

July 3, 1934.

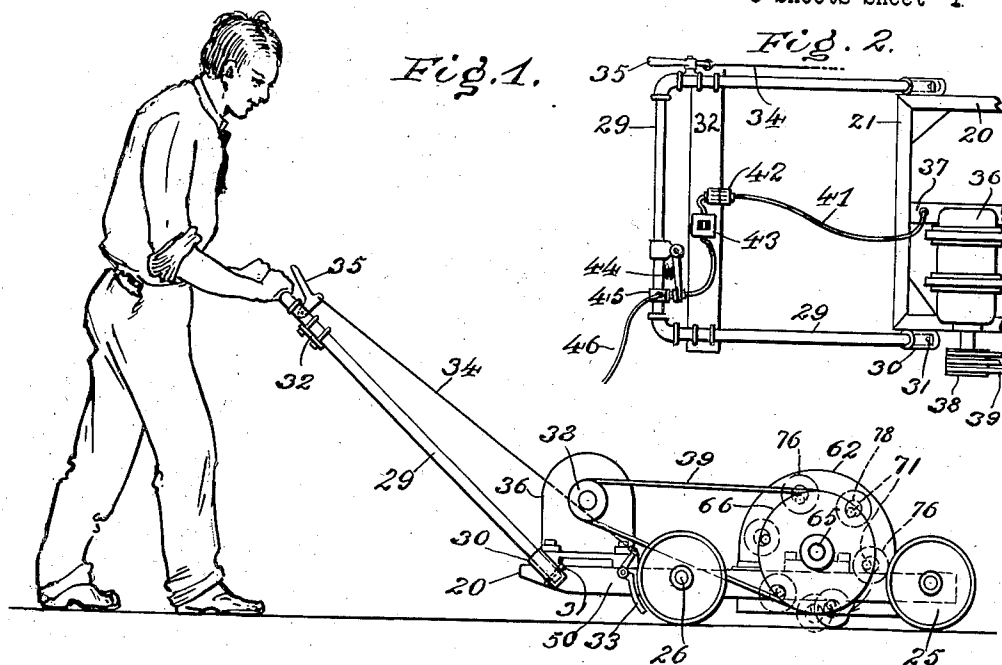
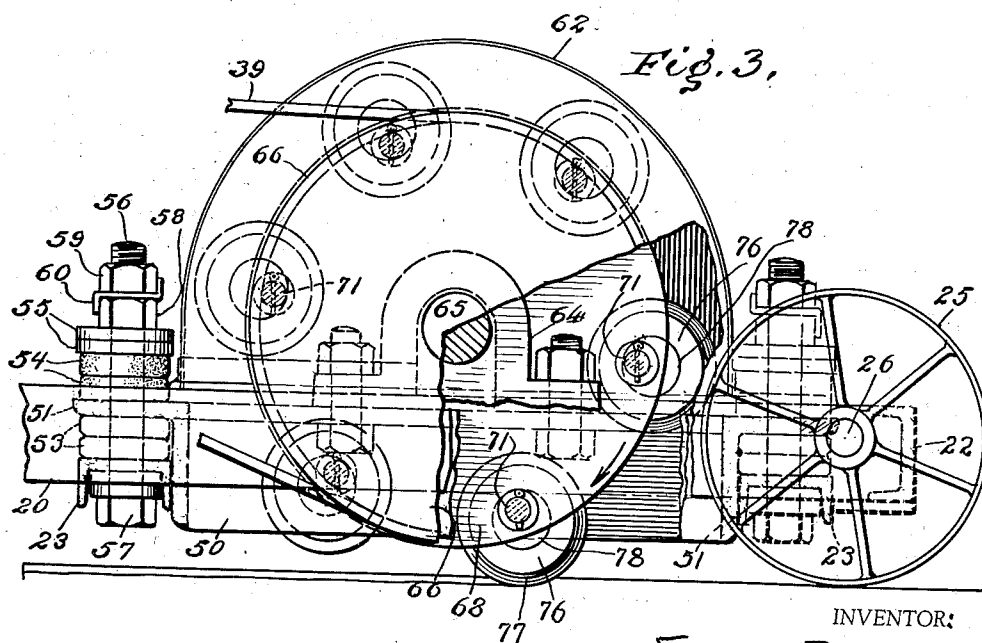
F. P. SLOAN

1,964,746

FLOOR ROUGHING MACHINE

Filed June 9, 1932

3 Sheets-Sheet 1



INVENTOR:

Francis P. Sloan

BY

Morrison, Kennedy & Campbell
ATTORNEYS,

July 3, 1934.

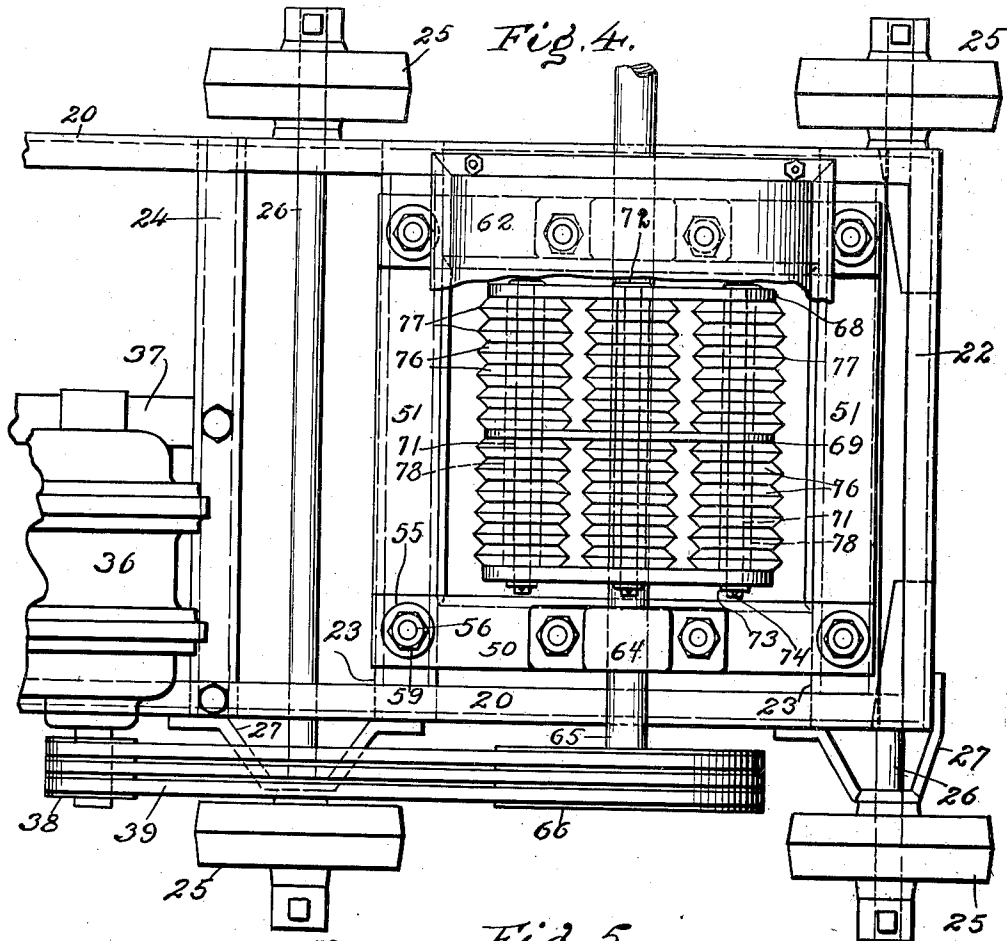
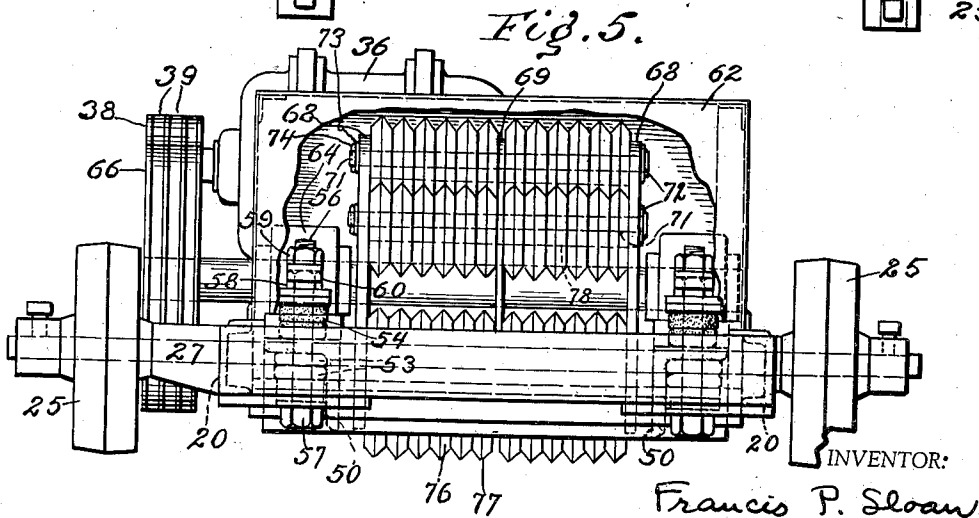
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FLOOR ROUGHING MACHINE

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3 Sheets-Sheet 2



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3 Sheets-Sheet 3

Fig. 6.

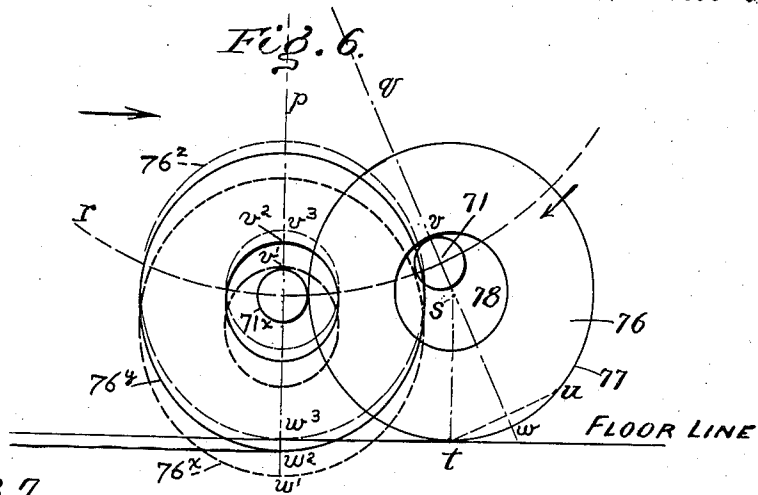


Fig. 7.

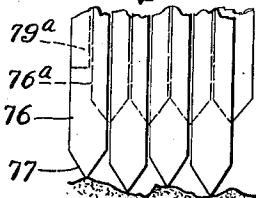


Fig. 8.

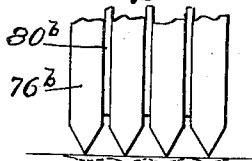


Fig. 9.

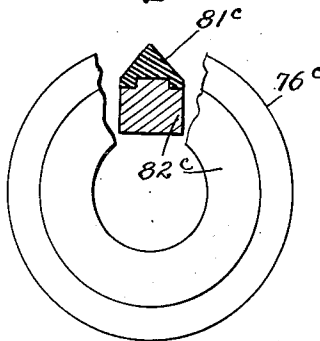


Fig. 10.

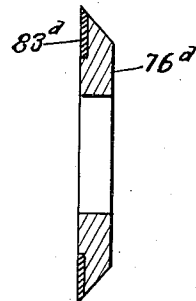


Fig. 11.

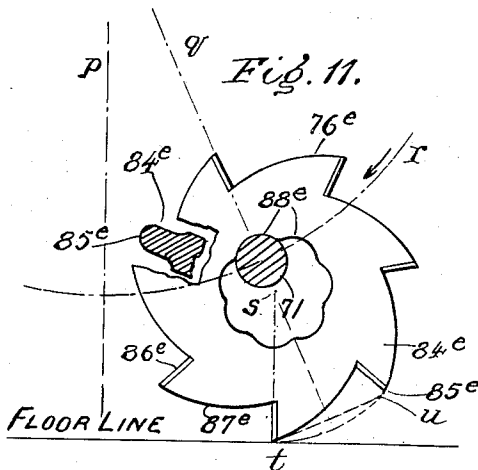
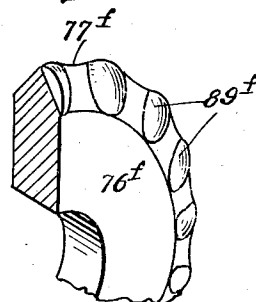


Fig. 12.



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UNITED STATES PATENT OFFICE

1,964,746

FLOOR ROUGHING MACHINE

Francis P. Sloan, Scarsdale, N. Y.

Application June 9, 1932, Serial No. 616,284

13 Claims. (Cl. 262—8)

This invention is a novel floor roughing machine, being a self-contained power-driven mechanism for the special purpose of operating upon a concrete or similar stony flooring, pavement or the like; the machine being shiftable progressively over the floor on which it rests, and operating by a picking, chopping or analogous impacting action to render rough the floor surface as by scoring or indenting it.

Such machine is particularly useful for the important and difficult work of improving or preparing the surface of concrete flooring by providing a clean new surface adapted to receive and unite effectively with an overpoured layer or topping of cement mortar or similar finishing material and by increasing substantially the extent of exposed area and holding surface through scorings or other indentations; but the principles may have other practical uses, such as for roughing or grooving a smooth or finished surface, as a stone pavement, to afford a more secure footing or traction contact; for reducing an area or portion of flooring to a lower elevation; or the like.

The main object of the present invention is to afford a machine for the purposes set forth which will have increased efficiency in comparison with existing methods of doing the same work, and an enlarged capacity or coverage, so that an extensive floor area may be roughed in a minimum period of time when economically important; with the additional commercial advantage of reduction of labor and cost in roughing a given area. A further object is to secure in a machine of the kind superior ease and convenience of advance, guidance and other control. Another object is to afford a strong and rugged construction of machine which will be durable in practical use and with its wearing parts readily replaceable.

Other and further objects and advantages of the invention will be set forth in the hereinafter following description of an illustrative embodiment thereof or will be understood to those conversant with the subject. To the attainment of such objects and advantages the present invention consists in the novel floor roughing machine and the novel features of combination, arrangement and construction herein illustrated or described.

In the accompanying drawings Figure 1 is a general side elevation of a floor roughing machine embodying the present invention and showing the same in practical operation.

Fig. 2 is a top plan view of the operating and

guiding handle of the machine and showing the driving and braking control.

Fig. 3 is a side elevation on an enlarged scale of the central portion of the apparatus.

Fig. 4 is a top plan view and Fig. 5 is a right elevation of the parts shown in Fig. 3 with the housing broken away to show more clearly the interior construction.

Figs. 6, 7 and 8 are diagrams explanatory of the action of the invention.

Figs. 9, 10, 11 and 12 are detached views showing various alternative forms of impacting or chipping members adapted to effect different sorts of results upon different characters of floor surface.

In general the present improvement may be described as a floor roughing machine comprising a combination of certain elements to be described, including a chassis or frame which is mobile or progressively shiftable over the floor while resting upon it, a rotatable carrier or cage mounted on the chassis and having driving connections operated by any suitable power for rotating it at substantial speed, and numerous impacting members or disks arranged around the periphery and along the axial length of the carrier and mounted loosely for independent play while held yieldingly outward by the substantial centrifugal force developed by the rotary speed; the cage and impacting members being of such arrangement and dimensions that the normal position of each member is at a distance from the carrier axis greater than the spacing of such axis above the floor, so that each member will impact the floor slightly in advance of its point of lowest travel and thereafter will resume its centrifugal position on the cage.

It will be convenient to commence the description with the chassis and other general parts, leaving the cage and impacting members for later description. The chassis may be built up of two opposite longitudinal frame members or channels 20 connected transversely by a lateral or cross channel 21 at the front and a similar transverse channel 22 at the rear, with a pair of transverse channels 23 at intermediate points, shown arranged with their flanges depending, and affording with the longitudinals a square frame to receive the carriage or body to be described. Between the transverse channel 21 and the channel 23 to the rear of it is shown a fifth channel 24 cooperating with the channel 21 in the support of a suitable motor or engine. The several frame or chassis members thus described may be interconnected in any known manner, for example by

welding, so as to afford a strong and rigid chassis.

The chassis is arranged to rest upon the floor while movable over it, and is spaced a predetermined distance above the floor level, for example
 5 by supporting wheels 25 near its four corners, although skids or other supports might be used in some cases. Each pair of wheels is supported on an axle 26 and, as appears from Figs. 4 and 5,
 10 while the two left wheels are mounted quite close to the chassis longitudinal 20, those at the right are spaced substantially outward by means of brackets 27 at that side, thus giving space for a belt drive connection between motor and cage to be described.

At what will be termed the rear end of the machine the chassis has mounted on it a handle 29 shown as built up of pipes and elbows, the handle cross bar being at a convenient height for manual operation and the side bars being inclined so as
 20 to space the chassis from the operator, this arrangement also affording longitudinal leverage when it is desired to tilt upwardly the front end of the machine about the rear wheels. The handle 29 is preferably removable, the lower ends of its side bars being shown set within sockets or
 25 sleeves 30 attached or welded to the sides of the chassis longitudinals, with removable pins 31 to lock the handle in place. On Figs. 1 and 2 is shown a cross piece 32 spanning the handle bars and adapted to carry controlling means for the electric or other motor.

On account of a self propelling or creeping action of the machine to be described it is advisable to have a brake to facilitate the restriction
 35 of the advance of the machine and for this purpose a simple brake shoe 33 is indicated operated by a brake rod 34 from a brake handle 35 mounted on the handle 29.

As a power source an electric motor 36 is indicated, this being supported upon a special longitudinal chassis member 37 extending from lateral 21 to lateral 24. The motor is shown provided with a pulley 38 operating a driving belt 39 extending to the driven parts to be described, the
 45 pulley being shown as of the V-grooved type with a series of V-belts engaging the grooves. A flexible cable 41 contains leads to the motor and this cable is shown as detachably connecting by a plug socket 42 to a switch 43 mounted on the cross beam 32. This permits bodily detachment of the handle and parts mounted thereon by merely
 50 detaching the plug 42 and removing the pins 31. The switch 43 may be of any known type comprising for example a lever, shown in middle position in Fig. 2, but shiftable to either extreme position for driving the motor in opposite directions, the middle position being neutral for disconnecting power. In series with the main switch is a switch consisting of a movable pair of contacts
 55 44 in the nature of a handle and a fixed pair of contacts 45 supplied by current through a power line 46, this operating switch being normally held open by a spring but adapted to be held closed by hand. When the machine has to be transported
 60 on hoists or accommodated in a short space the handle with equipment thereon may be readily detached.

As shown, the operator may effect drive by holding closed the switch 44, 45, with one hand,
 70 while making any necessary application of the brake through the brake handle 35 operated by the other hand; and he of course may additionally regulate the speed of travel over the floor by direct pushing or pulling upon the handle bar
 75 itself. The motor is to be selected to furnish

the requisite horse power, for example 10 horse power more or less, to operate the cage, and impact elements, and in some cases the rate or speed of cage rotation may be regulable by rheostat, variable speed reducing gear or otherwise. 80

The driven parts of the machine may be supported on a resiliently suspended body or carriage shown as built up of longitudinal beams or angles 50 and similar lateral angles 51, connected for example by welding, and so arranged
 85 as to present a flat top surface overhanging the longitudinals and laterals of the chassis or frame. Resilient mounting may be secured by the provision of rubber pads 53 resting on top of the frame laterals 23 and underlying the carriage beams 50 or 51. To secure resilience in both directions a second set of rubber pads 54 is located above each of the four suspension points,
 90 at the four corners. Above the upper pad are enlarged washers or plates 55, and at each corner is a vertical bolt 56 extending through the washer and through the rubber pads and portions of the frame and carriage, the bolt having a lower head 57 below a part of the frame and an upper nut 58 bearing upon the washer
 95 and a lock nut 59 held by a locking device 60. Mounted on top of the flat rim of the carriage is shown a housing 62 enclosing the mechanism within but readily removable for access. 100

The driven mechanism of this invention is supported by the carriage 50, 51. At each side, resting on a longitudinal 50, is a pillow block 64, and a transverse shaft 65, preferably horizontal, turns in the pillow blocks as bearings, the shaft having a belt pulley 66 at its exterior right
 110 end driven by the belts 39. It will be understood that the cage shaft 65 may be mounted in various ways, for example the pillow blocks may have reversely inclined series of rollers giving thrust resistance; and the power drive may
 115 be delivered in any way, for example by propeller shaft and hence gears instead of belts and pulleys.

The impacting or roughing members or disks are preferably supported by a rotary carrier or cage mounted on the driven shaft 65. Such carrier for example may be built up as follows. In the space between the carriage sides the shaft carries circular plates 68 at the two ends of the space, and preferably a third or middle circular
 125 plate 69, all of which may for example be welded or otherwise rigidly attached to the shaft, and each of which is formed with a series of perforations to receive a system of spindles 71, for example six in number, arranged around the peripheries of the circular plates, preferably parallel to the axis, thus forming the rotary cage. Each of the six spindles 71 is preferably in the form of an elongated bolt having its head 72
 130 at the left side of the cage, outside the plate 68, and the other end of each spindle being engaged by a loose collar or annulus 73 secured by a cotter pin 74. This arrangement permits the removal of the cotter pins and collars and the drawing out of each spindle at the left side,
 140 in order to remove and replace one or more or all of the impacting members carried thereon.

The impacting members or disks 76 may take various forms, but in each case the impactor or disk is formed with an impacting peripheral edge
 145 or part 77 and a central hole 78, substantially concentric, and substantially larger than the diameter of the spindles. By this arrangement a complete row, series or gang of impacters or roughing disks may be strung or mounted loose- 150

ly on each spindle of the carrier so that the numerous impacters have independent play or displacement inwardly on the spindles, while each of them is held yieldingly outward, to what will be termed its normal position, by the centrifugal force developed by the fast rotation of the carriage. The full or normal outward position of each impacter on the carrier is such that its impacting part or point is at a distance from the carrier axis greater than the predetermined spacing of the carrier axis above the floor, so that the impacter or disk will strike the floor with a downward inclined motion somewhat prior to its reaching a position directly beneath the axis. The action is like the chop of an axe but with a more or less glancing impact.

Before describing in full the action and results of the arrangement certain modifications will be described. In the main figures the impacting disks of the several gangs are in relative alinement, in planes normal to the axis, whereas in Fig. 7 the disks of each gang are staggered or offset with respect to those of the adjacent gang. In both cases they are quite loose, and capable of some lateral and tilting play. Thus a first gang or disk series 76 is shown, and following that a gang 76^a, spaced endwise out of alinement, for example by an end washer 79^a. This staggering arrangement might be carried further by washers of various thicknesses for the several disk series so that the impacting lines will be different with all of the gangs of disks, and the floor will be more thoroughly covered by the impacting or roughing operation.

Fig. 8 shows a modification differing from the previous figures in that the disks 76^b in each gang are spaced slightly from each other by interposed washers 80^b, sometimes desirable in order to separate more widely the lines of impacting action, or to reduce the total number of impacters or disks, or the thickness of each disk. The washers may be omitted, and looseness of disks provided by placing five in the place where six would fit, this allowing tilt of each disk so that during action it may slide off a hard spot and cut into a softer one; and the spindles may in such case be wavy or notched to restore the intended spacing of the loose disks. The inside of each disk tends to wear to a rounded form thus increasing its ability to swing or tilt.

In Fig. 9 is shown a particular construction of impacting disk 76^c possessing greater weight and impacting momentum than a simple steel or iron disk. This disk is shown as having its peripheral portion 81^c composed of a suitable metal having great toughness, strength and resistance to impact, as steel, while the body 82^c of the disk is composed of a heavier softer metal, such as Bab-bitt metal, which may be cast to interlock with the peripheral portion.

Fig. 10 shows a modification wherein the disk 76^d is flat at one side, its periphery slanting to a chipping edge at the other side only, and in this disk is shown inset a hard tough ring 83^d arranged to assume the brunt of the impact and intended to preserve better the shape and chipping qualities of the disk. For example the insert 83^d may be of stellite, fused upon the body of the disk. With wear, the softer body wears faster than the cutting insert, so that a fairly sharp edge is continuously preserved.

In Fig. 12 is shown another form of impacting disk 76^e differing from the main form in that the edge or periphery 77^e is provided with a series of projections or teeth 89^e in the form of pieces of

hard cutting material, such as stellite, applied to the peripheral edge so as to afford a circular row of hard impacting teeth adapted to give very effective action with minimum wear.

The impacters or roughing disks of the preceding figures are reversible in action, as they will operate with rotation in either direction of the carrier, which is of advantage. When this feature is not necessary a special impacter may be used for certain special conditions giving superior action but in one direction only. Fig. 11 shows such a disk 76^e with special teeth 84^e having chipping or picking apexes 85^e, the full construction and operation of which will be separately described below, but which is inferior for general roughing work to the first described disk with continuous impacting edge in a plane at right angles to the rotation axis.

In the embodiment of Figs. 1-6, as a practical example, the carrier shaft may be $8\frac{1}{8}$ inches above the wheel base or floor, spindle length between end plates $12\frac{3}{4}$, distance of spindle from carrier axis 6 inches, and other dimensions in proportion; the disks may be 1 inch thick, $4\frac{1}{2}$ inch diameter, with $1\frac{1}{4}$ inch hole, weighing 3 pounds; rotary speed between about 400 and 800 R. P. M. and travel speed between about 10 and 40 feet per minute. The rotary speed more than suffices to hold the disks normally outward. At impact each disk is moving with a greater horizontal than vertical component, the blow being that of a pick rather than an axe. Gravity works with the impact, but at the top of the orbit does not control the disk movement. After each impact occur certain displacements and reactions; but the disk quickly resumes its centrifugal position on the carrier, and ceases oscillation before the next impact, but with a different part of the striking edge presented for impact.

Fig. 6 shows the spindle 71 and disk 76 at the impact position on the radius q , and in subsequent other positions, on the vertical radius p , the circle r representing the spindle path. At the moment of impact the center of gravity s of the disk is directly above the impact point t . The cord $t-u$ is normal to the radius q , which intersects the cutting edge at w .

Each disk strikes the floor at t in the impact direction $u-t$, effecting a roughing action beginning at t . The depth, width and length of the cut varies with the character and hardness of the floor. With zero resistance the disk 76 would travel to position 76^x, the point w' indicating the maximum depth of cut. A practical depth might be that indicated by w^2 , the disk being at 76². Assuming zero cut the point w would be at w^3 , on the disk position 76³. These three positions are vertically separated, the point v of intersection of the radius with the disk hole assuming the three positions v' , v^2 , v^3 .

On the assumption that the several disks in each cutting plane will cut to the depth w^2 this cut will be in the nature of a groove extending leftward therefrom as indicated. Adjustment of the impacting action may be effected by vertical adjustment of the height of the carrier axis above the floor, for example by relatively raising or lowering the front wheels on the chassis, or by interchanging the resilient pads 53 for others of different thickness; or to the same purpose the impacting disks might be exchanged for others of different diameter. The several disk positions with relation to the spindle as shown in Fig. 6 are theoretical; in practice the disk may retain contact with the spindle, it is found that there is

no appreciable blow or retarding action of the disk upon the spindle.

The described embodiment possesses the advantage of a useful degree of self propulsion or thrust in a direction opposite to the horizontal component of impact, that is, to the right in Fig. 6; which is of high advantage in facilitating manual propulsion across a floor. This thrust is due to the summation of numerous small reactions communicated through the spindles to the carrier and chassis, and the action is so substantial that the described brake has been found desirable.

A given area may be covered by forward travel only or by forward and reverse travel, the latter effected by reversal of the rotation of the motor and carrier. Parallel roughing grooves are usually sufficient, but if desired the machine may be run at right angles to form intersecting grooves. To skip a given area the chassis is readily tilted up by the aid of the counterbalancing weight of the motor. The impacting action may be modified by bearing up or down on the handle or by adding a variable weight to the front of the chassis.

The roughing action may be regulated also by changing the speed of travel or propulsion. At ten feet per minute the rapid repetition of overlapping cuts along each line is found to afford satisfactory roughing for ordinary concrete. By slowing the travel, the depth and width of cut can be increased, and vice versa. By holding the machine against travel it will chip out a basin of the maximum depth of cut.

Fig. 4 shows the shaft 65 extended outwardly at one side and on this may be mounted a narrow carrier with spindles and disks beyond the chassis to enable roughing to be effected close to a wall. To reduce the width of the roughing path all of the disks at one side of the center might be omitted. The chassis tends to ride upon the rapidly impacting series of disks; and if the disks are omitted from three of the six spindles the angle of impact may consequently be increased.

Fig. 11 shows an impactor or disk 76 of special form, giving a superior chipping or picking action but only in one direction of rotation of the carrier. It is characterized by teeth 84 having apexes 85° and durable radial faces 86°. The teeth are seven in number and the disk hole has seven notches 88°, for the spindle 71, each notch being so positioned that a nearly opposite tooth apex will first meet the floor at an effective impact point. Between teeth apexes are convex tooth surfaces 87° giving maximum backing and strength to the teeth while clearing the floor throughout each cut. The radii p and q and path r are shown as in Fig. 6. The odd number seven is the greatest number of teeth adaptable to proper action and clearance, determined as follows. The chord $t-u$ is drawn as in Fig. 6, intersecting the apex circle at u , which falls just short of the next apex to the right, which is above the line $u-t$; and by reason of this arrangement the impacting and chipping action will be free from interference by contact with the floor of either the next apex to the right or that to the left. The disk 76 has a chipping or picking which is highly effective as compared with a simple disk, and it is inexpensive of manufacture and durable in use.

The herein disclosed method or step of preparing a concrete flooring or arch surface to receive an overpoured or topping layer of cement mortar which comprises the roughing of the flooring by bonding grooves placed in parallelism to facilitate the clearing of the flooring of

debris as by water jets applied in the direction of the grooves is not claimed herein but is made the subject of claim in copending application Serial No. 680,042 filed July 12, 1933.

Having thus described one or more illustrative embodiments of the principles of the invention it is stated that the invention is not intended to be limited to matters of combination, arrangement and construction except to the extent set forth in the appended claims.

What is claimed is:

1. A machine for roughing concrete flooring comprising a mobile frame progressively shiftable over while resting upon the floor, a carrier rotatably mounted on the frame in a predetermined suspended position wholly clear of the floor, and having power connections for rotating it at substantial speed, and numerous impacting members or disks arranged around the periphery and along the length of the carrier, mounted loosely on the carrier for independent inward play thereon while held yieldingly outward by centrifugal force, and the normal outward position of each impacting member on the carrier being such that its impacting edge is at a distance from the axis substantially greater than the spacing of the carrier above the floor.
2. A machine as in claim 1 and wherein is a body on which the rotary carrier is directly mounted in elevated position, and with cushion or rubber mountings attaching the body to the frame for insulation of vibration without substantial freedom of yield.
3. A machine for roughing concrete flooring comprising a mobile frame progressively shiftable over while resting upon the floor, a carrier mounted on the frame to rotate about a horizontal axis in suspended position wholly clear of the floor, and having a peripheral series of spindles and with power connections for rotating it at substantial speed, and a series of impacting members or disks arranged along the length of each carrier spindle, mounted loosely on the spindle for independent inward play thereon while held yieldingly outward by centrifugal force, and the normal outward position of each impacting member on the carrier being such that its impacting edge will strike the floor substantially before reaching the vertical plane of the carrier axis.
4. A machine as in claim 3 and wherein is means for adjusting the spacing of the carrier above the floor to determine the distance of the impact point from the vertical plane of the carrier axis and the angle of impact.
5. A machine for roughing concrete flooring comprising a mobile frame progressively shiftable over while resting upon the floor, a carrier rotatably mounted on the frame in suspended position wholly clear of the floor, and having power connections for rotating it at substantial speed, and numerous impacting disks arranged around the periphery and along the length of the carrier, each having a substantially continuous circumferential impacting edge in a plane at right angles to the carrier axis and a large interior hole by which it is mounted loosely on the carrier for independent inward play thereon while held yieldingly outward by centrifugal force.
6. A machine as in claim 5 and wherein each disk is circular with a concentric circular hole and therefore shiftable circularly and operative in any position.
7. A machine as in claim 5 and wherein the several disks are located with their peripheral

edges in spaced apart lines of impacting action thereby to roughen the floor in the form of parallel grooves.

8. A machine for roughing concrete flooring comprising a mobile frame progressively shiftable over while resting upon the floor, a carrier rotatably mounted on the frame in suspended position wholly clear of the floor, and having power connections for rotating it at substantial speed, and numerous impacting disks arranged around the periphery and along the length of the carrier, mounted loosely on the carrier for independent inward play thereon while held yieldingly outward by centrifugal force, and mounted loosely also for lateral play whereby each disk may shift sidewise somewhat during impact.

9. A machine for roughing concrete flooring comprising a mobile frame progressively shiftable over while resting upon the floor, a carrier rotatably mounted on the frame in suspended position wholly clear of the floor, and having power connections for rotating it at substantial speed, and numerous impacting disks arranged around the periphery and along the length of the carrier, mounted loosely on the carrier for independent inward play thereon while held yieldingly outward by centrifugal force, and mounted loosely for slight tilting movement out of its normal position whereby each disk may adapt itself to the work.

10. A machine as in claim 3 and wherein upon each of the spindles the impacting disks are arranged loosely adjacent, thereby allowing freedom of play laterally or tiltingly so that each disk may shift in adaptation to the work.

11. A floor roughing machine comprising a mobile chassis or frame progressively shiftable over while resting upon the floor, a carrier or cage rotatably mounted on the chassis with its axis spaced a substantial predetermined distance above the floor line, and having power connections for rotating it at substantial speed, and numerous impacting disks arranged around the periphery and along the length of the carrier,

mounted loosely on the carrier for independent play or inward displacement thereon while held yieldingly outward by centrifugal force, and the normal outward position of each disk on the carrier being such that its impacting part is at a distance from the carrier axis greater than the spacing of the carrier axis above the floor; the impacting discs being arranged in several peripheral series lengthwise of the carrier, and the disks of each series being spaced apart or loose and thereby adapted relatively to tilt during impact.

12. A machine for roughing concrete flooring comprising a wheel-supported frame freely shiftable over the floor, carrying a motor, but its wheels unconnected with the motor, a carrier with shaft rotatably mounted on the frame with the carrier in a predetermined elevated position wholly clear of the floor, and with connections from the motor for rotating it at substantial speed, and with a system of peripheral spindles, and numerous impacting disks arranged around the periphery and along the length of the carrier, on said spindles, each substantially circular and with a substantially circular concentric hole over $3/2$ times the diameter of the spindle, whereby the disks are loose for inward play while held yieldingly outward by centrifugal force, and the normal outward position of each disk being such that its point of impact on the floor is substantially in advance of the vertical plane of the carrier axis; whereby after the impact of each disk it is drawn by its spindle along the floor until lifted therefrom, and whereby the reaction of all the disks on all the spindles during their contact with the floor produces a substantially continuous thrust on the carrier and propulsive force to advance the wheeled frame.

13. An impacting disk as in Fig. 11 having an odd number of cutting teeth, and a central hole to receive a spindle with spindle notches opposite to the spaces between tooth apexes.

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