

Feb. 11, 1964

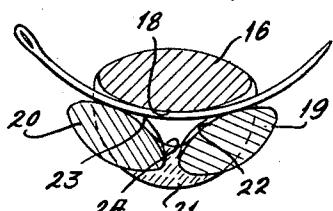
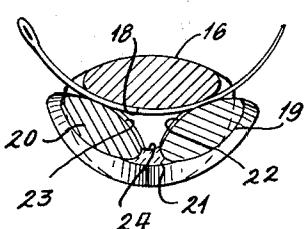
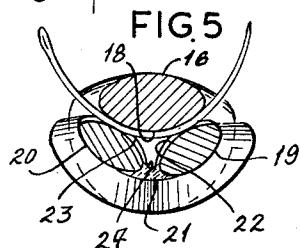
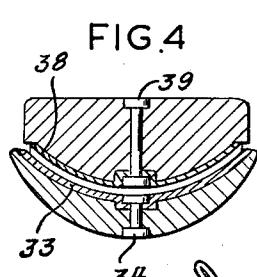
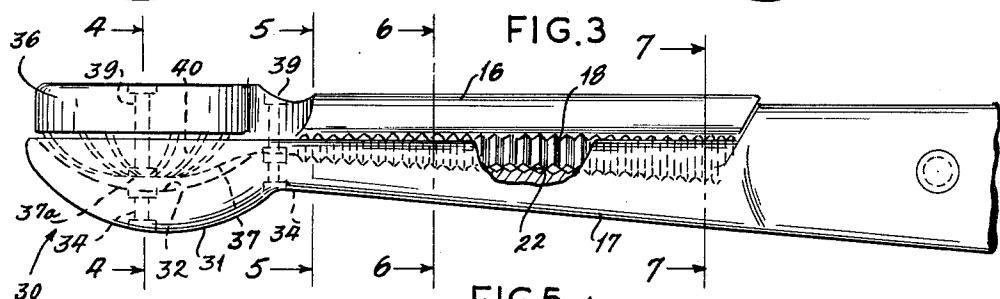
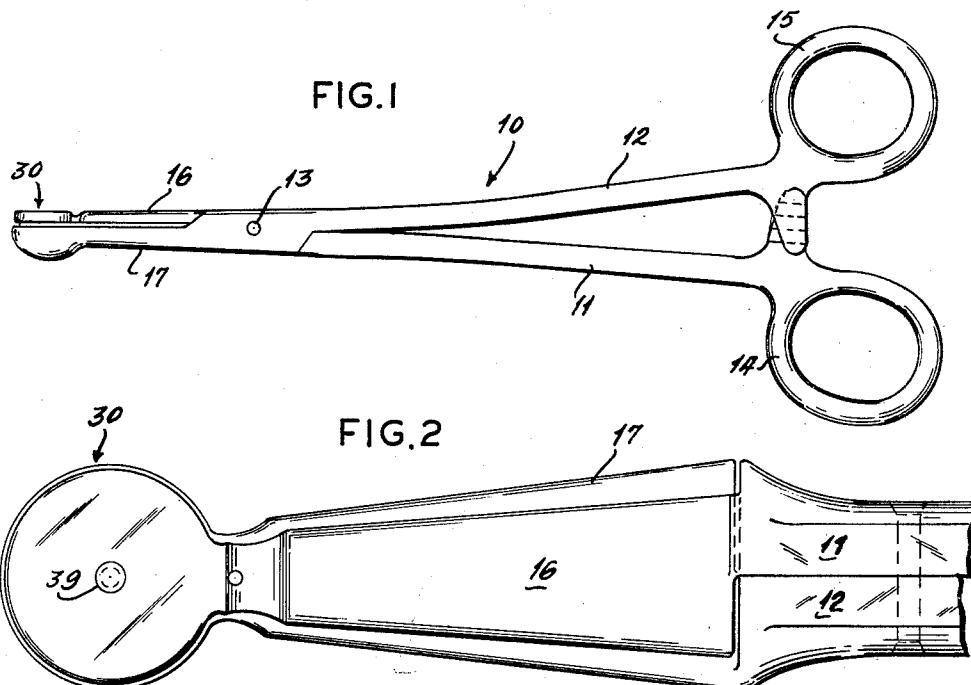
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3,120,847

SURGICAL NEEDLE HOLDER

Filed Nov. 6, 1961

2 Sheets-Sheet 1



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SURGICAL NEEDLE HOLDER

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2 Sheets-Sheet 2

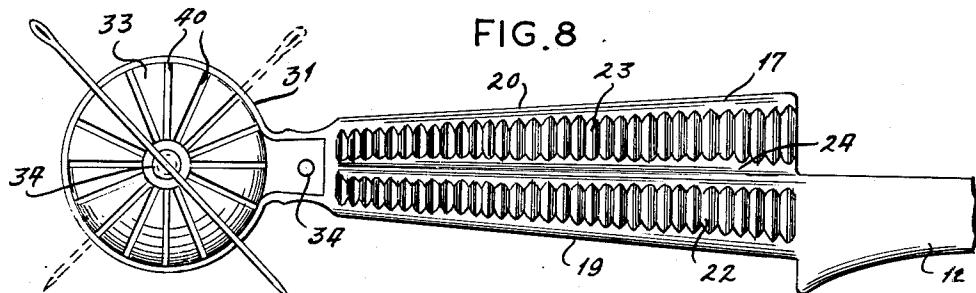


FIG. 8

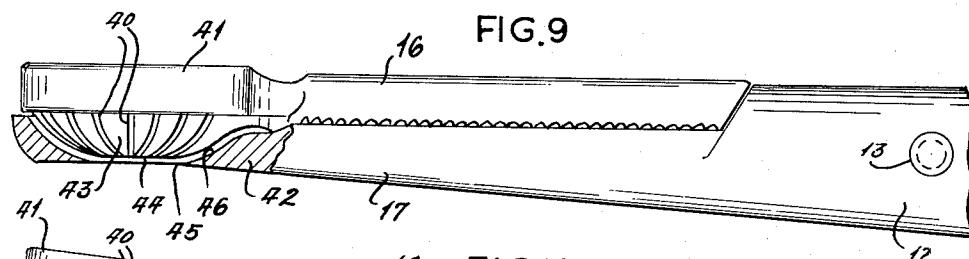


FIG. 9

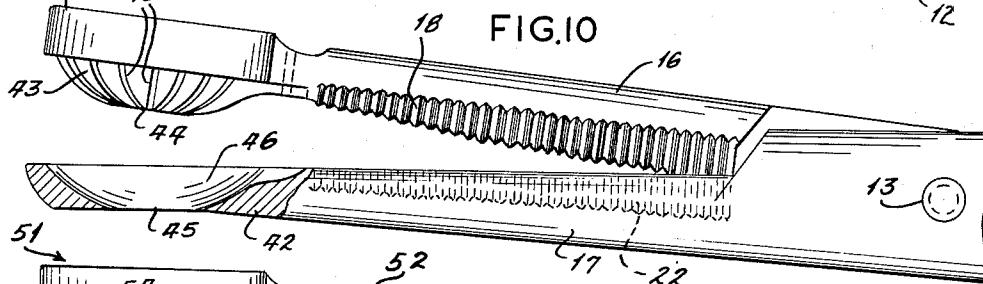


FIG. 10

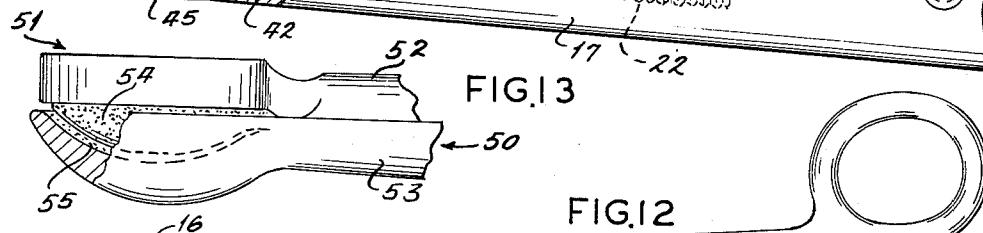


FIG. 11

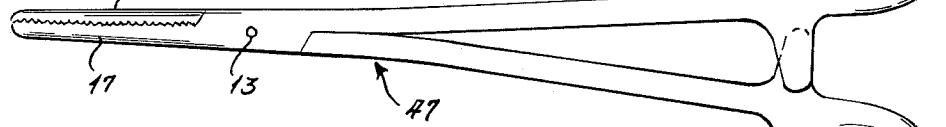
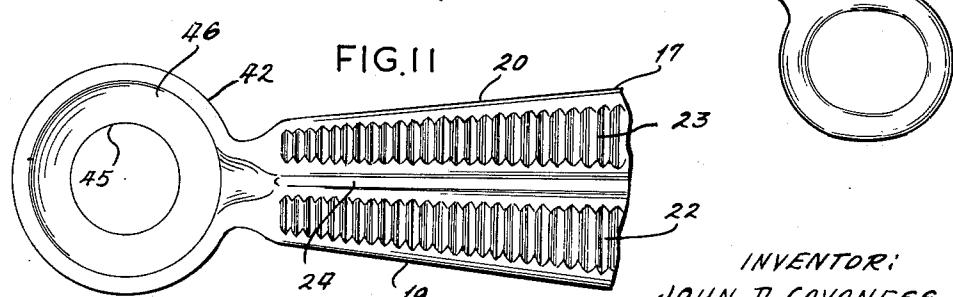


FIG. 12



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SURGICAL NEEDLE HOLDER
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6 Claims. (Cl. 128—349)

The present invention relates to a surgical needle holder and particularly a surgical needle holder which will accommodate needles having different curvatures.

One of the principal objects of the present invention is to provide a surgical needle holder which will accommodate a variety of surgical needles having different curvatures. Another object is to provide a surgical needle holder in which the needle can be positioned on the tip end anywhere within an arc of approximately 300° relative to the longitudinal axis of the holder.

Another object is to provide a needle holder which will positively grip the needle so as to prevent its rotation on its long axis and to prevent its sliding longitudinally through the needle holder.

More specifically it is an object of the present invention to provide a needle holder having tapered upper and lower jaws which define therebetween a gripping surface which accommodates needles having different curvatures.

Another object of the present invention is to provide a needle holder having upper and lower tapered jaws, the upper jaw having a convex arcuate needle engaging surface and the lower jaw having an oppositely double curved needle engaging surface and a depression between the curves, needles of varying curvature being accommodated between the jaws.

A further object of the present invention is to provide a needle holder having tapered upper and lower jaws which define therebetween needle gripping surfaces adapted to accommodate surgical needles of varying thickness and curvature along their length.

Still another object is to provide a needle holder having at its tip end a concave lower cup and a convex upper cup which cooperate to provide gripping elements between which a surgical needle is retained at predetermined positions within an arc of approximately 300°.

Still another object of the present invention is to provide removable gripping inserts for the jaws of a surgical needle holder which can be replaced readily and inexpensively when they become worn.

These and other objects and advantages will become apparent hereinafter.

The present invention comprises a surgical needle holder having tapered upper and lower jaws which converge toward the tip end of the holder and have needle gripping surfaces of varying curvatures along their length, the jaws being adapted to accommodate needles of greater curvature toward the tips thereof. The present invention further comprises a pair of cooperating elements on the nose of the jaws having curved gripping surfaces to accommodate therebetween surgical needles of varying curvatures in a variety of angular positions relative to the longitudinal axis of the holder.

In the drawings wherein like numerals refer to like parts wherever they occur,

FIG. 1 is a side view of a surgical needle holder incorporating the present invention,

FIG. 2 is an enlarged plan view of the needle gripping jaws with the remainder of the needle holder broken away,

FIG. 3 is a partially broken detailed side view of the needle gripping jaws shown in FIG. 2,

FIG. 4 is a sectional view taken along line 4—4 of FIG. 3,

FIG. 5 is a sectional view taken along line 5—5 of FIG. 3 showing a needle having a short radius of curvature gripped between the jaws,

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FIG. 6 is a sectional view taken along line 6—6 of FIG. 3 showing a needle of intermediate curvature gripped between the jaws,

FIG. 7 is a sectional view taken along line 7—7 of FIG. 3 showing a thick needle having a long radius of curvature accommodated between the jaws,

FIG. 8 is an enlarged plan view of the bottom jaw and shows a needle accommodated in different angular positions in the lower jaw tip,

FIG. 9 is an enlarged side view of a modification of the present invention with the lower jaw partially broken away,

FIG. 10 is an enlarged side view of the modification shown in FIG. 9 with the bottom jaw partially broken away and shows the jaws opened,

FIG. 11 is a top plan view of the lower jaw shown in FIGS. 9 and 10,

FIG. 12 shows a modification of the present invention in which the surgical needle holder does not have the cooperating cup elements on the tip, and

FIG. 13 shows a modification of the present invention in which the surgical needle holder has only the ball-in-cup needle holding assembly on the tip end of the jaws and in which the jaws are not adapted to retain needles along their length.

FIG. 1 shows a surgical needle holder 10 comprising a pair of arms 11 and 12 connected by a pivot 13 and having handles 14 and 15 at one end. The forward end of the arms 11 and 12 define a pair of needle gripping jaws 16 and 17.

The upper jaw 16 comprises an oval bar which tapers inwardly and upwardly from a point adjacent to the pivot 13 toward the nose of the holder 10, and whose under surface is provided with a roughened needle gripping surface 18. The surface 18 may be notched as shown in FIG. 3, or it may be smooth and surfaced with Carborundum or diamond dust. The lower jaw 17 includes a pair of oval bars 19 and 20 positioned beneath the upper jaw 16 and laid partly on end so that their transverse axes are angularly related to the transverse axis of the upper jaw 16. The lower ends of the bars 19 and 20 are joined together as by a weld 21. The arcuate upper needle engaging surface of the lower jaw 17 is formed with two convex curves 22 and 23 having a depressed surface 24 therebetween. The curves 22 and 23 are opposed to the arcuate convex surface 18 of the upper jaw 16 and grip the surgical needles therebetween.

The lower jaw bars 19 and 20 taper inwardly and upwardly from a point adjacent to the pivot 13 toward the nose of the holder 10. The lower jaw bar needle gripping surfaces 22 and 23 may be notched as shown in FIG. 3 or surfaced with Carborundum or diamond dust.

The bearing needle gripping surfaces 18, 22 and 23 may be made replaceable, if desired, by positioning replaceable inserts thereon.

As may be seen more clearly in FIGS. 5—7, the cross-section of the needle gripping surface of the jaws 16 and 17 varies from rear to front, and in conjunction with the depressed surface 24 of the lower jaw 17, allows holder 10 to accommodate needles of different curvatures and different thicknesses. The ability of the same needle holder to grasp needles of different curvatures is an important advantage, since when the surgeon is using the needle in interior body cavities or in small inaccessible locations, a variety of needle curvatures may be dictated depending on the suturing which is being done.

Since the top bar 16 and the two lower bars 19 and 20 taper from rear to front, the radius of curvature of the needle gripping surface defined therebetween also varies from rear to front. For example, the radius of curvature of the needle gripped in the jaws at a point

near the pivot 13 (FIG. 7) is greater than the radius of curvature of a needle gripped between the jaws at a point near the tips (FIG. 5).

It also may be seen that the construction of the jaws so as to provide a curved gripping surface provides a positive two-point mechanical grip on the needle which prevents the needle from rotating on its long axis. This too is extremely important, since once a stitch is started with the needle in a particular position in the holder, it must be completed with the needle in the same relative position in the needle holder jaws. If the needle turns or slides in the holder, the stitch must be removed and reinserted and sometimes this is not feasible when delicate tissue is being worked upon. Also, such delays are time consuming, and dangerous during a delicate operation.

Another advantage of the present arrangement of oppositely curved gripping jaws is that needles of varying curvature can be fixed between the upper and lower jaws without resulting in undue stress on the needle as occurs when jaws of a common curvature grip a needle of a curvature different from that defined between the jaws. The result in such instances is warping or strain on the needle since the curvature of the needle must be changed to conform to the curvature of the jaws. The overstressed needle may break while it is inside the body cavity, and since the needles are often extremely small and the pieces difficult to remove, a considerable hazard to the patient is presented. Thus it is apparent that the present needle holder not only provides a more sound mechanical construction, but also provides considerable additional safety measures for patients.

The tapered upper and lower jaws allow the surgeon great flexibility in the size of the needle which he can use since the mechanical advantage can be varied by moving the needle along the length of the jaws, and there is less danger of overpowering a small needle in a delicate situation.

Furthermore, since an almost unlimited variety of needles may be used with the same instrument, the present needle holder is far more practical than an instrument of fixed curvature. The present invention also eliminates the rotation of the needle either on its long axis or on a tangential plane. As hereinbefore discussed, the design of the three oval or elliptical oppositely curved surfaces which oppose each other with a central gap therebetween, allow the use of needles having an almost unlimited variation in size, segment of curvature, and diameter of basic circumferential tangent with the same needle holder.

The bars 18, 19 and 20 also may be of circular cross section as well as the oval or elliptical configuration illustrated.

A further novel feature of the present invention is the ball-in-cup needle gripping assembly 30 provided on the tip ends of the upper and lower jaws 16 and 17. The lower jaw 17 is provided with a concave cuplike element 31 having a concave needle gripping inner surface 32 of semi-spherical shape and provided with a removable gripping insert 33 (FIG. 4) which is held in place by brads 34. The insert 33 ordinarily is surfaced with diamond dust or Carborundum to provide a solid needle gripping element or it may be provided with a series of slots 40 (FIG. 8) which receive the needles.

The upper jaw 16 includes a needle gripping element 36 positioned on the tip end thereof. The element 36 includes a convex under surface 37, which is flattened at the center 37a and is provided with a removable insert 38 held in place by brads 39. The convex surface 37 is provided with spaced radial slots 40 which are designed to accommodate a needle and allow the needle to be gripped in predetermined fixed positions within an arc of approximately 300° relative to the longitudinal axis of the holder 10. The slots 40 are surfaced with diamond dust or Carborundum. Surgical needles are po-

sitioned in the notches 40 and are held therein by the engagement of the upper jaw ball element 36 in the concave lower jaw cup element 31.

The upper jaw under surface 37 need not have the slots 40, but may be surfaced with Carborundum or diamond dust to receive needles in a plurality of angular positions and to securely grip the needles between diametrically spaced apart sets of opposed contact points (FIG. 13).

Also, the elements 31 and 36 need not have replaceable inserts, but use of such inserts is a desirable economy, since the holders themselves are expensive.

FIG. 8 shows a plan view of the lower jaw 17 showing the cup element 31 having a replaceable insert 33 thereon which is provided with spaced radial needle receiving notches 40. The solid lines show a needle in a first position on the element 31 while the dashed lines show a needle rotated about 90° to a second position on the element 31.

Figs. 9-11 show a modification of the present invention which comprises a needle holder having a tapered upper jaw 16 and a tapered low jaw 17 similar to FIGS. 1-3. However, the ball-in-cup assembly is modified in that the lower portion of both the top element 41 and the lower element 42 are sliced off. The top element 41 has a needle engaging under surface 43 with a flat bottom 44; while the lower element 42 has an opening 45 at the bottom thereof and a needle engaging upper surface 46. The use of the open bottom cup 42 increases the stability of the needle and decreases the stress on the needle when it is positioned between the elements 41 and 42. Also, needles of a larger range of different curvatures can be accommodated between the jaws when the bottom of the lower jaw is open.

A further modification of the present invention is shown in FIG. 12 and shows a surgical needle holder 47 which has tapered upper and lower jaws similar to the structure shown in FIGS. 1-7, but which does not have a ball-in-cup assembly on the forward end thereof. The function and operation of the needle holder 47 shown in FIG. 12 is similar to that shown and described hereinbefore.

A further modification of the present invention is shown in FIG. 13 which shows the nose portion of a needle holder 50 which is provided only with a ball-in-cup needle gripping assembly 51 on the end of straight jaws 52 and 53. The modification of FIG. 13 does not utilize the tapered jaw structure shown in FIGS. 1-12 and the holder 50 is not designed to accommodate needles between the jaws except at the end thereof. This structure is preferable in certain surgical situations wherein it is not necessary that the needle holder accommodate needles of different curvatures and in which it is important that the needle be positioned in a variety of angular relationships relative to the longitudinal axis of the needle holder.

The ball and socket assembly 51 shown in FIG. 13 does not utilize replaceable inserts as the bearing surfaces 54 and 55. Also, the opposed bearing surfaces 54 and 55 are not grooved, but are surfaced with a rough material such as diamond dust or Carborundum to firmly grip the needles. These variations can be adapted to any of the structures shown in FIGS. 1-11.

The radial slots 40 shown in FIG. 8 preferably are positioned about 22½° apart around the inner surface 37 of the element 36, but may be positioned closer together or farther apart according to the intended use of the tool.

Thus it is apparent that the present invention provides novel surgical needle holders which achieve all of the objects and advantages sought therefor.

This invention is intended to cover all changes and modifications of the examples of the invention herein chosen for purposes of the disclosure, which do not con-

stitute departures from the spirit and scope of the invention.

What is claimed is:

1. A surgical needle holder comprising a pair of pivoted scissor arms defining upper and lower needle engaging jaws on one side of the pivot, said upper jaw being a substantially oval bar tapering from a point adjacent to the pivot toward the nose of the jaw, said bar having an arcuate needle engaging under surface, said lower jaw comprising a pair of substantially oval bars angularly positioned beneath said upper jaw and joined together at their lowermost point to define a double-curved needle engaging upper surface, each of said bars tapering from a point adjacent to the pivot toward the nose of the jaw, said jaws defining needle engaging surfaces which vary in curvature along their lengths and being constructed and arranged to accommodate needles of varying curvature along their length.

2. The needle holder defined in claim 1 including cooperating needle engaging members on the noses of the jaws to accommodate a needle in different angular positions relative to the long axis of the jaws, one of said needle engaging members having a substantially convex ball-like outer needle engaging surface and the other member having a concave cup-shaped outer needle engaging surface.

3. The needle holder defined in claim 2 wherein said concave member has a central opening at the bottom thereof and said convex member is substantially frusto-spherical in shape, said cooperating needle engaging members accommodating needles of varying curvature therebetween.

4. A surgical needle holder comprising a pair of pivoted scissor arms defining upper and lower needle engaging jaws on one side of the pivot, said upper jaw having an arcuate needle engaging under surface whose radius of curvature gradually decreases from a point adjacent to the pivot toward the nose of the jaw, said lower jaw having a double curved upper surface defined by opposed converging convex surfaces in fixed spaced relationship,

the convex surfaces having diminishing radii of curvature toward the nose of the jaw, said jaws defining a needle engaging surface which decreases in curvature along their length toward the noses thereof.

5. A surgical needle holder comprising a pair of elongated pivoted scissor arms having handles at one end and having cooperating upper and lower needle engaging members at the extremity of the other end to accommodate a needle in different angular positions relative to the long axis of the arms, said upper member having a substantially frusto-spherical outer needle engaging surface forming an annular convex side wall, and the lower member having a fixed obstruction-free, concave, cup-shaped needle engaging surface substantially complementary with the annular convex side wall of the upper member over substantially all of its area, said upper and lower surfaces forming diametrically spaced apart sets of opposed contact points, said lower member being immediately available to receive a needle in a plurality of angular positions merely by selectively placing the needle on the lower member, and said lower member needle engaging surface being non-adjustable and together with said upper member being engageable with a plurality of needles of varying curvature at different sets of opposed contact points.

6. The structure defined in claim 5 wherein said cup-shaped lower member is provided with a central opening to accommodate the central portions of a plurality of needles of varying curvatures.

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