars 37 having inclined curved cutting portions 38 adjacent the end of the curved portion of the member 32, and serving as a cutting edge and a guide for the material to direct it into the buckets. We may, if desired, provide two similar members to the type 33 adjacent each other, and may, if desired, provide one of these members with side cutting knives 53 similar to the cutting knives 52 above referred to. The members 31 and 33 are provided with end extensions, whereby the series may be secured by suitable pivots 35<sup>a</sup>.

It will thus be noted, that each bucket proper is formed of two members 31 and 32, and directly in front of each bucket are two cutting members adapted to loosen the material to facilitate its removal by the buckets. One side of each bucket is entirely open, and to prevent the material from falling out of the side as it is being raised, we provide a vertical plate 39 supported by the vertically movable frame 12 and adapted to lie between the side extensions 36 and engage with the rear side of the bottom 50 of the member 31. By rotating the upper wheel, the series of buckets is raised and the excavated material is conducted to the upper end of the vertical frame. Here the plate 39 curves over between the opposite wheels 22 and is provided with a downwardly inclined extension 40 leading to a suitable receptacle or trough 41, whereby the material may be conveyed to one side of the device for removal. This receptacle or trough is supported within the upper frame 17 and adjacent the upper wheels 22, whereby as the buckets pass over the top of the wheels and to a horizontal position, the material falls directly therefrom onto the plate 40 or into the receptacle or trough 41. In order to provide sufficient space for the receptacle or trough 41 and to prevent interference therewith on the part of the series of buckets, we provide the frame 17 with a shaft 42 adjacent the rear end thereof, and this shaft supports wheels 43 similar to the wheels 22 and 19. The series of buckets runs from the wheel 22 across above the frame 17 in a substantially horizontal line to the wheels 43, from which they descend along an inclined plane to the lower wheels 19 adjacent the bottom of the ditch.

In connection with the machine above described, we may, if desired, provide side plates 44 extending downward from the main frame 10 and serving to prevent the sides of the trench or ditch from crumbling inward after the material has been removed. For adjusting the position of the rear end of the machine, or if desired for supporting the same, we may provide a suitable shoe 45 adapted to travel upon the bottom of the trench and connected by suitable bars 46 to the main portion of the frame. These bars are preferably slidably mounted within the main frame, and a suitable rack bar 47 and pinion is provided for raising or lowering the main frame in respect to the supporting shoe 45, and a suitable dog and ratchet 48 is provided to hold the parts in the desired position. Intermediate the supporting shoe 45 and the lower end of the vertically movable frame, we preferably provide a

suitable scraper 49 slidably mounted within the main frame and adapted to push forward any loose material which may fall into the ditch and bring it within reach of the series of buckets.

Having thus described our invention, we claim as new and desire to secure by Letters Patent:

1. In a device of the class described, a supporting frame, vertical guideways mounted thereon, a vertically-movable frame mounted in said guideways and having two wheels adjacent its upper end and a wheel adjacent its lower end, an endless excavator in engagement with said wheels and operated thereby, and means at the upper end of said supporting frame and intermediate the upper wheels for conveying the excavated material to one side as it is discharged from the buckets between said upper wheels.

2. In a device of the class described, a frame, an endless excavator, comprising a series of buckets, each of said buckets having an open side, and a stationary vertical plate carried by said frame and adapted to engage with said buckets to close the open side of each of said buckets as the excavator is raised adjacent said plate.

3. In a device of the class described, the combination of an endless excavator formed of a plurality of pivotally connected members, and wheels having studs or projections thereon adapted to engage with said excavator adjacent the pivotal connections of said members for moving said excavator.

4. In a device of the class described, a vertically movable frame, an endless excavator mounted thereon, said excavator comprising a series of cutting members and a series of buckets, each of said buckets having an open side, and a vertical plate carried by said frame and adapted to engage with said buckets to close the sides as said buckets are being raised.

5. In a device of the class described, the combination of an endless excavator formed of a plurality of pivotally connected members, each of said members being provided with extensions and wheels having studs or projections thereon adapted to engage with the recesses formed between said extensions for moving said excavator.

6. In a device of the class described, an endless excavator, comprising a plurality of pivotally connected members, certain of said members comprising buckets, each of said members being provided with extensions, and oppositely disposed wheels having parallel extensions adjacent the periphery thereof and adapted to engage with the recesses formed at the junction of each pair of adjacent members and between the extensions thereof.

7. In a device of the class described, the combination of a vertically movable frame, wheels mounted adjacent the upper and lower ends thereof, an endless excavator comprising a series of members each having an extension thereon forming recesses between the adjacent members, and studs or projections upon said wheels and adapted to engage with said recesses for operating said excavator.

8. In a device of the class described, the combination of a vertically movable frame, wheels mounted adjacent the upper and lower ends thereof, each of said wheels having projections or studs extending parallel to the axis and located adjacent the periphery of said wheel, a vertical plate carried by said frame, and an endless excavator comprising a plurality of pivotally connected members, certain of said members forming open-sided buckets, and each of said members having extensions thereon coacting with the extensions upon the adjacent members to form recesses therein adapted to be engaged by the studs or projections upon said wheels, and a plate adapted to engage with said bucket members adjacent the open side thereof.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

GEORGE MAT SCHNELL.  
CHARLEY NICKLES SCHNELL.

Witnesses:

CHAS. T. POWERS,  
ALEXANDER G. WEST.