

May 19, 1936.

G. W. RIENKS

2,041,208

SURFACE WHEEL

Filed Jan. 7, 1935

3 Sheets-Sheet 1

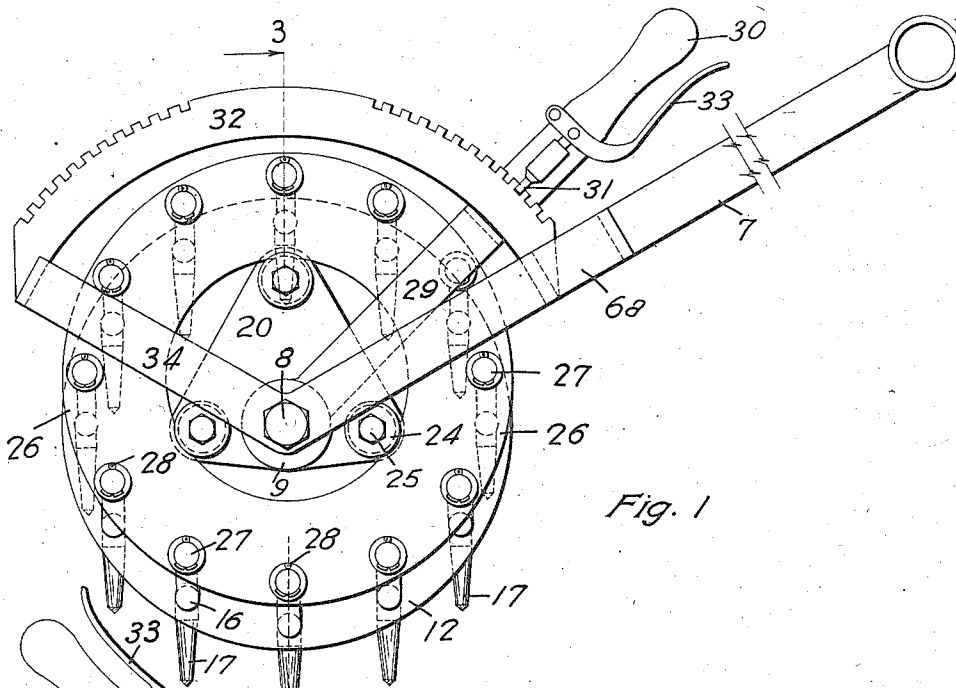


Fig. 1

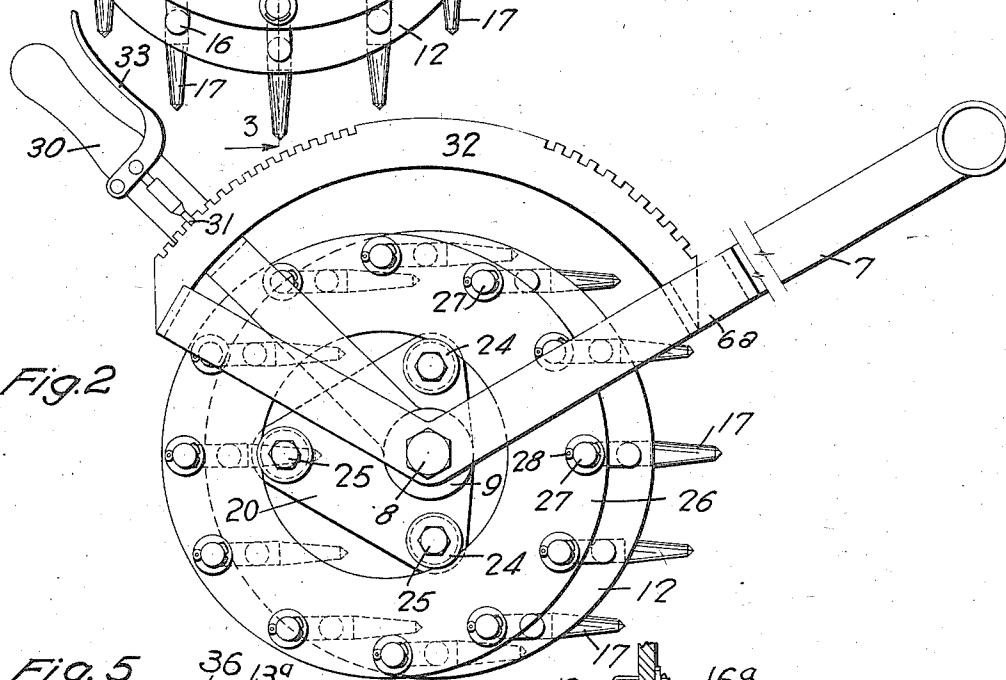


Fig. 2

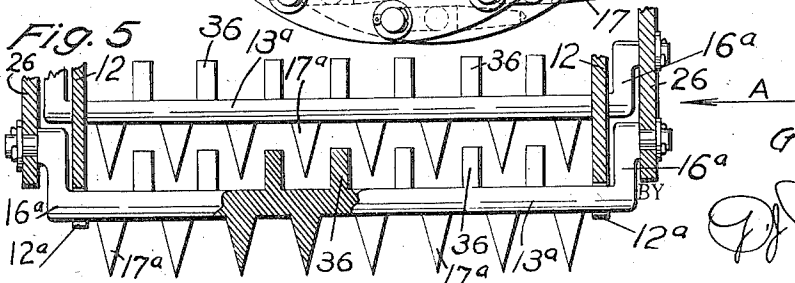


Fig. 5

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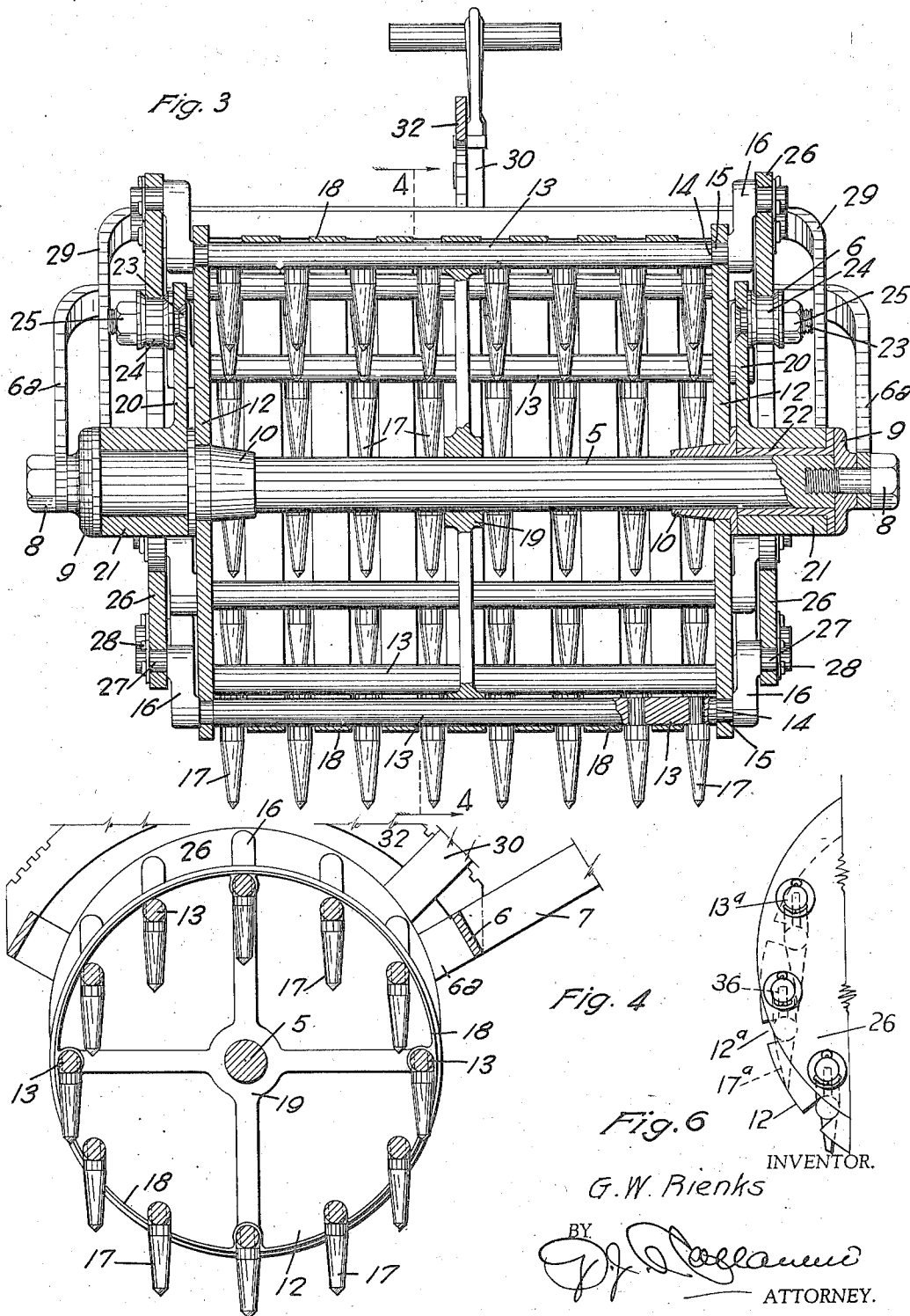
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SURFACE WHEEL

Filed Jan. 7, 1935

3 Sheets-Sheet 2.



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SURFACE WHEEL

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3 Sheets-Sheet 3

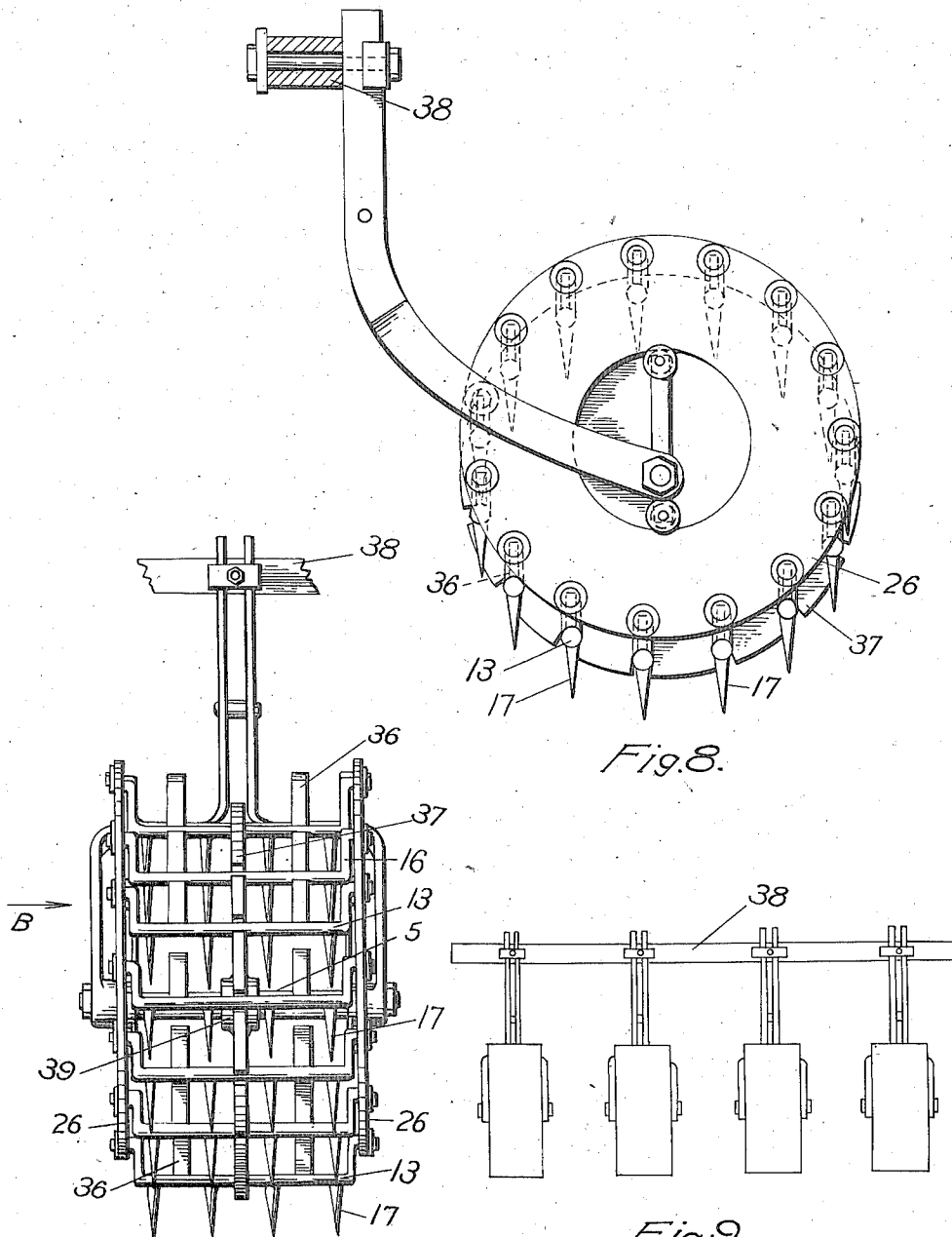


Fig. 7.

Fig. 8.

Fig. 9.

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SURFACE WHEEL

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7 Claims. (Cl. 97—52)

My invention relates to surface-wheels of the type in which peripheral protuberances, such as spikes or lugs, engage a surface over which the wheels are driven, for various purposes.

The invention relates more specifically to improvements in so-called spiking rollers, principally used for breaking lawns, and greens or fairways of golf-courses, and it is in this connection that it has been illustrated in the accompanying drawings and will hereinafter be described.

It is to be understood however, that the invention is applicable to devices of different character, as for example, cultivators or traction wheels of trucks and the like, or even as an adjunct to the rubber-tired wheels of motor vehicles.

It is an object of the invention to provide in rollers or wheels of the above stated character a simple, practical and highly efficient mechanism by which the peripheral spikes or lugs may be adjusted to enter the ground and be retracted therefrom in either a vertical direction or at a selected angle to the perpendicular, or to be withdrawn beyond the periphery of the wheel or roller to present a smooth tread whenever the service of the spikes or lugs is not desired, as for example, when the roller or other implement is transported along paved roads or is moved inoperatively from place to place.

Other objects of the invention are to be found in details of construction and in novel and advantageous arrangements and combinations of parts as will be fully brought out in the course of the following description.

In the drawings,

Figure 1 represents a partially broken end-elevation of a spiking roller embodying the distinctive features of the present invention, the peripheral spikes of the roller being shown as adjusted to an operative position in which they enter the ground and are retracted from the same, in a substantially vertical position;

Figure 2 is a similar view showing the spikes as adjusted to a retracted and inoperative position to provide a smooth tread at the point at which the roller engages the surface of the ground;

Figure 3 is a section taken on the plane indicated by the line 3—3 in Figure 1;

Figure 4 is a transverse section along the line 4—4 of Figure 3;

Figure 5 is a fragmentary view showing, partially in section, a modified construction of the spike-carrying crank shafts included in the invention;

Figure 6, a side elevation of the same, looking in the direction of the arrow A;

Figure 7 is a front elevation showing a modified construction of the machine;

Figure 8 is a sectional elevation looking in the direction of the arrow B in Figure 7, and

Figure 9 is a diagrammatic view showing a series of the implements illustrated in Figures 7 and 8 assembled for conjoint operation.

Referring further to the drawings, the spiking roller comprises a shaft 5 mounted between arms 6a of a U-shaped yoke 6 forming a part of an operating handle 7. The shaft 5 is fixed in a substantially horizontal position by means of machine bolts 8 screwed into its ends through holes in the extremities of the arms 6a, the ends of the shaft being spaced from the arms through the intermediary of washers 9.

Rotatively supported upon flanged collars 10 of anti-friction material fitted upon the shaft, is a wheel composed of circular end-plates 12 provided adjacent their peripheral edges with aligned series of equidistantly spaced holes for the support of crank-shafts 13. The shafts are shouldered as at 14 to fit between the plates and their reduced end portions 15 carry, exteriorly of the plates 12, the relatively fixed cranks 16. The shafts 13 carry, between the plates 12, pluralities of pointed spikes 17 which in the operation of the device engage the surface of the ground over which it is propelled.

The spikes may be of any suitable size and form, or if the device is employed for purposes other than that of breaking ground, they may be replaced by lugs such as those usually found on traction wheels.

In the form shown in the drawings, the spikes have reduced end-portions or shanks which are secured in any suitable manner in transverse holes of the shaft, the spikes thus being positioned to project laterally from the shaft in a plane of the longitudinal axis of the same.

Circular spacing rings 18 are fitted around the shafts, between the spikes thereof, and in case the shaft is long, one or more of these rings may be spoked or webbed around a hub carried upon the shaft as shown at 19 in Figure 3, to strengthen and further support the wheel, of which the rings are component parts.

Supported upon the portions of the shaft between the flanged collars 10 and the washers 9 are plates 20 preferably of triangular form, formed integrally with hubs 21 provided with bushings 22 of anti-friction material.

At the corners of the triangular plates are

holes, the centers of which are in a circle eccentric to the shaft 5, and secured in these holes are screw-threaded studs 23 for the support of spool-shaped rollers 24. Nuts 25 screwed upon the ends of the studs hold the spools in place.

The rollers or spools of the two plates provide, conjointly, bearings for floating rings 26 which, adjacent their peripheries, have series of equidistant holes to receive the wrists 27 of the cranks on the shafts 13 of the wheel. Cotter pins 28 in the ends of the wrists prevent relative displacement of the parts.

Integrally connected with the hubs of the triangular plates, is a U-shaped yoke 29, carrying intermediate of its arms, a hand-lever 30. A detent 31 on the lever cooperates with a segmental rack 32 on the yoke 6 of the operating handle 7, and a thumb-crank 33, on the lever 30 serves to move the detent into and out of engagement with the teeth of the rack. A yoke 34 formed integrally with the yoke 6 and projecting divergently from the ends of the arms 6a connecting with the shaft 5, provide a brace for the rigid support of the rack at its end opposite to that at which it connects with a yoke 6.

Referring to Figures 1 and 4 of the drawings, the spikes are constantly maintained in a vertical position while the wheel is propelled over the surface of the ground by means of its handle 7, owing to the crank connections between the shafts of the spikes, and the eccentric rings 26 which revolve around the spools 24 on the plates 20. In the use of the device for spiking lawns and greens or fairways of golf-courses, the spikes, in consequence of the above described arrangement, enter the ground and are withdrawn from the same in a substantially perpendicular position, thereby preventing the spikes from tearing or uprooting the turf and the soil.

The adjustment of the spikes to any other position is effected by varying the angle of the eccentricity relative to the perpendicular, through the medium of the adjustable bearing plates 20, which are moved by means of the lever 30 and are held in their adjusted positions by the detent 31 cooperative with the rack 32.

Thus the spikes may be placed at any angle to the perpendicular to enter the ground in a slanting direction, or should it be required to move the wheel over the ground without the spikes coming in contact therewith, as for example, when the implement is transported from place to place in an inoperative condition, the spikes may be placed in a position in which they extend continuously in a substantially horizontal direction, by further adjustment of the bearing plates through the medium of the lever. This condition of the implement has been illustrated in Figure 2 of the drawings.

In ordinary spiking rollers as heretofore used, an auxiliary smooth-faced roller of smaller diameter, is usually provided to be brought into engagement with the ground during inoperative transportation of the implement. By the use of the present invention, the auxiliary wheel can be eliminated, thereby simplifying both the construction and the operation of the device.

It will be observed that the rings 18, not only reinforce the construction, but perform the additional function of removing adherent dirt from the spikes 17 as they move across the rings in the rotary movement of their shafts during rotation of the wheel.

This result may also be attained by the use of

lugs 36 on the crank shafts as shown in Figures 5 and 6 of the drawings. These lugs extend from the shafts in a direction opposite to that of the spikes and in planes between those of the spikes, so that when during movement of the wheel, the crank shafts rotate about their axes, the spikes on one shaft on passing across the thereto adjacent shaft will move in close adjacency to the lugs thereby causing the latter to dislodge dirt and debris adhering to the spikes as they move upwardly after disengagement from the ground.

A further modification of the invention, shown in Figures 5 and 6, resides in constructing the spikes 17a, the lugs 35 and the cranks 16a integrally with the shafts 13a. The disks 12 are, in this construction, slotted as at 12a to receive the crank shafts 13a, it being understood that the shafts are held in position by the connection of their cranks 16a with the rings 26.

In the modified construction shown in Figures 7 and 8, the implement is reduced in size and a single disk 37 supports the crank shafts 13 as a substitute for the two disks 12, shown in Figures 1 to 3, the disk being supported upon the shaft 15, by means of a hub 39.

The modified device is particularly designed for use in breaking crusts in cultivated and sown fields, especially those in which the seeds are planted in rows, as for example, sugar beet fields. The reduced implement may be propelled by hand, or it may be attached to a cultivating machine, in which case a number of the implements may be attached to a beam 38 of the machine, as shown diagrammatically in Figure 9. The center-to-center distances of the implement are, in such case, substantially equal to the distances between the rows of seeds in the field, so that a number of the rows may be simultaneously cultivated by puncturing the crusts formed above the same.

Since, in implements of this character, the principal requirement is that the spikes be entered into and withdrawn from the ground in a substantially vertical position, the adjustments of the first-described forms of the device have been eliminated.

While the device as shown is particularly adapted for use as a spiking roller or as a cultivator or the like, the invention, with obvious modifications in its construction, may be applied to traction wheels for the purpose of presenting a smooth-surfaced tread when the vehicle supported on the wheels, is moved over a paved road or other surface not requiring the use of the peripheral lugs of the wheels. In fact, it is well within the scope of the invention to apply its principle to tractor chains as well as to tractor wheels in which case the spikes and their crank-shafts, are carried by chains, one of which is mounted upon bearings similar to those herein described, in eccentric relation to the other.

Moreover, the invention may be used as an adjunct to the rubber-tired wheels of motor-vehicles, to prevent skidding and insure traction when the vehicles are driven along muddy or slippery roads.

Since these modified uses of the invention are readily apparent to those versed in the art, it is thought unnecessary to illustrate the same by additional drawings.

What I claim and desire to secure by Letters Patent is:

1. A device of the character described, comprising a handle, a yoke on the handle, a rotary wheel carried by the yoke, normally fixed bearings carried by the yoke, rotary elements sup-

ported by the bearings in eccentric relation to the wheel, a yoke connecting the bearings, a lever on the last mentioned yoke, a toothed segment on the yoke of the handle, a detent cooperating with the segment for holding the lever in adjusted positions, and spike-carrying shafts on the wheel, having crank-connections with the rotary elements.

2. A device of the character described, comprising two rotary elements, axially eccentric with relation to each other, rotary shafts on one element, having crank-connections with the other element, laterally projecting spikes on the shafts, and means comprising cleaning elements projecting from the shaft, and free at one end, for removing adherent matter from the spikes by and during the rotary movement of the elements.

3. A device of the character described, comprising two rotary elements, axially eccentric with relation to each other, rotary shafts on one element, having crank-connections with the other element, laterally projecting spikes on the shafts, and rings encircling the shafts, between their spikes.

4. A device of the character described, comprising two rotary elements, axially eccentric with relation to each other, rotary shafts on one element, having crank-connections with the other element, laterally projecting spikes on the shafts, and lugs projecting from the shafts in planes between those of the spikes.

5. A device of the character described, com-

prising a shaft, a rotary wheel on the shaft, a rotary element supported in eccentric relation to the shaft, rotary shafts on the wheel, having crank-connections with the rotary element, spikes projecting laterally from the shafts, and a ring encircling the crank-shafts, and supported by the first mentioned shaft.

6. A device of the character described, comprising a shaft, a rotary wheel on the shaft, a rotary element supported in eccentric relation to the shaft, rotary shafts on the wheel, having crank-connections with the rotary element, spikes projecting laterally from the shafts, and rings encircling the crank-shaft between their spikes, inclusive of a ring supported by the first mentioned shaft.

7. A device of the character described, comprising a handle, a yoke on the handle, a wheel carried by the yoke and mounted for rotation, bearings carried by the yoke, rotary elements supported by the bearings in eccentric relation to the wheel, a yoke connecting the bearings, a lever on the last mentioned yoke, a toothed segment on the yoke of the handle, a detent on the lever for cooperating with the segment to hold the lever in adjusted position, spike carrying shafts carried by the wheel, crank connections between the shaft and the rotary elements, and means for cleaning the spikes at each revolution of the wheel.

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