July 29, 1930. E. J. BEATTIE 1,771,764

CUTTING DEVICE

Filed Nov. 19, 1928

Fig. 1.

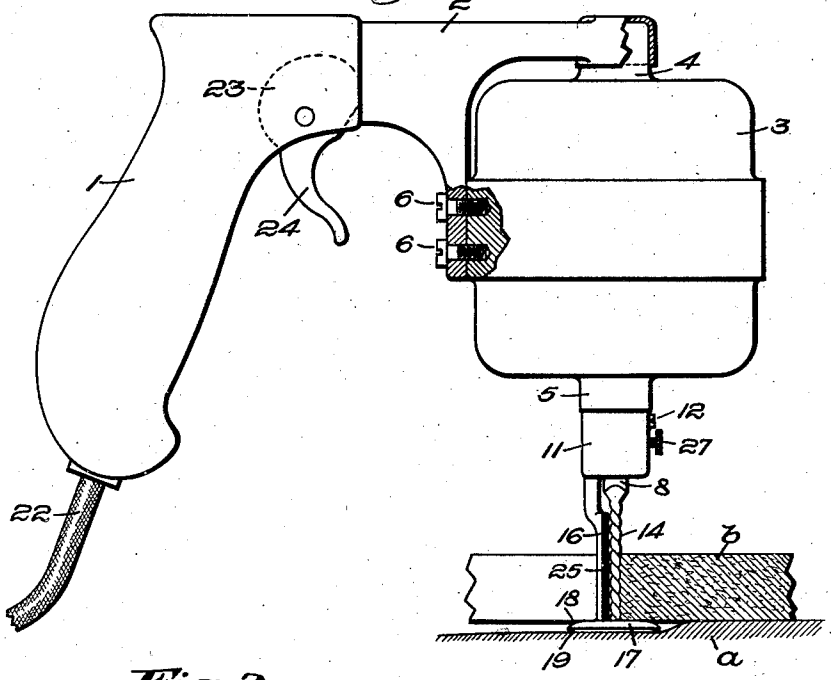


Fig. 2

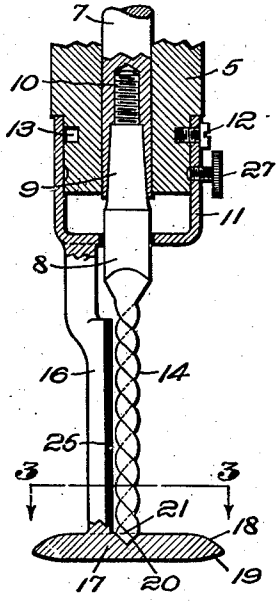
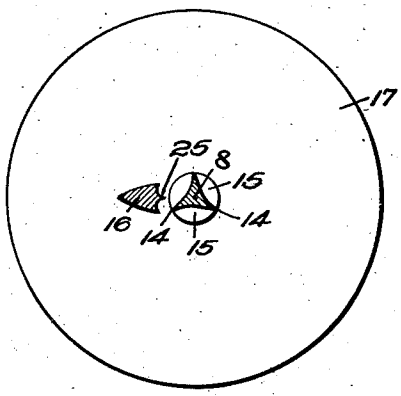


Fig. 3.



Inventor:
Ernest J. Beattie,
by Emery, Booth, Janney & Varney
Attys.

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UNITED STATES PATENT OFFICE

ERNEST J. BEATTIE, OF FALL RIVER, MASSACHUSETTS, ASSIGNOR TO CLIFTON B. LEECH, OF FALL RIVER, MASSACHUSETTS

CUTTING DEVICE

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This invention aims to provide a novel cutting device, more particularly designed for cutting plaster casts employed in surgery and the like to facilitate removal of the same.

In applying these casts, a common practice is to wrap the limb or part that is to be enclosed with one or more layers of non-absorbent cotton sheet wadding and then apply thereto several layers of preferably wet cotton gauze or other open mesh fabric impregnated with dry plaster of Paris, the latter also being introduced between the windings until the requisite thickness of material has been produced, whereupon the entire mass is wet with water, which causes the plaster of Paris to assume a thoroughly hard and inflexible condition with the windings of fabric incorporated therein, such windings acting as reinforcements to prevent destructive cracking or crumbling of the plaster of Paris.

When the plaster cast shall have been in place the requisite length of time, usually through periods of weeks and sometimes months, it becomes a considerable task to remove the same; it is so hard and rigid and oftentimes the sensibilities of the patient are such as to make it extremely difficult to fracture it to permit convenient removal.

Various attempts have been made to provide cutting devices that could be used to saw or cut the cast in various directions to permit of its removal, but, so far as I know, such attempts have not resulted in anything practicable. Small saws have been tried, but, while they are efficient in segregating the cast into parts that could be readily removed, they have been impracticable because the substantial diameter of a saw prevents the tool being advanced in any but a substantially direct line, that is to say, it is impossible to swing it around a short curve such as is frequently desirable if the cast is to be conveniently removed and without suffering to the patient.

My invention provides a tool which is convenient to operate and which may be turned upon comparatively short radii, this greatly conveniencing its use.

In the drawing I have shown an illustrative embodiment of my invention, and, referring to the drawing:

Figure 1 is a side view, partial section, of an illustrative embodiment of my invention;

Fig. 2 is an enlarged vertical cross-section detail of the cutting tool and its associated parts; and

Fig. 3 is an enlarged horizontal section taken on the line 3—3 of Fig. 2, looking downward.

In the particular embodiment of my invention selected for illustration and shown in the drawing, referring first to Fig. 1, my improved tool comprises a convenient and preferably pistol-like handle 1, from which projects an arm 2 bifurcated at its end.

In the bifurcated end of this arm is mounted a self-contained electric motor 3 which furnishes a convenient power means for operating the cutting tool. The motor is arranged in a suitable casing provided at its two ends with projecting bosses 4 and 5 in which the armature is mounted to turn, the fields of the motor being enclosed within the casing 3 and protected by the latter.

One branch of the bifurcated arm 2 is extended across the end of the motor and provided with a socket in which the boss 4 is received, and the other branch of said bifurcated arm is extended down along the side of the motor casing and is secured as by screws 6 to said casing.

The armature shaft is extended through and beyond the boss 5, as best shown at 7 in Fig. 2, and the end of the armature shaft is socketed to receive and hold the end of the cutting tool 8.

The tool may be secured to the armature shaft in any desired manner, but preferably the socket is tapered to receive the tapered end 9 of the tool and at the inner end of the socket a threaded recess is provided to receive the threaded end 10 of the cutting tool, and, as the tool is screwed into the extreme end of the socket, the tapered portion of the tool is drawn into firm contact with the tapered walls of the socket to furnish a rigid and secure attachment of the tool to the armature shaft.

The boss 5 is reduced in diameter at its

end to receive the cap 11, through which the tool 8 protrudes, and the cap is provided with preferably a plurality of inwardly projecting lugs conveniently formed by screws 12 which enter and travel freely in a circumferential groove 13 cut in the boss. This construction holds the cap permanently in position upon the end of the boss, but permits it to swivel or turn freely upon the boss.

The tool 8 is novel in that it is relatively long and of small diameter and is provided with spiral cutting teeth or lands 14, best shown in Fig. 3, with wide and open clearances or flutes 15 between them. These teeth or lands are so made to facilitate the cutting of substances or materials of the nature of plaster of Paris reinforced with or in which is incorporated cotton fibre and the like. Such a substance requires for the best results cutting teeth of considerable depth and of rather small cross-section and with relatively large clearances between them and of a high spiral pitch to cause the tool to free itself and the scarf as quickly as possible of the chips and particles removed in the act of cutting.

To steady and support the device in use and to facilitate its introduction to and passage through the work and to protect the person of the patient, the swivel cap 11 is provided with a depending strut 16 which extends down along the side of the cutting tool 14, preferably parallel thereto, and serves as a support for the preferably disc-like guiding and supporting foot 17. This foot is shown as broad and flat so that it may pass readily between the person of the patient (indicated at *a* in Fig. 1) and the plaster cast (indicated at *b* in Fig. 1) and so facilitate the cutting operation. The edge of the guiding foot 17 is preferably beveled above and below its median plane as indicated at 18, 19, the upper bevel 18 being preferably the larger and more pronounced.

The guide foot at its upper face is provided with an inverted pyramidal socket 20 to receive the tapered end 21 of the cutting tool, said socket serving to steady the end of the cutting tool and the latter in turn serves as a pivot point or center about which the guide foot 17 may turn about the axis of the cutting tool which is also the axis of the swivel cap 11, the construction being such that the swivel cap and the guide foot joined by the strut 16 may turn freely around and about the tool and about the axis of the latter to facilitate the advancement and turning of the tool in a manner that will be presently described.

The current for the motor 3 may be conducted thereto in a suitable manner, as by the flexible conductor 22 (Fig. 1) shown as entering the tip of the handle 1 into and through which it passes to the motor, controlled by a conventional switch, not shown, but typified by the dotted line 23, operable by means of a trigger-like handle 24.

The strut 16 is shown provided adjacent the cutting tool with a clearing fin 25, which stands closely adjacent the cutting tool and serves to remove from the latter any portions of the fabric or of the substance of the cast itself that might tend to adhere to the cutting tool and interfere with the operation thereof. The presence of this clearing surface, in juxtaposition to the circle of travel of the cutting edges of the tool, also assists the spiral teeth or lands of the cutter in lifting the particles removed from the cast vertically to and above the top of the cast, where they may be readily pushed aside.

In operation, the cast having served its purpose and being ready for removal, the surgeon, seizing the handle of the cutting device as he would the handle of a pistol and pressing the trigger switch 24 to set the motor in operation, presents the cutting tool to an edge of the cast much as illustrated in Fig. 1, being careful that the edge of the flat guide foot 17 is pushed carefully between the inner edge of the cast and the skin of the member about or upon which the cast has been applied. Thereafter, as the device is pushed firmly and steadily forward, the rapidly rotating cutting tool 14 acts much like a common form of milling cutter and cuts its way laterally and parallel with its axis into and through the substance of the cast, cutting a path or scarf in any desired direction or directions therethrough until the cast has been separated into a plurality of portions or fragments, which may be readily separated and removed without pain to the patient.

Because of the small diameter of the cutter in the direction in which it is advanced, the path of the cut may be made as sinuous as desired and even relatively sharp corners may be turned without inconvenience, and this turning about curves of short radii is greatly facilitated by the swivel mounting of the guide foot 17 and its supporting strut 16, which permits said guide foot and strut to trail after the cutter, swinging from side to side as may be necessary, like the rudder of a ship, but at the same time always maintaining the guide foot sufficiently firm in its position to assure proper operation of the cutting tool.

The swivel cap 11 is shown provided with a clamping screw 27 having a knurled head for convenient manipulation by the fingers and which may be screwed inward upon the boss 5 to clamp the cap and its attached strut and guide foot against swiveling movement when the latter is not desired.

My invention is not limited to the particular embodiment shown.

Claims:

1. A portable surgeon's plaster cast cutting device comprising a carrier having a

handle to be grasped by the hand of the operator; a swiveling guide foot mounted thereon; a tool holder mounted on said carrier to rotate about an axis perpendicular to said guide foot; and means to rotate said tool holder.

2. A portable surgeon's plaster cast cutting device comprising a carrier; a guide foot mounted thereon; a tool holder mounted on said carrier to rotate about an axis perpendicular to said guide foot; means to rotate said tool holder; and a side cutting tool 8 mounted in and to be rotated by said tool holder.

3. A portable surgeon's plaster cast cutting device comprising a carrier; a guide foot mounted thereon; a tool holder mounted on said carrier to rotate about an axis perpendicular to said guide foot; means to rotate said tool holder; and a side cutting tool 8 mounted in and to be rotated by said tool holder; said tool having a supporting bearing 20 in said guide foot.

4. A portable surgeon's plaster cast cutting device comprising a carrier provided with a handle; a guide foot mounted thereon; a tool holder mounted on said carrier to rotate about an axis perpendicular to said guide foot; an electric motor also mounted on said carrier and connected with and to rotate said tool holder; a flexible electric conductor leading to said motor; and a finger control switch for said motor mounted adjacent said handle in position to be operated by a finger of the hand grasping said handle.

5. A portable surgeon's plaster cast cutting device comprising a carrier; a guide foot swivelly mounted thereon; a tool holder mounted on said carrier to rotate about an axis perpendicular to said guide foot; and means to rotate said tool holder.

6. A portable surgeon's plaster cast cutting device comprising a carrier; a guide foot mounted thereon; a tool holder mounted on said carrier to rotate about an axis perpendicular to said guide foot; means to rotate said tool holder; and stripping means for the cutting tool.

7. A portable surgeon's plaster cast cutting device comprising a carrier; a guide foot mounted thereon and to swivel with relation thereto; a tool holder mounted on said carrier to rotate about an axis perpendicular to said guide foot; means to rotate said tool holder; and means to secure said guide foot against swiveling action when desired.

8. A portable surgeon's plaster cast cutting device comprising a carrier; a guide foot mounted thereon; a tool holder mounted on said carrier; a side cutting tool 8 mounted thereon and to be rotated thereby; and means to rotate said tool holder.

In testimony whereof, I have signed my name to this specification.

ERNEST J. BEATTIE.