

April 8, 1941.

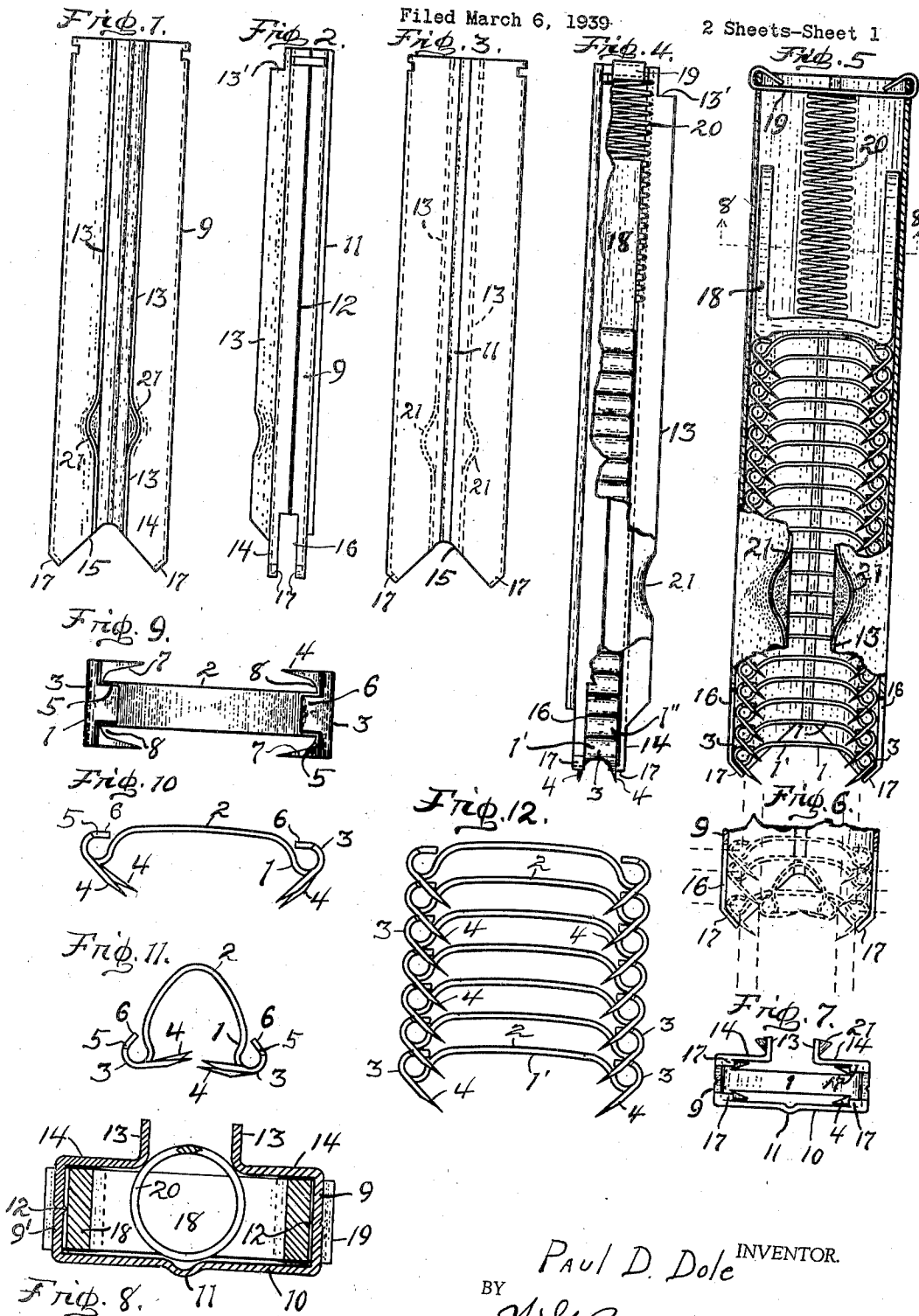
P. D. DOLE

2,237,589

MAGAZINE FOR SURGICAL LIGATURES

Filed March 6, 1939.

2 Sheets-Sheet 1



Paul D. Dole INVENTOR.
BY *J. E. Burns* ATTORNEY.

April 8, 1941.

P. D. DOLE

2,237,589

MAGAZINE FOR SURGICAL LIGATURES

Filed March 6, 1939

2 Sheets-Sheet 2

Fig. 13.

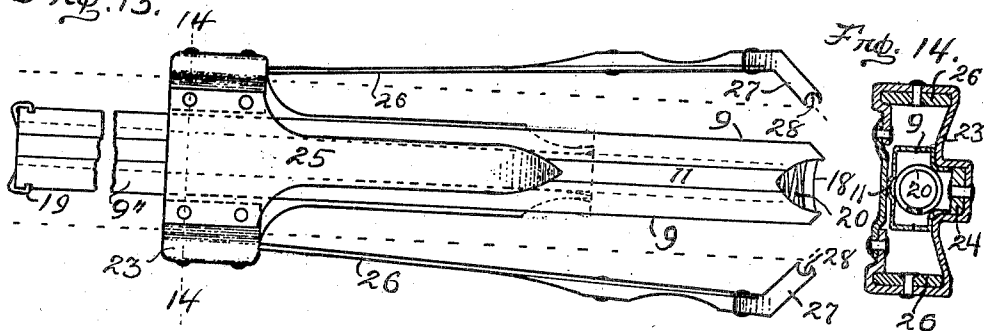


Fig. 14.

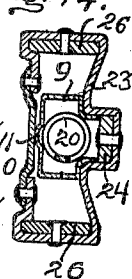


Fig. 15.

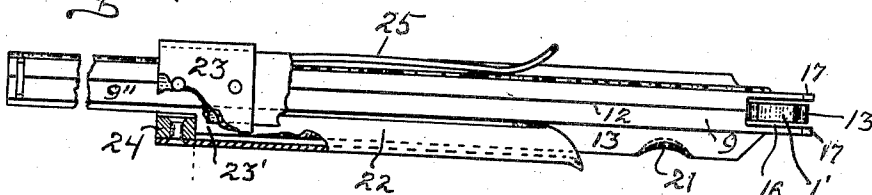


Fig. 16.

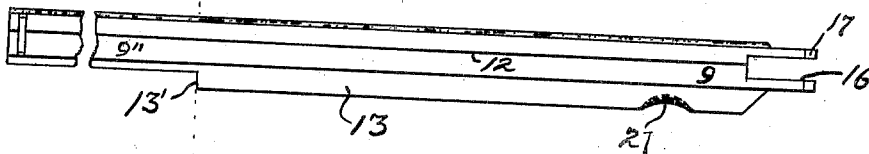


Fig. 17.

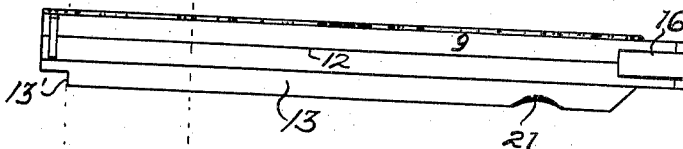
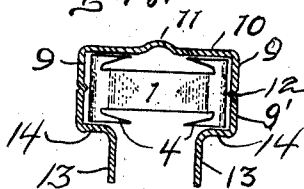


Fig. 18.



Paul D. Dole INVENTOR.
BY *G. G. Burns* ATTORNEY.

UNITED STATES PATENT OFFICE

2,237,589

MAGAZINE FOR SURGICAL LIGATURES

Paul D. Dole, Fort Wayne, Ind., assignor of one-half to Edward H. Kruse, Fort Wayne, Ind.

Application March 6, 1939, Serial No. 260,093

5 Claims. (Cl. 1—56)

This invention relates to surgical ligatures and magazines therefore adapted for use in conjunction with an applicator for applying the ligatures to close incisions and lacerations in flesh.

An object of the invention is to afford a metallic ligature in the form of a clip shaped in such manner as to be without pockets or crevices thus to facilitate sterilization of the clips and prevent secretions of infectious matter thereon.

Another object of the invention is to provide a magazine adapted to hold therein nested clips in readiness to be applied successively as required, with use of suitable forceps, and which magazine is so constituted as to have contact with the clips, serried therein, only at minute points, thus to permit thorough circulation within the magazine and about the clips of the sterilizing agent when applied.

Other objects and advantages of the invention appear in the following description.

An illustrative embodiment of the invention is shown in the accompanying drawings, in which—

Fig. 1 is a bottom plan view of the shell for a clip-holding magazine;

Fig. 2 is a side view projected from Fig. 1;

Fig. 3 is a top plan view projected from Figs. 1 and 2;

Fig. 4 is a side view of the magazine drawn to an enlarged scale, portions thereof being cut away;

Fig. 5 is a bottom plan view projected from Fig. 4, portions being cut away;

Fig. 6 is a fragmentary plan view projected from Fig. 5;

Fig. 7 is a front end view projected from Fig. 6;

Fig. 8 is a cross-sectional view of Fig. 5 on the line 8—8 thereof;

Fig. 9 is a rear view drawn upon an enlarged scale showing a clip formed in accordance with the invention;

Fig. 10 is a side elevation projected from Fig. 9;

Fig. 11 is a side elevation of the clip shown in Fig. 10 after being clinched;

Fig. 12 is a side elevation showing a group of clips nested in serried order;

Fig. 13 is a top plan view of an instrument of the character used for applying the ligatures contained in the magazine, the magazine being included in the view;

Fig. 14 is a cross-sectional view of Fig. 13 on the line 14—14 thereof;

Fig. 15 is a side view projected from Fig. 13, portions thereof being broken away;

Fig. 16 is a side view of a magazine shell of the form shown in Figs. 13—15;

Fig. 17 is a similar view of a magazine shell without the elongation shown in Figs. 13—16; and

Fig. 18 is a cross-sectional view of the magazine shell with a clip shown positioned therein.

The illustrative embodiment of the invention consists of a metallic surgical ligature, or clip, shaped particularly to facilitate nesting and sterilization thereof while nested, and a magazine for holding the nested clips therein, and which is removably positioned in suitable forceps adapted for applying the clips as required in successive order.

The ligature

A preferred form of the ligature is constituted of a clip 1 made of a strip of thin plate metal shaped to have a narrow middle backwardly arched portion 2, rounded backturned ends 3 and forwardly convergent spurs 4 disposed upon each side of the clip and that extend from the ends thereof. The terminals of the back-turned ends 3 have made therein notches 5 between which extend corresponding continuations constituting tongues 6. The notches permit the spurs of one clip to straddle the corresponding tongues of an adjacent clip when said clips are nested together. The spurs 4 of the clip are made with sharp pointed ends, and their inner edges 7 are shaped so that juncture thereof with the corresponding edge of the narrow back 2 is such as to afford a wide crotch 8 thereby to prevent secretions of infectious or other foreign matter or permit ready removal of same by sterilization of the clips.

The clips are shaped so that the pointed ends of the spurs upon the opposite ends thereof are spaced wide apart, as shown in Fig. 10, and the metal strip is made of such pliant metal as permits bending of the back portion 2 which causes the sharp points of the spurs on one end of the clip to closely approach those on the other, as shown in Fig. 11, such as occurs when the clip is applied in forming a suture.

In Fig. 12 a group of clips are shown nested together in readiness to be encased conveniently in a suitable holder preparatory for use.

The magazine

One preferred form of magazine for holding the nest of clips, as shown in Figs. 1 to 3 in-

clusive and Fig. 17, consists of a hollow shell 9 made of thin sheet metal shaped to have a top 10 provided with a central longitudinal rib 11 that projects upwardly, and each side having an inwardly protruding longitudinal ridge 12.

The sides 9' of the shell (Fig. 18) terminate with flanges 13 that are parallel with the sides and are spaced apart from each other, there being corresponding inwardly extending longitudinal ledges 14 that partially restrict the open bottom of the shell, and an offset in each flange to provide a shoulder 13' hereinafter mentioned. The top of the shell, at its forward end, has made therein a notch 15 having divergent edges, and the ledges 14, at their forward ends, have corresponding outwardly divergent edges. Also, the sides 9' of the shell, at their forward ends, have slots 16 that extend through their outer extremities. There are also formed at the outer ends of the shell, contiguous with the top and the ledges, laterally intumed fingers 17 that partially restrict the opening through the front end of the shell.

Within the shell 9 is disposed a plunger 18, preferably U-shaped, that has longitudinal movement therein, and in the rear end of the shell is secured a cross-bar 19, between which plunger and cross-bar there is positioned an expansion spring 20 that tends to move the plunger forwardly in the shell. The clips are arranged in a nested group between the plunger 18 and the fingers 17 so that the spurs converge toward the open end of the shell. The ends 3 of the forwardmost clip 1' bears against the corresponding fingers 17, while pressure is exerted against the back of the rearwardmost clip 2'. In this manner the group of nested clips are held compactly together within the shell of the magazine while pressure is constantly exerted, by the spring 20 through the medium of the plunger, against the group of clips which tends to urge them toward the open end of the shell.

For convenience in handling the magazine, the flanges 13 of the shell, at a point suitably spaced from their forward ends, are sprung outwardly to provide a finger-hold 21, thus to enable the operator to grasp firmly the magazine while inserting it in and removing it from the forceps.

The purpose of the present invention is to provide a supply of ligatures in a container so that the ligatures may be applied one after another as required, by use of suitable forceps. In Figs. 13-15 is shown a type of forceps adaptable for use in applying the clips that are contained in the magazine when the magazine is positioned in said forceps.

The applicator

A suitable instrument for use with the magazine is made the subject of a separate application, Ser. No. 260,097, filed March 6, 1939, and is herein shown as an example, and consists of forceps constituted of a channeled holder 22 having at its rear end a hollow base 23, there being a longitudinal opening 23' extending therethrough, and in the lower part of which is located a stop 24. Upon the top of the base is secured a member having a forwardly extending spring tongue 25 spaced above the holder 22. Also, the base 23 has secured in each side thereof a tweezer arm 26 that extends forwardly therefrom, said arms having on their forward ends corresponding jaws 27 that diverge and have in their outer extremities a concavity 28 for the purpose hereinafter described.

Operation

In use, the magazine containing an assemblage of nested clips is positioned in the applicator with its flanges 13 disposed in the holder 22 and with the spring tongue bearing upon the rib 11, and with its shoulders 13' butted against the stop 24. When thus located in the forceps the jaws 27 of the tweezers are located respectively opposite the corresponding slots 16 in the sides of the shell of the magazine, so that upon pressing the tweezer arms toward each other, the jaws enter through the slots and engage the ends of the forwardmost clip 1', the rounded ends of said clip being received in the concavities of the jaws and upon further pressure being applied to the tweezer arms, said forwardmost clip is clinched so that its spurs on the opposite ends are forced toward each other and the rounded ends of the clips, concurrently are moved free from the fingers 17. During this operation the spurs are projected into the flesh upon the opposite sides of the incision or laceration, and the clip thus clinched is released from the magazine, leaving the ligature emplaced upon outward movement of the jaws 27.

In some instances, where it is desired that a considerable number of clips are required in making a suture, the shell of the magazine is formed with a rear extension 9'', as shown in Figs. 13-16. This form of magazine is adapted especially for use in connection with the applicator as shown in Figs. 13-15, which has a longitudinal opening in its base 23 through which the extension 9'' on the magazine projects when the magazine is inserted between the holder 22 and tongue 25 and moved rearwardly in the forceps to that point where the shoulders 13' on the flanges on the magazine contact with the stop 24. When thus positioned the forward end of the magazine is located precisely between the tweezer jaws 27 so that upon operation of the tweezers, said jaws enter the slots 16 and engage the ends 3 of the forwardmost clip 1' in their concavities, causing said clip to become clinched. Upon parting of the jaws, the clip is released, whereupon the next succeeding clip 1'' automatically is advanced into contact with the fingers 17 to be applied in similar manner upon subsequent manipulation of the tweezers.

When the magazine is provided with a shell in the form shown in Fig. 17, the magazine is adaptable for use in the forceps herein shown, as well as those disclosed in my copending application or any other type of forceps having suitable tweezers and means for attachment thereto of the magazine.

Variations from the particular construction above disclosed may readily be made by exercise of engineering skill without departure from the ing claims are intended to be inclusive of such spirit or scope of the invention, and the following variations.

What I claim is:

1. A surgical appliance constituted of a magazine including a shell closed at its rear end and having an open front end, said shell having a longitudinal spring-engaging rib projecting upwardly from the top thereof, the sides being so formed as to provide inwardly extending ledges that terminate in downturned flanges that are parallel and spaced apart with respect to each other, said flanges having outwardly sprung portions to provide a finger-hold and stop-engaging shoulders located in their rear portions, the forward end of said shell, contiguous with the top

and side walls thereof, having inturned clip-engaging fingers and slots therebetween that partially restrict the front opening of the shell, and a spring-pressed plunger disposed within said shell tending to move forwardly therein, so that a group of nested metallic clips when positioned in said shell between the plunger and said fingers, are adapted to be successively clinched by suitable forceps when said magazine is positioned therein, and said shoulders abut a stop on said forceps.

2. A surgical appliance consisting of a clip-holding magazine, said magazine including a shell closed at its rear end and having an open front end, the sides of said shell being so formed as to provide inwardly extending ledges that terminate in downturned flanges to provide guide means for said shell when fitted in a forceps, clip-engaging fingers and slots therebetween disposed to partially restrict the front opening of the shell, and a spring-pressed plunger disposed within said shell tending to move forwardly therein, so that a group of nested metallic clips when disposed in said shell between said ridges and between said plunger and fingers are adapted to be clinched by said forceps in a manner to liberate said clips from the magazine when clinched.

3. A surgical clip-holding magazine, said magazine consisting of a shell closed at one end and open at its other end, there being provided clip-engaging fingers on each side of said shell disposed to partially restrict the open end thereof and side openings in the shell between said fingers, guide means on the shell to hold said shell in operative position when disposed in a forceps, and spring-pressed mechanism within said shell to move a group of clips when held within the shell towards said fingers so as to be clinched

and liberated in successive order from said fingers by said forceps when applied through said openings.

4. A surgical clip-holding magazine adapted to be removably inserted in an operating forceps, said magazine consisting of a shell closed at one end and open at its other end, there being provided clip-engaging fingers disposed to partially restrict the open end of the shell and side openings in the shell adjacent said fingers, guide means on the shell to hold said shell in operative position when disposed in said forceps, and spring-pressed means within said shell adapted to move nested ligatures when disposed within the shell toward said fingers and hold same in position to be clinched and liberated in successive order from said fingers by said forceps when applied through said openings.

5. A surgical clip-holding magazine adapted to be removably inserted in an operating forceps provided with a stop, said magazine consisting of a hollow shell provided with a rear extension closed at its outer end, said shell being open at its forward end, there being provided clip-engaging fingers disposed on the shell to partially restrict the open end thereof and side openings in the shell adjacent said fingers, guide means on said shell having offsets engageable with the stop on said forceps when said magazine is positioned therein, and spring-pressed means within said shell adapted to move nested ligatures when disposed within the shell toward said fingers and hold same in position to be clinched and liberated in successive order from said fingers by said forceps when applied through said openings.

PAUL D. DOLE.