Nov. 25, 1930. C. H. RUTH 1,782,478

DITCH DIGGING MACHINE

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Fig. 1.

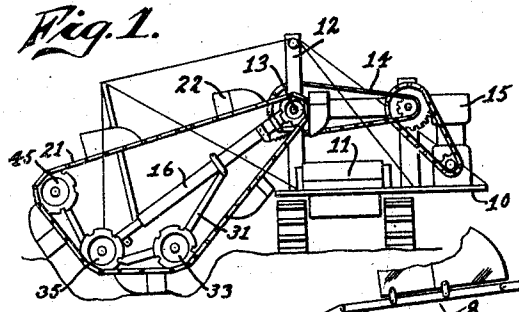


Fig. 2.

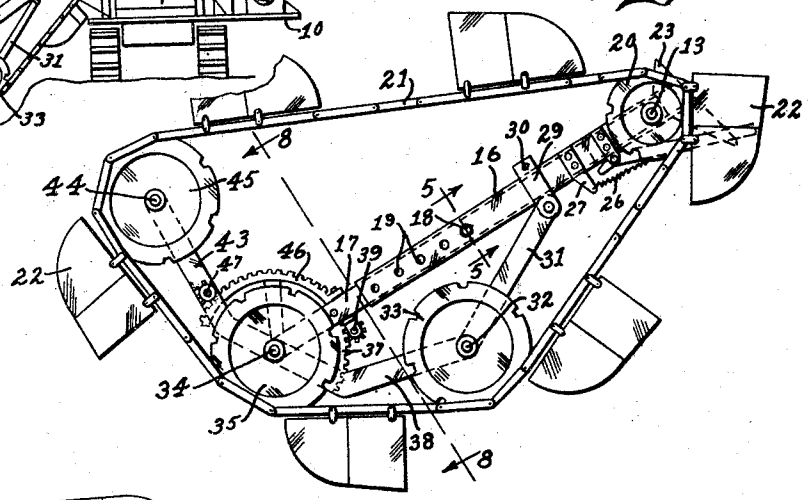


Fig. 3.

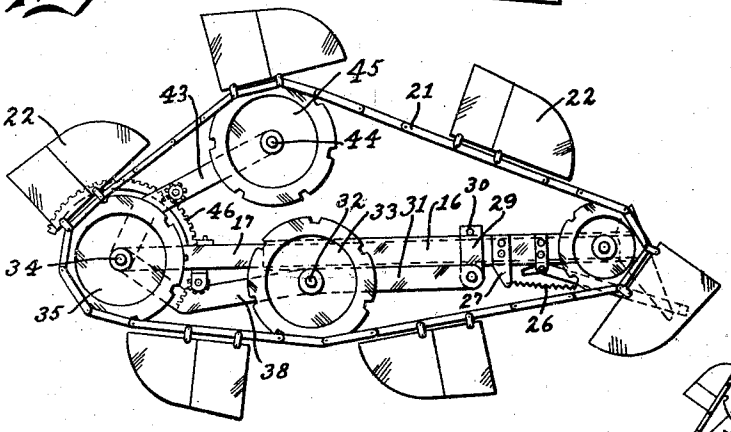


Fig. 5.

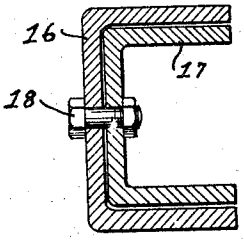
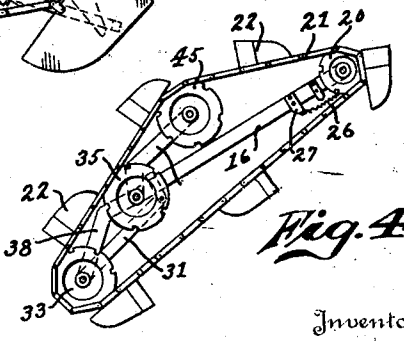


Fig. 4



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DITCH DIGGING MACHINE

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Fig. 7.

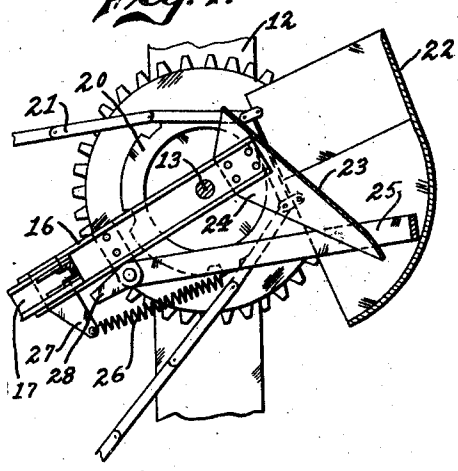


Fig. 6

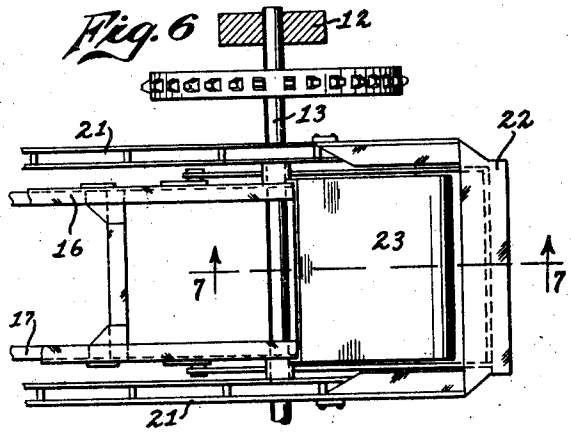


Fig. 10.

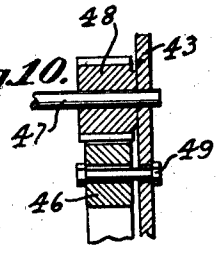


Fig. 8.

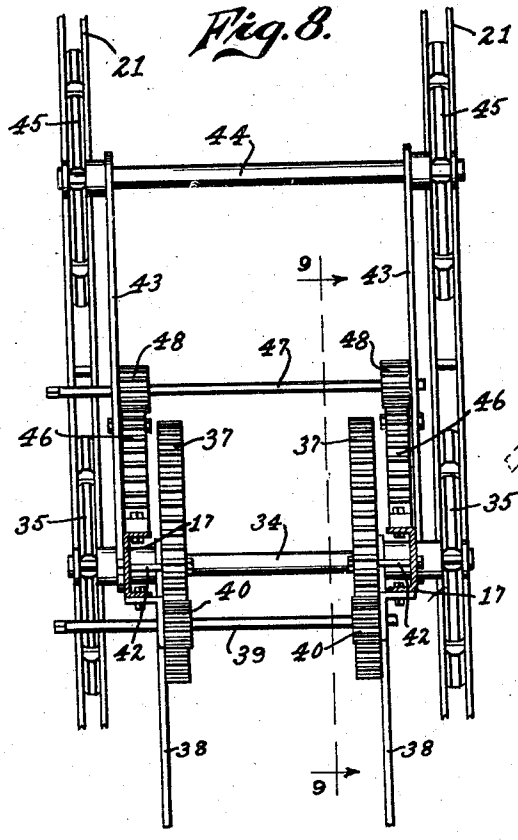
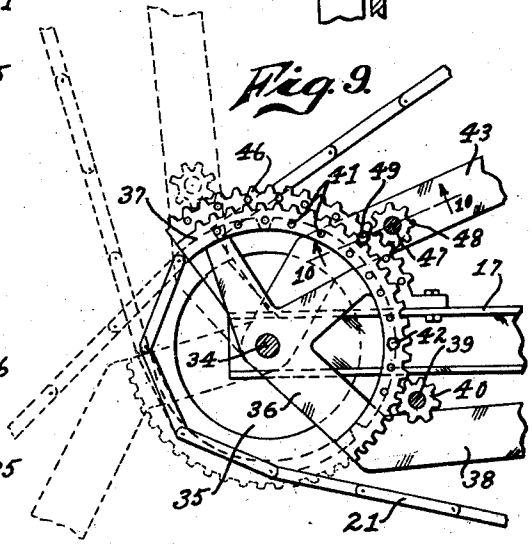


Fig. 9.



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Patented Nov. 25, 1930

1,782,478

UNITED STATES PATENT OFFICE

CHARLES H. RUTH, OF HUNTINGTON PARK, CALIFORNIA, ASSIGNOR, BY MESNE ASSIGNMENTS, TO RUTH DREDGER MANUFACTURING CORPORATION, LTD., OF LOS ANGELES, CALIFORNIA, A CORPORATION

DITCH-DIGGING MACHINE

Application filed August 16, 1928. Serial No. 300,038.

My invention relates to a ditch digging machine or excavator, and has for its principal object the provision of a relatively simple, practical, strong and durable machine that may be conveniently and economically operated for digging ditches or for accomplishing excavating operations, for instance in the construction of streets or road-beds.

Further objects of my invention are to generally improve upon and simplify the construction of the existing forms of ditch digging machines, to provide a machine of the character referred to having an extensible frame that is capable of a wide range of adjustment, which frame supports endless carriers on which are mounted earth-carrying buckets, and, further, to provide simple and efficient means for effecting a discharge of the earth from the buckets as the latter reach the point of discharge.

A further object of my invention is to provide simple and efficient means for maintaining the chains or endless carriers in taut condition, which chains carry the buckets or conveyers that pick up the earth and carry the same to the point of discharge.

With the foregoing and other objects in view, my invention consists in certain novel features of construction and arrangement of parts that will hereinafter be more fully described and claimed and illustrated in the accompanying drawing, in which:—

Fig. 1 is a side elevational view of a ditch digging machine constructed in accordance with my invention.

Figs. 2, 3 and 4 are elevational views of the adjustable extensible frame that carries the chains and buckets forming the endless conveyer, and said parts being illustrated in differently adjusted positions.

Fig. 5 is an enlarged cross section taken on the line 5—5 of Fig. 2.

Fig. 6 is a top plan view of the inner or discharge end of the adjustable frame and the endless conveyer that operates thereon.

Fig. 7 is a vertical section taken approximately on the line 7—7 of Fig. 6.

Fig. 8 is an enlarged cross section taken approximately on the line 8—8 of Fig. 2.

Fig. 9 is a detail cross section taken approximately on the line 9—9 of Fig. 8.

Fig. 10 is a detail section taken approximately on the line 10—10 of Fig. 9.

Referring by numerals to the accompanying drawings which illustrate a practical embodiment of my invention, 10 designates a platform that is mounted on a suitable tractor which, as illustrated in Fig. 1, may be of the well known caterpillar type, and mounted on said platform 10 is a turntable 11 that carries an upwardly projecting frame 12, the latter being arranged adjacent to one side of the platform 10.

Journaled in suitable bearings on the intermediate portion of the frame 12 is a shaft 13 that is driven in any suitable manner, preferably by means of sprocket chains 14 that are driven from an engine or motor 15 that is mounted on platform 10.

Loosely mounted on shaft 13 are the upper inner ends of a pair of arms 16, the same being channel-shaped in cross section, and arranged for sliding movement in the outer lower portions of these arms are extension arms 17 that are channel-shaped in cross section and which are securely fastened to the arms 16 in adjusted positions by means of bolts 18 that pass through apertures 19 that are formed in the webs of the channel-shaped arms 16 and 17.

Fixed on shaft 13 just outside the arms 16 are sprocket wheels 20 and arranged to operate thereon are sprocket chains 21 that carry buckets 22, the latter having upwardly curved rear ends and being open at the front and on top.

Fixed in any suitable manner to the upper inner ends of the arms 16 is an outwardly and downwardly projecting plate 23 having short depending side walls 24, and the size of this plate is such that it passes through the chambers within the buckets 22 as the same are carried upwardly around the sprocket wheels 20. This plate serves to engage and remove the greater portion of the earth or material that is carried upwardly by the buckets of the conveyer, but owing to the movements of the buckets as they pass over the sprocket wheels 20 the front edge of

the plate 23 cannot engage all portions of the inner surface of the bottom and rear walls of the buckets.

In order to scrape the inner surfaces of the buckets and remove practically all of the earth or material therefrom as said buckets pass over the sprocket wheels 20, a substantially U-shaped scraping bar 25 is arranged beneath the upper inner ends of the arms 16 so that the outer portion of said bar projects into the buckets as they pass over the sprocket wheels 20 and the rear or inner ends of the side arms of this scraping bar are hinged or pivoted to the underside of the arms 16.

Secured to the intermediate portions of the side arms of the scraping bar 25 are the forward ends of retractile springs 26, the rear ends of which are connected to brackets 27 that project downwardly from the arms 16 and these springs normally exert a downward pull on the scraping bar so that the transverse portion thereof will yieldingly engage the inner surface of the bottom and rear walls of the conveyer buckets as the same pass the inclined plate 26 and the inner upper ends of the arms 16.

In order to limit the downward swinging movement of the scraper bar 25 fingers 28 project rearwardly from the ends of the side arms that are hinged to the arms 16 and these fingers are adapted to engage against the under faces of the arms 16, thereby serving as stops to limit the downward movement of the scraping bar (see Fig. 7).

Adjustably mounted on the intermediate portions of the arms 16 are collars 29 that may be clamped to said arms in adjusted positions by tightening bolts 30 that are carried by the upper portions of said collars, and hinged to the lower ends of said collars are downwardly and rearwardly projecting bars 31 and journaled in the lower ends of the latter is a transversely disposed shaft 32 on which are mounted sprocket wheels 33 that receive the under-running portion of the sprocket chain 21.

Journaled in the lower outer ends of the secondary arms 17 is a transversely disposed shaft 34 on which are fixed sprocket wheels 35 that receive the under-running portion of the chains 21 and loosely mounted on this shaft 34 are the hub portions of spiders 36, the outer portions of which carry arcuate toothed racks 37.

Projecting inwardly from the lower portions of the spiders 36 are arms 38 and the outer ends of said arms are loosely mounted on the transverse shaft 32.

Journaled in suitable bearings on the under sides of the outer portions of arms 17 is a transversely disposed shaft 39 on which are fixed pinions 40 that engage the teeth of the arcuate racks 37. One end of the shaft 39 projects a short distance beyond the side of the conveyer and the end of this projecting portion is made square or non-circular for the reception of a crank that is used for rotating the shaft.

Formed in the arcuate racks 37 are apertures 41 and adapted to enter in one of said apertures and corresponding apertures that are formed in the arms 17 are pins or bolts 42.

As a result of the construction just described the arcuate racks and the arms 38 that are connected to shaft 32 may be locked to the arms 17 in differently adjusted positions.

Loosely mounted on the shaft 34 near its ends are upwardly and inwardly projecting arms 43 and journaled in the inner ends thereof is a transversely disposed shaft 44 that carries sprocket wheels 45, and which latter receive the over-running portions of the chains 21.

Rigidly fixed to the outer portions of the arms 17 are the inner ends of arcuate toothed racks 46, the same being concentric with the axis of shaft 34 and journaled in the arms 43 is a transverse shaft 47 on which are fixed pinions 48 that mesh with the teeth of the racks 46.

To lock the arms 43 in their adjusted positions pins or bolts 49 are inserted through apertures that are formed in the racks 46 and through apertures that are formed in said arms 43 (see Fig. 9).

One end of shaft 47 is extended a short distance and made square or non-circular for the reception of a crank that is utilized in rotating said shaft to adjust the positions of the arms 43.

It will be noted that the telescoping arms 16 and 17 and the adjustable pairs of arms 31, 38 and 43 that carry the sprocket wheels 33, 35 and 45 provide a readily adjustable support for the endless conveyer comprising the chains 21 and buckets 22 and by adjusting the positions of the various arms the conveyer can be shifted into the various positions as illustrated in Figs. 2, 3 and 4 and as a result ditches or excavations of different cross sectional shapes may be formed.

To vary the distance between the shafts 13 and 34 the secondary arms 17 may be moved lengthwise relative to arms 16 and said arms may be locked to each other in their adjusted positions by means of the bolts 18.

To adjust the position of shaft 32 vertically the bolts 30 are withdrawn to permit the collars 29 to be moved lengthwise on arms 16, and by rotating shaft 39 the pinions 40 carried thereby will engage the arcuate racks 37 to move the same and the arms 38 upwardly or downwardly and, after the proper adjustment of bolts 42, are inserted through the apertures 41 in said racks through the arms 17 and the bolts 30 are tightened to clamp the collars 29 on the arms 16, thus securing the

parts just mentioned in their adjusted positions.

Shaft 44 carrying sprocket wheels 45 may be adjusted inwardly or outwardly by rotating shaft 47 so as to cause pinions 48 to traverse the racks 46 and after this adjustment the arms 43 carrying the shaft 44 are locked in their adjusted positions by means of the bolts 49 that pass through the apertures in the racks 46 and through apertures in said arms 43.

During operation of my improved ditch digging machine or excavator shaft 13 is rotated by means of the driving connections 14 from the motor or engine 15 and the buckets 22 on the endless conveyer pass downward through the earth to the side of the tractor on which the apparatus is mounted and as said buckets pass upwardly over the sprocket wheels 20 the inclined plate 23 and the scraping bar 25 will engage the earth or material within the buckets and scrape and dislodge the same so that said earth or material will discharge onto the apron or conveyer on the platform 10 or into a hopper that discharges through the platform 10.

The inclined plate 23 is instrumental in removing the greater portion of the earth or material that is carried by the buckets and the yielding scraper bar 25 engages the inner surfaces of the side, bottom and rear end walls of the buckets, and thereby removes practically all of the earth or material from said buckets.

Thus it will be seen that I have provided a ditch digging machine or excavator that is relatively simple in construction, capable of being readily adjusted so as to cut ditches or excavations of different cross sectional shapes, and said machine being provided with simple and efficient means for cleaning the earth or other material from the buckets as the same are brought to the discharge end of the conveyer.

It will be understood that minor changes in the size, form and construction of the various parts of my improved ditch digging machine may be made and substituted for those herein shown and described without departing from the spirit of my invention, the scope of which is set forth in the appended claims.

I claim as my invention:

1. In a ditch digging machine, an extensible frame, shafts journaled at the ends thereof, sprocket wheels carried by said shafts, pairs of arms pivotally mounted on the shaft at one end of said extensible frame, rack and pinion connections between each pair of arms and said frame for adjusting the positions of said arms, shafts carried by said arms, sprocket wheels carried by said last mentioned shafts, sprocket chains operating on said sprocket wheels, and buckets carried by said sprocket chains.

2. In a ditch digging machine, an extensible frame, shafts journaled at both ends of said frame, sprocket wheels carried by each shaft, two pairs of arms mounted for swinging movement upon the shaft at one end of said extensible frame, rack and pinion connections between each pair of arms and the frame for adjusting the positions of said arms, means for locking each pair of arms to the frame in differently adjusted positions, a shaft carried by each pair of arms, sprocket wheels carried by each shaft, sprocket chains operating on said sprocket wheels, and buckets carried by said sprocket chains.

3. In a ditch digging machine, a support, an extensible frame extending outwardly or downwardly from said support, shafts journaled at the ends of said extensible frame, pairs of arms mounted for swinging movement at the lower end of said frame, on opposite sides of the shaft journaled therein, rack and pinion connections between each pair of arms and the frame for adjusting the positions of said arms, shafts carried by said pairs of arms, sprocket wheels carried by said last mentioned shafts, chains operating on said sprocket wheels, and buckets carried by said chains.

4. In a ditch digging machine, an extensible frame, shafts journaled at the ends thereof, sprocket wheels carried by said shafts, pairs of arms pivotally mounted on the shaft at one end of said extensible frame, shafts journaled in each pair of arms, sprocket wheels mounted on said last mentioned shafts, sprocket chains arranged for operation upon the sprocket wheels, buckets carried by said sprocket chains, rack and pinion connections between the pairs of arms and the frame for adjusting the positions of said arms, said racks being provided with apertures, said frame and one pair of said arms being provided with apertures that are adapted to register with the apertures in said racks and pins removably positioned in the apertures in said frame arms and said racks.

In testimony whereof I affix my signature.

CHARLES H. RUTH.