M. LANGWORTHY.

SURGICAL SAW.

APPLICATION FILED MAR. 5, 1921.

1,417,669. Patented May 30, 1922.

Fig. 1

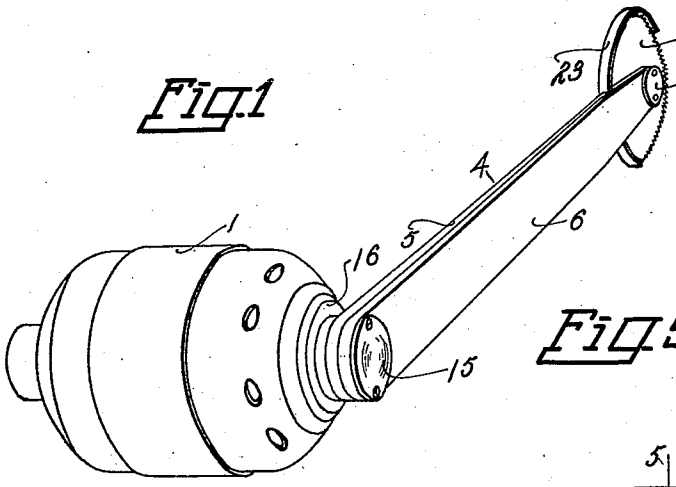
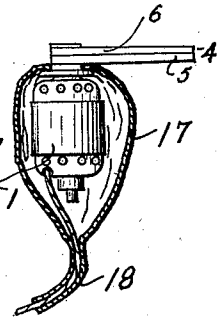


Fig. 9



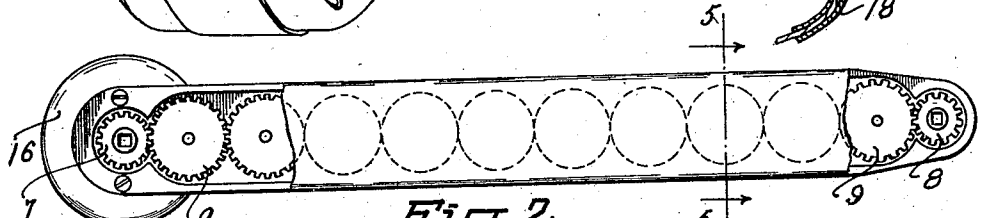


Fig. 2

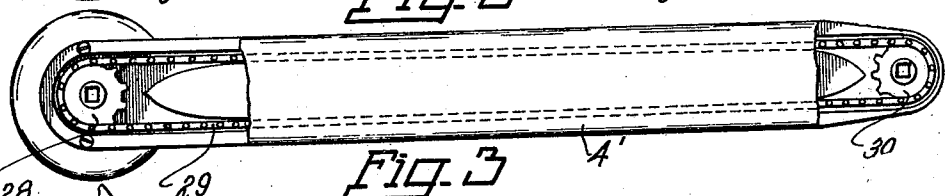


Fig. 3

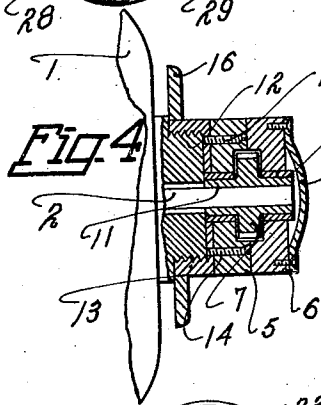


Fig. 4

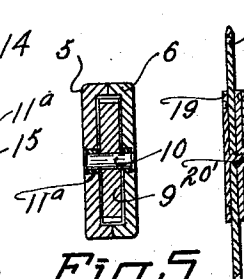


Fig. 5

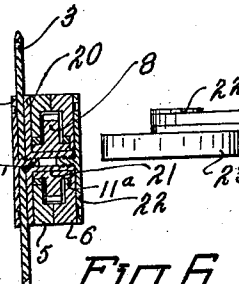


Fig. 6

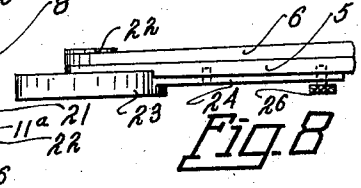


Fig. 8

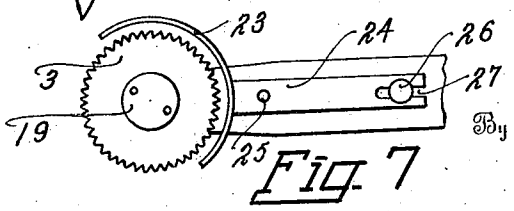


Fig. 7

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SURGICAL SAW.

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To all whom it may concern:

Be it known that I, MITCHELL LANGWORTHY, a citizen of the United States, residing at Spokane, in Spokane County, and the State of Washington, have invented certain new and useful Improvements in Surgical Saws, of which the following is a specification.

My present invention relates to improvements in surgical saws of the motor operated, rotary type, by means of which cranial and other incisions or cuts may be made with accuracy and precision, to required depths.

The primary object of the invention is the provision of an instrument of this character which is comparatively simple in construction and operation and composed of a minimum number of parts which are assembled and capable of being dismantled in such manner as to permit sterilization, and the motor for operating the instrument is adapted to receive a sterilized covering, thus insuring perfect sanitary conditions and cleanliness in the use of the instrument.

By the utilization of my invention many different styles of incisions or cuts, with the instrument at various angles, may be made, and the saw manipulated to penetrate to unusual depths.

The invention consists in certain novel combinations and arrangements of parts, involving the driving motor here illustrated as an electric motor, and certain features of construction, as will be hereinafter more fully pointed out and claimed.

In the accompanying drawings I have illustrated one complete example and a modification of the operating parts thereof, constructed according to the best mode I have thus far devised for the practical application of the principles of my invention.

In the physical embodiment of the invention shown in the drawings—

Figure 1 is a perspective view of a rotary saw and its connected electric motor, the motor being shown without its covering, for convenience of illustration.

Figure 2 is a side view, partly broken away, of the enlarged arm at the end of which the saw is carried, disclosing a train of operating gears within the arm or casing.

Figure 3 is a view similar to Figure 2 with a sprocket drive between the motor end of the saw arm and the saw.

Figure 4 is a transverse sectional view at the junction of the saw arm with the motor.

Figure 5 is a sectional view at line 5—5 of Figure 2.

Figure 6 is a transverse sectional view at the end of the arm, through the rotary saw operatively carried thereby.

Figure 7 is a side view of the arm at the saw end showing the detachable saw guard.

Figure 8 is an edge view of the device of Figure 7.

Figure 9 is a small view illustrating the sterilized covering over the motor and the electric wires thereto.

In the preferred form of the invention as illustrated in the drawings I have utilized a well known or standard type of electric motor 1 with its driving shaft 2 protruding therefrom, and the saw 3 is of the disk type, of which various sizes may be used to adapt it to different conditions. The saw is operated from the motor and carried at the side of a tubular arm or casing 4, which is made up of a pair of complementary grooved plates 5 and 6 suitably attached together, and readily detachable, in order that the various parts may be sterilized and cleansed.

The tubular arm is of a size and shape to be conveniently held by the operator in manner similar to the manner in which a pen or pencil is retained in the hand, and within the tubular arm is encased a train of operating gears including the driving gear 7, a driven gear 8 at the saw end of the arm, and a series of intermediate, co-acting gears 9, the latter being journaled by their trunnions 10 in the complementary plates forming the tubular arm, and all the gears being encased in the flat tubular arm 4 as shown.

As best seen in Figure 4 the driving gear 7 is fixed on the end of the motor shaft 2, by means of its elongated hub or sleeve 11 which bears against the threaded boss 12 of the motor, through which boss the motor shaft projects as shown. An attaching nut 13 is threaded over the end of the boss, and the plate 5 of the arm 4 is secured to this nut by means of attaching screws 14 as shown. Bearing rings 11[a] may be interposed between the hub 11 and the two perforated ends of the plates 5 and 6 of the arm, to reduce wear and friction, and insure a smooth rotation of the driving gear 7, while a cap 15 may be attached, in the form of a concavo-convex disk or plate, to the outer

face of the plate 6 to shield the bearing of the gear. All of the gears are encased within the complementary grooves of the two plates 5 and 6, and the train of gears is retained in alinement within the tubular arm in order to be effective in their operation of transmitting the power of the motor through its shaft and the gears, to the saw.

A flange or disk 16, provided with an open center is fitted over the nut 13 adjoining the motor, and the bag 17 which covers the motor is drawn tight around this flange to secure the bag, while a tubular extension 18 is provided on the bag for the electric conductors or wires of the motor. Thus, the arm and train of gears, together with the saw, may be sterilized, and the bag 17 and its extension 18 may also be sterilized to be used as a sanitary covering for the motor and wires, as a protection against infection.

The saw 3, which is located laterally of the arm, and projects beyond its free end, is attached to the arm by means of a cap plate or disk 19, and a complementary, inner plate 20, between the saw and its arm is provided with a sleeve 21 to which the driven gear 8 is fixed. As best seen in Figure 6 the outer disk 19 is fashioned with a central pin 20′ passing through the sleeve 21, and at the outer side of the arm remote from the saw a third cap plate 22 is attached to the arm by screws as seen in Figure 1. Thus it will be apparent that saw 3, the plate 20, its sleeve 21, and the driven gear 8 revolve together, the saw being guided and held in stable position by the plate 19 and the arm, and the journal bearing being closed by the retaining plate 22 attached at the outer side of the arm as shown.

The saw is provided with a guard or shield 23 of arcuate shape which encases a portion of the periphery of the saw or its cutting teeth, and this guard is fashioned with an attaching bracket 24 secured to the arm 4 by a screw 25, and held in rigid position by the set pin 26 passing through the slot 27 of the bracket and secured in the arm which latter is tapped for the reception of the screw. The saw may be of various sizes, and the guard is also made in various sizes complementary to the saw, and these elements may be changed at will, to adapt them for different uses.

In Figure 3 a modified form of power transmission is illustrated, wherein the driving sprocket 28, chain 29 and driven sprocket 30 are encased within the arm 4′ and the saw (not shown) is operated through this sprocket drive from the motor 1^a.

The tubular arm is of convenient size to be grasped between the fingers and thumb, and the tapered saw-end of the arm readily adapts the arm for receiving and carrying the saw at the side thereof as indicated. The arm, which forms a casing for the gears or transmission mechanism may be highly polished for cleanliness and the operating parts are of course sterilized preliminary to surgical operations. The arm may readily be manipulated to attain cuts at various angles and depths for cranial and other cuts, and the laterally disposed saw affords an instrument which may be manipulated with facility and accuracy in the operations. In preparing the instrument, the arm which has previously been sterilized in boiling water is attached to the motor, which has been encased in the sterilized bag with the cords in the extension, and a draw string or other tension device is used to close the bag over flange 16. The tubular arm, which performs also the function of a handle, is grasped by the operator, and the usual manipulations are proceeded with.

What I claim and desire to secure by Letters Patent is—

1. The combination with a motor and its shaft and a threaded boss on said motor, of a tubular arm, a nut on said arm for attachment to said boss, a driving wheel on said shaft located in the tubular arm, a driven wheel encased within the free end of said arm and operatively connected with said drive wheel, and a laterally disposed rotary saw operatively connected with said driven wheel.

2. The combination with a motor, of a detachable, tubular arm and transmission mechanism therein, driving mechanism connecting said motor and transmission mechanism, a driven member journaled in the free end of the arm and actuated from said transmission mechanism, a rotary saw rigid with said member, disposed at the side of the arm, and projecting beyond its free end, and a detachable guard secured to said arm and encircling part of said saw.

In testimony whereof I affix my signature.

MITCHELL LANGWORTHY.