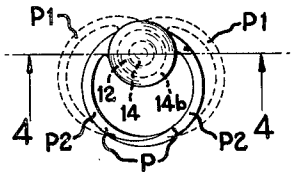
Jan. 2, 1951 R. J. TAPKE 2,536,145

SURGICAL INSTRUMENT

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FIG. 5



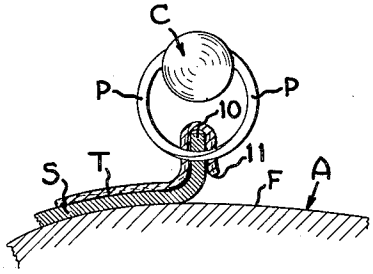


FIG. 3

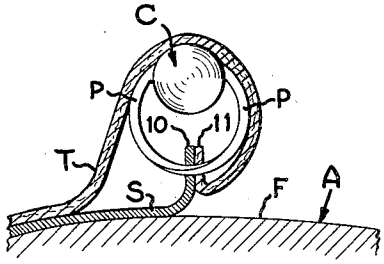


FIG. 2

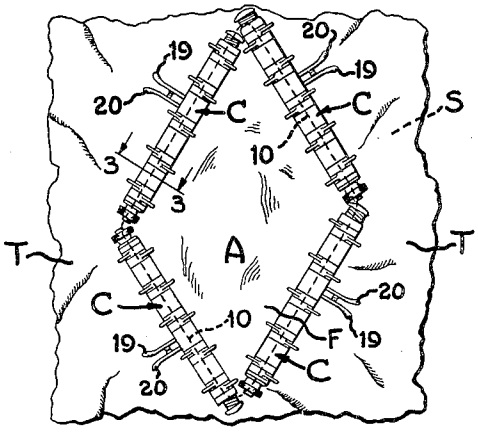


FIG. 1

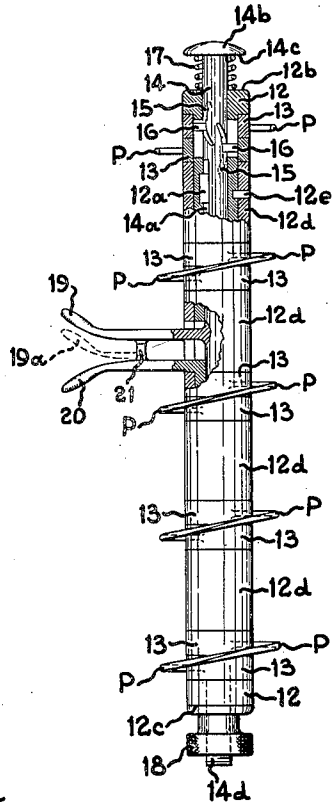


FIG. 4

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FIG. 6

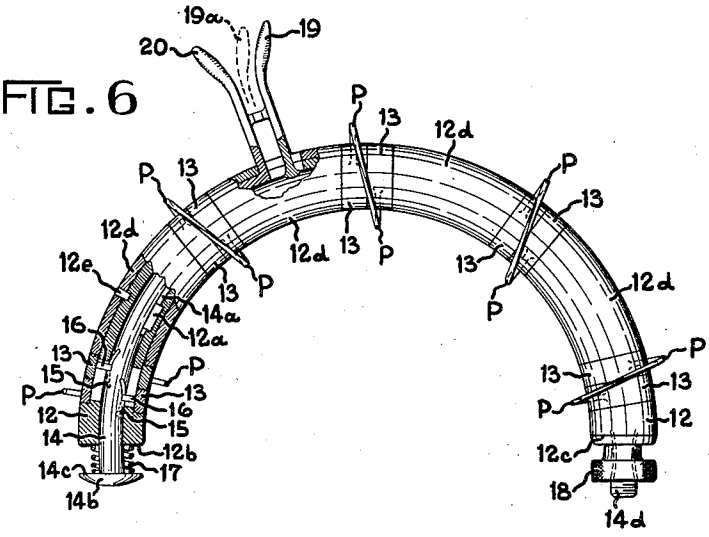
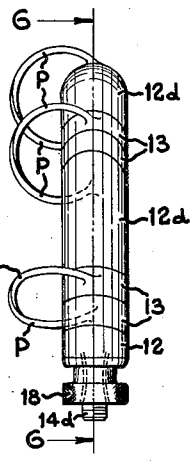


FIG. 7



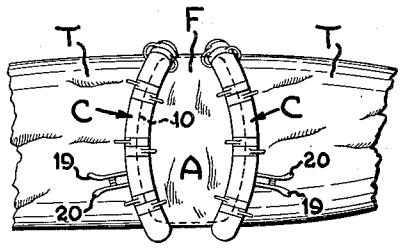


FIG. 9

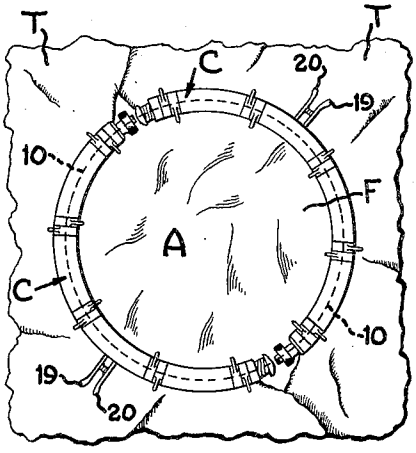


FIG. 8

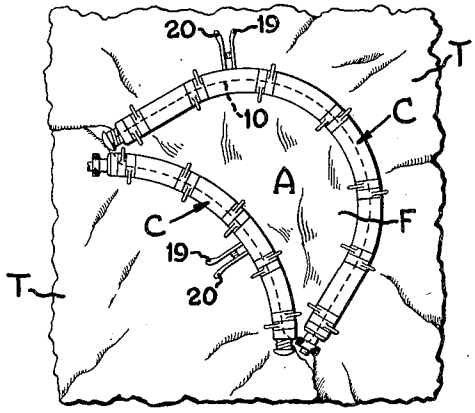


FIG. 10

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SURGICAL INSTRUMENT

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Application September 19, 1946, Serial No. 697,981

8 Claims. (Cl. 128—346)

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This invention relates to surgical instruments and is particularly directed to an instrument for use in conjunction with making incisions in a patient to facilitate the operation by the surgeon upon the deeper tissues of the body.

In the practice of surgery, and particularly for major operations, it is necessary to protect the skin edges from contagion after incisions have been made by binding the edges of the skin with towels. The towel clips heretofore used for covering and securing the towels to the edges of the incised skin consist of instruments having the form, approximately of scissors, provided with curved, needle-like jaws at their distal ends for gripping and penetrating the parts in maintaining the towels in contact with the skin edges.

The principal object of this invention is to provide a multiple prong towel clip operable from a single control lever or knob, one of the advantages of this arrangement being that a lesser number of instruments will be required for a single operation, the time required for an operation will be lessened, and the skin edges will be uniformly and effectively covered and protected.

Another object of this invention is to provide an improved towel clip instrument which is practically adapted for use in any surgical operation, major or otherwise, and which may be quickly and easily manipulated in placing it in operative position relative to the wound or incision.

Another object of this invention is to provide a surgical towel clip instrument having a plurality of adjustable tongs operable from a single control member.

Another object is to provide a surgical instrument in the form of a multiple towel clip device which is particularly useful and readily adapted to different types and sizes of incisions made by the surgeon.

A still further object is to provide a surgical instrument for use in connection with the application of towels to the edge of the skin during a surgical operation which will be economical to manufacture, highly efficient, and reliable in performance, and which will meet all of the demands of the medical profession for its particular purpose.

Another object of this invention is to provide a multiple prong towel clip operable from a single manipulating lever or control knob which substantially takes the conformation of the shape of the incision made for the particular operation.

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Still another object of this invention is to provide a multiple prong towel clip which may take the form of a straight instrument or a curved or arcuate instrument for application to various surfaces of the body upon which an operation is to be performed.

Further features and advantages of this invention will appear from a detailed description of the drawings in which:

Figure 1 is a fragmentary view showing the application of a series of the multiple prong towel clips incorporating the features of this invention to a surgical operation.

Figure 2 is an enlarged fragmentary section showing one technique of applying the towel and clamp to the incised edge of the skin.

Figure 3 is a view showing another technique of applying the towel to the skin edge on the line 3—3 of Figure 1.

Figure 4 is a general view, partly in section on the line 4—4 of Figure 5, showing the particular operating details of the surgical instrument.

Figure 5 is an end view of the towel clamp shown in Figure 4.

Figure 6 is a plan view of an arcuate arrangement of the towel clamp of Figure 4, shown partly in section on the line 6—6 of Figure 7.

Figure 7 is an end view of a towel clamp shown in Figure 6.

Figure 8 shows an application of the arcuate towel clamp of Figure 6 to an incision.

Figure 9 shows the application of another form of the arcuate towel clamp to a convex surface of an arm or leg of the patient.

Figure 10 shows the application of an arcuate or curved type towel clamp to an irregular type of incision.

Referring particularly to Figures 1, 2, and 3, the technique in performing a major surgical operation upon a patient comprises making the initial incision in the skin S and drawing the two skin edges 10 apart so as to expose the area A for performance of the operation. One method of procedure is shown in Figure 2 where the skin S is shown drawn back off the fat portion F of the patient's body and a towel T has its edge 11 placed adjacent the edge 10 and on the inside of the skin S. The novel multiple prong towel clamp or forceps C is then applied to bind the edges of the towel and skin together. The towel is then lapped back over the multiple prong towel clip C, as best shown in Figure 2, exposing the area A for the operation while protecting the edge 10 and outer surface of the with-

drawn skin from contamination or injury during the operation.

Another procedure is that shown in Figure 3 where the towel T has its edge 11 pointing downwardly toward the operating area or fat portion F and is lapped over the inner and outer surfaces of the skin adjacent the skin edge 10 by bringing the towel up over the edge 10 from the inside of the skin and laying it over the outside of the skin and the multiple prong towel clip C which is then clamped through the lapped-over portions of the towel and the skin just below its edge 10, as best seen in Figure 3, the towel T extending over the outside face of the skin for protection.

Considering now the detailed structure of the multiple pronged towel clip or forceps of this invention, the device comprises a main body sleeve part 12 extending the length of the device as will be seen in Figure 4 and terminating at the upper end of Figure 4 in the enlarged head part 12*b*. The lower end of the main body sleeve 12 may comprise an enlarged portion 12*c* that may be threaded thereon or otherwise suitably attached as by sweating, soldering or brazing.

Rotatably mounted on sleeve 12 at spaced points therealong are pairs of hubs 13 each of which carries a prong P. Interposed between the pairs of hubs 13 may be the spacing sleeve portions 12*d* which also surround the main body sleeve 12. The spacing sleeves 12*d* are preferably attached to the main sleeve 12 by the pins 12*e* and thus assist in positioning the pairs of hubs 13 to which the prongs P are attached in the proper desired positions along the instrument.

The assembly of the main body sleeve 12 with the hubs 13 of the prongs P rotatable thereon and the spacer sleeves 12*d* pinned thereto, forms a cylindrical body for the instrument which is preferably of relatively small diameter so as not to interfere with the operation being performed. This body may take the form of various arcuate or curved shapes as illustrated in Figures 6 through 10, inclusive, when the instrument is to be adapted to irregular or curved type incisions.

The main body sleeve 12 is circumferentially slotted at points therealong adjacent the hubs 13 of the prongs P, and extending inwardly through the said slots and attached to the hubs 13 are pins 16. These pins 16 form the means for turning hubs 13 relatively in order to open and close the prongs P.

Inside of the main sleeve 12 is an operating plunger 14 having suitable helically or spirally arranged actuating cam slots 15 which engage the inwardly projecting pins 16 so that as the member 14 is moved axially in the sleeve 12, the prongs will be rocked from the open position shown in broken line at P1 to the closed position P2, Figure 5, or vice versa. A key 12*a*, fixed to the inside of the sleeve 12 and slidingly engaging in a suitable slot or keyway 14*a* formed in the operating plunger 14, serves to prevent rotation of the plunger 14 as it is being axially moved in the sleeve 12.

The operating plunger is provided with a headed end 14*b* formed integral with the plunger 14. A compression spring 17 abutting against surface 14*b* and against the surface 12*b* of the main sleeve 12 serves to normally urge the plunger 14 in the direction of opening of the prongs P to the position P1, Figure 5. The plunger 14 may be moved in opposition to the spring 17 to close the clamps to position P2, Figure 5, by operating mechanism which may preferably take the form of a rotatable thumb nut 18, Figure 4, mounted on the threaded end 14*d* of the plunger 14. The thumb nut abuts against the surface 12*c* of the main sleeve 12 so that when the nut is rotated in tightening direction the plunger 14 will be moved so as to compress the spring 17 and move the prongs P from position P1 to position P2 to effect the clamping of the towel and skin edge as shown in Figures 2 and 3. Loosening the thumb nut 18 will allow the spring 17 to return the plunger 14 and the prongs P back to position P1 to release the prongs from the towel and skin edge.

Another form of actuating device for the plunger 14 may comprise a pincher arrangement consisting of an arm 19 fixed to the plunger 14 and a cooperating arm 20 formed integral with the sleeve 12. These arms may be moved together so as to bring arm 19 to the position 19*a*, Figure 4, to move the plunger 14 against the spring 17 to close the prongs P to position P2 to lock the towel and skin edge together. The usual ratchet or latch mechanism 21 may be provided between the two arms to hold them in locked position with the prongs gripping the towel and skin edge in positive relationship during the operation. The arms 19 and 20 may be sprung relative to one another in a direction perpendicular to their clamping or unclamping movement so as to release the latch 21 and allow the spring 17 to return the plunger 14 to withdraw the prongs back to retracted position P1.

Either of the recited methods of actuating the plunger 14 may be utilized. In certain instances where the arm mechanisms 19 and 20 may interfere with the operating procedure, it may be preferable to use the thumb nut arrangement. In other instances where greater rapidity and simplicity of operation is desired, the arm control constituting arms 19 and 20 may preferably be utilized. In either case it will be noted that the manipulation of the single control thumb nut 18 or the levers 19—20 will automatically effect the simultaneous actuation of a plurality of prongs P to clamping or released position. Thus the surgeon may rapidly prepare the patient for the operation as the towel clamps simultaneously apply a large number of clamping prongs to quickly cover a large area of skin opening and at the same time provide a mechanism small in over all dimensions which will not interfere with the operation being performed.

It is contemplated providing these multiple prong towel clamps of varying lengths and numbers of simultaneously operable prongs and also of various shapes so that they may readily conform to any type or size or shape of incision. In Figure 1 is illustrated an instrument of straight body design having five prongs. In this particular instance, four of the towel clamps are utilized to provide proper access to the region A for the operation. Any length and number of set of prongs can be provided for these clamps in view of their universal mechanical structure as described above.

In Figures 6 and 7 there is shown a curved, semicircular or arcuate type of adaptation of this multiple prong towel clip. In this case, the sleeve member and plunger 14 are formed of arcuate or semicircular shape and the various prongs mounted on their respective hubs 13 are spaced about the curved body of the towel clamp. The operating mechanism is identical with that of Figure 4 and performs in the same manner. In this particular embodiment of Figures 6 and 7, the

prongs project outwardly from the side of the curved instrument and are applicable to incisions of a type shown, for example, in Figure 8 where two of the arcuate clamp mechanisms are utilized to hold the towel and skin edge in a circular position for operating in an area A. In Figure 9 is shown another arrangement where the arcuate type of towel clamp is used but in which the prong members extend radially inwardly toward the center so that they might be applied to a convex surface such as an arm or leg of the patient. In Figure 10 is still another arrangement of combining different shaped towel clamps for an incision of irregular character.

Thus, by utilizing the design and actuating mechanism of applicant's arrangement, it is practical to manufacture this instrument in a wide variety of shapes, sizes, and combination of operating elements so as to readily adapt it to any type of surgical operation.

While the apparatus herein disclosed and described constitutes a preferred form of the invention, it is to be understood that the apparatus is capable of mechanical alteration without departing from the spirit of the invention and that such mechanical arrangements and commercial adaptations as fall within the scope of the appendant claims are intended to be included herein.

Having thus fully set forth and described this invention, what is claimed as new and desired to be secured by United States Letters Patent is:

1. In a surgeon's towel clamp, a main sleeve member, a plunger slidable in said sleeve, pairs of towel and skin engaging prongs rockably mounted on said sleeve, means for spacing said pairs of prongs in various positions lengthwise of said sleeve, cam slot actuating means on said plunger cooperating with said prongs to effect rocking motion of said prongs upon axial movement of said plunger in said sleeve, and a single operative means for actuating said plunger to effect simultaneous rocking movement of said prongs.

2. In a surgeon's towel clamp, a main sleeve member, a plunger slidable in said sleeve, pairs of towel and skin engaging prongs rockably mounted on said sleeve, means for spacing said pairs of prongs in various positions lengthwise of said sleeve, cam slot actuating means on said plunger cooperating with said prongs to effect rocking motion in said prongs upon axial relative movement of said plunger in said sleeve, and a single operative means for actuating said plunger to effect simultaneous rocking movement of said prongs, said single operative means comprising a thumb nut on one end of said plunger, and spring means opposing said thumb nut in prong opening direction.

3. In a surgeon's towel clamp, a main sleeve member, a plunger slidable in said sleeve, pairs of towel and skin engaging prongs rockably mounted on said sleeve, means for spacing said pairs of prongs in various positions lengthwise of said sleeve, cam slot actuating means on said plunger cooperating with said prongs to effect rocking motion of said prongs upon axial movement of said plunger in said sleeve, and a single operative means for actuating said plunger to effect simultaneous rocking movement of said prongs, said single operative control means comprising a pair of thumb and finger arms attached to said sleeve and plunger at a point intermediate said body portion to effect relative movement between said members.

4. In a surgeon's towel clamp, a main sleeve member, a plunger slidable in said sleeve, pairs of towel and skin engaging prongs rockably mounted on said sleeve, means for spacing said pairs of prongs in various positions lengthwise of said sleeve, cam slot actuating means on said plunger cooperating with said prongs to effect rocking motion of said prongs upon axial movement of said plunger in said sleeve, and a single operative means for actuating said plunger to effect simultaneous rocking movement of said prongs, said single operative control means comprising a pair of thumb and finger arms attached to said sleeve and plunger at a point intermediate the ends of said sleeve member to effect relative movement between said member and plunger, said arms including ratchet locking mechanism releasable upon moving said arms relative to each other substantially perpendicular to their normal operating direction of movement.

5. In a multiple prong towel clip surgical instrument, a main sleeve, a series of pairs of prongs journaled on hubs around said sleeve, spacing members fixed to said sleeve between said respective pairs of prongs and hubs, an actuating plunger axially slidable and confined against rotation in the bore of said sleeve, helically arranged cam slots in said plunger, cam slot engaging pins engaging in said cam slots and connected integrally with the hubs of said prongs, and means for axially reciprocating said plunger relative to said sleeve to effect simultaneous opening and closing of said pairs of prongs.

6. In a multiple prong towel clip surgical instrument, a main sleeve, a series of pairs of prongs journaled on hubs around said sleeve, spacing members fixed to said sleeve between said respective pairs of prongs and hubs, an actuating plunger axially slidable and confined against rotation in the bore of said sleeve, helically arranged cam slots in said plunger, cam slot engaging pins engaging in said cam slots and connected integrally with the hubs of said prongs, and means for axially reciprocating said plunger relative to said sleeve to effect simultaneous opening and closing of said pairs of prongs, said means comprising a resilient device for normally axially moving said plunger to prong opening position, and manually operated means for actuating said plunger in opposition to said resilient means to close said prongs.

7. In a multiple prong towel clip surgical instrument, a main sleeve, a series of pairs of prongs journaled on hubs around said sleeve, spacing members fixed to said sleeve between said respective pairs of prongs and hubs, an actuating plunger axially slidable and confined against rotation in the bore of said sleeve, helically arranged cam slots in said plunger, cam slot engaging pins engaging in said cam slots and connected integrally with the hubs of said prongs, and means for axially reciprocating said plunger relative to said sleeve to effect simultaneous opening and closing of said pairs of prongs, said means comprising a resilient device for normally axially moving said plunger to prong opening position, and manually operated means for actuating said plunger in opposition to said resilient means to close said prongs, said means comprising a knurled thumb nut threadedly mounted on said plunger and engaging said sleeve whereby rotation of said thumb nut effects axial motion of said plunger in said sleeve.

8. In a multiple prong towel clip surgical instrument, a main sleeve, a series of pairs of prongs journaled on hubs around said sleeve,

spacing members fixed to said sleeve between said respective pairs of prongs and hubs, an actuating plunger axially slidable and confined against rotation in the bore of said sleeve, helically arranged cam slots in said plunger, cam slot engaging pins engaging in said cam slots and connected integrally with the hubs of said prongs, and means for axially reciprocating said plunger relative to said sleeve to effect simultaneous opening and closing of said pairs of prongs, said means comprising a resilient device for normally axially moving said plunger to prong opening position, and manually operated means for actuating said plunger in opposition to said resilient means to close said prongs, said actuating mechanism for said plunger comprising a pair of arms, one respectively connected to each of said sleeve and

said plunger, and latch means interconnected between said arms to hold said arms in prong closed position, said latch being released by springing said levers in a direction substantially perpendicular to their normal operative movement.

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