April 29, 1952 H. E. McCRERY 2,594,331

TROWELING MACHINE

Filed July 6, 1946 3 Sheets-Sheet 1

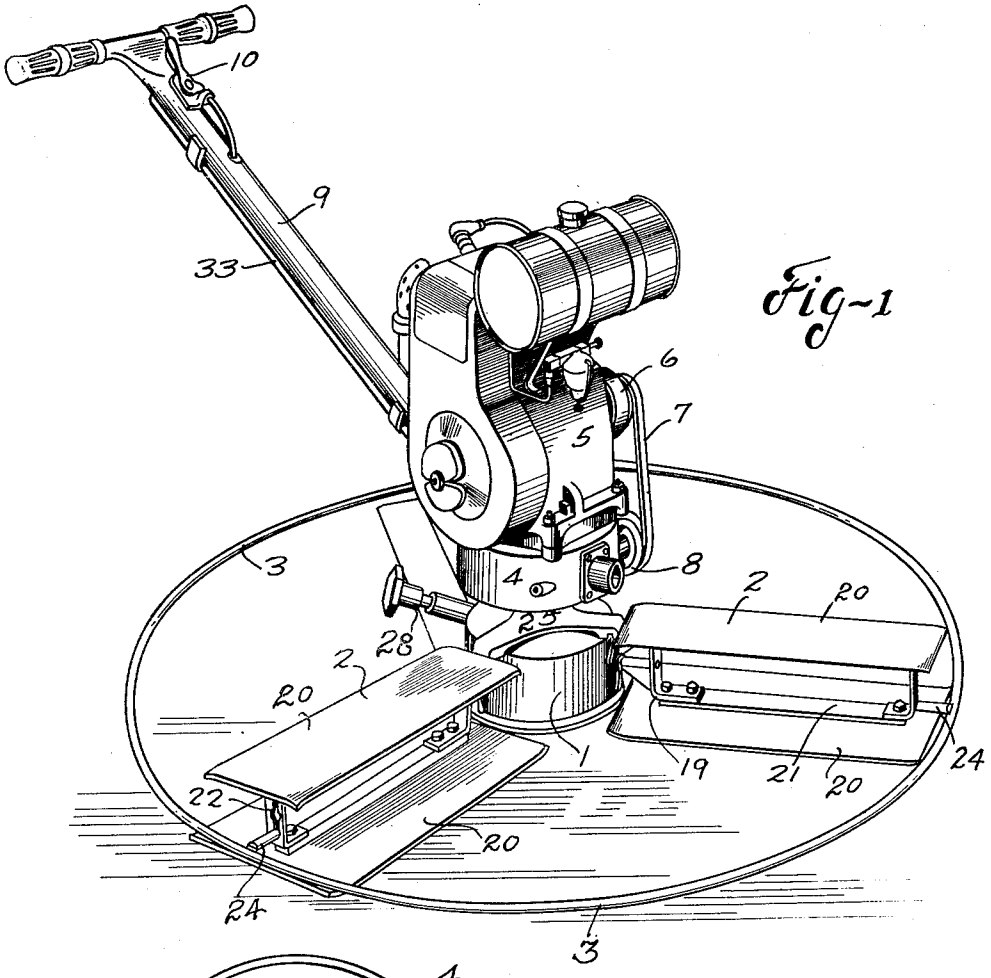


Fig-1

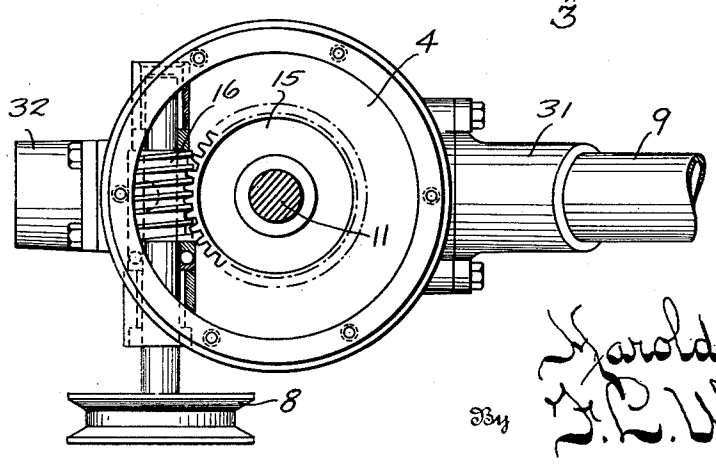


Fig.-8

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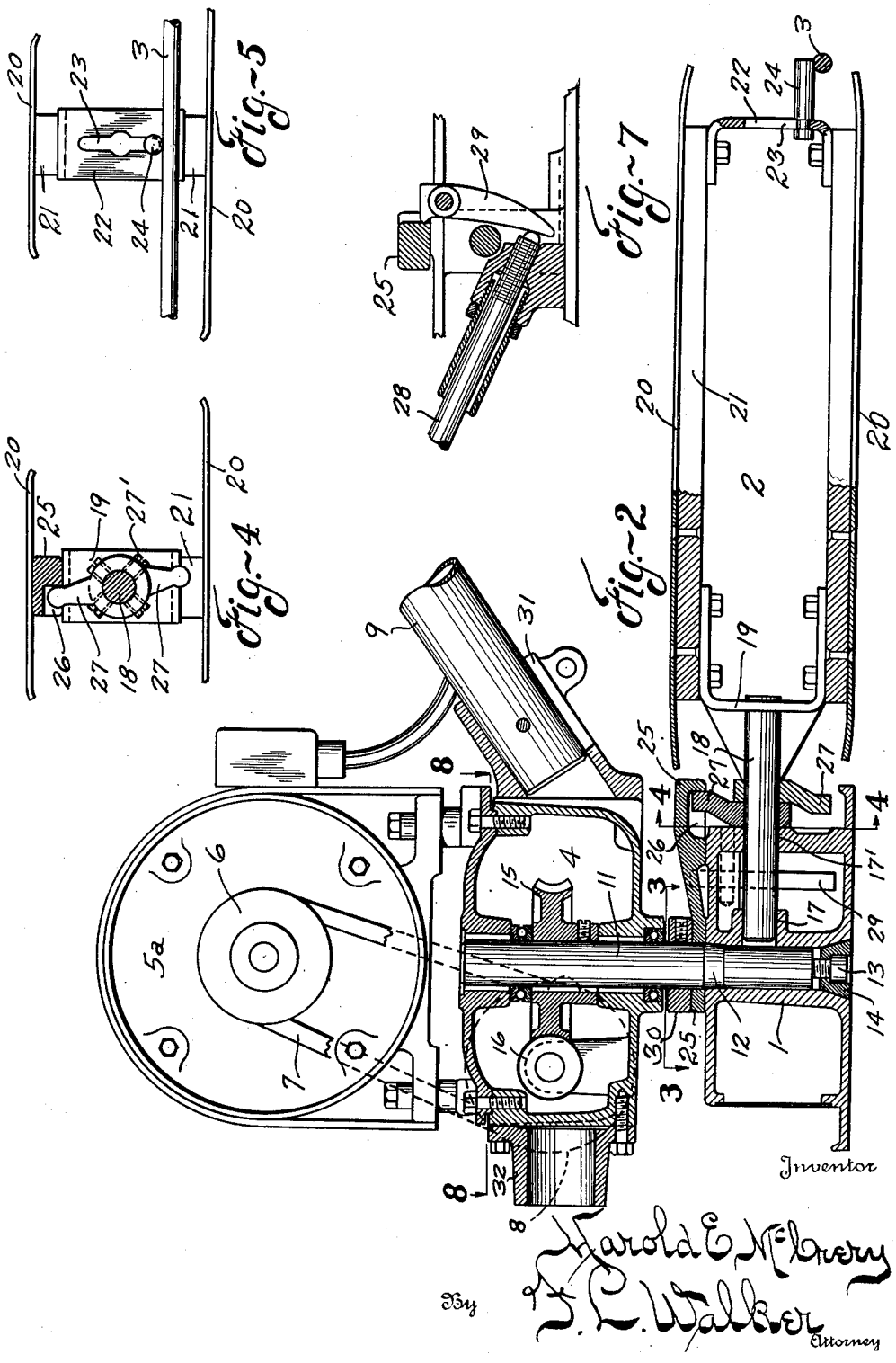
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TROWELING MACHINE

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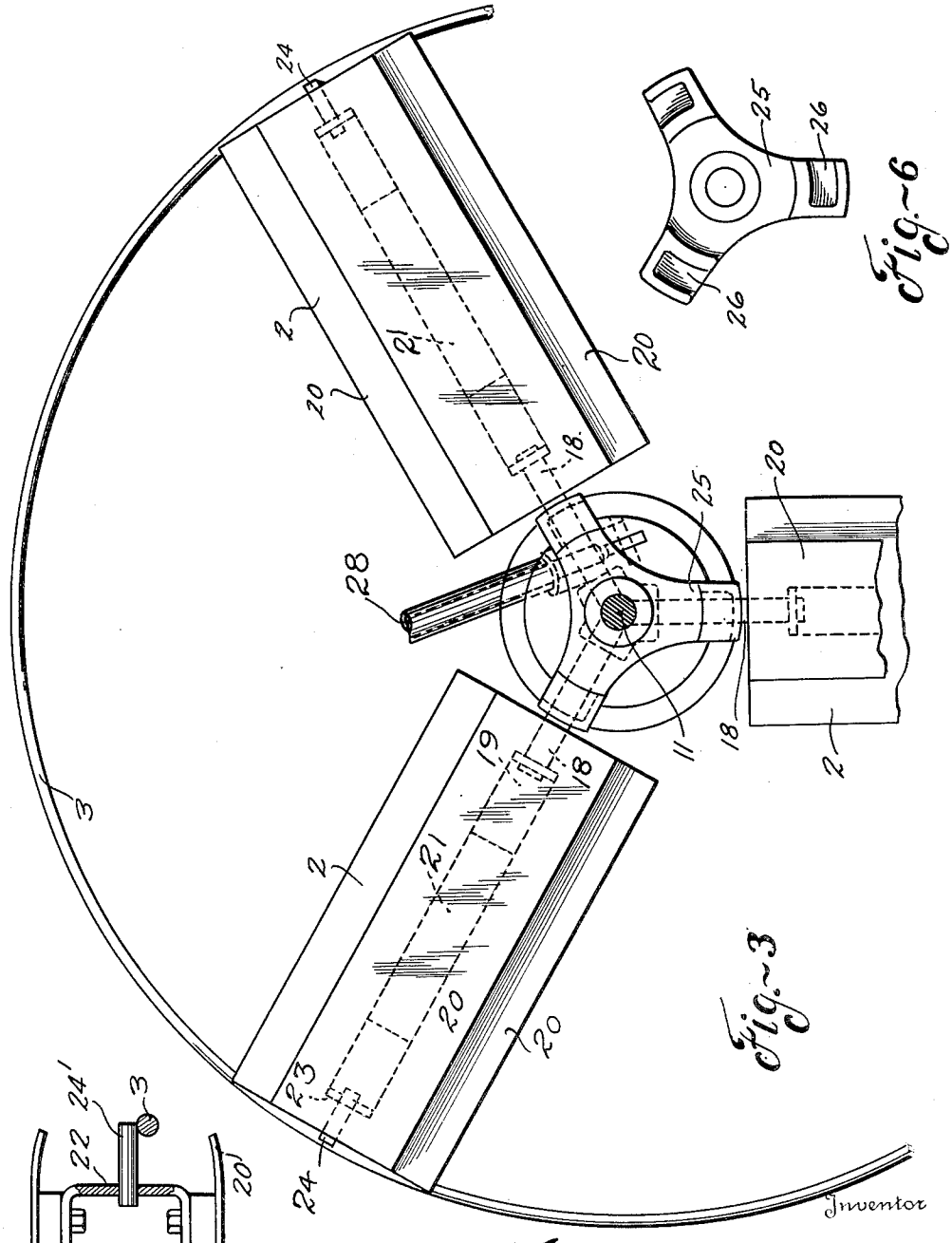


Fig.-6

Fig.-3

Fig.-9

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UNITED STATES PATENT OFFICE

2,594,331

TROWELING MACHINE

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Application July 6, 1946, Serial No. 681,711

12 Claims. (Cl. 94—45)

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This invention pertains to surfacing implements, and more particularly to a rotary power driven apparatus having progressive circular wiping engagement over the surface upon which it operates.

While, for illustrative purpose, the invention is herein shown and described as embodied in a concrete troweling machine or float for finishing concrete surfaces and hard or mastic toppings for concrete sub-bases but is obviously not limited thereto. By substitution of suitable work engaging elements, the present rotary power driven apparatus may be utilized for cleaning or scrubbing operations, or when equipped with abrasive work faces may be employed to smooth tessellated and terrazzo floors and when equipped with felt or other soft friction applicators, it may be used for waxing and polishing floor surfaces.

The concrete finishing embodiment of the rotary power driven apparatus forming the subject matter hereof, involves radial sweeps which are easily and quickly convertible for floating and for finishing a concrete surface or interchanged for other sweeps adapted to other operations.

The object of the invention is to improve the construction as well as the means and mode of operation of rotary surface treating apparatus, whereby it may not only be economically constructed, but will be more efficient in use, automatic in operation, uniform in action, having a minimum number of working parts, and be unlikely to get out of repair.

A further and important object of the invention is to minimize the time and the tiresome labor required for hand troweling and surface finishing concrete floors and roadways, and thereby minimizing the cost of such construction.

A further object of the invention is to provide an assembly having a comparatively low center of gravity which facilitates ease of handling and guidance.

A further object of the invention is to provide easily detachable mountings for the rotary sweeps and improved means for simultaneously adjusting the pitch of the several sweeps and the degree thereof accurately controlled.

A further object of the invention is to provide reversible sweeps, the opposite working faces of which are adapted to performance of work of different character, without necessity of substitution or removal from the machine.

A further object of the invention is to provide conveniently located auxiliary handle engaging means by which the apparatus will be well balanced for transportation.

A further object of the invention is to provide

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a rotary power driven surface treating apparatus embodying the advantageous structural features, the inherent meritorious characteristics and mode of operation herein set forth, or their equivalents.

With the above primary and other incidental objects in view as will more fully appear in the specification, the invention intended to be protected by Letters Patent consists of the features of construction, the parts and combinations thereof, and the mode of operation, or their equivalents, as hereinafter described or illustrated in the accompanying drawings.

In the accompanying drawings, wherein is shown the preferred, but not necessarily the only form of embodiment of the invention,

Fig. 1 is a perspective view of a power driven rotary concrete floating and finishing machine embodying the present invention.

Fig. 2 is a sectional side elevation of the assembled apparatus showing an electric motor in place of the explosive engine of Fig. 1.

Fig. 3 is a plan view of the radial sweeps and guard ring on the plane 3—3 of Fig. 2.

Fig. 4 is a detail view of the sweep adjusting means on line 4—4 of Fig. 2.

Fig. 5 is a detail view of the detachable mounting of the outer ends of the sweeps.

Fig. 6 is a bottom plan view of the sweep control spider.

Fig. 7 is a detail view of the sweep adjusting means.

Fig. 8 is a top plan view on line 8—8 of Fig. 2.

Fig. 9 is a detail view of a modified form of detachable mounting for the outer ends of the sweeps.

Like parts are indicated by similar characters of reference throughout the several views.

Referring to the accompanying drawings, the rotary surfacing machine in Fig. 1 comprises a rotary base 1 from which radiate a plurality of reversible sweeps 2—2, surrounded by a guard ring 3 upon which the outer ends of the sweeps 2 are pivoted. Located in axial relation above the revoluble base 1 is a gear housing 4 surmounted by a driving motor 5. The motor shown in Fig. 1 is a conventional explosive engine or hydro carbon motor. In Fig. 2 an electric motor 5a is shown substituted for the expolsive engine 5. A driving pulley 6 of the motor, of whatever type, is connected by V belt 7 with a driven pulley 8 of the gear driving mechanism within the housing 4. A handle 9 extends upwardly and radially from the housing 4 for controlling and guiding the machine. Manually operated control devices 10 mounted on the handle 9 within easy reach of

the operator, are connected through the handle shaft with the actuating motor 5.

Referring more particularly to Fig. 2, there is carried by the revoluble base 1 a relatively fixed vertical shaft 11. The shaft 11 is formed with a peripheral bevel 12 fitting a corresponding beveled seat within the central bore of the base 1 against which it is tightly drawn by a bolt 13 extending through a beveled plug 14 seated in a bevel seat at the bottom of the central bore of the base 1 and engaging with the end of the shaft 11. The shaft 11 carries, within the gear housing 4, a worm gear 15 with which meshes a worm 16. On the shaft of the driving worm is mounted the driven pulley 8 engaged by the motor drive belt 7.

By this means the base 1 and the radiating sweeps 2—2 carried thereby are rotated relative to the housing 4 and the driving motor 5 or 5a mounted thereon.

Journaled in different radial positions in bearings 17—17 of the base 1 are adjustable rock shafts 18. The rock shafts 18 carry bifurcated heads 19 to each side of which is attached a troweling blade 20—20. Each troweling blade is reinforced by a medial longitudinal bar 21 directly connected to the head 19 at one end, and interconnected by a U-shaped tie plate 22 with the reinforcement bar 21 of the opposing troweling blade at their outer ends. The tie plates 22 have therein key hole type slots 23 in which engage headed studs 24 fixedly attached to the guard ring 3. The studs 24 maintain the proper spacing of the ends of succeeding sweeps 2—2 and resist their deflection as they are rotated. The blades 20—20 of each sweep may be of different character to produce different results. For instance in the concrete surfacing machine illustrated, one blade 20 may be for floating the concrete surface and the opposite blade may be adapted to finishing operations. The blades 20 are brought alternately into operative positions by reversal of the sweeps 2, and their shafts 18 in their bearings 17 and 17'. They are further capable of limited unison oscillatory movement to change their inclination to the plane of rotation, or the pitch of the rotary blades. Journaled upon the main shaft 11 immediately above the base 1, for limited relative rotary adjustment, is a spider 25, the radial arms of which extend into overhanging relation with the periphery of the base 1. The arms of the spider 25 have in their under sides pockets or recesses 26, into which project the ends of rock arms 27 fast upon the sweep shafts 18. By rotatively adjusting the arms of the spider 25, the rock arms 27 can be minutely adjusted simultaneously to slightly rock the shafts 18 and with them the blades 20—20 to correspondingly vary their pitch. In lieu of the spider 25, a revoluble disc having recesses 26 in its under side may be substituted therefor.

To reverse the sweeps in order that the other blade 20 may be brought into engagement with the work surface it is only necessary to manually oscillate the sweep in a counter-clockwise direction (Fig. 4). Such motion swings rock arm 27 out of recess 26 in the adjusting spider 25, whereupon the sweep and its associated rock shaft 18 may be axially withdrawn from the central hub a sufficient distance to permit the opposite rock arm to pass the edge of spider 25 during its counter-clockwise rotation. Upon reversing the sweep by movement through 180° of rotation, the sweep is then axially reinserted in the central hub and oscillated in a clockwise direction until rock arm 27 is brought into engagement with the shoulder within recess 26. The engagement of rock arm 27 within recess 26 provides in effect a one-way connection since the rock arm is always free for movement in a counter-clockwise direction relative to the spider 25, while the spider 25 is free for movement towards the right of Fig. 4 relative to the rock arm.

The fact that the studs 24 are not in axial alignment with the sweep shafts 18 in no way interferes with the tilting of the sweeps to change the pitch of the faces thereof to the work. The guard ring 3 being similarly eccentrically connected to all of the sweeps, the U-shaped tie plates 22 acting somewhat like rock arms or cranks, shift the guard ring slightly rotatively to compensate for the angular adjustment of the sweeps about the axis of the shafts 18.

The guard ring 3 being of light weight and resilient can be easily sprung to shift the studs from the ends of the slots in the tie plates to the medial eye thereof when it is desired to disconnect the sweeps. It also enables the studs 24 to be shifted to the opposite ends of the key hole slots when the sweeps are reversed. The construction shown and described enables the sweeps to be readily reversed without disengagement from the machine or to be bodily removed for interchange of other sweeps having working faces of different character or for storage. In order to accurately control such adjustment there is provided a screw stem 28 on the base 1 which has thrust engagement with a lever 29, the upper end of which extends above the top of the base 1 into engagement with the side of one of the arms of the spider 25, as is shown in Fig. 7. By adjusting the thrust stem 28 the spider can be minutely adjusted by the lever arm 29 to move the spider 25 rotatively and thereby correspondingly oscillate the sweep rock arms 27 to tilt the troweling blades to greater or less degree. A clamp coller 30 secured on the main shaft 11 prevents displacement of the spider 25 under the camming pressure of the rock arms 27.

Obviously scrub brushes can be substituted for the troweling plates 20—20, thereby converting the apparatus into a power operated scrubbing machine. Likewise abrasive faced elements may be utilized in lieu of the troweling plates, for smoothing a surface operated upon, and by employing friction faces on the sweeps the apparatus may be used for waxing and polishing the surface operated upon.

A handle shaft 9 having at its extremity a handle bar is seated in a socket 31 on the side of the housing 4, for guiding and controlling the movement of the apparatus, and for resisting the tendency of the superstructure to rotate reversely incident to reaction of the driving mechanism while the sweeps remain stationary. The shaft 9 is preferably tubular and control cables for the actuating motor, whether electrical or mechanical, extend through the tubular shaft and are manually controlled by devices 10 within easy reach of the operator. A socket 32 is provided on the side of the housing 4, directly opposite the socket 31 and handle shaft 9, for engagement of a lifting bar for carrying the machine in an approximately balanced position by said bar and the handle shaft. Such lifting bar may ordinarily be detachably engaged beneath the handle shaft as at 33, Fig. 1.

The eccentric relation of the studs 24 with the axes of the shafts 18 when engaged with the sweeps enables the guard ring 3 to descend into proximate spaced relation with the surface oper-

ated upon, to prevent an operator's feet from being protruded beneath the guard ring into the path of the revolving sweeps. The elongated key hole slot enables the guard ring to shift its position upon reversal of the sweeps to again assume a like predetermined spaced relation with the plane of rotation of the sweeps. The lower most end of the slots **23** thus support the resilient guard ring in both positions of adjustment of the sweeps, and serve to gauge the height of the ring above the surface operated upon. The central eye of the slots **23** enable the guard ring to be quickly and easily detached from the sweeps in the event the latter are to be interchanged for others having different type of working faces.

The rock arms **27** are adjustably secured upon the rock shafts **18** by means of set screws **27'** to provide adjusting means intermediate the shafts **18** and the spider **25**. By this means the blades **20** may be brought into alignment and secured in fixed relation with the rotative adjustment of the spider **25**. For example, in initially assembling the machine, all of the blades will be located in a common horizontal plane, and the arms **27** adjusted so that they will contact the spider **25**. Rotative movement of the spider will then oscillate each of the blades a like amount.

In lieu of separate rock arms **27** for each of the blades **20**, the arms **27** may be made integral with a common mounting upon the rock shafts **18**. In such a construction adjusting means are provided intermediate the extremity of the arms **27** and the spider **25** which provides the same adjustment as does the individual mounting of the arms upon the rock shafts **18**.

For some operations it is not necessary for the guard ring **3** to be as near the work as is shown in Figs. 1, 2, and 5. Under such conditions, the key hole slot arrangement may be dispensed with, and the ring **3** supported concentrically with the rock shaft **18**. This modification is shown in Fig. 9 wherein the stud **24'** is centrally supported in the tie plate **22** in axial alignment with the rock shaft **18**.

From the above description it will be apparent that there is thus provided a device of the character described possessing the particular features of advantage before enumerated as desirable, but which obviously is susceptible of modification in its form, proportions, detail construction and arrangement of parts without departing from the principle involved or sacrificing any of its advantages.

While in order to comply with the statute the invention has been described in language more or less specific as to structural features, it is to be understood that the invention is not limited to the specific features shown, but that the means and construction herein disclosed comprise the preferred form of several modes of putting the invention into effect, and the invention is therefore claimed in any of its forms or modifications within the legitimate and valid scope of the appended claims.

Having thus described my invention, I claim:

1. A rotary power driven surface treating machine, including a rotary base member, a plurality of reversible radial sweeps carried thereby, parallel relatively spaced work faces carried by the sweeps and alternately engageable with the work by reversal of the sweeps, a vertical main shaft carried by the base, a worm drive couple for actuating the main shaft to rotate the base and sweeps, a drive gear housing surrounding the shaft above the revoluble base member and enclosing the worm drive couple, an actuating motor surmounting the gear housing and operatively connected with the worm gear couple for rotatively driving the base and sweeps, a rock shaft on each sweep upon which the sweeps are capable of oscillation through at least a half rotation, a pair of oppositely disposed rock arms on each rock shaft, a rotative actuator common to the several sweeps with which the rock arms thereof engage in alternate positions of sweep reversal, and adjusting means for rotatively moving the actuator through minute degrees of rotation to simultaneously change the inclination of the sweeps to the plane of rotation, and an upwardly inclined handle shaft connected with the driving gear housing, for controlling and guiding the movement of the machine.

2. A rotary power driven surface treating machine, including a rotary base member, a plurality of radially disposed sweeps carried thereby, parallel relatively spaced work faces alternately engageable with the work by reversal of the sweeps, rock shafts, one for each sweep medially mounted intermediate the work engaging faces, a guard ring surrounding the sweeps with which the ends of the sweeps are adjustably engaged, a pair of oppositely disposed rock arms carried by each of the sweep rock shafts, a rotatively adjustable control device, with which the sweep rock arms of each pair alternatively engage, an adjusting lever for moving the rotative control device through minute degrees of adjustment to effect tilting action of the work engaging faces to the plane of rotation of the sweeps, power driving means for the sweeps and controlling and guiding means for the machine.

3. A power driven rotary surface treating machine, wherein a plurality of radially disposed sweeps are rotatively actuated about a common center, including a pair of parallel spaced working surfaces on each sweep and a mounting for the sweeps relatively to which the sweeps are rotatively reversible to optionally present either of the parallel spaced working faces in engagement with the work surface operated upon, driving means for actuating the mounting with either of the working faces in operative position, and means for tilting the sweeps with either of the spaced working faces in operative engagement with the work surface.

4. A power driven rotary surface treating machine, wherein a plurality of radially disposed sweeps are rotatively actuated about a common center in varying degrees of angularity to the plane of rotation, including a pair of parallel relatively spaced working surfaces on each sweep, said working surface being alternately engageable with the work a plurality of rock shafts, one on each sweep, a plurality of rock arms, at least one on each rock shaft, a rotative actuator common to the sweeps, having therein a plurality of recesses in which the respective rock arms are engaged by oscillatory motion relative thereto, and means for progressively transmitting to the rotative actuator minute degrees of rotative adjustment to simultaneously rock the several rock arms and the rock shafts to which they are connected to correspondingly vary the pitch of the sweeps, a mounting for the sweeps relative to which the sweeps are rotatively reversible without disengagement from their mounting to bring one or the other of the spaced working surfaces into engagement with the work, and actuating means for rotating the sweeps in various degrees of

angularity with either of the parallel surfaces in engagement with the work.

5. A power driven rotary surface treating machine, wherein a plurality of radially disposed reversible sweeps having parallel relatively spaced work faces alternately engageable with the work by reversal of the sweeps are rotatively actuated about a common center in varying degrees of angularity to the plane of rotation, mounting means in which the sweeps are mounted for oscillatory motion about individual radial axes, rotative means common to the plurality of reversible sweeps in either position thereof, an operative connection between the rotative means and the sweeps in either position, and means for manually adjusting the rotative means for simultaneously rocking the sweeps about their individual radial axes into variable degrees of angularity to their plane of rotation.

6. As an article of manufacture a concrete finishing implement, including a pair of reversible interconnected parallel spaced troweling blades and a common support intermediate the troweling blades in a parallel plane therewith upon which the troweling blades are mounted for simultaneous oscillatory motion thereabout.

7. A concrete finishing machine including a plurality of rotary oscillatory troweling blades having parallel relatively spaced work faces aternately engageable with the work by oscillation of the blades, a mounting therefor in which the blades are mounted for oscillatory adjustment about their longitudinal axes, a rock arm connected with each troweling blade, a rotary actuator common to the troweling blades having spaced recesses therein in different radial positions in which the rock arms of the different troweling blades are adjustably engaged, and adjusting means engageable with the actuator in radially spaced relation to the rock arms for transmitting to the common rotary actuator minute degrees of rotative adjustment which is simultaneously transmitted to the several troweling blades to vary the inclination of the troweling blades to their plane of rotation.

8. A concrete finishing machine including a plurality of rotary troweling blade assemblies having a pair of spaced alternately usable work faces, a mounting therefor in which the blade assemblies are mounted for oscillatory adjustment about their longitudinal axes, a rotative actuator common to the troweling blade assemblies, an operative connection therebetween for transmitting limited degrees of oscillatory adjustment of the actuator to the troweling blade assemblies simultaneously to effect corresponding oscillation thereof, a reducing lever for actuating the rotative actuator through a reduced degree of movement, and an adjusting screw engaging the longer arm of said reducing lever to actuate the latter to move the rotative actuator.

9. A power driven surface treating machine, wherein a plurality of radially disposed sweeps having spaced alternately usable work faces are collectively rotated about a common axis, and are capable of oscillatory adjustment about individual radially disposed axes into variable angularity with their plane of rotation, including a rock arm connected with each sweep, a rotatively adjustable control member common to the plurality of sweeps, with which the rock arms engage, a pivoted operating lever having unequal

arms, the shorter of which engages with the rotatively adjustable control member to actuate said control member through a minute degree of rotative adjustment, to correspondingly adjust the rock levers and tilt the corresponding sweeps in unison, and a thrust member having engagement with the longer arm of the operating lever for initiating such movement.

10. A power driven rotary surface treating machine, wherein a plurality of radially disposed sweeps are collectively rotatable about a common axis, multiple work engaging faces upon the several sweeps, a rock shaft on each sweep, a common mount in which the sweep shafts are journaled for oscillatory adjustment, a rotative control member common to the working faces of the sweeps, alternatively operable motion transmitting means interconnecting the rotative control member with the rock shafts of the plurality of sweeps, said motion transmitting means being brought selectively into cooperative relation with said rotative control member by adjustment of said sweeps to present the work engaging faces thereof selectively to the work and actuating means for the rotative control member for oscillating the working faces of the sweeps in unison into angular relation with their plane of rotation.

11. A rotary power driven surface treating tool, including a plurality of radial sweeps each having a plurality of work engaging blades to be brought selectively into cooperative relation with the work by oscillation of the sweep, a common mount for said sweeps providing for relative axial and oscillatory movement of the individual sweeps, means for rotatably driving said mount, a rotatable tilt adjustment member supported on said mount, and a detachable connection between said member and each sweep disengaged by relative oscillatory motion of the sweep to release the sweep for blade selection.

12. In a rotary power driven surface treating tool, a power driven rotatable mount, radially projecting sweeps carried by said mount, each of said sweeps comprising a pair of spaced apart working blades, end brackets interconnecting said blades, a shaft secured to one of said brackets and received in said mount with freedom of axial and oscillatory movements, said sweeps being individually oscillated by hand relative to said mount to bring said blades selectively into cooperative relation with the work, an oscillatory member on said mount common to the sweeps, movement of which simultaneously oscillates all of said sweeps to a like degree relative to the mount, and a one-way connection between said member and sweeps permitting hand oscillation of the individual sweeps relative to the member and mount.

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