

March 7, 1933.

F. C. MASON

1,900,122

APPARATUS FOR CLEANING

Filed Aug. 8, 1929

2 Sheets-Sheet 1

Fig. 2.

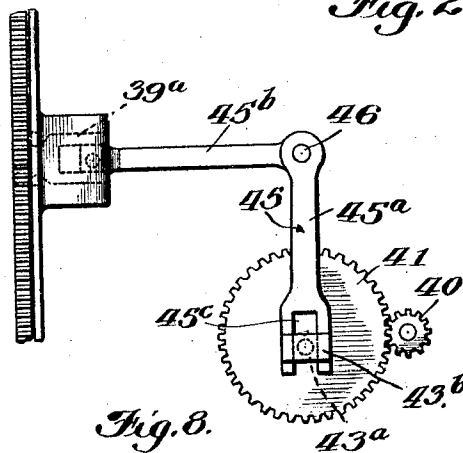


Fig. 7.

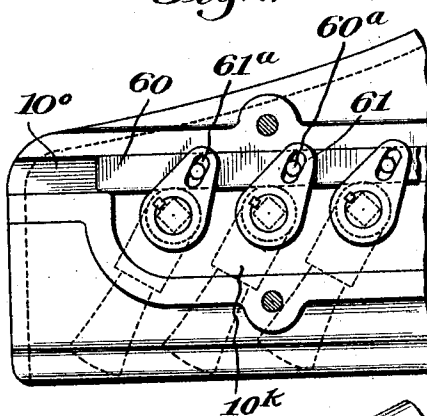


Fig. 8.

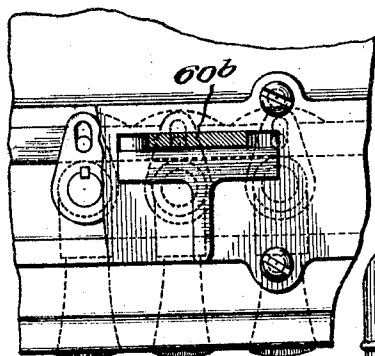
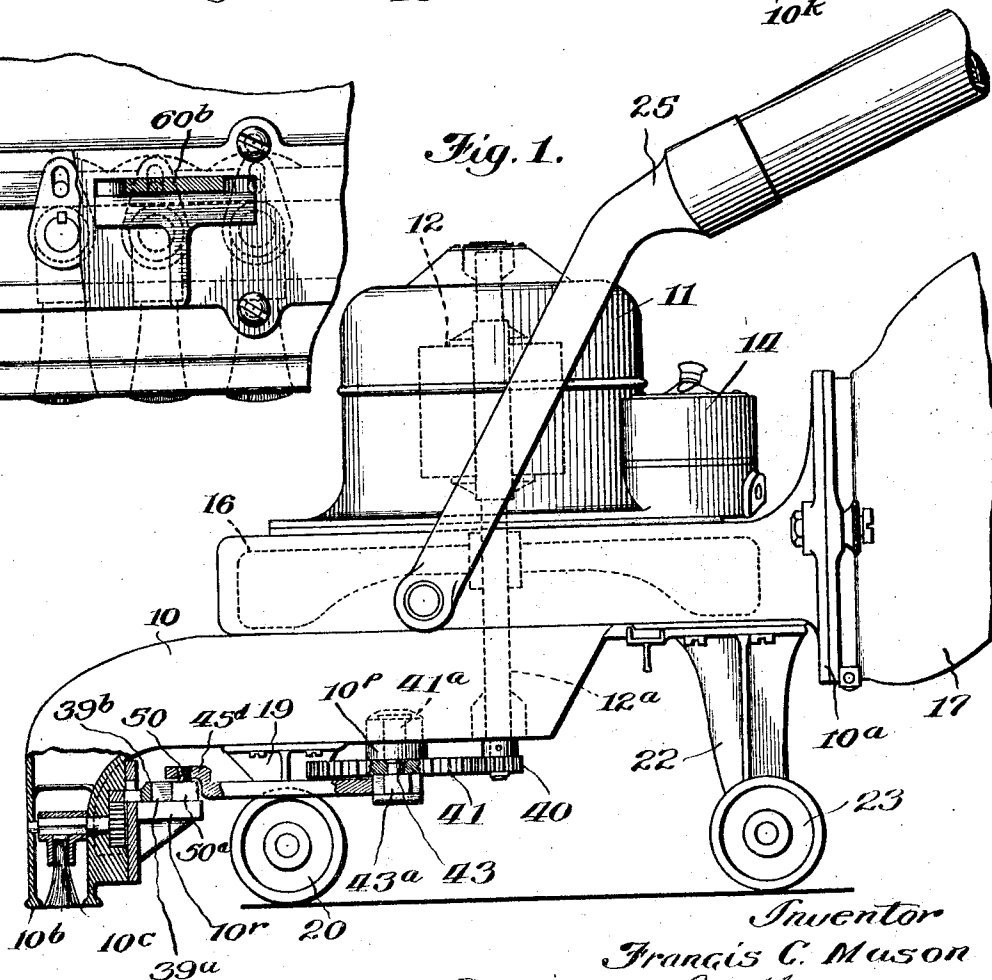


Fig. 1.



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Fig. 3.

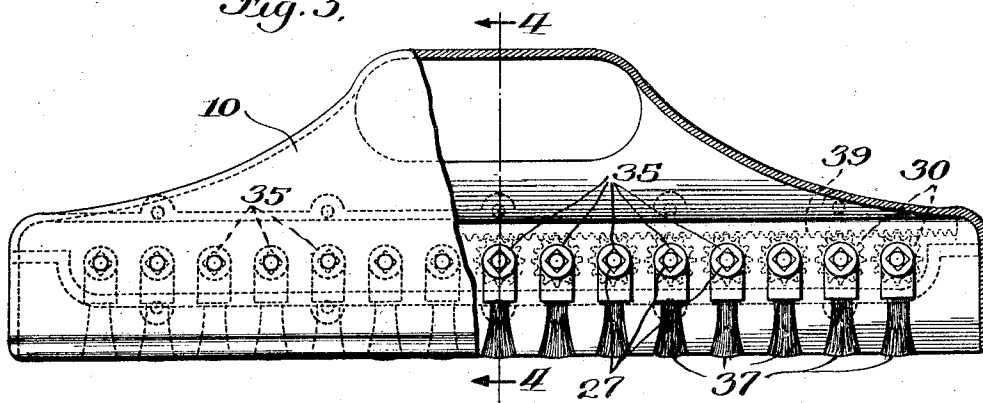


Fig. 6.

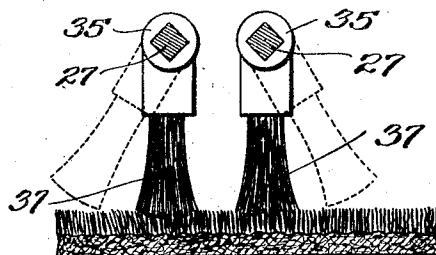


Fig. 4.

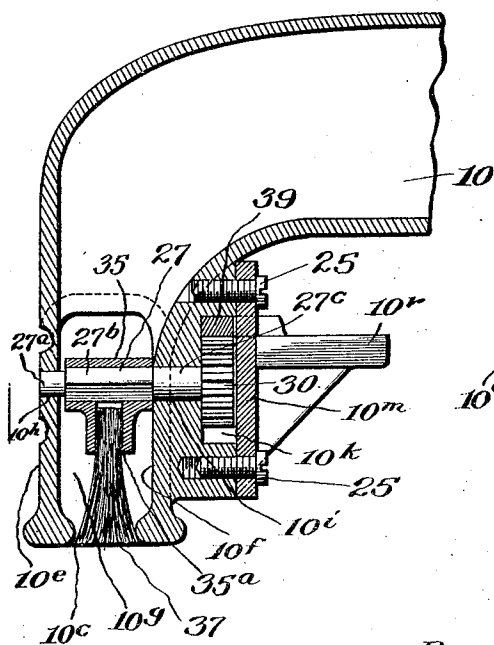
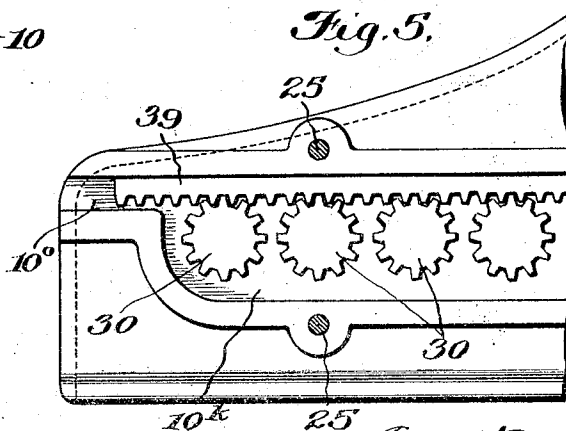


Fig. 5.



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APPARATUS FOR CLEANING

Application filed August 8, 1929. Serial No. 384,258.

My invention relates to apparatus for cleaning and has for an object to provide a device of that character in which a brush or brushes will co-act with a fluid movement-creating mechanism to dislodge foreign particles or the like from a surface to be cleaned so that they may be subjected to the action of the moving fluid.

Other objects include the provision of a vacuum cleaning apparatus in which the brushing means is so constructed and arranged that a relatively narrowed or constricted opening in the casing may be utilized which will result in the creation of a greater fluid velocity at the opening than is possible in present day devices;

To provide such an apparatus in which the brushing means will more effectively dislodge the foreign substances which are to be removed from the surface being cleaned;

To provide such an apparatus in which the brush members will oscillate and will clear or substantially clear the surface being traversed adjacent each limit of travel of the brushing means;

To provide an apparatus including a plurality of members each of which may be readily removed, replaced or changed;

To provide an apparatus in which is utilized a plurality of moving brush members driven by a common driving means;

To provide a cleaning apparatus in which is utilized a relatively constricted entrance port or opening in which are mounted brush members, moving in substantial coincidence or parallelism with the major axis of such opening;

To provide apparatus of the character described which may be readily assembled and disassembled, and which will be efficient and durable in use;

And, in general, to provide novel and efficiently operating apparatus of the character described which may be economical and readily manufactured.

Other objects will be apparent and more fully set forth in the following specification, and illustrated in the accompanying drawings in which:

Fig. 1 is a side view of an embodiment of

my invention, a portion thereof being illustrated in section;

Fig. 2 is an inverted plan view of a portion of the brush actuating mechanism;

Fig. 3 is a front view of the device with a portion of the casing broken away;

Fig. 4 is a vertical section along the line 4-4 of Fig. 3;

Fig. 5 is a detail of a portion of the actuating mechanism drawn to large scale;

Fig. 6 is a detail of a pair of brush members illustrating the method of operation;

Fig. 7 is a fragmentary rear view of a modified form of brush actuating means; and

Fig. 8 is a fragmentary rear view of a portion of the apparatus also illustrating the modified form of brush actuating mechanism.

Like numerals refer to like elements throughout the drawings.

10 indicates generally a hollow casing having a table-like top portion on which is mounted the motor casing 11, which encloses an electric motor generally indicated by numeral 12. A suitable electric circuit is provided for attachment to any source of electric current. In such circuit is included a switch member generally indicated by numeral 14. The motor is provided with a shaft 12-a upon which is mounted a fan or impeller 16 located in the casing. In the embodiment illustrated the casing is provided with a flanged outlet 10-a to which may be attached a dirt receiving sack 17 of conventional or suitable construction. At its opposite end the casing is downwardly curved or directed so that its lower end 10-b will lie adjacent the surface being traversed. This end 10-b is elongated as illustrated in Fig. 3, for example, and is provided with a constricted entrance 10-c. Near its front the casing 10 is mounted upon or carries brackets 19 in which are journaled suitable supporting wheels 20, while at the rear is a depending leg 22 in which is journaled a caster or wheel 23, these wheels affording a mobile support for the casing, motor, and associated parts. A forked handle, generally indicated by numeral 25, is pivotally attached to the sides of the casing for propulsion and handling of the apparatus.

The lower portions of the front wall 10—e and rear wall 10—f of the casing 10 are relatively closely spaced to provide a narrow duct 10—g leading from the entrance 10—c to the main interior of the casing. Spaced bearing apertures 10—h are provided in the front wall portion 10—e and larger bearing openings 10—i are similarly spaced in the rear wall portion 10—f, these being located in alignment with the corresponding front apertures 10—h. The rear wall portion 10—f is thickened and provided at its rear face with a recess 10—k therein which, when the device is assembled, is covered by the plate 10—m secured at top and bottom by cap screws 25.

A plurality of shafts 27 are provided, each of these shafts having the reduced outer end 27—a, the square or non-circular portion 27—b and the inner end 27—c of circular section, the diameter of the portions 27—c being at least as great as the diagonals of the portion 27—b to permit withdrawal of each shaft through its larger bearing aperture 10—c. The small ends 27—a are journaled in the bearing apertures 10—h and the larger ends 27—c are journaled in the apertures 10—i. The non-circular portions 27—b are thus rotatably or oscillatably mounted in the duct 10—g. At the inner end of each of the shafts 27 is secured a pinion 30, these pinions being arranged to lie in the recess 10—k as illustrated in Fig. 4, for example. The construction and dimensions of the portions of shaft 27 are such that when the plate 10—m is removed shafts 27 may be driven out of their mounting through the bearing apertures 10—i.

A plurality of brush carriers 35 of T-shape are provided, each having a transverse opening of non-circular contour through the upper portion to slidably fit and engage the non-circular portion 27—b of one of the shafts 27. The stem of the carriers 35 is also apertured to permit the insertion of a plurality of bristles forming a brush 37, which is secured in the carrier 35 by a contraction or swaging of the lower end of the stem 35 as indicated by numeral 35—a.

The recess 10—k is contracted at each side of the casing 10 to form reduced guide-ways 10—o as illustrated in Figs. 5 and 7, for example.

In the form illustrated in Figs. 1 to 6, a reciprocable rack 39 is provided at the top of the recess 10—k, the ends of such rack being capable of movement into and out of the narrow guideways 10—o. At its lower side the rack 39 is toothed and in meshed engagement with the pinions 30.

The shaft 12—a is extended below the casing and carries a driving pinion 40, which meshes with the driven gear 41 whose axle shaft 41—a is journaled and supported in the bearing 10—p on the bottom of the casing.

Eccentrically carried by the gear 41 is the rotatable pin 43 headed at its upper end (see Fig. 1). This pin 43 carries or has formed integrally therewith, the block portion 43—a. A bell crank 45 is provided which is rotatably mounted at its apex upon the stud 46 carried at the lower portion of the casing 10. This bell crank is formed with the arms 45—a and 45—b. The free end of the arm 45—a is slotted or bifurcated at 45—c to embrace the block portion 43—a which is free to slide therein. This block portion is provided with a head 43—b underlying the bifurcated end of the arm 45—a as shown in Figs. 1 and 2.

The free end 45—d of arm 45—b is offset, as shown in Fig. 1, and carries therein the headed pin 50 which is rotatable in the portion 45—d (see Fig. 1). This pin 50, like pin 43, is provided with a block portion 50—a which is slidably mounted in and engages in a slot 39—a formed in the arm 39—b which extends inwardly from the rack 39 preferably at the central portion thereof. (See Figs. 1 and 2.) The plate 10—m is provided with a table 10—r projecting rearwardly therefrom to support the arm 39—b and the arm 45—b of the bell crank 45 as will be apparent.

When the motor 12 is in operation the eccentric block 43—a will oscillate the bell crank 45 and the consequent oscillation of arm 45—b will be imparted to the rack 39 in obvious manner, and an oscillation of the brush carriers 35 will ensue.

In the operation of cleaning apparatus utilizing brushing means in conjunction with a moving current of fluid, such as air, particularly in the operation of what is generally termed a "vacuum cleaner," it is desirable for the brush or brushes to kick loose and dislodge foreign particles from the surface being cleaned and thereby to render them readily susceptible to the action of the moving fluid stream for removal and deposit in a collector.

In the so-called vacuum cleaners practical considerations have limited the reduced pressure or so-called "vacuum" which is obtainable in the casing of the apparatus. The brushing means utilized has necessitated an entrance port or nozzle opening of such size as to limit the suction effect or fluid velocity obtaining at the nozzle, and the brushing means has also been more or less inefficient in its operation.

With my invention I am able to obtain relatively great efficiency and a relatively large area of brushing action while reducing the area of the entrance port or opening, which reduction greatly enhances the effect of the suction or reduced pressure obtaining in the cleaner casing, a result which will be readily apparent to those skilled in the art.

I am thus enabled to increase and render

more effective the brushing action and at the same time to increase the effective action of the moving current of fluid which likewise greatly contributes to the efficiency and satisfactory operation of the apparatus.

I find it desirable in at least some forms of my invention to form the brush members of a greater length than the distance from the axes of the shafts 27 to the surface over which the opening 10—*c* is being moved for cleaning purposes.

As illustrated in Fig. 6 the brushes are oscillated through an arc of travel sufficient to clear all or substantially all of the bristles of each brush adjacent each limit of the arcuate travel thereof. This arrangement with the excess length of the bristles results in a snap or "kick" action as each brush approaches its limits of travel, which has a beneficial influence in dislodging and clearing particles of dirt, hairs or other foreign substances from the surface being cleaned. In Fig. 6 is illustrated in somewhat exaggerated form a typical carpet or rug surface illustrating the manner in which the bristles of the brush will act on a fabric having a deep pile as illustrated. I have illustrated the arc of travel of the brushes as approximately 60°, but obviously this may be varied as required by the dimensions of the brush member and the associated structure to produce the desired effect.

When it is desired to remove or replace a brush member, it is merely necessary to remove the plate 10—*m* which may be readily done, pull or drive out the corresponding shaft 27 through its large bearing aperture 10—*i* after which the corresponding brush carrier 35 will be released and drop sufficiently to permit seizing the bristles to rotate the carrier 35 approximately 90° until it may be pulled through the opening 10—*c*. The reverse of these operations is followed to insert a new brush which similarly may be done with ease by the user.

The mounting and arrangement of the brushes in a vertical plane coinciding or substantially parallel with the major axis of the opening 10—*c* permits the utilization of a relatively narrow or constricted nozzle opening 10—*c* which greatly enhances the suction effect of the reduced pressure in the casing 10, which is created by the movement of the fan 16 in well known manner. This brush construction and arrangement also provides for a more effective and efficient treatment of the surface being cleaned by the brush members which cover substantially the entire area of the opening 10—*c*, as the brush length may be such as to cause an overlap of the surfaces treated by the brushes.

Also due to the fact that each brush is clear at one side adjacent one limit of travel, both sides of the brush are equally worn in use and a longer life is obtained for the brush mem-

bers, which also effect a more efficient cleaning action.

In Figs. 7 and 8 I have illustrated a modified form of actuating mechanism for the brushes. In the embodiment there illustrated, a slide bar is provided which is guided by the guide-ways 10—*o* at its ends. A crank arm 61 is secured to each of the shafts 27 at one end thereof at the recess 10—*k*, each of these crank arms 61 being provided with a slot 61—*a* near its outer end. A pin 60—*a* is provided on the bar 60 to engage each of the slots 61—*a*. The bar 60 is provided with a rearwardly extending arm 60—*b* similar to arm 39—*b* in the form previously described, this being constructed and arranged for engagement with the block portion 60—*a*, in a similar manner, for reciprocation of the bar 60, which reciprocation will be transmitted to the crank arms 61 to effect the arcuate oscillation of the brush members.

The construction illustrated and described readily lends itself to the use of a vertically mounted motor 12 with an efficient gear drive therefrom to the brush member.

It will be apparent that my invention is susceptible of modification and departure from the forms illustrated in the accompanying drawings and described in the preceding specification, and I do not wish to be restricted to such forms except as reasonable interpretation of the appended claims and state of the prior art render such restriction necessary.

What I claim is:

1. Apparatus of the class described including a casing having an elongated opening therein, a plurality of brushes oscillatably mounted and projecting into said opening, said brushes being arranged with their axes of oscillation transverse to the major axis of said opening, and means to oscillate said brushes about said axes in substantial parallelism with said major axis and across the surface underlying said opening.

2. In apparatus of the class described, a casing having an elongated opening therein, a plurality of brushes arranged to oscillate through an arcuate path projecting into said opening, and means to simultaneously oscillate each of said brushes through its arc of travel about an axis substantially parallel to the normal direction of operative travel of said apparatus.

3. Apparatus of the class described comprising a casing having an opening therein, means to create a movement of fluid through said casing and said opening including a motor, a plurality of brushes mounted to project into said opening, each individually oscillatable about an axis substantially parallel to the normal direction of operative travel of said apparatus, and means operatively connecting said brushes and said motor whereby the latter will effect oscillation of said brushes.

4. Apparatus of the class described comprising a casing having an opening therein, means to create a movement of fluid through said casing and said opening including a motor, a plurality of brushes mounted to project into said opening, each individually oscillatable about an axis substantially parallel to the normal direction of operative travel of said apparatus, and means operatively connecting said brushes and said motor whereby the latter will effect oscillation of said brushes, said last named means comprising a pivoted bell crank oscillated by said motor and operatively connected to said brushes.

5. Apparatus of the class described comprising a hollow casing having an opening, means including a motor to create movement of fluid through said opening and casing, a plurality of separately mounted brushes projecting into said opening, each of said brushes being carried by an oscillatable shaft having an axis substantially parallel to the direction of normal operative travel of said apparatus, and means operatively connecting said motor and said shafts to oscillate the latter under actuation of said motor.

6. Apparatus of the class described including a casing having an opening, an oscillatable shaft journaled in said casing transversely of the major axis of said opening and substantially parallel to the plane of said opening, a brush carrier connected to said shaft, a brush carried by said carrier and projecting into said opening, and means to oscillate said shaft.

7. Apparatus of the class described including a casing having an opening, an oscillatable shaft journaled in said casing transversely of the major axis of said opening and substantially parallel to the plane of said opening, a brush carrier connected to said shaft, a brush carried by said carrier and projecting into said opening, said shaft being provided with a pinion secured thereto, and means to oscillate said pinion, shaft and brush.

8. Apparatus of the class described including a casing having an opening, an oscillatable shaft journaled in said casing transversely of the major axis of said opening and substantially parallel to the plane of said opening, a brush carrier connected to said shaft, a brush carried by said carrier and projecting into said opening, said shaft being provided with a pinion secured thereto, and means to oscillate said pinion, shaft and brush, said last named means including a reciprocable rack.

9. In apparatus of the class described, a casing having an opening with a major longitudinal axis, a brush member provided with a brush projecting into said opening, a shaft extending transversely of the major axis of said opening and carrying said member, said casing being provided with a pair of aligned

bearing apertures, said shaft being journaled in said apertures substantially parallel to the plane of said opening, one end of said shaft projecting beyond its bearing aperture and an actuating member secured to said projecting portion.

10. In apparatus of the class described, a casing having an opening with a major longitudinal axis, a brush member provided with a brush projecting into said opening, a shaft extending transversely of the major axis of said opening and carrying said member, said casing being provided with a pair of aligned bearing apertures, said shaft being journaled in said apertures substantially parallel to the plane of said opening, one end of said shaft projecting beyond its bearing aperture and an actuating member secured to said projecting portion, said casing being recessed to accommodate said actuating member and projecting shaft end.

11. In apparatus of the class described, a casing having an opening, a brush member provided with a brush projecting into said opening, a shaft extending transversely of the major axis of said opening and carrying said member, said casing being provided with a pair of aligned bearing apertures, said shaft being journaled in said apertures substantially parallel to the plane of said opening, one end of said shaft projecting beyond its bearing aperture and an actuating member secured to said projecting portion, motor means to drive said actuating member, said casing being recessed to accommodate said actuating member and projecting shaft end, and a cover for said recess.

12. In apparatus of the class described, a hollow casing having an opening, a fan mounted therein, means including a motor to actuate said fan, a plurality of spaced shafts journaled in said casing adjacent said opening and transversely of the major axis thereof, a brush carried by and actuable by each of said shafts, said brushes projecting into said opening, and means to actuate said shafts to oscillate said brushes in a direction transverse the normal direction of operative movement of said casing.

13. In apparatus of the class described, a hollow casing having an opening, a fan mounted therein, means including a motor to actuate said fan, a plurality of spaced shafts journaled in said casing adjacent said opening, a brush carried by and actuable by each of said shafts, said brushes projecting into said opening, and means to actuate said shafts to oscillate said brushes in a direction transverse the normal direction of movement of said casing, said last named means comprising pinions, one secured to an end of each of said shafts, a rack meshing with said pinions, and means actuated by said motor to reciprocate said rack.

14. In apparatus of the class described a

hollow casing having a constricted nozzle opening, a plurality of oscillating brushes mounted in said opening, means to oscillate said brushes across the surface underlying said opening in substantial parallelism with the major axis thereof, each about an individual axis, each of said brushes substantially spanning the minor dimension of said opening.

10 15. Apparatus of the class described including a casing having an opening therein, a plurality of brushes projecting into said opening, and rack and pinion means to oscillate said brushes in an arcuate path in substantial parallelism with the major axis of said opening in such manner to cut its plane periodically.

16. Apparatus of the class described including a casing having an elongated opening, a plurality of shafts parallel with the plane of said opening but extending transversely of the major axis thereof, brush members mounted for reciprocal motion on said shafts in such manner that their free extremities extend beyond the plane of said opening through a portion of their path of travel, and a power driven reciprocating member operatively connected with each of said shafts.

30 In witness whereof, I hereunto subscribe my name this 2nd day of August, 1929.

FRANCIS C. MASON.

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