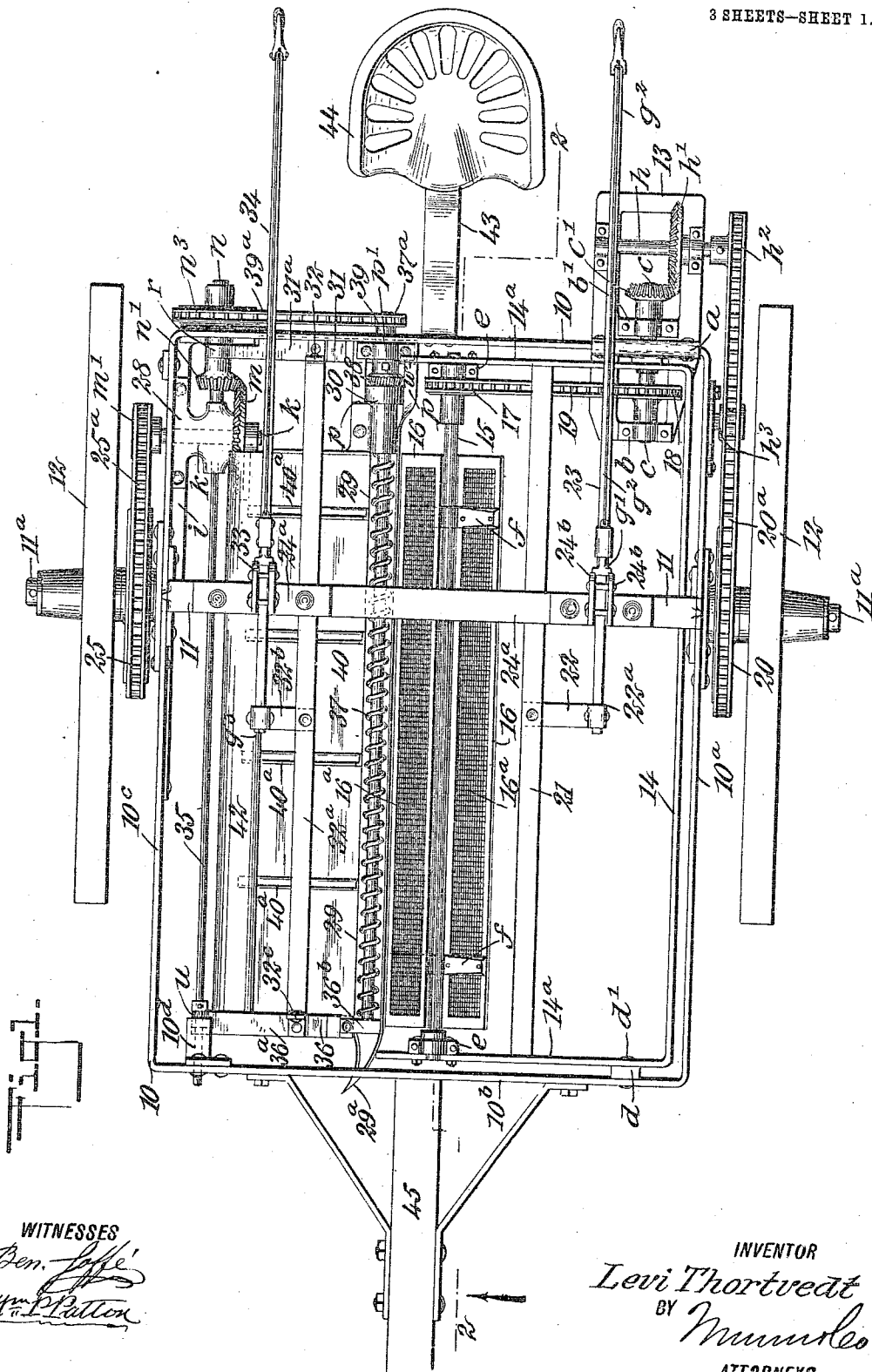


L. THORTVEDT.
BUG AND WORM KILLING MACHINE.
APPLICATION FILED MAR. 9, 1909.

957,634.

Patented May 10, 1910.

3 SHEETS—SHEET 1.



WITNESSES
Ben. J. J. J.
H. P. Patton

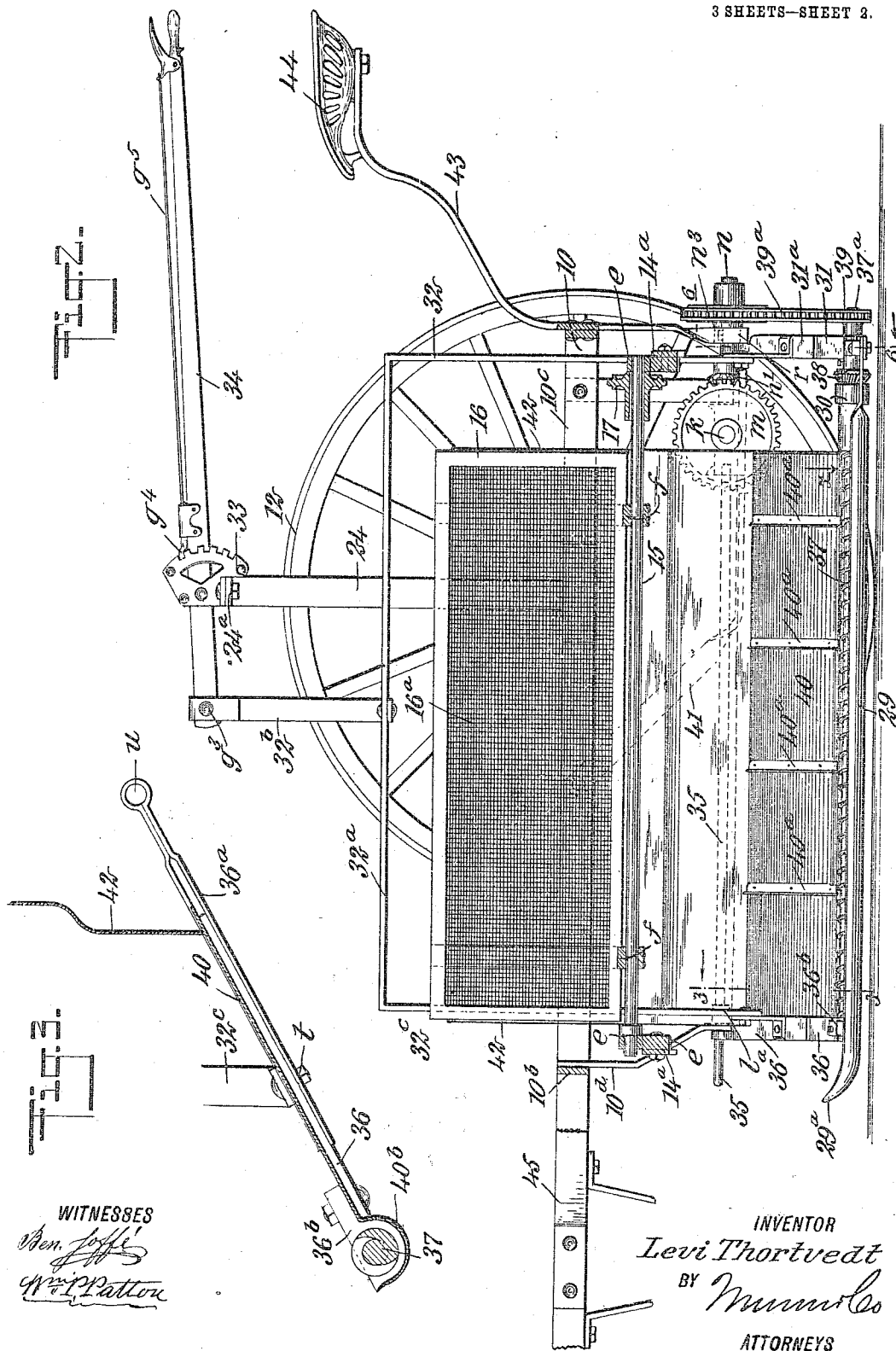
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3 SHEETS—SHEET 2.



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3 SHEETS—SHEET 3.

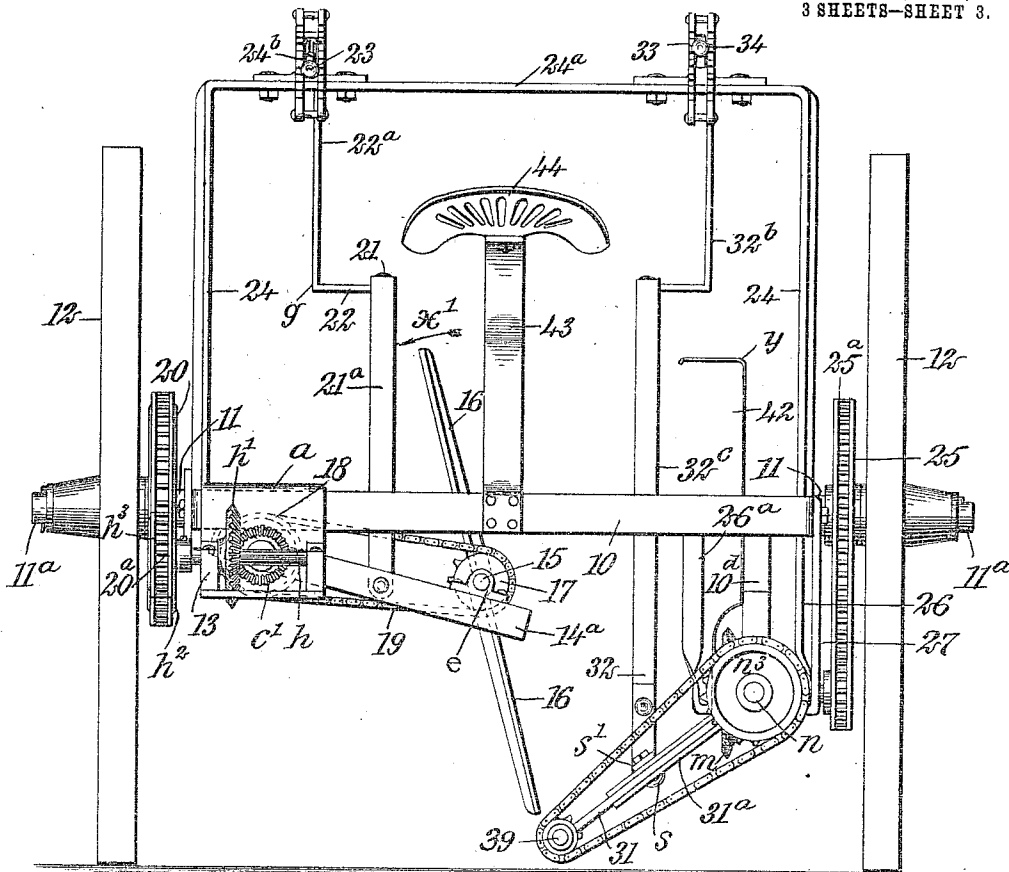


Fig. 4.

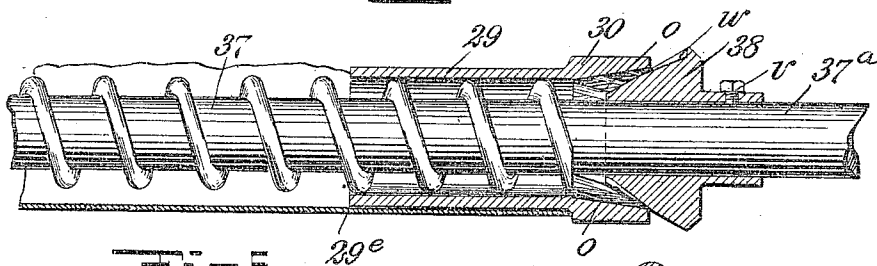


Fig. 5.

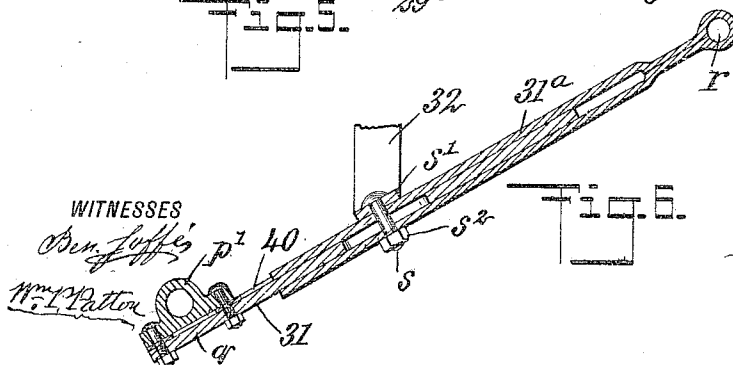


Fig. 6.

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BUG AND WORM KILLING MACHINE.

957,634.

Specification of Letters Patent.

Patented May 10, 1910.

Application filed March 9, 1909. Serial No. 482,328.

To all whom it may concern:

Be it known that I, LEVI THORTVEDT, a citizen of the United States, and a resident of Glyndon, in the county of Clay and State of Minnesota, have invented a new and Improved Bug and Worm Killing Machine, of which the following is a full, clear, and exact description.

This invention relates to mechanical means for removing and killing bugs or worms, that infest plants or bushes while growing, and has for its object to provide novel details of construction for a power-actuated machine of the character indicated, which is simple, practical and convenient to control while operating, and that is particularly well adapted for the removal and killing of bugs upon growing potato vines.

The invention consists in the novel construction and combination of parts, as is hereinafter described and defined in the appended 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 views.

Figure 1 is a plan view of the improved bug-killing machine; Fig. 2 is a partly sectional side view of the same, substantially on the line 2—2 in Fig. 1; Fig. 3 is an enlarged transverse sectional view of details, substantially on the line 3—3 in Fig. 2; Fig. 4 is a rear end elevational view of the machine; Fig. 5 is an enlarged partly sectional plan view of a bug-killing device that is a feature of the improvement, seen in the direction of the arrow *x* in Fig. 2; and Fig. 6 is an enlarged transverse sectional view, substantially on the line 6—6 in Fig. 2.

The main frame 10 that supports in proper relative positions the working parts of the machine, is preferably constructed of a flat metal bar having greater width than thickness. The frame 10 is of somewhat greater length than width and is mounted upon axles 11 whereon traction wheels 12 are rotatably secured, said wheels engaging spindles 11^a on the ends of the axle disposed a suitable distance outside of the main frame, as appears in Fig. 1. At the rear end and left side of the main frame 10, an elongated nearly rectangular gear frame 13 is secured on said frame by means of a hollow arm *a* that hooks onto the rear transverse member

of the main frame and is secured thereto, thus disposing the gear frame 13 below and parallel with the main frame, as is indicated in Figs. 1 and 4. In boxes *b*, *b'*, on the gear frame 13, a shaft *c* is journaled, said shaft passing through the hollow arm *a*.

A rocking frame is provided having a rectangular yoke shape, comprising two parallel members 14^a that are spaced apart by an intervening member 14, the length of the latter being somewhat less than that of a side member 10^a of the main frame. The rocking frame is rockably supported within the main frame 10 and spaced therefrom by a spacing block *d* and pivot *d'*, that are located near the member 14, and between the front members 10^b and 14^a of the main frame and rocking frame, the corresponding rear member 14^a being pivoted upon the shaft *c*.

A beater-carrying shaft 15 is journaled at its ends respectively in boxes *e*, *e*, mounted upon the free ends of the members 14^a of the rocking frame. The beaters, two in number, of like form, each consist of an elongated rectangular border frame 16 of suitable material, whereon wire-woven material 16^a is stretched and secured, said beaters being firmly affixed oppositely on the shaft 15 by bracket arms *f* that are mounted upon and secured to said shaft, as is shown in Fig. 1. Upon the shaft 15, adjacent to the supporting box *e* at its rear end, a sprocket gear 17 is secured, and in the same vertical plane therewith a larger sprocket gear 18 is affixed upon the shaft *c*, said gears being connected by a chain 19. On the rear end of the shaft *c*, a bevel pinion *c'* is secured, and transversely on the gear frame 13, rearward of the bevel pinion, a shaft *h* is journaled, whereon a larger bevel gear *h'* is mounted and affixed which meshes with the pinion *c'*. Upon the hub of the traction wheel 12, at the left side of the machine, a sprocket wheel 20 of considerable diameter, is secured, which aligns with a smaller sprocket gear *h*² that is secured upon the extended end of the shaft *h*, said gears 20 and *h*² being connected by a chain 20^a, said chain also engaging an intermediate idler gear *h*³, from which it receives support. It will be seen that the train of gears which connects the beater-supporting shaft 15 with the hub of the left hand traction wheel 12, will be

adapted to transmit rotary motion from the latter to the shaft 15, turning it rapidly in the direction of the arrow w' in Fig. 4. Upon the frame members 14^a, the depending members 21^a of a yoke frame are secured at a suitable distance from the shaft 15, whereby the horizontal top member 21 of said yoke frame is supported parallel with and a proper distance above said shaft.

10 Near the center of the top member 21 of the yoke frame mentioned, an offset hanger bar 22 is secured by its lower end thereon, and upon the upper end 22^a of said bar one end of a lever 23 is pivoted, which extends rear-

15 wardly. Two upright standards 24 project vertically from the side members 10^a, 10^c, of the main frame 10, and at their upper ends are connected by a cross bar 24^a, as is shown in Fig. 4. From the hanger bar 20 22, which has a right angled bend at g , projects the upwardly extending member 22^a thereof, and upon the cross bar 24^a a sector 24^b is secured having spaced teeth in its curved periphery as usual; the lever 23 laps 25 upon the sector 24^b and is pivoted thereon at the radial center of the sector. A latch dog g' and controlling rod g'' are employed that are mounted on the lever in the ordinary manner, and afford means for holding 30 the lever when rocked above or below a horizontal position. The bent hanger bar 22, at its lower end, is lapped upon and secured to the horizontal member 21 of the yoke frame that extends longitudinally above the 35 main frame 10, and as shown in Fig. 4 for one depending limb 21^a of said yoke frame, said limb laps upon and is pivoted to a corresponding member 14^a of the rockable frame 14, and it is to be understood that a 40 corresponding limb on the yoke frame is pivoted upon the other member 14^a of the rockable frame. It will be noted that the described construction and connection of parts adapts a rocked adjustment of the lever 23 to correspondingly raise or lower the 45 shaft 15 and beater blades thereon. Upon the inner end of the hub of the traction wheel 12, that is mounted to revolve on the right-hand spindle of the axle 11, a large 50 sprocket gear 25 is concentrically secured.

Two adjacent hanger arms 26, 27, depend from the side member 10^c of the main frame 10, and upon the lower portions of said arms an inwardly-bent flange i is formed, 55 whereon a bracket box 28 is mounted and secured, as appears in Figs. 1 and 4, said box also receiving support from a hanger arm 26^a. Transversely in the bracket box 28, a short shaft k is rotatably carried, as shown 60 by dotted lines in Fig. 1, said shaft projecting at each end a distance for the reception of a bevel gear m on its inner end, and a sprocket gear m' on the outer end thereof, and it will be seen that the large sprocket 65 gear 25 on the hub of the traction wheel

and the smaller one m' , are connected by a chain 25^a. Meshing with the bevel gear m is a bevel pinion n mounted on a shaft n that is journaled at its ends respectively in the bracket box 28 and the rear member of 70 the main frame 10.

Coacting with the beater blades 16 for the destruction of the potato bugs, is a novel crushing device which will be described. A trough 29 of a length nearly 75 equal to that of the main frame 10 is employed, the body of which is in the form of a semicircular shell of metal or other suitable material. On one end of the trough 29, a hopper 30 is formed that is mainly cylindrical, but near the free end is flared out- 80 wardly, and in said hopper radial teeth o that have a spiral trend in the same direction are formed on its wall, as is clearly shown in Fig. 5. Upon opposite sides of the 85 hopper body 30, two bracket arms p are secured that are joined at their outer ends to a journal box p' . The journal box p' , as shown in Figs. 2 and 6, is mounted upon one 90 end q of a hanger bar, which is formed in two sections 31, 31^a, that are longitudinally adjustable one within the other, whereby said hanger arm is adapted for receiving a 95 change in length. One end of the section 31^a is formed with a transversely-perforated eyehole r that receives the shaft n and is thus rockably supported thereon near the bevel pinion n . The member 31 is longitudinally slotted at a proper distance from 100 its ends, and through said slot a clamping bolt s is passed, the bolt also passing through a flange s' on the lower end of a depending member 32 of a yoke frame that is similar to the frame 21, and through aligned perforations in the member 31^a, said bolt hav- 105 ing a threaded end and a nut s'' thereon which, by adjustment, will secure the link plate and hanger bar at a desired point on the latter.

Upon the cross bar 24^a of the upright 110 frame which affords support to the beater shaft 15, a sector 33, similar to the sector 24^b, is mounted and secured, and upon said sector a lever 34, similar to the lever 23, is pivoted, thus adapting the lever 34 to extend 115 rearward parallel with said lever 23.

As shown in Fig. 2, the yoke frame, of which the member 32 is a depending member, is extended longitudinally of the main frame 10, and on its top cross bar 32^a, the 120 lower end of a link plate 32^b is secured, which plate at its upper end, is pivoted upon the forward end of the lever 34, as is shown at g^3 in Fig. 2. The lever 34 is provided with a locking dog g^4 and tripping rod g^5 125 which enables the retention of the lever at any desired point of rocked engagement. The depending member 32^c of the yoke frame, which is parallel with the depending member 32 thereof, extends down near the 130

inner side of the front transverse member of the main frame 10, and near the lower end of said part 32^c, a transversely perforated box is secured thereon, as shown at *l* in Fig. 2. A countershaft 35 is supported at its rear end in a socket in the bracket frame 28, and at its forward end in a bracket arm 10^d that is projected rearwardly and downwardly from the front transverse member of the main frame 10, whereby said shaft is disposed parallel with and below the plane of the beater shaft 15.

As shown in Figs. 1, 2 and 3, an extensible hanger bar formed of two telescoping members 36, 36^a, is employed for the adjustable support of the forward end of the trough 29, said members being held from sliding endwise one on the other, by a transverse bolt and nut *t*, that also secures the lower end of the depending limb 32^c of the cross bar 32^a of the rectangular yoke frame whereon the lever 34 is connected by the link plate 32^b. On the free lower end of the hanger bar member 36, a box 36^b is secured in which the semi-cylindrical forward end portion of the trough 29 is loosely inserted. At the upper end of the hanger bar member 36^a, a ring eye *u* is formed, in which is loosely inserted the front end portion of the countershaft 35, thus disposing said end of the hanger bar near the bracket arm 10^a that supports the forward end of the countershaft as before explained. A continuous propeller screw 37 is loosely fitted into the trough 29 and projects therefrom at the rear end of said trough, and as shown in Figs. 1 and 2, the rear end portion 37^a of the propeller screw that is rendered cylindrical, passes loosely through the box *p'* that is mounted on the lower end of the forward hanger bar member 31. On the cylindrical end portion 37^a of the propeller screw 37, a coniform head block 38 is mounted and adjustably secured by means of a set screw *v*. The head block is provided with spirally-trending teeth *w* that are opposite in pitch from the teeth *o* in the hopper 30, and it will be noted that material propelled by the screw 37 through the hopper will be pulverized by the teeth *o* and *w*. On the rear end 37^a of the propeller screw 37, a small sprocket gear 39 is mounted and secured, and upon the rearwardly-extended end of the shaft *n* at the right side of the machine, a larger sprocket gear *n*³ is secured, this gear and the gear 39 being connected by a chain 39^a. The forward end of the trough 29 is turned up so as to adapt it for a free movement between the rows of potato vines, this end portion 29^a projecting in advance of the main frame 10.

A chute plate 40 is provided for stunning and transferring bugs or the like that may be brushed from vines by the beaters 16^a into the trough 29, and as shown, said plate

is formed of plate metal or a thin board, reinforced by transverse strips 40^a that are secured thereon at suitable distances apart. One end of the chute plate 40 is secured to and forms a portion of the telescoping section 36 of the front hanger bar which carries the front end of the trough 29, so that said end of the chute plate is given an inclination corresponding with that of the front hanger arm 36, 36^a. The lower edge portion 40^b of the chute plate 40 is concaved to fit upon the trough 29, and is secured thereon, extending from the front hanger bar member 36^a to the rear end of the trough, said rear end of the chute plate along with the trough receiving support from the bracket arms *p*, an inclined brace 41, shown by dotted lines in Fig. 2, also aiding in the stable support of the chute plate. A guard wall 42, formed of plate metal or other flat material of proper rigidity, is erected from the upper edge of the chute plate 40, and as shown in Fig. 4, said guard wall is supported in a vertical position by the depending arm 26^a. At a suitable height, there is a lateral bend *y* formed in the guard plate or wall 42, thus projecting the upper portion over the chute plate 40. Upon the rear transverse member of the main frame 10, a bent arm 43 is secured by its lower end, and thence extends upward and rearward, said arm carrying at its upper end a seat plate 44 of usual form, this arm and seat being positioned at the transverse center of the main frame 10. From the front transverse frame member 10^b of the main frame 10, a draft pole 45 extends, to which as usual draft animals are attached when the machine is to be put into service. It will be noted that the levers 23 and 34 extend at each side of the seat 44 within convenient reach of the driver occupying said seat.

In operation the machine is moved along the rows of potato plants in a field, and the beater blades 16^a are caused to gently brush over the plants, said blades revolving rapidly in the direction of the arrow *x'* in Fig. 4. The bugs or other vermin that may infest the plants, will be thoroughly removed from the vines that have been brushed by the beater blades, and by the impingement of said blades will be stunned, so that they will fall upon the chute plate 40 and thence pass into the trough 29. The propeller screw being rotated by the gearing hereinbefore described, in a proper direction, will convey the bugs or worms into the hopper 30, so that the rotation of the head block 38 will, by co-action with the teeth in the hopper, pulverize the bugs that will be expelled from the open end of the hopper.

The construction of the beater blades of perforated material, permits them to rotate rapidly and avoid creating an air cur-

rent, and such bugs as are hit but do not fall on the chute plate 40, will be caught by the guard wall 42 and from the latter pass over the chute plate into the trough 29. The strips 40^a that are secured on the chute plate 40 at spaced distances apart, not only serve to stiffen said plate, but also provide abutments against which insects brushed by the beater blades 16^a will be thrown, so as to 5 stun them and direct the bugs down into the trough 29. Upon the trough 29, a cover of thin plate metal may be secured that arches over the propeller screw 37 and serves to prevent said screw from crowding the bugs 10 sidewise from the trough, said cover being indicated partially in section at 29^e in Fig. 5.

It will be evident that by the manipulation of the levers 23 and 34, the beater blades 16^a may be adjusted higher or lower, to 20 correspond with the height of the growing plants that are being operated upon by the machine, and the trough 29, together with its attachments, may be rocked toward or from the surface of the soil, as the proper 25 action of the bug-destroying device may require.

While the preferred use of the improved apparatus is to remove and destroy bugs that infest potato vines growing in a field, 30 it is to be understood that the machine may also be used effectively for removing and killing bugs or worms that are parasites which infest and injure growing cotton plants, dwarf pea vines and dwarf beans 35 when grown in a field.

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

1. A machine of the character described, 40 embodying a four-sided wheel-supported frame, a beater shaft rotatable on the end members of the frame, two radial beater blades oppositely secured on the shaft, gearing on the frame connecting the hub of one 45 wheel with the beater shaft for its rotation, an insect crusher on the frame comprising a trough, an elongated screw rotatable in the trough, a crushing device at one end of the trough and screw, and gearing on the frame 50 connecting the hub of the other wheel with the screw and crushing device.

2. A machine of the character described, embodying a main frame, a rockably adjustable frame supported in the main frame, 55 a beater device rotatable on the said adjustable frame, and a crushing device adjustably supported on the main frame and adapted for crushing insects transferred thereinto from the beater device.

3. A machine of the character described, embodying a main frame, a rockably adjustable frame pivoted on the main frame, 60 a beater device rotatable on the said adjustable frame, a crushing device, hanger bars adjustable for length and supporting the

ends of the crushing device, and means for transferring insects from the beater device into the crushing device.

4. A machine of the character described, embodying a main frame, a rockably adjustable frame in the main frame, a rotatable beater device supported on the said adjustable frame, a pair of extensible hanger bars rockably adjusted on the main frame, an insect-crushing device connected 70 at its ends to the lower ends of the hanger bars, and a chute plate carried by the crushing device and one hanger bar, said plate extending between the crushing device and the beater device. 75

5. A machine of the character described, embodying a main frame, a rockably adjustable frame in the main frame, a beater device rotatable on the said adjustable frame, an insect-crushing device, two hanger bars 80 pivoted at one end of each on the main frame, means for adjusting the hanger bars an insect-crushing device hung at its ends on the hanger bars, a chute plate inclined 85 between the beater device and the crushing device, and a guard plate supported from the main frame near the beater device. 90

6. A machine of the character described, embodying a main frame, a frame pivoted in the main frame, a beater device rotatable 95 on the pivoted frame, a crushing device, two longitudinally-adjustable and pivoted hanger bars, loosely connected at their lower ends with the respective ends of the crushing device, controlled means for raising or 100 lowering the hanger bars, and controlled means for raising and lowering the pivoted frame. 105

7. A machine of the character described, embodying a main frame, a pivoted frame in the main frame, a beater device rotatable on the pivoted frame, an insect-crushing device, two levers on the main frame adapted for manual adjustment, and means adapted for 110 respectively connecting the ends of the levers with the pivoted frame and the crushing device, for their vertical adjustment. 115

8. A machine of the character described, embodying a main frame, a rotatable beater device pivotally mounted in the main frame, 120 an insect-crushing device pivotally mounted in the main frame, and two levers adapted for manual adjustment and respectively connected with the beater device and the insect-crushing device, for their adjustment toward 125 or from the ground over which the machine is moved. 130

9. In a machine of the character described, a rectangular wheel supported frame, a gear frame secured to rear cross bar of the main 125 frame at one side thereof, a yoke-shaped frame pivoted within the main frame, a shaft mounted in the parallel members of the pivoted frame, beater blades mounted on said shaft, means for raising and lowering 130

the pivoted frame, gearing mounted in the gear frame and operated from one of the supporting wheels, and means for operating the beater shaft from said gearing.

5 10. In a machine of the character described, a wheel supported frame having vertical standards connected by a cross-bar, a pivoted frame within the main frame, a beater mounted in the pivoted frame, means
10 for operating the beater from one of the supporting wheels, a yoke frame connected to the pivoted frame, a pivoted lever mounted on the cross bar connecting the standards of the main frame, a hanger bar connected to
15 the yoke frame, and to which the lever is pivoted and means for locking the lever in position.

11. In a machine of the character de-

scribed, a wheel supported frame, adjustable hanger bars pivoted in the said frame, a 20 trough carried at the ends of the hanger bars, a crushing device mounted in the trough means for operating the crushing device from one of the supporting wheels, a yoke frame secured to the hanger bars a 25 pivoted lever mounted on the main frame, a bar connecting the lever with the yoke frame, and means for locking the said lever in position.

In testimony whereof I have signed my 30 name to this specification in the presence of two subscribing witnesses.

LEVI THORTVEDT.

Witnesses:

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