H. BECKWITH.

BEET TOPPING AND EXCAVATING MACHINE.

APPLICATION FILED JAN. 30, 1919.

1,367,853.

Patented Feb. 8, 1921.

2 SHEETS—SHEET 1.

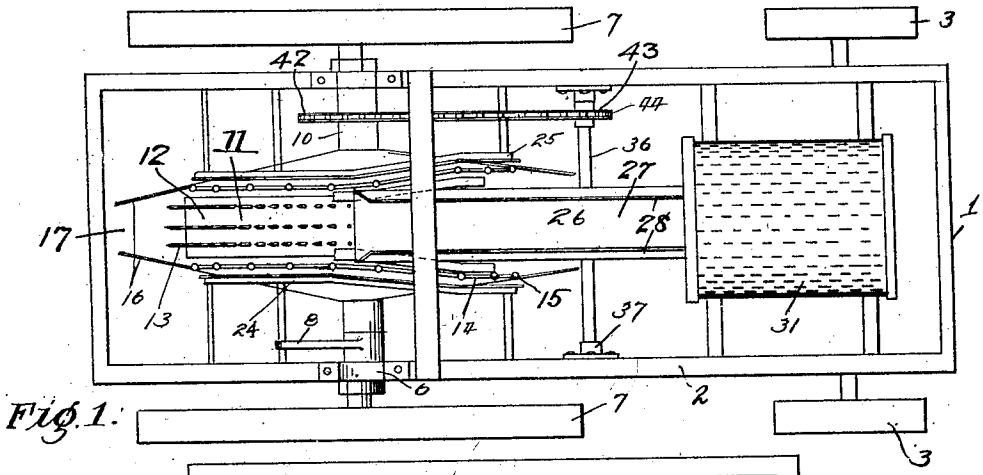


Fig. 1.

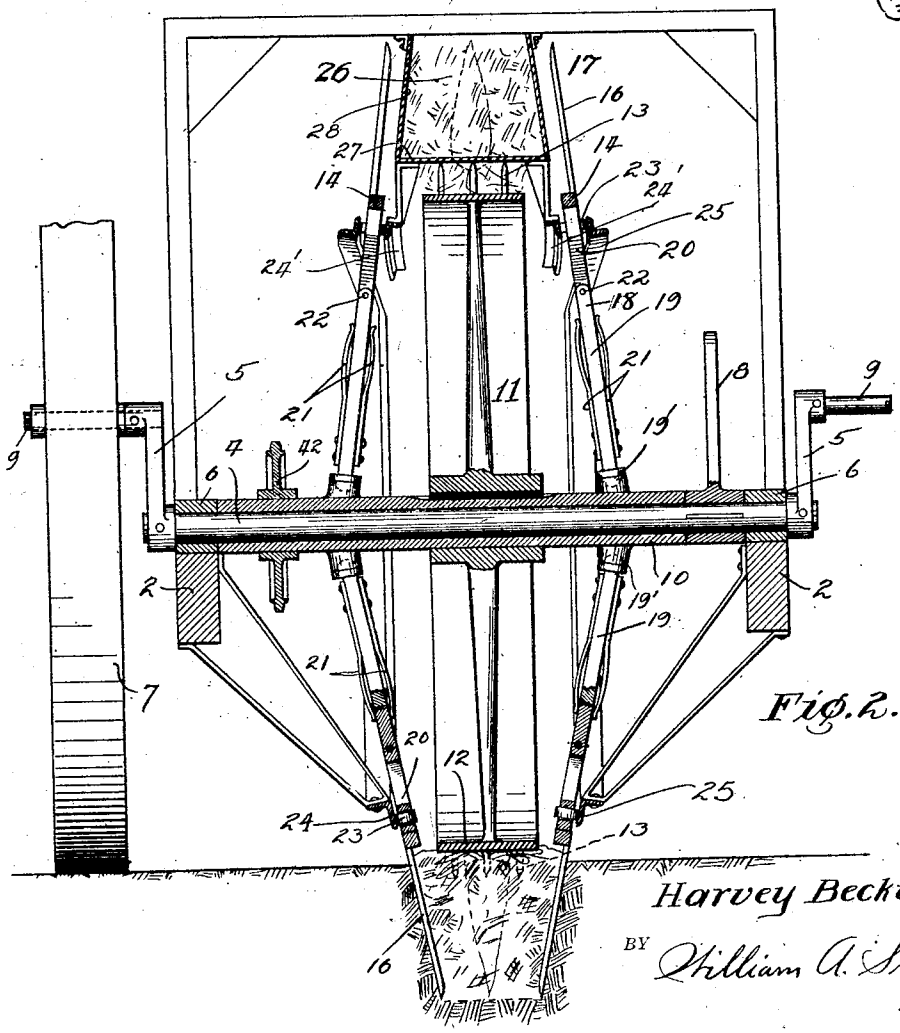


Fig. 2.

Harvey Beckwith
INVENTOR

BY William A. Stock

ATTORNEY

H. BECKWITH.

BEET TOPPING AND EXCAVATING MACHINE.

APPLICATION FILED JAN. 30, 1919.

1,367,853. Patented Feb. 8, 1921.

2 SHEETS—SHEET 2.

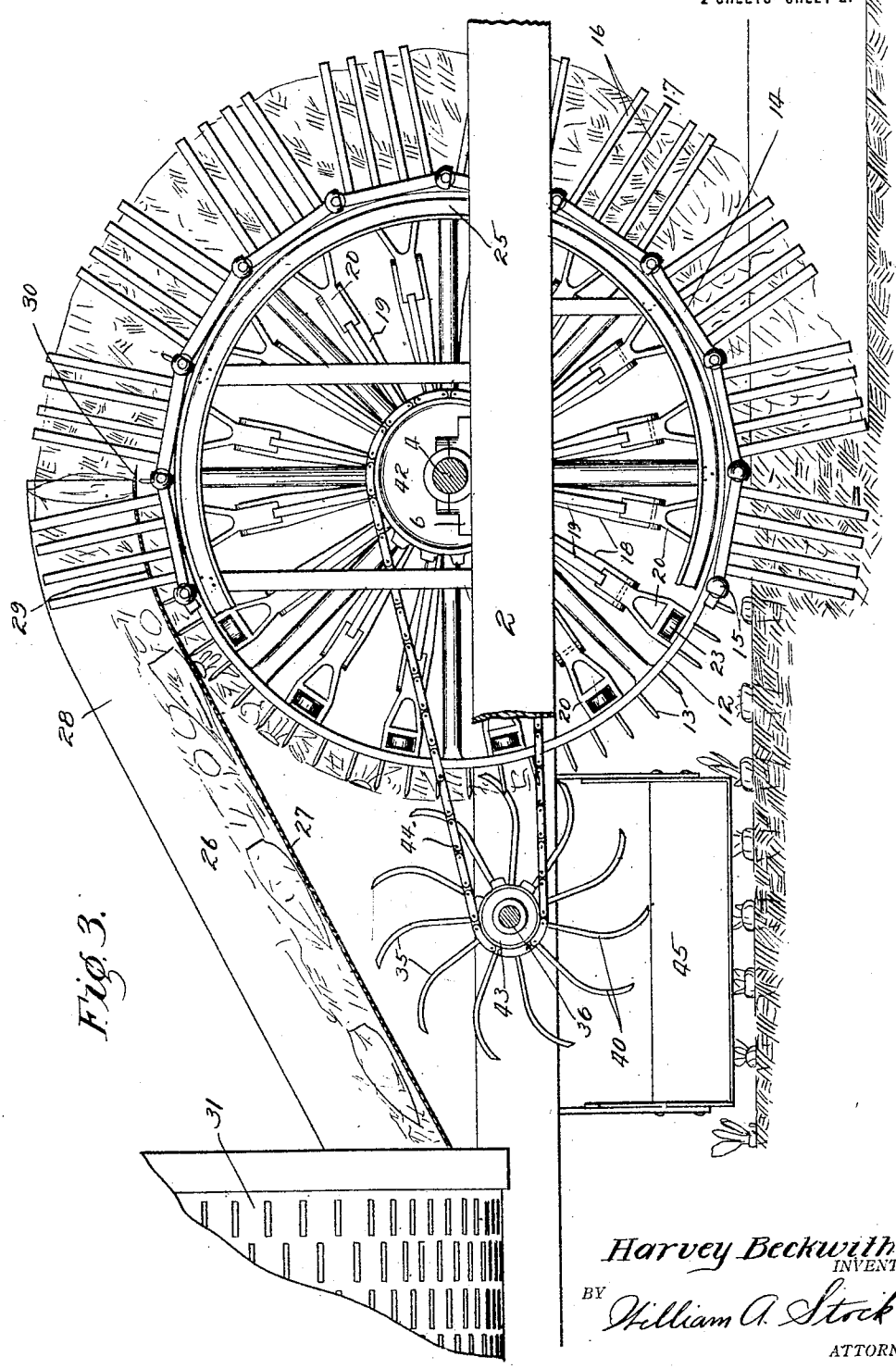


Fig. 3.

Harvey Beckwith
INVENTOR

BY William A. Stock
ATTORNEY

UNITED STATES PATENT OFFICE.

HARVEY BECKWITH, OF BETHANY, CALIFORNIA.

BEET-TOPPING AND EXCAVATING MACHINE.

1,367,853. Specification of Letters Patent. Patented Feb. 8, 1921.

Application filed January 30, 1919. Serial No. 274,153.

To all whom it may concern:

Be it known that I, HARVEY BECKWITH, a citizen of the United States, residing at Bethany, in the county of San Joaquin and State of California, have invented certain new and useful Improvements in Beet-Topping and Excavating Machines, of which the following is a specification.

This invention relates to improvements in beet-topping and excavating machines and has as its object the construction of a machine particularly adapted for agricultural purposes.

One of the principal objects of my invention is to provide a machine which may be used for excavating and digging trenches for the purpose of laying drain tile or providing water courses for irrigation.

A further object of the invention is to provide a mechanism which will not only excavate soil to a suitable depth, but which will at the same time lift without injury, roots which have grown in the soil. I further provide means by which when the machine is being used to raise roots aong with soil, the latter may be separated from the former, and if desirable the tops of the plants may be cut off from the roots and separated therefrom.

With these and other objects in view, the invention consists of certain novel features of construction, combination and arrangements of parts hereinafter described and more specifically pointed out in the appended claims; it being understood that changes in form, proportion, size and minor details of construction within the scope of the claims may be resorted to without departing from the spirit of the invention or sacrificing any of the advantages thereof.

References being had to the accompanying drawings forming a part of this specification—

Figure 1 is a view in plan of my improved machine.

Fig. 2 is a transverse view through the wheel by which the soil that contains matter is lifted to the top of the machine.

Fig. 3 is a view partly in side elevation and partly in section of my improved machine.

Referring to corresponding parts of the several views by the same numerals of reference, the carriage of the machine consists of a frame 1 having the longitudinal members 2 to which are attached the steering wheels 3. Extending between the frame members 2 at the end opposite the steering wheels is an axle 4 which is revolubly mounted in journals 6. This axle has secured to each end on the outside of the frame members, cranks 5 on the crank pins 9 of which are revolubly mounted wheels 7. Keyed to the axle is a lever 8 or other suitable means for rotating the axle. Thus when the axle is turned by means of the lever 8 the crank pins are raised or lowered, correspondingly raising or lowering this end of the machine to regulate the depth of the excavation.

Revolubly mounted on the axle within the frame is a sleeve 10 and forming a part thereof, or keyed thereto is a wheel 11 having the circular rim 12, the outer surface of which is provided with a plurality of sharp spikes 13. On each side of this wheel is an endless flexible chain 14, the joints 15 between the links having a limited universal movement.

Extending radially outwardly from each of these links is a plurality of tines 16 which thus form a fork 17 for penetrating the earth. The inner face of each link is connected to the sleeve 10 by means of a jointed arm 18, the inner end 19 of which is mounted on the sleeve by means of the ball and socket 19′ or an equivalent device which will permit a slight turning of the arm, and a lateral movement in respect to the wheel, but not movement about the axis of the sleeve. That portion 20 of the arm 18 which is attached to the link is preferably made shorter than the inner portion 19 which is connected to the universal joint. Contacting with the inner end of the portion 20 are heavy springs 21, preferably one on each side of the arm, and by which the two portions of the arm are normally held in alinement, but which permit the member 20 to pivot on the pin 22 in case the forks encounter an obstacle, which otherwise would offer too much resistance for the tines to move.

The member 20 is provided with a suitable recess in which is pivotally mounted a roller 23, the rollers of the various arms being arranged to contact with certain rings 24 and 25, which in effect form cams and cause the outer ends of the arms to move laterally with respect to a plane at right angles through the axis of the sleeve 10. The arms

converge toward each other at their outer ends, and the rings are adapted to press these outer ends toward each other at the time the forks are in the ground.

Above the highest point of the wheel 11 is located a chute 26 comprising a bottom plate 27 and side walls 28. The former is curved as shown at 29 so that the points of the spikes 13 just clear the under side of this plate. The walls are set at an angle corresponding to that of the tines of the various forks, and the latter just miss the outside of the walls at the point where the forks are closest together. The rear edge of the plate 27 is provided with a removable cutting knife 30 which is set at a tangent to the ends of the spikes, the edge therefore being a slight distance above the points to prevent possible interference. The chute extends toward the front of the machine and empties into a rotating screen 31 which is arranged to separate the earthy matter from the roots of the plants. Under the chute is located a rotating forked wheel 35 for the purpose of removing any matter which may be retained between the spikes 13. This wheel is attached to an axle 36 which is mounted revolubly in bearings 37 on the frame members 2. The wheel is provided with a series of tines 40 extending radially from a suitable web member and having their outer ends curved as shown. They are of such length that they extend between the rows of spikes and almost contact with the outer periphery of the rim 12. The axle itself is located a sufficient distance from the wheel that the ends of the tines 16 have sufficient clearance.

Toothed sprocket wheels 42 and 43 are attached to the sleeve 10 and axle 36 respectively; these sprockets being connected by a chain 44 for the purpose of driving the axle. As the matter removed by the cleaning wheel just described is generally matter which practically amounts to waste, I provide an inclined chute 45 under this wheel which may extend to one side of the machine and discharge the earth and other materials at a point where they will not interfere with subsequent operations.

Attached to the under side of the chute are short bars 24′ which are substantially parallel to the rings 25, but which are arranged to contact with the opposite sides of the rollers 23. These bars form cam surfaces which begin at about the knife edge and extend a sufficient distance therefrom in the direction of rotation of the wheel to open out the forks.

In operation the machine is drawn across the field by any preferred form of power, and by means of the lever 8 the rear end of the machine is let down until the forks penetrate the ground any desired distance within the capacity of the machine. Then as the machine is drawn forward, the forks remain within the ground causing the wheel to rotate.

At the lowest point of the machine the rollers 23 contact with the cam rings 25 and the forks are squeezed toward each other. The earth and other material which may be between them is thus compressed and firmly held between the two opposed forks. By this means it is raised to the top of the machine where the knife on the chute separates that portion of the mass which is above the points of the spikes from that which is below. That above is forced into the chute by the mass within the next succeeding set of forks and slides down into the screen. If a trench alone be desired, the chute is arranged to deposit the excavating material to one side of the machine.

It will be apparent that if a machine of this character be passed along a row of root vegetables, the squeezing action of the forks will excavate and lift up any roots which may be growing in the mass of earth between the forks. When using the machine for this purpose the depth of the machine is so regulated that the spikes 13 just penetrate the tops of the plants. Then when the mass of earth and inclosed roots reach the top of the machine, the top of the plant is severed by the knife 30 and passes down adhering to the spikes, while the root itself passes down the chute 26. The roots and earthy materials are separated and deposited in separate rows. After the spikes pass from under the chute bottom, the plant tops and other material held therein are removed by the curved outer ends of the wheel 35. A machine of this character may be used for the purpose of digging trenches by which a field may be irrigated as well as for gathering the crops raised on the irrigated lands.

The forks are in effect connected side by side by a universal joint which is necessary as when they are displaced laterally they assume an angular relation to each other, and when any one of the supporting arms bends, the back of the fork or the link must rotate in reference to the adjoining links.

The machine is simple in construction and operation requiring no auxiliary power for the purpose of rotating the various parts associated therewith, the sleeve which is driven by the penetration of the forks into the ground furnishing the required power.

Having thus described my invention, I claim as new and wish to cover by Letters Patent:

1. A machine of the character described comprising a frame, a wheel revolubly mounted therein, a rim on said wheel having radially projecting spikes, a plurality of pairs of forks connected sid by side and projecting beyond the face of said wheel, and

means for laterally dsplacing said forks with reference to said wheel.

2. A machine of the character described comprising a frame, a wheel revolubly mounted therein in a vertical plane, a rim on said wheel, a plurality of spikes extending radially outwardly from the face of said rim, links connected to each other to form endless chains on each side of said wheel, supporting means for said links, tines extending outwardly from said links to form oppositely disposed forks and means for moving said forks laterally with respect to each other.

3. A machine of the character described comprising a frame, an axle extending across said frame, cranks attached to the ends of said axle, supporting wheels revolubly mounted on the outer ends of said cranks, a rimmed wheel revolubly mounted on said axle, a plurality of forks connected side by side to form endless rings on each side of said rimmed wheel, a sleeve on said axle revoluble with said wheel, arms extending from said forks to said sleeve, and means for displacing said forks to and from said wheel.

4. A machine of the character described comprising a wheeled frame, an axle extending across said frame, a spiked wheel revolubly mounted on said axle, a sleeve on said axle revoluble with said wheel, a plurality of pairs of forks, the forks of each pair being symmetrically disposed on each side of said wheel, means connecting the sides of said forks to form endless rings, arms extending from said forks and connected to said sleeve, and cam means for laterally displacing said forks with reference to said wheel.

5. A machine of the character described comprising a wheeled carriage, a wheel revolubly mounted in said carriage, a rim, a plurality of spikes extending outwardly from said rim, a plurality of oppositely disposed pairs of forks pivotally connected at their sides to form endless rings on each side of said wheel, supporting means for said rings, cam means adjacent the lowest point of said wheel for moving the forks of each pair toward each other, and means at the top of the wheel for moving said forks away from each other.

6. A machine of the character described comprising a carriage, a wheel revolubly mounted in said carriage, a rim, a plurality of spikes extending outwardly from said rim, a plurality of tined forks pivotally connected side by side to form endless rings on each side of said wheel and extending beyond the face of said rim, a sleeve revoluble with said wheel, and joined arms connecting said forks with said sleeve.

7. A machine of the character described comprising a carriage, a wheel revolubly mounted in said carriage, a rim, a plurality of spikes extending outwardly from said rim, a plurality of tined forks pivotally connected side by side to form endless rings on each side of said wheel and extending beyond the face of said rim, a sleeve revoluble with said wheel, jointed arms connecting said forks with said sleeve, spring means for holding the parts of said arms in alinement, and cam means for displacing said forks laterally with respect to said wheel.

8. A machine of the character described comprising a carriage, a wheel revolubly mounted in said carriage, a rim, a plurality of spikes extending outwardly from said rim, a plurality of pairs of forks extending beyond the face of said rim and adapted to penetrate the ground, means for moving said forks toward each other to pick up the earth therebetween, means at the top of said wheel for moving said forks apart and a chute for receiving the earth held between said forks.

9. A machine of the character described comprising a carriage, a wheel revolubly mounted in said carriage, a rim, a plurality of radially disposed spikes arranged in rows around the face of said rim, pairs of forks extending beyond the face of said rim and adapted to penetrate the ground, cam means for moving said forks toward each other when in the ground, a chute disposed between said forks at the highest point of the wheel, means for moving said forks apart at the entrance of said chute and a cutting edge on said chute substantially tangential to the path of the outer ends of said spikes.

10. A machine of the character described comprising a carriage, a wheel revolubly mounted in said carriage, a rim, a plurality of radially disposed spikes arranged in rows around the face of said rim, pairs of forks extending beyond the face of said rim and adapted to hold and raise the earth therebetween, a wheel having its axis parallel to the aforesaid wheel, tines extending from said last mentioned wheel into the spaces between the rows of spikes and means for rotating said wheel.

11. A machine of the character described. a wheel frame, a wheel revolubly mounted thereon, a rim on said wheel, a plurality of spikes extending outwardly from said rim, a plurality of tined forks pivotally connected side by side to form endless rings on each side of said wheel, a sleeve revoluble with said wheels, laterally yieldable arms connecting said forks with said sleeve and means for displacing said forks toward each other at the bottom of said wheels and other means for displacing them in the opposite direction at the top of said wheel.

12. In a beet topping and excavating machine, a wheel frame, a wheel revolubly mounted thereon to roll over the surface of the ground, a flat faced rim carried by said

wheel, a plurality of spikes extending outwardly from the face of said rim and penetrating the tops of the beets, a plurality of forks on opposite sides of said rim extending beyond the face thereof and adapted to penetrate the ground, means for displacing said forks toward each other when in the ground to pick up the matter inclosed between them and said rim, cutting means for severing the portion of the beet impaled on said spikes, means for moving said forks apart to release the picked up matter therebetween and means for removing the matter impaled on said spikes.

13. In a machine of the character described, a frame, a wheel revolubly mounted thereon so as to substantially roll over the surface and the ground, a cylindrical rim carried by said wheel, a plurality of spikes extending radially outwardly from said rim adapted to impale the tops of the beets, a plurality of forks on opposite sides of said rim extending beyond the face and having their outer ends converging toward each other, said forks being adapted to penetrate the ground over which the wheel passes, means for displacing said forks toward each other to inclose a mass of earth containing beets therebetween, means for severing the impaled portion of the beet, a chute extending between said forks, means for moving said forks apart at the entrance of said chute and means for removing the severed portion of the beet from between said spikes.

In testimony whereof I affix my signature.

HARVEY BECKWITH.