Feb. 7, 1950 M. E. CROWLEY 2,496,858

HOP-PICKING MACHINE

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Fig. 1.

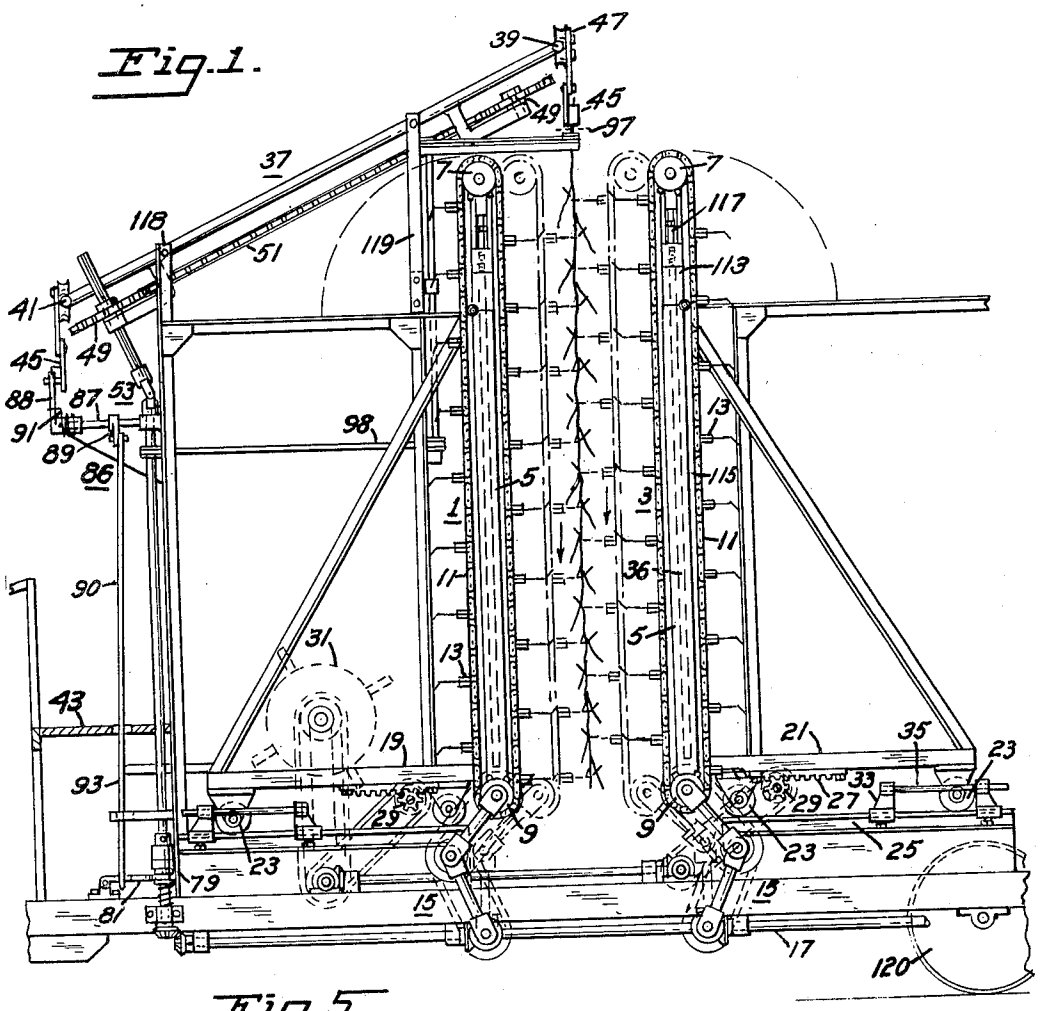


Fig. 5.

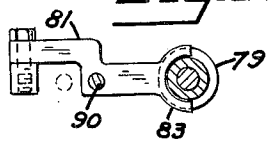
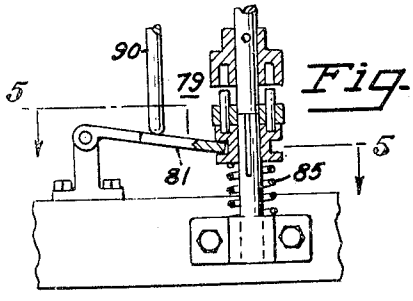


Fig. 4.



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Fig. 2.

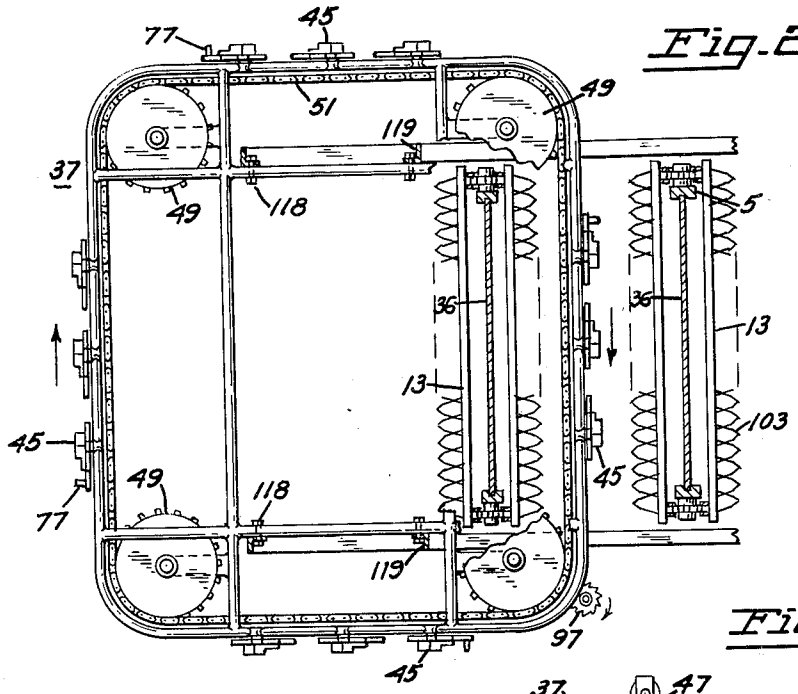


Fig. 3.

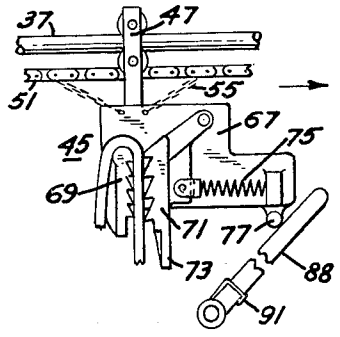


Fig. 6.

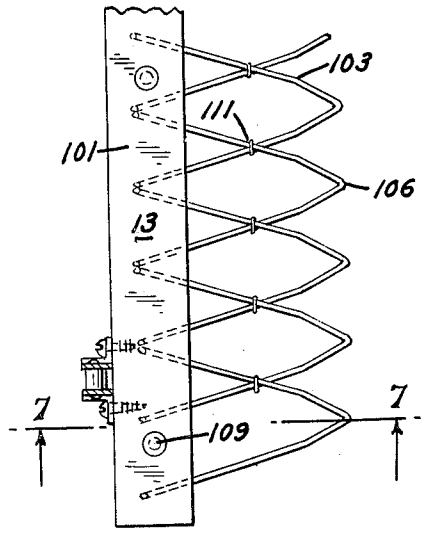
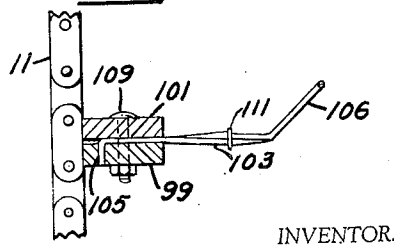


Fig. 7.



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HOP-PICKING MACHINE

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Application August 18, 1945, Serial No. 611,303

8 Claims. (Cl. 130—30)

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My invention relates to hop-picking machines or the like, and more particularly to improvements in the construction and mode of operation of the same.

Among the objects of my invention are:

(1) To provide a novel and improved hop-picking machine;

(2) To provide a novel and improved hop-picking machine capable of portability for use in the hop fields;

(3) To provide a novel and improved hop-picking machine which will assure accurate disposition of hop vines at the picking station in the machine;

(4) To provide a novel and improved hop-picking machine in which unpicked vines are automatically moved to the picking station upon removal of stripped vines;

(5) To provide a novel and improved picker-bar for a hop-picking machine;

(6) To provide a novel and improved portable hop-picking machine capable of having its overall height temporarily reduced for passage under viaducts, etc., while on its way to hop-picking fields.

Additional objects of my invention will be brought out in the following description of a preferred embodiment of the same taken in conjunction with the accompanying drawings wherein—

Figure 1 is a side elevational view of my improved machine;

Figure 2 is a plan view of the machine of Figure 1;

Figure 3 is a side elevational view of a vine clamp mounted on a track, as embodied in the machine of Figure 1;

Figure 4 is an enlarged view of a clutch feature of the machine of Figure 1;

Figure 5 is a sectional view in the planes 5—5 of Figure 4;

Figure 6 is a plan view of an improved picker-bar for use in the machine of Figure 1;

Figure 7 is a view in section taken in the plane 7—7 of Figure 6.

Referring to the drawings, my improved hop-picking machine centers around a pair of spaced, vertically disposed picker columns 1 and 3, each of which includes a column frame 5 carrying at each end a pair of sprockets 7 and 9 for supporting endless chains 11, which in turn carry a plurality of transversely disposed picker-bars 13. Each of the endless chains is driven through a linked chain drive 15 connecting a lower sprocket 9 of each column to a main drive shaft 17, the

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direction of drive being such as to cause the opposing picker-bars to travel downwardly. Such linked connections permit of relative movement of the picker columns toward and away from each other, and to provide further for such movement, each column is mounted on an end of an associated platform 19 and 21 respectively, supported on rollers 23 riding on members 25 of the frame of the machine or suitable tracks provided therefor.

The relative movement of the columns is under the manual control of an operator. To provide for such control, each platform has affixed thereto, a rack 27, and in mesh with such rack is a drive pinion 29. Each pinion is chain-connected to a control wheel 31, with the chain connection of one pinion reversed, to produce simultaneous rotation of the pinions in opposite directions upon manipulation of the control wheel. By such means, the picker columns 1 and 3 may be made to approach or recede with respect to each other in response to operation of the control wheel.

The approach of the picker columns toward each other is limited by stops 33 disposed in the path of the rear wheels of the column supporting platforms, and their locations are so determined as to permit the picker-bars of the columns to alternately overlap when the vertical columns come to a stop. From this it will be apparent that the picker-bars of the one column must lie in intermediate planes with respect to the picker-bars of the opposing column.

The approach positions of the vertical columns, as determined by these stops 33, represent the picking positions of the columns. During shut down periods of the machine, the columns are spaced to occupy positions determined by an intermediate position of the pinions on their respective racks, and such constitutes the neutral position of each column.

An anchor bar 35 having one end fixed in a stop 33, is supported horizontally and tangent to the upper surface of the shaft of the rear wheels of each vertical column platform, and serves to preclude tilting or tipping of its associated column and platform assembly, without impairing the ability of such platform to move in response to manipulation of the control wheel 31 as previously described.

With the vertical columns in spaced relationship, hop vines, after being cut in the field, are suspended by their butt ends, in picking position between the vertical columns, following which the columns are caused to approach each other to

bring the picker-bars into alternate overlapping relationship, with the vines gripped between them. The downward travel of the picker-bars serves to strip the vine of its hops along with some foreign matter such as twigs and leaves. Such hops and any foreign matter accompanying the same, fall upon a horizontally disposed conveyor (not shown) which may lead to any known or conventional apparatus for separating the hops from such foreign matter and then sacking the same.

Each picker column is provided with an internal transverse partition 36 to prevent any of the hops from being thrown through the columns, thereby assuring that practically all will drop to the aforementioned conveyor.

In conjunction with my vertically disposed picking columns, I provide mechanism for accurately feeding the vines to the picking station and subsequently removing the same following picking, to present a fresh set of vines.

Such mechanism includes an endless track 37 of substantially rectangular form, supported in fixed position at the top of the machine, with one side 39 of the rectangle lying in the picking plane between said spaced vertically disposed picking columns, and the opposite side 41 held at lower elevation to bring it within reach of a loading platform 43 at the front end of the machine. The track may be fabricated from pipe or channel as desired. A plurality of vine clamps 45 are movably supported by means of trolleys 47 in uniformly spaced groupings on the track, and these clamps are adapted to hold vines in suspended position for operation thereon by the picker-bars of the picker columns.

A plurality of pulleys 49, each supported adjacent a corner of the track, are adapted to receive an endless chain or cable 51 encircling the same. Through a drive connection 53 to one of these pulleys, the cable is adapted to be driven, and by connecting each vine clamp to the cable by means of a drag connection 55, the vine clamps will travel along the track with movement of the cable.

Each clamp includes a plate 67 suspended from the trolley, and to this plate are attached a pair of clamping elements 69 and 71 having adjacent saw-tooth edges. One of these elements 69 is immovably affixed to the plate 67 while the other 71 is pivotally secured thereto and provided with a handle 73 adapted to be used in rotating this element away from the other against the action of a restoring spring 75. In hanging a vine from the clamp, the butt end of the vine is bent over the fixed element 69 and brought down between the two saw-tooth edges while the pivoted element 71 is held away from the other, whereby upon release of the pivoted element and the action of the restoring spring, the vine becomes firmly held against being pulled loose from the clamp.

In grouping the clamps on the track, I prefer to dispose a like number of clamps on each side of the track rectangle to constitute a group, and to one clamp of each such group, preferably the last clamp, I attach a trip finger 77.

The drive connection 53 to the cable operates through a normally engaged clutch 79, and by itself such connection would maintain continuous travel of the vine clamps along the track. As previously indicated, the vines are loaded on these clamps from the loading platform 43, and when a group of loaded clamps reaches the picking station between the vertical columns, it becomes desirable to halt progress of the clamps along the track in order to hold the vines stationary while the columns are moved into picking engagement with the vines.

Accordingly, with this purpose in mind, I provide automatic clutch disengaging and locking means in the path of the trip fingers 77 whereby upon actuation by such trip finger, the clutch will be disengaged and locked in such disengaged position. Such clutch disengaging means includes an offset lever 81 pivotally mounted to the frame and terminating in a yoke 83 straddling one of the clutch elements in such manner that in response to pressure upon the lever, such clutch member will be disengaged from the other against the restoring force of a clutch spring 85.

Such pressure is transmitted to the clutch lever 81 through a lever system 86 including a bell crank type lever 87 having one arm 88 in the path of movement of the trip fingers 77 and the other arm 89 functioning as a pivotal support for a depending pressure rod 90. As the trip finger of one of the clamps moves against the arm 88, the resulting rotation causes the pressure rod to bear against the clutch lever 81 and disengage the clutch. Such disengagement is designed to occur before the trip finger can ride over the end of the arm 88 thereby locking the clutch in its throw-out position. From this, it will be apparent that the locking of the clutch in this manner can be accurately timed with the arrival of a group of loaded vine clamps at the picking station.

After the vines, hanging from such clamps, are stripped clean of hops, the vertical picker columns are caused to recede beyond neutral position, and in response to such movement of the picker columns, I cause the drive clutch 79 to automatically engage and drive the cable until the succeeding group of loaded vine clamps arrives at the picking station, when another trip finger will again cause disengagement of the clutch followed by a locking of the same, thus holding the vines stationary in preparation for operation thereon by the picker columns. This is accomplished in the following manner. The lever system 86 is held in locking position against the restoring action of a spring 91, which is adapted to restore the lever system to its prior status when such lever system is not under the influence of a trip finger. To relieve the lever system of such influence, I provide the platform 19 with a push rod 93 which upon separation of the picker columns, will push rod 90 from its lever engaging position and permit engagement of the clutch, whereupon the resulting movement of the chain or cable 51 will cause the pertinent trip finger to ride over the end of the lever arm 88 and permit the lever system to be restored to normalcy under the action of the spring 91.

The stripped vines may be left hanging in the clamps until they again reach the loading position, at which times fresh vines may be substituted therefor. I prefer, however, to cut the vines from the clamps automatically and promptly upon withdrawal of the same from the picking station. Accordingly, in the path of movement of the stripped vines as they leave the picking station, I provide a horizontally positioned circular saw 97 having a pulley drive connection 98 to the power drive 53 for the cable. Severing of the vines in this manner, of course leaves the

butt ends of the vines in the clamps, but these are readily removable when the clamps are opened to hang fresh vines at the loading position.

Each of the picker bars 13 includes a pair of wood strips 99 and 101 or the like, between which are clamped a plurality of picker fingers 103. Each of these picker fingers comprises a piece of wire bent V-shape and having turned down terminals 105, the V-ends 106 being bent out of the plane of the fingers proper. The terminals 105 are inserted into small openings provided in one of the strips 99, with the fingers in overlapping relationship to one another, following which the second strip 101 is placed upon the former and clamped thereto by means of a series of clamping bolts 109. These fingers are preferably wired together at cross-over points 111 to rigidify the same.

My picker-bar is an improvement upon picker-bars of the prior art in that those of the prior art rely solely upon the angular point of the picker fingers to snag the hops, whereas in my improved picker-bar, the many existing cross-over points 111 provide additional wire forming angles for snagging the hops as the picker fingers move over the vines.

Hop vines grow to a height of fifteen to eighteen feet, and for utilization in a picking machine, are cut off at from four to six feet from the ground. Thus, in a machine where the vines are suspended for picking, the overall height of a machine to handle such vines must be at least fifteen feet and probably more, particularly where the machine is mounted on wheels for portability. Such height would exceed the clearance of most underpasses and viaducts encountered on the highways. Therefore, from the viewpoint of a portable machine, it is a desirable thing to be able to reduce the overall height sufficiently to permit movement of the machine through such underpasses or viaducts.

While the overhead beams constituting part of the frame structure of the machine might readily be disassembled for the purpose, the overhead track assembly and vertical picker columns present a problem in this connection. For this purpose, I accordingly prefer to construct the picking column frame in two sections, namely, an upper section 113 and lower section 115, with the upper section of smaller length and hinged to the lower section. The upper sprockets 7 are then carried by adjustable supports 117 affixed to the upper section 113 of the picker column frame, whereby the chains 11 may be relaxed sufficiently to permit the upper section to be swung into a horizontal position when it is desired to temporarily reduce the overall height of the machine. When restored to its vertical operating position, however, a plate is affixed to the frame across the hinge joint to rigidify the column frame for use.

The endless track 37 and cable assembly and that portion of the supporting frame to which it is affixed, is preferably pivoted at a point 118 towards its lower end and removably secured at its higher end to a hinged upright frame member 119, whereby this portion of the machine may be lowered to occupy a substantially horizontal plane, and the hinged frame member also lowered out of the way. Inasmuch as the track rectangle is of greater width than the vertical picker columns, the track assembly can be lowered down about the column 1 without interference.

The entire machine assembly is capable of being mounted on wheels 120 for hauling by tractor

to its points of use as needed, or the same may be designed for permanent installation at a fixed location. Either type may embody the features described in detail above.

While I have described a preferred embodiment of my invention in considerable detail, the same is subject to alteration or modification without departing from the underlying principles involved, and I accordingly do not desire to be limited in my protection to the specific details illustrated and described except as may be necessitated by the appended claims.

I claim:

1. A hop-picking machine comprising a pair of spaced vertically disposed picker columns; means for removably supporting hop vine between said picker columns; means for causing relative approach of said picker columns to bring the same into picking relationship to such vine, said means including a movable platform associated with each of said columns and carrying the same, a rack on each of said platforms, a fixedly mounted pinion meshing with each such racks, and a manually operable drive connection to each of said pinions with one of said drive connections reversed to produce simultaneous but opposite directions of rotation of said pinions; and means responsive to separation of said picker columns for replacing such vine with a fresh vine between said picker columns.

2. A hop-picking machine comprising a pair of spaced vertically disposed picker columns, each of said picker columns including a plurality of movable horizontally disposed picker-bars; means for driving said picker-bars in a downward direction between said picker columns; means for removably supporting hop vines between said picker columns, said means including a fixed endless track of substantially rectangular shape having one side lying in a plane between said spaced vertically disposed picker columns, a plurality of vine clamps movably supported on said track, drive means for causing movement of said vine clamps along said track, said drive means including a clutch; means for disconnecting said clutch when a group of said clamps occupy the side of said track lying between said spaced picker columns to hold clamped vines suspending therebetween; means for causing relative approach of said picker columns to bring the same into picking relationship to such vines; and means responsive to separation of said picker columns for restoring said clutch to its closed condition to bring a succeeding group of vine clamps to position between said picker columns.

3. A hop-picking machine comprising a pair of spaced vertically disposed picker columns occupying neutral positions, each of said picker columns including a vertically disposed column frame, and a plurality of horizontally disposed picker-bars movably supported on said frame; means for driving said picker-bars in a downward direction between said frames; means for removably supporting hop vines between said picker columns, said means including a fixed endless track of substantially rectangular shape having one side lying in a plane between said spaced vertically disposed picker columns, a plurality of vine clamps movably supported on said track, a plurality of corner pulleys each supported adjacent a corner of said track, an endless cable encircling said pulleys, and a drag connection from each of said vine clamps to said cable; means for causing movement of said cable about said pulleys with consequent movement of said

vine clamps along said track, said drive means including a clutch; means for disconnecting said clutch when a group of said clamps occupy the side of said track lying between said neutrally spaced picker columns to hold clamped vines suspended therebetween; means for causing relative approach of said picker columns to bring the same into picking relationship to such vines, said means including a movable platform associated with each of said columns and carrying the same, a rack on each of said platforms, a fixedly mounted pinion meshing with each such racks, and a manually operable drive connection to each of said pinions with one of said drive connections reversed to produce simultaneous but opposite directions of rotation of said pinions, said racks being of sufficient length to permit wide separation of said picker columns beyond their neutral positions; and means responsive to such wide separation of said picker columns for restoring said clutch to its closed condition to bring another group of vine clamps to position between said picker columns.

4. A hop-picking machine comprising a pair of spaced vertically disposed picker columns occupying neutral positions, each of said picker columns including a vertically disposed column frame, a pair of sprockets at each end of each frame, a pair of endless chains supported on the sprockets of each frame and encircling such frame, and a plurality of substantially horizontally disposed picker-bars carried by said chains; means for driving said endless chains and picker-bars carried thereby; means for removably supporting hop vines between said picker columns, said means including a fixed endless track of substantially rectangular shape having one side lying in a plane between said spaced vertically disposed picker columns, a plurality of vine clamps movably supported in uniformly spaced groupings on said track, a plurality of corner pulleys each supported adjacent a corner of said track, an endless cable encircling said pulleys, and a drag connection from each of said vine clamps to said cable; means for driving one of said pulleys to cause movement of said cable about said pulleys with consequent movement of said vine clamps along said track, said drive means including a clutch; means for disconnecting said clutch when a group of said clamps occupies the side of said track lying between said neutrally spaced picker columns to hold clamped vines suspended therebetween; means for causing relative approach of said picker columns to bring the same into picking relationship to such vines, said means including a movable platform associated with each of said columns and carrying the same, a rack on each of said platforms, a fixedly mounted pinion meshing with each such racks, and a manually operable drive connection to each of said pinions with one of said drive connections reversed to produce simultaneous but opposite directions of rotation of said pinions, said racks being of sufficient length to permit wide separation of said picker columns beyond their neutral positions; and means responsive to such wide separation of said picker columns for restoring said clutch to its closed condition to bring a succeeding group of vine clamps to position between said picker columns.

5. A picker-bar for a hop-picking machine comprising a plurality of picker fingers, each including a wire formed in V-shape, said picker fingers being disposed in overlapping relationship to provide cross-over points adapted to function along with the points of such fingers in the picking of hops from a vine.

6. A picker-bar for a hop-picking machine comprising a plurality of picker fingers, each including a wire formed in V-shape, said picker fingers being disposed in overlapping relationship to provide cross-over points adapted to function along with the points of such fingers in the picking of hops from a vine; and means clamping said fingers in fixed position relative to each other.

7. A picker-bar for a hop-picking machine comprising a plurality of picker fingers, each including a wire formed in V-shape with the V-point bent out of the plane of the finger proper, said picker fingers being disposed in overlapping relationship to provide cross-over points adapted to function along with the points of such fingers in the picking of hops from a vine.

8. A picker-bar for a hop-picking machine comprising a plurality of picker fingers, each including a wire formed in V-shape, said picker fingers being disposed in overlapping relationship to provide cross-over points adapted to function along with the points of such fingers in the picking of hops from a vine, and means binding such fingers together at such cross-over points.

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