

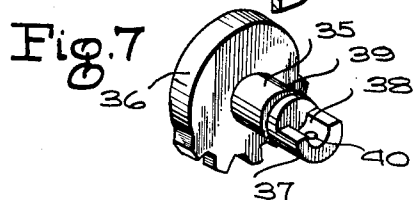
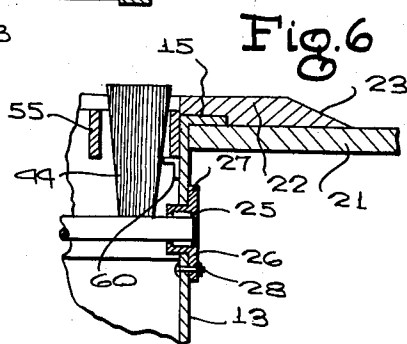
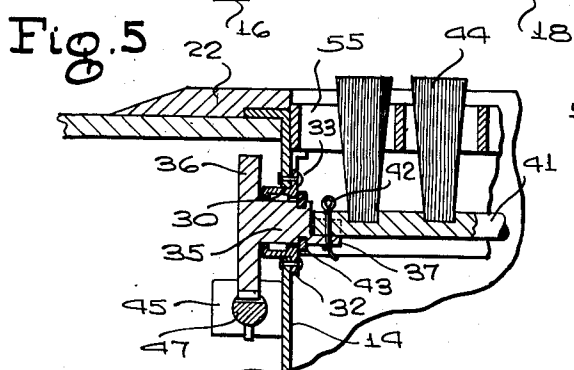
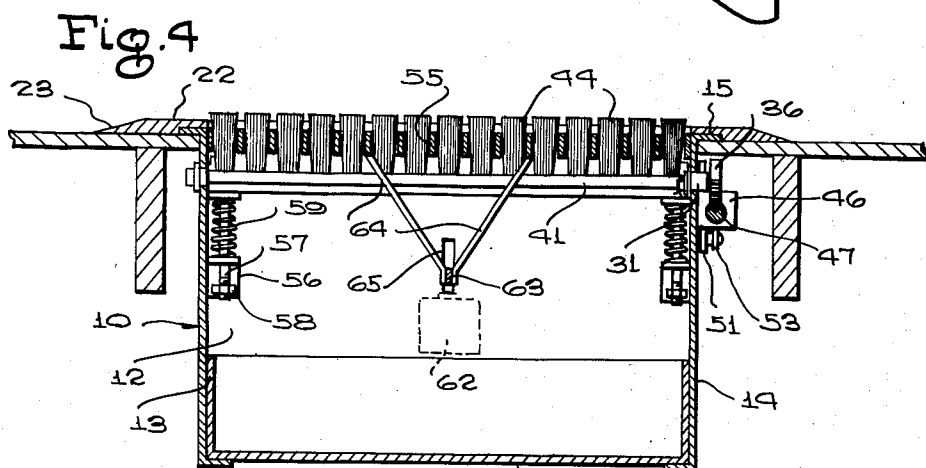
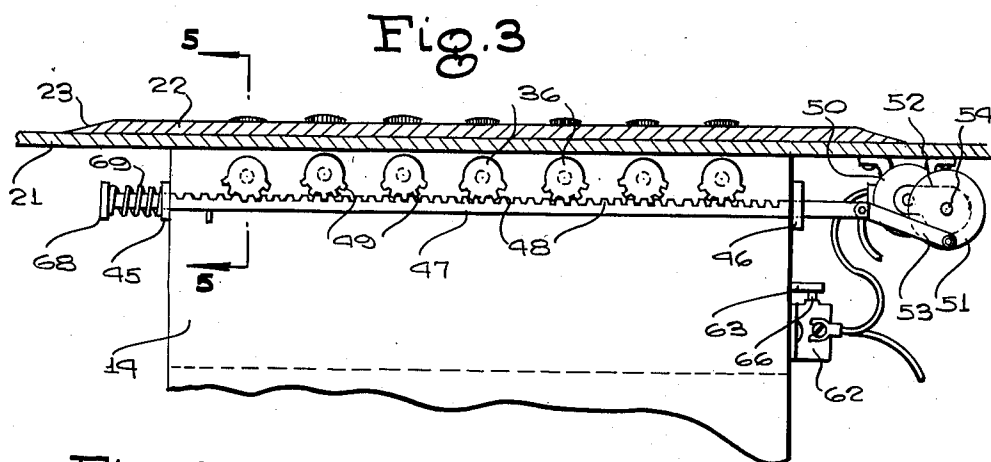
Aug. 4, 1953

R. H. RYZENGA
MECHANICAL FLOOR MAT

2,647,271

Filed July 18, 1952

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

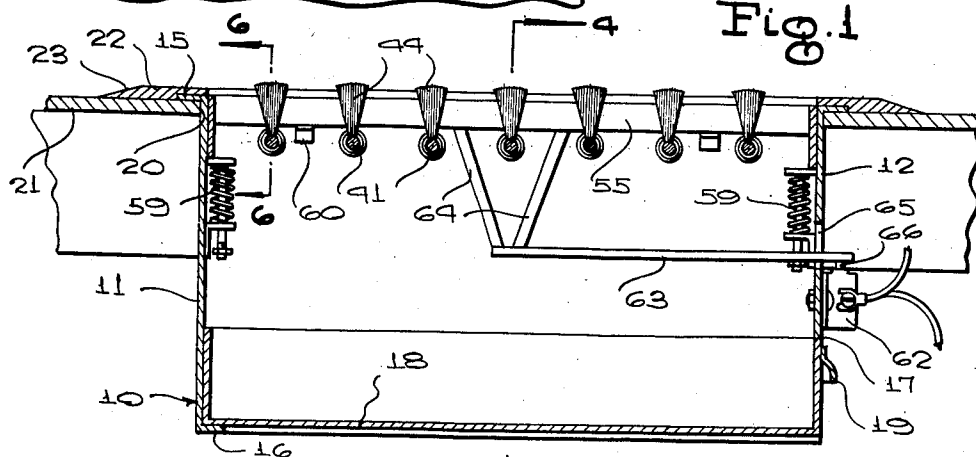
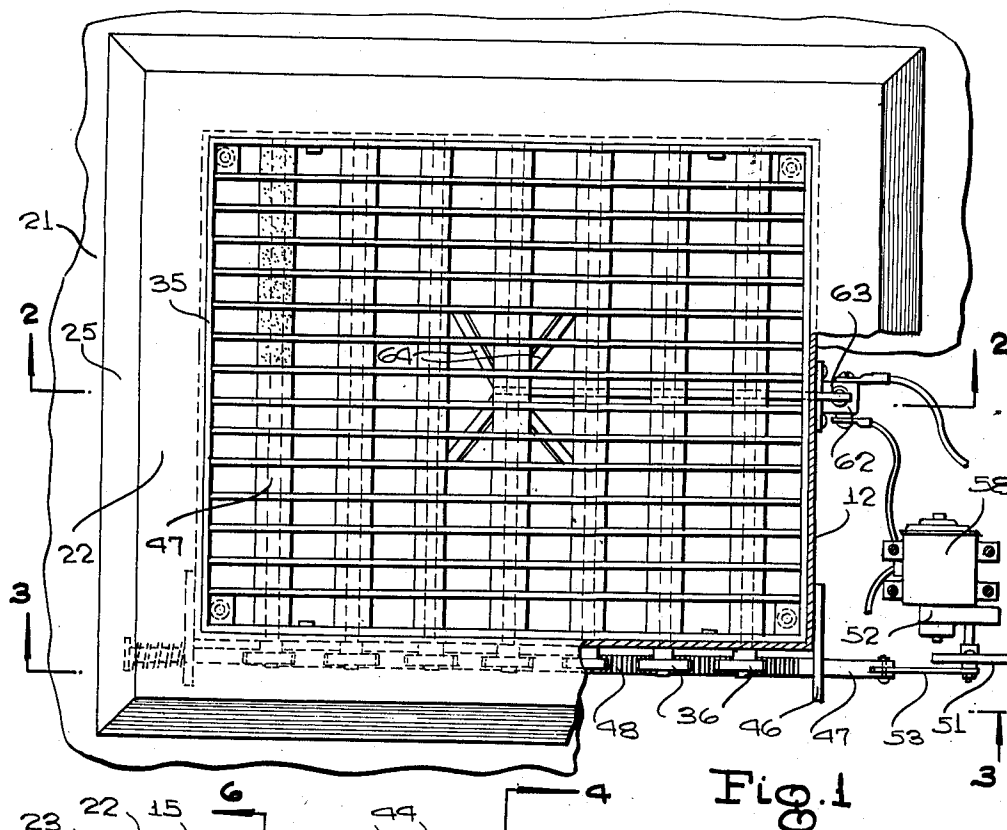


Fig. 2

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UNITED STATES PATENT OFFICE

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MECHANICAL FLOOR MAT

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4 Claims. (Cl. 15—37)

1

This invention relates to mechanical floor mats and more particularly to be mounted in an opening in a building floor and having power driven brushes for removing dirt from shoes of a person standing on the mat.

It is among the objects of the invention to provide a mechanical floor mat which can be mounted in an opening in a building floor with its upper surface substantially flush with the floor and will support a person walking or standing thereon; which has power driven brushes engageable with the shoe soles of a person walking over the mat to remove dirt from the shoe soles and which is placed in operation by the weight of a person thereon; which has a dirt receiving space or receptacle below the brushes which can be emptied when necessary; which has removable brushes which can be readily replaced by new brushes when necessary; and which is simple and durable in construction, economical to manufacture, easy to install, and neat and attractive in appearance.

Other objects and advantages will become apparent from a consideration of the following description and the appended claims in conjunction with the accompanying drawings wherein:

Figure 1 is a top plan view of a mechanical floor mat illustrative of the invention with a portion of the associated floor fragmentarily illustrated;

Figure 2 is a longitudinal cross sectional view on the line 2—2 of Figure 1;

Figure 3 is a cross sectional view on the line 3—3 of Figure 1;

Figure 4 is a transverse cross sectional view on the line 4—4 of Figure 2;

Figure 5 is a fragmentary cross sectional view on an enlarged scale on the line 5—5 of Figure 3;

Figure 6 is a fragmentary cross sectional view on an enlarged scale on the line 6—6 of Figure 2; and

Figure 7 is a perspective view of an arbor and sector gear unit constituting an operative component of the device.

With continued reference to the drawings, the device comprises a frame or housing, generally indicated at 10, having spaced apart and substantially parallel end walls 11 and 12 and spaced apart and substantially parallel side walls 13 and 14 joined at their opposite ends to the corresponding ends of the end walls and disposed substantially perpendicular to the latter. The upper end of the housing 10 is open and provided with an outwardly projecting, surrounding flange 15 and at its lower end the housing is provided with an inwardly projecting flange 16 extending along the

2

side and end walls thereof. The end wall 12 is provided with an opening 17 of rectangular shape at the lower end of the housing and a receptacle 18 of rectangular shape is slidable through the opening 17 into the housing and is supported on the inwardly extending flange 16 to receive the dirt cleaned from shoe soles by the operation of the mechanical mat. A handle 19 is provided on the receptacle 18 at the end of the latter disposed in the opening 17 to facilitate placing the receptacle in and removing it from the housing 10. When the receptacle 18 is in place in the housing it completely closes the bottom end of the housing.

The housing 10 is mounted in a rectangular opening 20 in a building floor 21 and the flange 15 rests on the upper surface of the floor surrounding the opening 20 to support the housing from the floor with the major portion of the housing disposed below the floor.

A fairing 22 having a beveled outer edge, as indicated at 23, surrounds the flange 15 of the housing 10 and has a recess in its inner edge receiving the flange 15 so that the flange and the upper end of the housing 10 is entirely concealed.

The side wall 13 of the housing is provided near its upper edge with a plurality of openings 25 spaced apart longitudinally of the side wall and roller bearing units 26 are mounted one in each of the openings 25. Each bearing unit includes a housing having a flange 27 overlying the outer side of the housing side wall 13 surrounding the corresponding opening 25 and secured to the side wall by suitable means, such as the screws 28 extending through registering apertures in the side wall 13 and the flange 27. The side wall 14 is also provided near its upper edge with a plurality of apertures 30 spaced apart longitudinally thereof and roller bearing units 31 are disposed one in each of the openings 30. Each of the bearing units 31 includes a housing having an outwardly extending flange 32 overlying the inner side of the side wall 14 around the corresponding opening 30 and secured to the side wall by suitable means, such as the screws 33 extending through registering apertures in the side wall 14 and the flange 32.

Arbors 35 of cylindrical shape are journaled one in each of the bearings 31 and each of these arbors has on its end disposed outwardly of the corresponding housing side wall 14 a sector gear 36. On its end disposed inwardly of the housing wall 14 each arbor 35 is provided with an extension or formation 37 of semi-cylindrical shape having therein a recess 38 also of semi-cylindri-

3

cal shape and disposed coaxially of the arbor 35. Each arbor also has an annular groove 39 therein at the end of the bearing unit 31 disposed inwardly of the housing side wall 14 and each extension 37 has a hole 40 extending radially there-through.

A plurality of shafts 41 are disposed transversely of the housing 10 and each shaft is journaled at one end in a corresponding bearing unit 26 carried by the housing wall 13. At its other end the shaft is received in the recess 38 of the corresponding arbor extension 37 and is secured to the arbor extension by suitable means, such as the cotter key 42 extending through a transverse aperture in the shaft 41 and through the hole 40 in the arbor extension 37. Snap rings 43 are mounted one on each arbor 35 at the inner ends of the corresponding bearing units 31 and each is engaged in the groove 39 in the corresponding arbor to maintain the arbors against longitudinal movement relative to the corresponding bearing units.

Bristle tufts 44 are secured each at one end to each shaft 41 at spaced apart locations along the shaft and extend radially from the corresponding shaft to provide a plurality of brushes extending transversely of the housing 10 and spaced apart longitudinally thereof. The bristle tufts 44 are secured to each shaft 41 and are disposed substantially in a straight line extending longitudinally of the shaft and have a length such that when in a vertical position they extend somewhat above the top surface of the fairing 22, as illustrated in Figures 4 and 5.

Apertured lugs 45 and 46 are secured to the end walls 11 and 12 respectively of the housing 10 and project outwardly beyond the side wall 14. A rack bar 47 extends slidably through the apertures in lugs 45 and 46 and is disposed at the outer side of the side wall 14 somewhat below and adjacent the sector gears 36. This rack bar 47 has a plurality of rack teeth 48 thereon which mesh with the teeth 49 of the sector gears 36 to impart rotational movements to the sector gears 36 and the shafts 41 when reciprocating movement is imparted to the rack bar 47. An electric motor 50 is mounted on the under side of the floor 21 adjacent one end of the rack bar 47 and drives a crank or disc 51 through a suitable reduction gear unit 52. A link 53 is pivotally connected at one end to the disc 51 eccentrically of the center of rotation 54 of the disc and the other end of this link 53 is pivotally connected to the adjacent end of the rack bar 47 so that the rack bar is reciprocated when the disc 51 is rotated by the motor 50.

A grid 55 of rectangular shape is mounted in the housing 10 above the shafts 41 and has openings therein through which the bristle tufts 44 extend when the tufts are brought to a position at which the tufts extend upwardly from the corresponding shafts 41.

Brackets 56 are mounted in the housing 10 one at each inner corner of the housing, and these brackets are all disposed substantially the same distance from the top flange 15 of the housing and each has an apertured portion disposed substantially parallel to the flange 15.

Pins 57 are secured at their upper ends to the grid 55 one at each corner of the grid and these pins depend from the grid and extend slidably through the apertures in the corresponding brackets 56. Each pin 57 has a screw threaded lower end receiving a nut 58 which engages the under side of the corresponding bracket to limit upward movement of the pins relative to the

4

brackets and upward movement of the grid 55 relative to the housing 10. A compression spring, as indicated at 59, surrounds each pin 57 between the corresponding bracket 56 and the lower side of the grid 55 and these springs resiliently support the grid 55 at an elevation such that the upper surface of the grid is substantially flush with the upper surface of the top flange 15 of the housing 10, as illustrated in Figures 2 and 4. Stops 60 in the form of small angle brackets are secured to the side walls 13 and 14 of the housing at the inner sides of the side walls and engage the bottom edge of the grid 55 when the grid has been depressed a predetermined amount to limit downward movement of the grid to an extent such that the bottom edge of the grid will not at any time contact the shafts 41. The nuts 58 are so adjusted on the pins 57 that when there is no weight on the grid the springs 59 move the grid upwardly until its upper surface is substantially flush with the upper surface of the fairing 22. A switch 62 is mounted on the end wall 12 at the outer side of the end wall and connected into the energizing circuit of the motor 50. A beam 63 is disposed below the grid 55 and secured at one end to the grid near the center of the latter by struts 64 depending from the grid to the corresponding end of the beam and this beam extends through a slot 65 in the housing end wall 12 and engages the switch button 66.

With this arrangement, when the grid 55 is depressed against the force of springs 59 by the weight of a person walking over or standing on the grid, the beam 63 is moved downwardly and moves the switch button 66 to close the switch 62 and energize the motor 50. When the motor 50 is energized it rotates the disc 51 and reciprocates the rack bar 47 which in turn oscillates the sector gears 36 and the shafts 41 causing the bristle tufts 44 on the shafts to swing in substantially semi-circular arcs above a horizontal plane including the rotational axes of the shafts 41. When the weight of the person is removed from the grid 55 the springs 59 raise the grid 55 in the bar 63 and the switch 62 is then opened to discontinue operation of the motor 50.

A head 68 is provided on the end of the rack bar 47 remote from the motor 50 and a compression spring 69 surrounds the rack bar between the head 68 and the lugs 45, this spring being effective to move the rack bar and rotate the shafts 41 to a position at which the bristle tufts 44 are all disposed below the grid 55 when operation of the motor 50 is discontinued.

The grid can be lifted out of the upper end portion of the housing 10 after the nuts 58 have been threaded off of the pins 57, and with the grid removed, the old brush units can be removed by first removing the cotter keys 42 and then lifting the shafts 41 out of the arbor extensions 37 and pulling them out of the bearings 26. After the old brushes have been removed new brushes can be placed by simply inserting the new shafts at one end in the corresponding bearings 26, placing the other ends in the corresponding arbor extensions 37 and reinserting the cotter keys 42. If the construction of the building is such that access to the receptacle 18 cannot be had below the floor 21 supporting the mat, this receptacle can be so shaped that it can be lifted out through the top of the housing 10 after the housing grid 55 and shafts 41 have been removed from the housing.

The mat will preferably be made of sufficient size that a person will take two or more steps in walking over it and these few steps will provide

ample opportunity for the mat to substantially remove all dirt from the person's shoe soles so that it will not be necessary for the person to pause or stand on the mat.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiment is, therefore, to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are, therefore, intended to be embraced therein.

What is claimed is:

1. A mechanical floor mat comprising a housing adapted to be mounted in an opening in a building floor and having spaced apart and substantially parallel end members and spaced apart and substantially parallel side members provided with apertures spaced apart longitudinally thereof, bearings disposed one in each of said apertures, arbors disposed one in each bearing in one of said side members and each having a sector gear at the outer side and a recessed semi-cylindrical formation at the inner side of said one side member, shafts extending transversely of said frame and each having one end received in a corresponding bearing in the other of said side members and its other end secured in the recessed formation of a corresponding arbor carried by said one side member, bristle tufts projecting radially from said shafts at spaced apart locations therealong, a rack bar disposed along the outer side of said one side member and having teeth thereon meshing with the teeth of said sector gears, a motor disposed adjacent said frame, means connecting said motor to said rack bar and imparting reciprocating movement to the latter when said motor is energized, a grid disposed above said shaft and having openings therein receiving said bristle tufts, springs supporting said grid from said housing and effective to permit a limited downward movement of said grid when the latter is subjected to the weight of a person thereon, and an energizing circuit for said motor including a switch disposed adjacent said grid and closed by the latter to energize said motor when said grid is subjected to the weight of a person thereon.

2. A mechanical floor mat comprising a housing adapted to be mounted in an opening in a building floor and having spaced apart and substantially parallel end members and spaced apart and substantially parallel side members provided with apertures spaced apart longitudinally thereof, bearings disposed one in each of said apertures, arbors disposed one in each bearing in one of said side members and each having a sector gear at the outer side and a recessed semi-cylindrical formation at the inner side of said one side member, shafts extending transversely of said frame and each having one end received in a corresponding bearing in the other of said side members and its other end secured in the recessed formation of a corresponding arbor carried by said one side member, bristle tufts projecting radially from said shafts at spaced apart locations therealong, a rack bar disposed along the outer side of said one side member and having teeth thereon meshing with the teeth of said sector gears, a motor disposed adjacent said frame, means connecting said motor to said rack bar and imparting reciprocatory movement to

the latter when said motor is energized, a grid disposed above said shaft and having openings therein receiving said bristle tufts, springs supporting said grid from said housing and effective to permit a limited downward movement of said grid when the latter is subjected to the weight of a person thereon, an energizing circuit for said motor including a switch disposed adjacent said grid and closed by the latter to energize said motor when said grid is subjected to the weight of a person thereon, and spring means connected between said rack bar and said housing effective to move said rack bar to a position at which all of said bristle tufts are disposed below said grid when said motor is de-energized.

3. A mechanical floor mat comprising a housing adapted to be mounted in an opening in a building floor and having spaced apart and substantially parallel end members and spaced apart and substantially parallel side members provided with apertures spaced apart longitudinally thereof, bearings disposed one in each of said apertures, arbors disposed one in each bearing in one of said side members and each having a sector gear at the outer side and a recessed semi-cylindrical formation at the inner side of said one side member, shafts extending transversely of said frame and each having one end received in a corresponding bearing in the other of said side members and its other end secured in the recessed formation of a corresponding arbor carried by said one side member, bristle tufts projecting radially from said shafts at spaced apart locations therealong, a rack bar disposed along the outer side of said one side member and having teeth thereon meshing with the teeth of said sector gears, a motor disposed adjacent said frame, means connecting said motor to said rack bar and imparting reciprocatory movement to the latter when said motor is energized, a grid disposed above said shaft and having openings therein receiving said bristle tufts, springs supporting said grid from said housing and effective to permit a limited downward movement of said grid when the latter is subjected to the weight of a person thereon, an energizing circuit for said motor including a switch disposed adjacent said grid and closed by the latter to energize said motor when said grid is subjected to the weight of a person thereon, and a receptacle removably mounted in said housing below said shafts for receiving dirt removed from shoe soles by said bristle tufts.

4. A mechanical floor mat comprising a housing adapted to be mounted in an opening in a building floor and having spaced apart and substantially parallel end members and spaced apart and substantially parallel side members provided with apertures spaced apart longitudinally thereof, bearings disposed one in each of said apertures, arbors disposed one in each bearing in one of said side members and each having a sector gear at the outer side and a recessed semi-cylindrical formation at the inner side of said one side member, shafts extending transversely of said frame and each having one end received in a corresponding bearing in the other of said side members and its other end secured in the recessed formation of a corresponding arbor carried by said one side member, bristle tufts projecting radially from said shafts at spaced apart locations therealong, a rack bar disposed along the outer side of said one side member and having teeth thereon meshing with the teeth of said sector gears, a motor disposed adjacent said

7

Frame, means connecting said motor to said rack bar and imparting reciprocatory movement to the latter when said motor is energized, a grid disposed above said shaft and having openings therein receiving said bristle tufts, springs supporting said grid from said housing and effective to permit a limited downward movement of said grid when the latter is subjected to the weight of a person thereon, and an energizing circuit for said motor including a switch dis-

8

posed adjacent said grid and closed by the latter to energize said motor when said grid is subjected to the weight of a person thereon, the bristle tufts on each shaft being disposed substantially in a straight line extending longitudinally of the corresponding shaft.

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No references cited.