

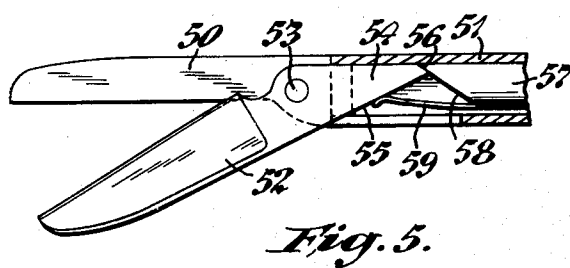
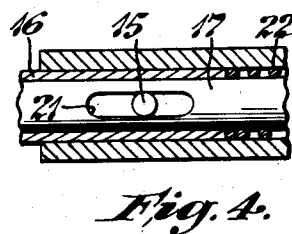
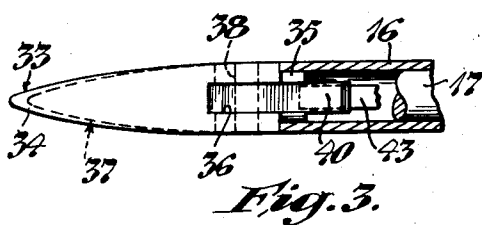
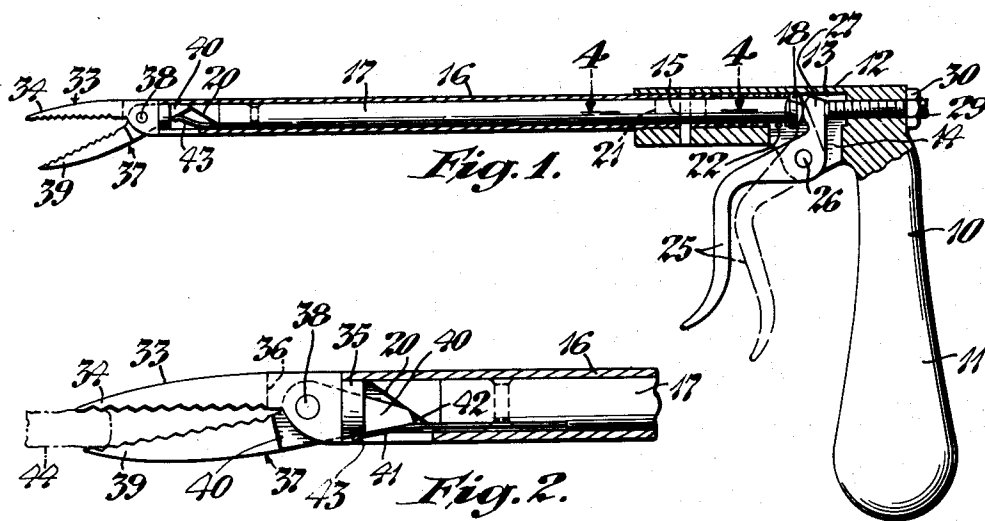
Aug. 15, 1950

W. J. MILLER

2,518,994

FORCEPS

Filed Aug. 21, 1946



Inventor:
William J. Miller
By
William C. Hall
Attorney.

UNITED STATES PATENT OFFICE

2,518,994

FORCEPS

William J. Miller, Glendale, Calif.

Application August 21, 1946, Serial No. 691,899

4 Claims. (Cl. 128—321)

1

My invention relates generally to surgical tools, and particularly to forceps and other devices having pivoted operating elements such as plier jaws, shear blades, and the like, and manually operable means located at a point remote from the operating elements for actuating the same. More specifically, the invention pertains to forceps of particularly small dimensions adapted to be inserted into relatively small but deep cavities or wounds in the human body to remove pieces of bones, tissue, bullets, gauze, and other foreign objects.

A particular object of the invention is to provide a forceps tool having a stationary jaw element adapted to guide the operating end of the tool into a cavity, and a second jaw element pivoted with respect to the first element and adapted to be moved toward said element to firmly grip an object therebetween.

Another object is to provide a device of the character referred to in which the movable jaw element is actuated by simple cam means, thereby avoiding the use of pivoted operating levers, screws, and other parts, which are liable to become worn and inoperative.

Another object is to provide a device of the type indicated having a handle portion adapted to be gripped in the hand of the operator, a finger lever pivoted on the handle, a tube secured to and projecting from the handle, a plunger slidable in the tube and operatively connected to the finger lever to be actuated thereby, a stationary jaw element and a pivoted jaw element arranged at the outer end of the tube, and interengaging cam means on the pivoted jaw element and plunger, sliding movement imparted to the plunger by said finger lever causing said pivoted jaw member to move toward the stationary jaw element to grip an object firmly therebetween, and spring means for returning the several parts to inoperative position when said finger lever is released.

Another object is to provide a device of the type specified which is comparatively simple in construction, economical to manufacture and highly efficient in performing its intended function.

Another object is to provide operating means for actuating the relatively pivoted elements of various tools, the present improved means being particularly adapted to actuate the pivoted blades of shears and the like.

Further objects of the invention are set forth in the following specification which describes two embodiments thereof, by way of example, as il-

2

lustrated by the accompanying drawing. In the drawing:

Fig. 1 is a side elevational view of a forceps tool constructed in accordance with my invention, certain outer parts being shown in section to disclose the internal elements;

Fig. 2 is an enlarged side view of the forward end of the device, showing the jaw elements moved together to grip an object therebetween;

Fig. 3 is a part-sectional plan view of the forward end of the device;

Fig. 4 is a longitudinal sectional view, taken on line 4—4 of Fig. 1; and,

Fig. 5 is a part-sectional side elevation of a pair of scissors embodying my improved operating means.

Referring first to Figs. 1 to 4 of the drawing, the improved forceps comprise a handle member 10 having a hand grip 11, and a bearing portion 12 extending laterally from the hand grip 11. The bearing portion 12 has a longitudinal bore 13 and a slot 14 communicating with the bore. Held in the bore 13, by means of a transverse pin 15, is a tube 16, and adapted to slide axially in the tube is a plunger rod 17 having a head 18 at its inner end and an inclined cam face 20 at its outer end. The pin 15 extends through an elongated slot 21 in the plunger 17. The pin 15 thus serves to prevent rotation of the plunger 17 in the tube 16 and also functions to retain the inner end of the tube within the bearing portion 12. A coil spring 22 surrounding the plunger with its opposite ends seated against the inner end of the tube 16 and the head 18, respectively, serves to normally slide the plunger rearwardly. A trigger-like finger lever 25 is pivoted on a pin 26 extending transversely across the slot 14, and has an upwardly projecting lug 27 adapted to engage against the head of the plunger 17 and a downwardly projecting finger-piece adapted to be engaged by the index finger of the operator. The inwardly sliding movement of the plunger rod 17, under the influence of the spring 22, is limited by the engagement of the lug 27 of the finger lever 25 with the inner end of an adjustable stop screw 29 screwed through the handle member 10, a check-nut 30 on the screw serving to retain the screw in its position of adjustment.

Mounted at the outer or forward end of the tube 16 is an upper, stationary jaw element 33 having a relatively pointed nose portion 34 which may be serrated on its under surface. The element 33 has a rearward cylindrical portion 35 which is secured within the end of the tube 16

3

in any suitable manner such as by forcing it therein. The upper jaw element 33 is slotted longitudinally, as shown at 36, to receive a lower jaw element 37, a pin 38 extending transversely across the slot 36 and through holes in the two elements to pivot the lower jaw element 37 to the upper jaw element 33. The element 37 has a forwardly projecting widened nose portion 39, which is preferably serrated, and a rearwardly projecting finger 40 provided with an inclined lower edge 41 and a relatively short cam surface 42 at its extremity. A leaf spring 43 carried by the forward end of the plunger rod 17 engages the edge 41 to normally pivot the rearward finger 40 upwardly to separate the nose portions of the jaws.

The forceps device operates in the following manner:

Assuming that the parts of the device are in the inoperative position shown by full lines in Fig. 1, when it is desired to grasp an object between the jaws 33 and 37 the hand grip is held in the palm of the hand and the device moved toward the position where the object is located. When an object is to be removed from a wound, for example, the tube 16 is inserted in the wound, and during this operation the jaws 33 and 37 may be closed together and later opened to embrace the object. To grasp the object between the jaws, the finger lever 25 is depressed by the index finger in the manner indicated by dash lines in Fig. 1. Pivotal movement of the finger lever 25 in this direction causes its upper end or lug 27 to force the plunger rod 17 outwardly, whereupon its cam face 29 engages the cam surface 42 of the lower jaw member 37 to pivot the latter in clockwise direction, against the action of the spring 43, to grip the object 44 (Fig. 2) firmly between the two jaws. With the object 44 thus held between the jaws the device is removed from the wound or cavity to extract the object. When pressure against the finger lever 25 is relieved, the coil spring 22 returns the plunger rod 17 and finger lever 25 to first position, and the leaf spring 43 opens the jaws 33 and 37 to release the object.

It will be apparent from the above that my improved forceps tool operates to positively grip objects between its jaw elements, and the jaw elements are conveniently operated from an end of the tool relatively remote from the jaws. As a particular feature of improvement, one of the jaws is stationary while the other jaw member is movable toward and away from the stationary jaw member, thereby simplifying the construction and reducing the number of moving parts to a minimum. As another feature, the movable jaw is actuated by sliding cam means so that the construction is further simplified and a positive actuation assured. While the device shown in Figs. 1 to 4 is designed primarily for surgical use, it will be readily understood that the features of construction may be advantageously applied to pincers, pliers, and similar tools having a variety of uses.

The improved actuating means described above may be utilized for operating scissors or shears of the type disclosed in Fig. 5 of the drawing. In this modified construction, a stationary shear blade 50 is secured to the forward end of the tube 51 and a movable shear blade 52 is pivoted to the stationary blade by means of a pin 53. The movable blade 52 has a rearward finger 54 having an inclined edge 55 and a cam surface 56. A plunger rod 57 is slidable in the

4

tube 51, and has an inclined cam 58 engageable with the cam surface 56 of the blade 52 to pivot the latter toward the stationary blade 50 to effect a shearing action. The plunger rod 57 may be slid by means similar to that shown in Figs. 1 to 4, and the rod carries a spring 59 engageable with the inclined edge of the blade 52 to return the latter to inoperative position.

While I have herein shown and described my improved tool as embodied in two preferred forms of construction, by way of example, it is to be understood that other changes may be made therein without departing from the spirit or scope of the invention. Therefore, without limiting myself in this respect, I claim:

1. In a tool of the class described, a rigid tube having a hand grip extending transversely from one end and a stationary jaw-like member extending longitudinally from the other end, a second jaw-like member pivoted at the latter end of the tube and adapted to pivot toward and away from the stationary jaw member, a trigger pivotally mounted at the first end of the tube in front of the grip, a rigid plunger slidably mounted in the tube, one end of the trigger extending into said tube in engagement with one end of the plunger, interengageable cam means on the other end of the plunger and on the inner end of the second jaw-like member and operative, when said plunger is slid toward the second jaw-like member, to rock the latter about its pivot, and resilient means on said plunger engaging the inner end of said second jaw-like member to maintain said cam means in engagement.

2. In a tool of the class described, a rigid tube having a hand grip extending transversely from one end and a stationary jaw-like member extending longitudinally from the other end, a second jaw-like member pivoted at the latter end of the tube and adapted to pivot toward and away from the stationary jaw member, a trigger pivotally mounted at the first end of the tube in front of the grip, a rigid plunger slidably mounted in the tube, one end of the trigger extending into said tube in engagement with one end of the plunger, and cam means operatively connecting the other end of the plunger with the inner end of the second jaw-like member for rocking the same about its pivot, the latter end of the plunger having a spring for resiliently holding the inner end of the second jaw-like member against the cam means when the plunger is shifted toward the second jaw-like member by the trigger.

3. In a tool of the class described, a rigid tube having a hand grip extending transversely from one end and a stationary jaw-like member extending longitudinally from the other end, a second jaw-like member pivoted at the latter end of the tube and adapted to pivot toward and away from the stationary jaw member, said second jaw-like member having a cam surface disposed within the tube, a trigger pivotally mounted at the first end of the tube in front of the grip, a rigid plunger slidably mounted in the tube, one end of the trigger extending into said tube in engagement with one end of the plunger, the other end of the plunger having a bevelled end adapted to engage the cam surface of the second jaw-like member for rocking the same about its pivot when the plunger is forced towards the same by the trigger, and a spring on said plunger engaging the inner end of said second jaw-like member to maintain said cam surface and said bevelled end in engagement.

4. In a tool of the class described, a rigid tube

5

having a hand grip extending transversely from one end and a stationary jaw-like member extending longitudinally from the other end, a second jaw-like member pivoted at the latter end of the tube and adapted to pivot toward and away from the stationary jaw member, a trigger pivotally mounted at the first end of the tube in front of the grip, and a rigid plunger slidably mounted in the tube, one end of the trigger extending into said tube in engagement with one end of the plunger, the other end of the plunger having a bevelled end adapted to engage the inner end of the second jaw-like member for rocking the same about its pivot when the plunger is forced towards the same by the trigger, the latter end of the plunger having an extended resilient arm for engaging the inner portion of the second jaw-like

6

member at the side opposite the bevelled end of the plunger for holding the former against the latter.

WILLIAM J. MILLER.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,113,246	Wappler	Apr. 5, 1938

FOREIGN PATENTS

Number	Country	Date
89	Great Britain	Jan. 2, 1900
61,503	Germany	Mar. 18, 1892