May 30, 1933. A. C. BUTTS ET AL 1,911,547

SURGEON'S SCRUBBING BRUSH

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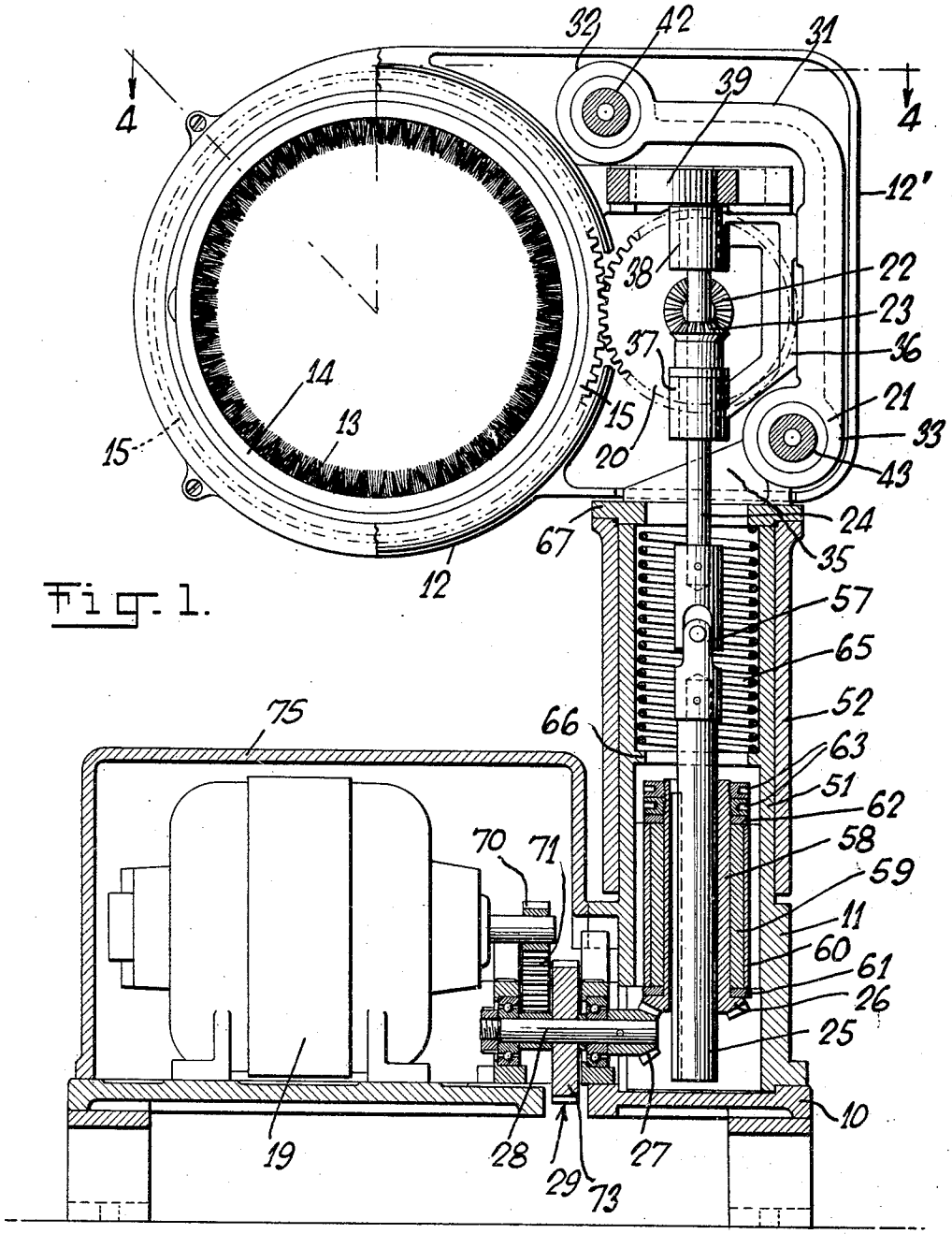


Fig. 1.

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Fig. 2.

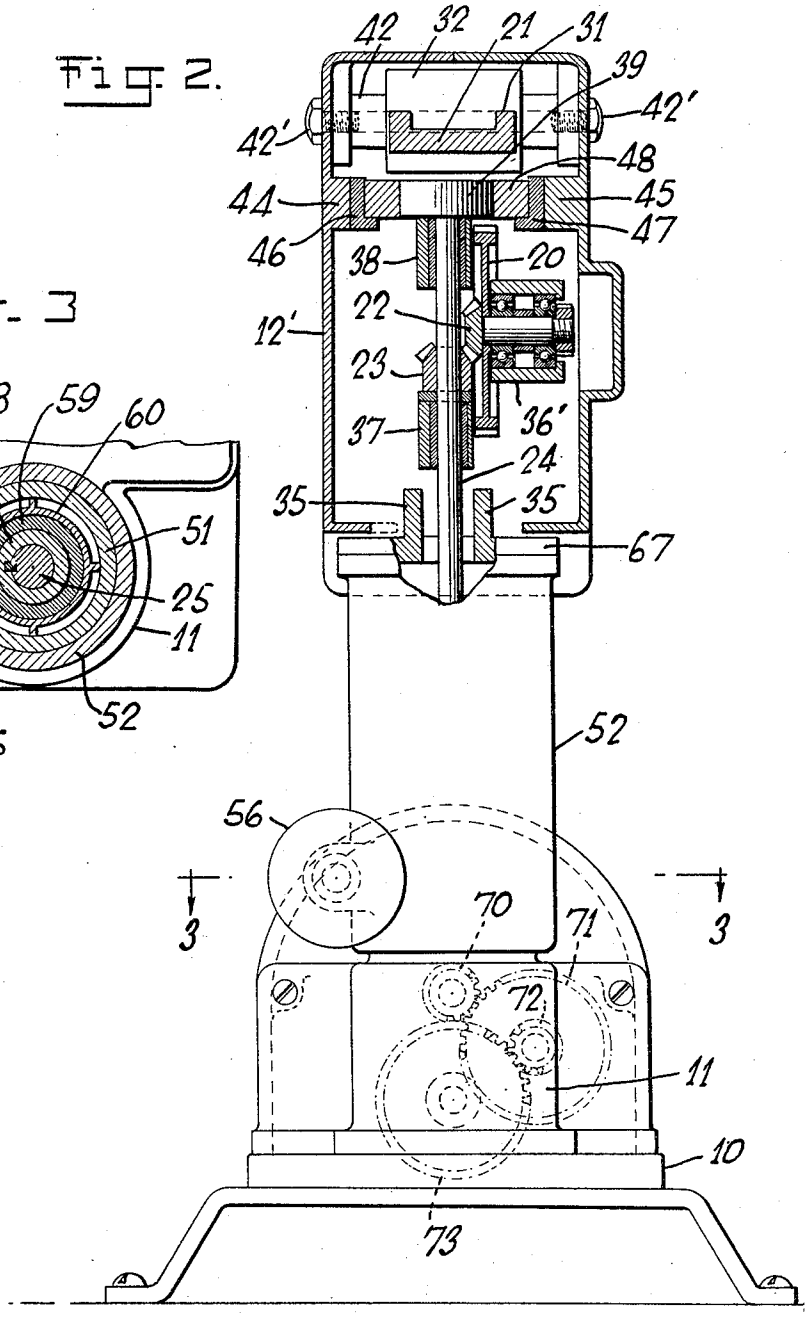


Fig. 3

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Fig. 4

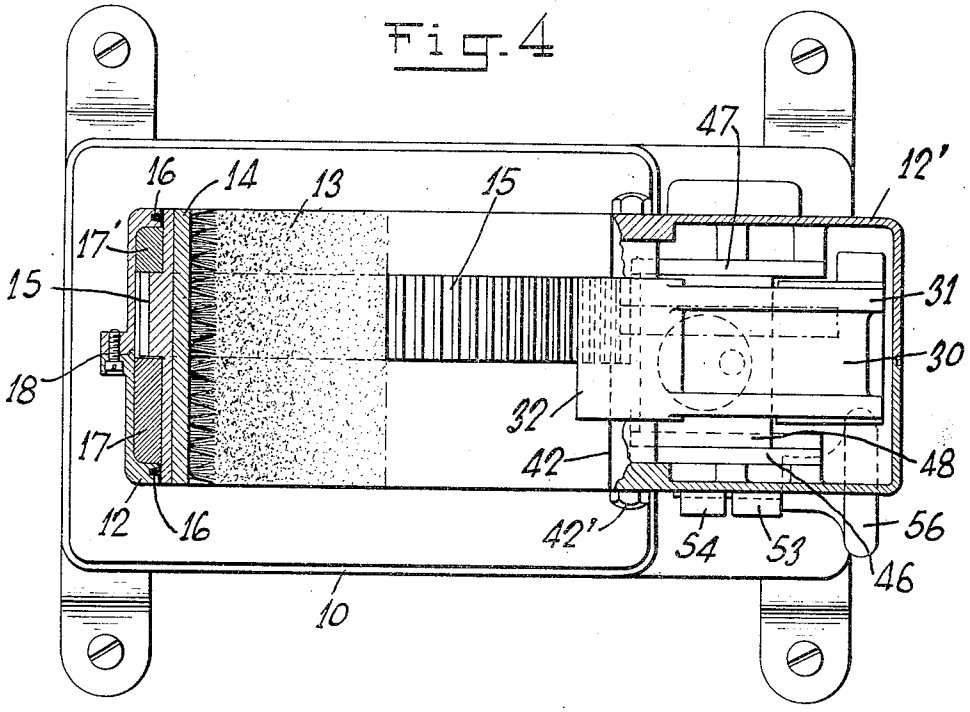


Fig. 5.

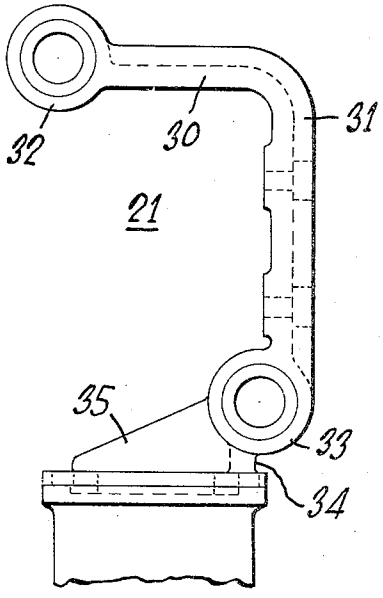
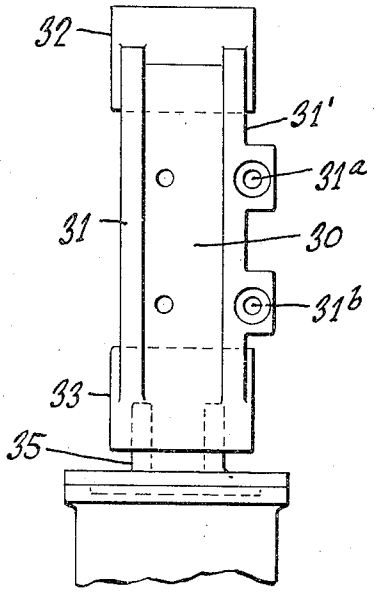


Fig. 6.



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UNITED STATES PATENT OFFICE

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SURGEON'S SCRUBBING BRUSH

Application filed January 28, 1930. Serial No. 423,955.

This invention relates to surgeons' scrubbing devices, and more particularly to scrubbing devices of the rotating variety which are power driven.

The invention has for its object generally, the provision of a device of the character indicated which has an improved construction and arrangement of parts that is efficient, compact and readily manufactured.

More specifically, an object is to provide a surgeon's scrubbing device which is of a unitary construction and has a rotating brush that is driven by a suitable built in power unit, for example, an electric motor.

Another object is to provide a device for scrubbing the arms of surgeons by means of a rotating cylindrical brush which is mounted on a pedestal and adapted to be adjusted to any convenient scrubbing position.

Still another object is to provide a scrubbing device of the character indicated with a rotating brush adapted to execute a thorough cleaning movement and to have a plurality of independent motions, that is, execute both rotating and reciprocating movements.

Other objects of the invention will in part be obvious and will in part appear hereinafter.

The invention accordingly comprises the features of construction, combinations of elements, and arrangement of parts, which will be exemplified in the constructions hereinafter set forth and the scope of the application of which will be indicated in the claims.

For a fuller understanding of the nature and objects of the invention reference should be had to the following detailed description taken in connection with the accompanying drawings, in which:

Fig. 1 is a view partly in section and partly in side elevation, showing a scrubbing device constructed in accordance with the invention;

Fig. 2 is a similar view of the device as seen from a plane at right angles to that of Fig. 1;

Fig. 3 is a fragmentary view taken on the line 3—3 in Fig. 2 looking in the direction of the arrows;

Fig. 4 is a view showing the device partly in plan and partly in section, the plane of the section being along the broken line 4—4 in Fig. 1 looking in the direction of the arrows; and

Figs. 5 and 6 are fragmentary elevational views showing constructional details employed in connection with the device.

Referring now to the drawings, and more particularly to Fig. 1, 10 denotes a base on which a pedestal 11 is provided to support a housing 12 in which rotates a scrubbing brush 13 adapted to scrub the arms of surgeons in connection with sterilizing and other prophylactic measures.

The brush 13 here employed has inwardly projecting bristles secured in the cylindrical frame 14, on the outer side of which is demountably mounted a relatively wide gear-wheel 15. This construction is particularly illustrated in Fig. 4, where it is seen that the casing 12 has inwardly extending flanges arranged to hug closely the exterior surfaces of the cylindrical ends of the gear-wheel 15. As shown, an annular strip of packing 16 is inserted in a groove formed in these flanges adjacent to the cylindrical surfaces of the gear-wheel, such packing being adapted to make a substantially fluid tight joint between the brush and its supporting casing. As the gear teeth extend beyond the edge of the cylindrical surfaces of the gear-wheel in the casing 12, advantage of this fact is taken to insure its position within the casing; to this end annular filling members 17 and 17′ are inserted between the cylindrical surfaces of the gear-wheel and the inner surface of the casing 12, which bear lightly against the sides of the gear teeth and maintain the brush in proper position in the casing 12 at all times. Such filler members are effectively retained in place by means of the inwardly projecting flanges of the casing 12, the casing being preferably made in two parts and provided with a central equatorial joint as indicated at 18 for convenience in assembly.

In Fig. 1, the casing 12 is shown broken away on the right hand side back as far as the equatorial joint, thereby disclosing the interior construction and the driving mechanism for the gear-wheel 15. The driving mecha-

nism may be any convenient train leading up through the pedestal 11 that is driven by a suitable power unit assembled as part of the device, as for example, an electric motor 19 mounted on the base 10.

The driving train here shown comprises a gear 20 meshing with the gear-wheel 15 and rotatably supported by a bracket 21 secured on the pedestal 11. The gear 20 has secured thereto in driving relation therewith a bevel gear 22 arranged to mesh with a second bevel gear 23 secured on and driven by the shaft 24, which latter extends vertically up through the top of the pedestal 11. The shaft 24 has a lower end 25 driven by a bevel gear 26 in mesh with a second bevel gear 27 on a horizontally disposed shaft 28 driven through reduction gearing shown generally at 29 by the electric motor 19.

The bracket 21 here employed preferably has a special construction in order to adapt it to the two-fold function of supporting the driving train and supporting the housing 12, so as to be movable independently of the pedestal. Details of a preferred construction of this bracket are shown in Figs. 5 and 6.

In Figs. 5 and 6, the bracket 21 is shown as comprising an inverted L-shaped member having a central web-portion 30 with upstanding ribs 31 and rolled at each end to provide cylindrical journal-like supports 32 and 33, the lower end of the inverted L being integrally secured at 34 to the top of the outer shell of the pedestal 11, there being a pair of upstanding wedge-shaped ribs 35 joining the same in order to impart strength to the connection between the bracket and the pedestal. The rib 31′ on one side of the bracket is preferably enlarged laterally, so as to support an auxiliary U-shaped bracket 36 secured at its base to the bracket 21 by means of the openings 31*a* and 31*b* formed in this rib. The arms of the auxiliary bracket 36 terminate in aligned journal members 37 and 38 respectively, the lower member 37 being arranged to support the shaft 24 and the bevel gear 23; the journal member 38 being arranged to support an extension of the shaft 24 and a driving eccentric 39 which is adapted to impart a second motion to brush 13 by reciprocating the casing 12 in an axial direction.

In order that the casing 12 may be supported so as to execute such second or independent reciprocating motion, it has an extension 12′ adapted to extend over and fit about the bracket 21, clearing the same sufficiently to execute the motion desired, the support for this purpose being had through a pair of pins 42 and 43 which pass horizontally through the extension 12′ and arranged to secure the parts of the casing together. These pins pass through and are supported respectively in the rolled ends 32 and 33 of the bracket 21. These pins preferably have their inner portions threaded, so as to be engaged by and secured in place by stud-bolts as indicated at 42′ in Fig. 4.

Within the extension 12′, a pair of ledges, as indicated at 44 and 45 in Fig. 2, is provided adjacent the eccentric 39. These ledges support channels or ways 46 and 47 respectively in which reciprocate an eccentric-block 48. This eccentric-block is preferably secured on and has an opening substantially the same size as the eccentric, in order to fit in working relation over the same, whereby when the eccentric 39 rotates, the block will be displaced in two directions in a horizontal plane. As the cam-block reciprocates in the ways 46 and 47 along a line parallel to the perpendicular of the plane of the drawings in Fig. 2, it is seen that the other component of the motion of this cam-block causes the housing 12 to execute harmonic motion to and fro along a line in the plane of the drawings, but perpendicular to the shaft 24. When the casing 12 is executing this reciprocating motion, it is seen that the pins 42 and 43 slide back and forth in the rolled-ends 32 and 33.

In order that the gears 15 and 20 shall not get out of mesh when the casing 12 is executing this reciprocating motion, the gear-wheel 15 is preferably made to have a bearing surface of sufficient width that it at no time slides out of engagement with the gear 20. By this arrangement, it is seen that when the shaft 24 rotates, the brush 13 rotates and also reciprocates relative to its pedestal support. It will be readily understood, however, that the number of reciprocations per minute relative to the number of revolutions per minute executed by the brush 13, is merely a matter of design and can be varied as desired by suitably proportioning the size of the gears 15 and 20 with reference to the bevel gears 22 and 23. The preferred arrangement of the bevel gear 22 with reference to the gear 20 is shown in Fig. 2 where the bevel gear 22 is mounted on a short shaft or stud that is journaled in a cylindrical housing 36′ that is an integral part of or otherwise suitably secured to the auxiliary bracket 36.

In order that the housing 12 may be adjusted to convenient scrubbing positions, its mounting with reference to the pedestal 11 is preferably such that it may be adjusted both vertically and angularly about the vertical axis of the pedestal. In accomplishing this adjustment, the pedestal is preferably constructed with an inner shell 51 formed integrally with the base portion thereof, and an outer shell 52 which telescopes thereover, the upper end of which has secured thereto the bracket 21 through the portion 34, as described above. This construction is clearly illustrated in Fig. 3 where it is seen that the outer shell 52 is preferably slit on one side and has lugs extending therefrom as indicated at 53 and 54, which are employed to secure the shell in adjusted positions. The

lug at 54 is preferably threaded in order to engage with the threaded end 55 of a manually manipulated screw 56 which bears upon the lug 53, so that when turned, it can draw the lugs together and cause the outer shell 52 to engage frictionally with the inner shell 51 and thereby secure the same in any desired relative adjustment.

Where the pedestal is thus constructed to telescope in order to be adjusted to different positions, the driving train preferably also is arranged to telescope and to accommodate itself automatically to the adjusted positions. To this end, the upper portion of the driving shaft 24 is shown as connected to the lower portion 25 by means of a universal-joint coupling 57. The driving connection between the shaft 25 and the bevel gear 26 is also accomplished by means of a sliding sleeve 58 keyed upon the shaft 25 and mounted to turn in a journal member 59 secured in a cylindrical spider 60 that is formed interiorly in the lower portion of the pedestal 11. Between the lower end of the journal and the gear 26, there is interposed an anti-friction washer 61. Over the end of the sleeve a similar anti-friction washer 62 is slipped, the sleeve and washers being held in place by the lock-nuts 63 shown in threaded engagement with the upper end of the sleeve. By this arrangement, it is seen that when the outer shell 52 of the pedestal 11 is moved longitudinally thereof, a similar movement is communicated by the shaft 24 to the portion 25 whereby it is caused to slide in the sleeve; also by this arrangement it is seen that the driving engagement of the parts is at all times continued in full effect regardless of the position of the shell 52 on the pedestal 11. It will also be seen that this arrangement permits the shell 52 of the pedestal to be turned about the axis of the pedestal without disturbing the driving connections, other than imparting a slight rotation to the gearing in the extension 12'.

In order that the casing 12 may be raised and lowered with relative ease, it is preferable to compensate for all or for a desired portion of its weight on the pedestal. This compensation may be accomplished in any convenient manner, for example by interposing a spring of sufficient strength between a fixed part of the pedestal and a part which moves with the casing. As here shown this is accomplished by means of the helical spring 65 that is inserted in the inner shell 51 of the pedestal and rests on and reacts against a ledge 66 formed interiorly thereof. The upper end of the spring 65 is adapted to react against the top-collar 67 secured to the outer shell 52, which supports and moves the casing 12.

The reduction gearing shown at 29 as interposed between the motor 19 and the bevel gear 27, may be any suitable driving train which effects the desired ratio in speed-reduction. Small motors generally have a relatively high speed of rotation. It is preferable in consequence to accomplish the speed-reduction desired in two stages. To this end, the projecting shaft of the motor 19 is shown as provided with a driving pinion 70 which is arranged to be in mesh with an offset gear 71. The offset arrangement is clearly shown in Fig. 2. The offset gear 71 has a driving pinion 72 on its shaft arranged to be in mesh with a third gear 73 that is keyed to the shaft 28 driving the bevel gear 27. The motor and reduction gearing are preferably housed in an auxiliary casing shown at 75, since by this means the running parts are not only protected against dust and injury from external sources, but the operators and surgeons using the device are shielded against accident, such as having their clothing and members come in contact with the working parts of the device.

In operation, the device of the present invention is set in a suitable place and arranged to have current supplied to the electric motor 19 for service operations. To scrub the arm of a surgeon, with or without sterilizing agents, the casing 12 is moved to a convenient position so that the surgeon may insert his arm inside the revolving brush 13. This is accomplished by moving the outer shell 52 either up or down, and by turning it about the axis of pedestal 11. When a suitable position is achieved, the hand-wheel 56 is turned until the outer shell is locked in position upon the pedestal. When current is supplied to the motor 19, its revolutions cause driving torque to be transmitted through the reduction train 29, thence through the bevel gears 27–26 to the sleeve 58. This sleeve in turn transmits its motion through the keyed shaft 25–24 and thence to the bevel gears 23–22 to drive the gear 20 which meshes with the gear 15 thereby rotating the brush 13. The extension of the shaft 24 causes the eccentric 39 to rotate at the same speed at which the bevel gear 23 is rotated. The cam in consequence causes the eccentric-block 48 to move and thereby impart lateral motion to the housing 12 relative to the pedestal. This lateral motion of the housing is followed by the brush 13, thereby executing a periodic motion to and fro along its axis, while at the same time revolving to effect the motions of the scrubbing operation desired. The surgeon may insert first one arm and then the other if desired during a single scrubbing operation.

Since certain changes may be made in the above construction and different embodiments of the invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying

drawings shall be interpreted as illustrative and not in a limiting sense.

Having described our invention, what we claim as new and desire to secure by Letters Patent, is:

1. In a surgeon's scrubbing brush the combination comprising a housing open at both ends, guides for said housing to allow reciprocatory action thereof, a driving ring mounted in said housing, a substantially cylindrical brush open at both ends having inwardly extending bristles and being demountably mounted within said driving ring, means for reciprocating said housing on said guides and means to drive said ring and operate said reciprocating means simultaneously.

2. In a surgeon's scrubbing brush the combination comprising a housing open at both ends, bearings in said housing, a gear-wheel mounted on said bearings and within said housing, a substantially cylindrical brush open at both ends having inwardly extending bristles and being mounted within said gear-wheel, a frame, horizontally disposed guiding and supporting means on said frame parallel to the axis of said brush to support said housing for reciprocal action, eccentric-block ways fixed to said housing, an eccentric-block mounted in said ways and an eccentric on said frame to cooperate with said eccentric-block and reciprocate said housing, and means to rotate said eccentric and said gear-wheel to impart to said brush to-and-fro movement along and rotational movement about the axis thereof.

3. In a surgeon's scrubbing brush the combination comprising a housing, reciprocatory guiding means for said housing, a rotatable cylindrical brush open at both ends having inwardly extending bristles and mounted in said housing, means for reciprocating said housing and power driven means for simultaneously rotating said brush and operating said reciprocating means.

4. In a surgeon's scrubbing brush the combination comprising a hollow cylindrical brush open at both ends having inwardly extending bristles, and means for rotating said brush about its longitudinal axis and for imparting to-and-fro movement along said axis.

In testimony whereof we affix our signatures.

ARTHUR C. BUTTS.
NORVIN PERRY.

CERTIFICATE OF CORRECTION.

Patent No. 1,911,547. May 30, 1933.

ARTHUR C. BUTTS, ET AL.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, lines 80 and 84, for "cam-block" read "eccentric-block"; page 3, line 113, for "cam" read "eccentric"; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 8th day of August, A. D. 1933.

M. J. Moore.

Acting Commissioner of Patents.

(Seal)