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HARDENED JAW INSERT FOR NEEDLE HOLDERS

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Fig. 1.

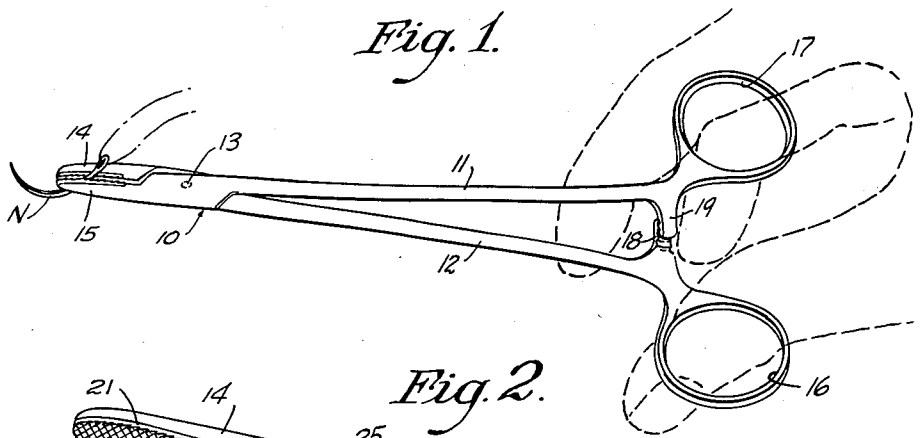


Fig. 2.

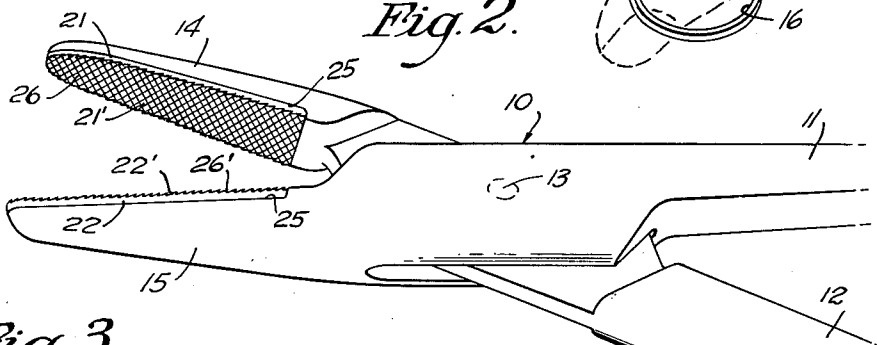


Fig. 3.

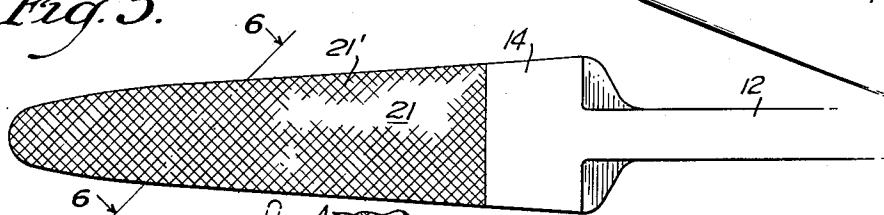


Fig. 4.

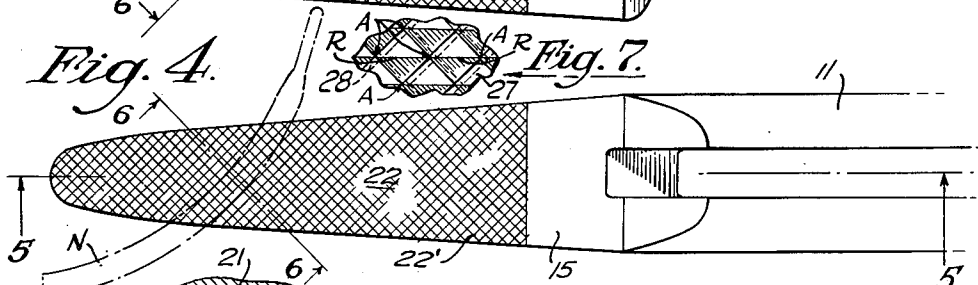


Fig. 7.

Fig. 6.

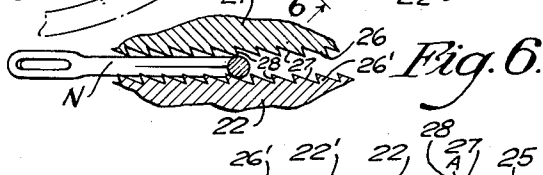
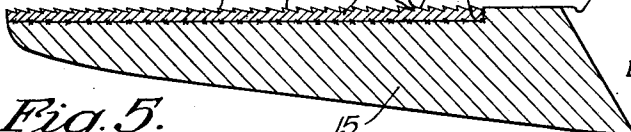


Fig. 5.



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HARDENED JAW INSERT FOR NEEDLE HOLDERS

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8 Claims. (Cl. 128—340)

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This invention relates to surgical instruments and more particularly to certain novel improvements in the jaw structure of surgical needle holders.

Immediately following surgery and on numerous other occasions surgeons are required to sew up wounds and incisions, an act commonly known as suture. In performing suture a surgical needle is used in stitching skin or other structure so as to unite the edges of a wound or to fasten an organ in place. Since surgical needles are relatively small and difficult to handle under certain operational circumstances it has become the practice for surgeons to use specially built needle holders. In this manner it is easier for the surgeon to see the needle and the anatomy being stitched, obtain better leverage, and facilitate suture neatly and with dispatch.

Despite the advent of needle holders surgeons are frequently confronted with serious aggravation due to the needle turning relative to the holder while suture is being performed. A slip of the needle or misplacement thereof often results in failure of an operation by a cause other than the ailment or organic difficulty necessitating the operation. It is therefore imperative that the needle be securely held by the needle holder during manipulation so as to minimize any undue reflection on the surgeon's skill and diligence.

The present invention contemplates the provision of an improved needle gripping insert adapted to be inlaid or built into the inner faces of the opposing jaws of a needle holder. In this connection it is an object of this invention to provide inlays constituting a strip of very hard and tough material which offers a maximum of resistance to wear.

Another object is to provide jaw inserts having their abutting faces cut with fine teeth adapted to cooperate with each other for firmly gripping a hardened steel needle in a manner to minimize turning thereof.

Another object is to provide the inner faces of opposing jaw inserts with oppositely directed saw tooth surfaces adapted to counteract turning of a needle shank in one or the other direction so that even the finest of needles is secured between the jaws grasping it.

Another object is to provide the inner faces of the jaws of a needle holder with inserts fitted to such jaws in a manner to effect inter-action thereof with precision and to attain assurance against slippage of the needle between them.

These and other objects and advantages of the present invention will be made apparent from a reading of the following description and claims in the light of the drawings in which:

Fig. 1 is a perspective view of a surgical needle holder having a pair of the hardened jaw inserts of the present invention associated therewith.

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Fig. 2 is an enlarged perspective view of the jaw portion only of the needle holder shown in Fig. 1.

Fig. 3 is an enlarged detail view of the inner face of the upper jaw portion only of Figs. 1 and 2.

Fig. 4 is an enlarged detail view of the inner face of the lower jaw portion only of Figs. 1 and 2.

Fig. 5 is a longitudinal section through the lower jaw shown in Fig. 4 and taken along line 5—5 thereof.

Fig. 6 is an enlarged fragmentary section of the upper and lower jaws taken substantially along lines 6—6 in Figs. 3 and 4 and illustrating the gripping action upon a needle between them.

Fig. 7 is an enlarged fragmentary detail of a portion of the needle engaging surface of one jaw insert as seen in either Fig. 3 or Fig. 4.

Referring to the drawings, a needle holder is shown generally at 10 as comprising arms 11 and 12 pivoted as at 13 in scissor-like fashion. The needle holder 10 is of conventional design each arm 11—12 having a jaw portion 14—15, respectively, forwardly of their pivotal connection and jaw having ring terminals 16 and 17 for receiving the finger or thumb of the person using the needle holder. In addition to the foregoing, each arm 11 and 12 has an arcuate rack portion 18 and 19, respectively. These rack portions 18—19 are adapted to interlock with each other for holding the jaws 14—15 in closed relation, it being noted that the arms 11 and 12 have a spring-like characteristic so as to flex somewhat when the arms 11—12 are forced together. This spring-like characteristic of the arms 11—12 tends to urge the respective jaws 14—15 together with greater or lesser force dependent upon the setting of the rack portions 18 and 19 relative to each other.

As illustrated in Figs. 1, 4 and 6 the jaws 14—15 are adapted to grip a surgical needle N between them. It is intended that this needle N be held firmly between the jaws and not slip or turn relative thereto when so held. In the past, the abutting faces of the jaws 14—15 have each been provided with a knurled or roughened surface the better to grip a needle. For purposes of sanitation and sterilization, the needle holders are made of rustproof material such as stainless steel. It is common knowledge that stainless steel cannot be hardened as can tool steel and therefore any attempt at hardening the knurled or roughened abutting surfaces of prior known jaws is limited and consequently unsatisfactory so far as long wearing qualities is concerned. Moreover, if the abutting surfaces of the jaws of conventional needle holders are hardened sufficiently to render them satisfactory, the jaws themselves become so brittle as to lose their spring-like characteristics and soon crack or break due to continuous flexing and the constant pressures they must bear.

The present invention contemplates overcoming the foregoing objectionable features by providing hardened jaw inserts to the abutting faces of the two jaws 14—15 of a needle holder. These hardened jaw inserts indicated 21 and 22, respectively, in the drawings, are made of a tool steel having a hardness quality of better than 50C and up to 90C according to "Rockwell" standards of hardness, preferably 70C in the present instance.

According to the present invention, each of the jaws 14—15 have their abutting faces milled away to provide a recess or seat 25 of a depth sufficient to receive one of the inserts 21 or 22 as the case may be. The inserts 21—22 are shaped correspondingly with the milled out portions of the abutting faces of the jaws 14—15 and are suitably secured in the respective recesses so as to become an integral part of the respective jaws. The best mode of securing an insert to a jaw is by brazing or the use of silver solder, although they can also be secured by rivets extending into the jaw proper if desired.

The invention further contemplates the provisions of teeth 26—26' on the abutting surfaces 21'—22 of the hardened inserts and so configured as to cooperate with each other to counteract turning of a surgical needle N when it is gripped between them.

The configuration of the teeth 26—26' is best illustrated in Fig. 6 and their effect is exemplified in Figs. 3 and 4 wherein it will be noted that teeth 26—26' extend diagonally of the long axis of the jaw and jaw insert. Each tooth 26 or 26' has the form of a saw tooth consisting of an angular surface 27 which converges with an inwardly extending wall 28 at a predetermined distance from the abutting or exposed face 21'—22' of the jaw insert 21—22. The inwardly extending wall 28 also merges with a similarly formed angular surface 27 of the next adjacent tooth at an apex A disposed in the plane of the abutting face of the needle holder jaw. The inwardly extending wall 28 of each tooth is preferably cut back under the tooth proper on which it is formed so as to be disposed at an acute angle relative to the angular surface 27 with which it converges and which forms the exposed surface of the next adjacent tooth.

The foregoing construction of the teeth 26—26' is the same on each jaw insert 21—22. However, the teeth 26 on the insert 21 have their inwardly extending walls 28 facing toward the tip or nose of the jaw 14 with which the insert 21 is associated whereas the teeth 26' on the insert 22 have their inwardly extending walls facing in an opposite direction, i. e., toward the broader or base end of the jaw 15 with which the insert 22 is associated.

In this manner, the apex A of each tooth 26—26' on opposing jaws 14—15 engages the needle N in such a fashion that any tendency of the needle to turn in one direction relative to one jaw insert is resisted by the digging effect of the apexes A of the teeth on the opposing jaw insert.

In addition to the foregoing, it will be noted in Figs. 3 and 4, that since the inwardly extending walls 28 on a jaw insert face in a common direction, and since the teeth run diagonally with respect to each other, each tooth has a ridge line R, Fig. 7, running from the apex A to the point of convergence of the angular faces 27 with the inwardly extending walls 28 of the adjacent tooth structure. Thus, the ridge lines R 75

of the respective diagonal teeth also function to dig into the needle N to oppose turning of the needle during gripping thereof between the jaws 14—15 of the needle holder. Moreover, since the needle N is engaged by a plurality of the teeth 26—26' and at various angles relative to the several teeth, it will be apparent that turning of the needle is resisted from all angles and the needle, therefore, securely held between the jaws.

From the foregoing it is clear that I have provided an improved type of inlaid jaw insert for needle holders which will give physicians and surgeons assurance during suture. Moreover, by applying my novel jaw inserts to spring-steel needle holders, the latter will have the characteristics necessary to the proper function of gripping a needle without becoming cracked or broken due to brittleness of its fibres when hardened. The jaw inserts of the present invention being of an entirely different fibre structure are more suitable to hardening separate and apart from the spring steel needle holder itself and therefore can be hardened to a degree far beyond that of which the needle holder is capable. This renders the needle engaging or abutting surfaces of the jaw inserts longer lasting and also replaceable if need be to thereby conserve on material and expenditures for surgery whether at clinics or hospitals.

While I have described my new jaw inserts for needle holders in specific detail, it will be apparent that they are susceptible to variations, modifications and/or alterations without departing from the spirit of my invention. I therefore desire to avail myself of all variations, modifications and/or alterations as fairly come within the purview of the appended claims.

What I claim as new and desire to protect by Letters Patent is:

1. In a surgical needle holder including a pair of jaws formed on a pair of pivoted scissor arms having springlike characteristics adapted to urge the abutting faces of said jaws together when said arms are forced together by hand; a hardened insert for the abutting face of each of said jaws comprising a strip of metal conforming in shape to the inner face of each of said jaws and having a plurality of sawtoothed configurations formed upon the exposed abutting surface thereof, each sawtooth configuration including an angularly disposed surface converging with an inwardly extending wall and providing an apex on each of said tooth configurations adapted to engage a needle disposed between each of said jaws.

2. In a surgical needle holder of the type including a pair of jaws formed on a pair of pivoted scissor arms having springlike characteristics adapted to urge the abutting faces of said jaws together when said arms are forced together by hand; a hardened metal insert secured to the abutting face of each of said jaws, each said insert having a surface adapted to abut the like surface of the opposite insert, the abutting surface of each insert having a plurality of sawtooth formations thereon in which each tooth comprises an angular surface converging with an inwardly extending wall and forming an apex with the angular surface of an adjacent tooth formation, the tooth formation on each of said abutting surface of one of said inserts having its inwardly extending wall facing in an opposite direction relative to the inwardly extending wall of the tooth formations on the abutting surface of the opposing insert whereby the apexes on the

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opposing abutting surfaces counteract one another to oppose turning of a needle between them.

3. In a surgical needle holder of the type including a pair of jaws formed on a pair of pivoted scissor arms having springlike characteristics for urging said jaws toward each other when said arms are forced together by hand; a hardened metal insert secured to the inner abutting face of each of said jaws comprising a needle engaging surface having a sawtoothed configuration including an angular surface converging with an inwardly extending wall at a predetermined depth from the abutting plane of each of said jaws, said sawtooth configurations extending diagonally relative to the longitudinal axis of said jaws and the inwardly extending walls of the tooth configuration on one of said inserts facing the inwardly extending walls of the tooth configurations on the opposite one of said inserts whereby to effect forces for effecting anti-turning action of a needle engaged by the tooth configurations on a pair of said inserts when said jaws are urged toward each other.

4. In a surgical needle holder including a pair of jaws formed on a pair of pivoted scissor arms having springlike characteristics adapted to urge the abutting faces of said jaws together when said arms are forced together by hand; a hardened insert for the abutting face of each of said jaws comprising a strip of metal conforming in shape to the inner face of each of said jaws and having a plurality of sawtoothed configurations formed upon the exposed abutting surface thereof, each sawtooth configuration including an angularly disposed surface converging with and disposed at an obtuse angle relative to an inwardly extending wall and inset inwardly relative to an apex provided on each adjacent tooth configuration for engaging a needle disposed between each of said jaws.

5. In a surgical needle holder of the type including a pair of jaws formed on a pair of pivoted scissor arms having springlike characteristics adapted to urge the abutting faces of said jaws together when said arms are forced together by hand; a hardened metal insert secured to the abutting face of each of said jaws, each said insert having a surface adapted to abut the like surface of the opposite insert, the abutting surface of each insert having a plurality of sawtooth formations thereon in which each tooth comprises an angular surface converging with an inwardly extending wall and forming an apex with the angular surface of an adjacent tooth formation, said inwardly extending wall being cut back under the apex formed thereby, and the tooth formation on each of said abutting surface of one of said inserts having its inwardly extending wall facing in an opposite direction relative to the inwardly extending wall of the tooth formations on the abutting surface of the opposing insert whereby the apexes on the opposing abutting surfaces counteract one another to oppose turning of a needle between them.

6. In a surgical needle holder of the type including a pair of jaws formed on a pair of pivoted scissor arms having springlike characteristics for urging said jaws toward each other when said arms are forced together by hand; a hardened metal insert secured to the inner abutting face of each of said jaws comprising a needle engaging surface having a sawtoothed configuration including an angular surface converging with an inwardly extending wall at a predetermined

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depth from the abutting plane of each of said jaws, said inwardly extending wall of said tooth being cut back under the angular surface thereof and being disposed at an acute angle relative to the adjacent angular surface with which it merges so that the apex thereabove extends over the said adjacent angular surface, said sawtooth configurations extending diagonally relative to the longitudinal axis of said jaws and the inwardly extending walls of the tooth configuration on one of said inserts facing the inwardly extending walls of the tooth configurations on the opposite one of said inserts whereby to effect forces for effecting anti-turning action of a needle engaged by the tooth configurations on a pair of said inserts when said jaws are urged toward each other.

7. In a surgical needle holder of the type including a pair of jaws formed on a pair of pivoted scissor arms having springlike characteristics for urging said jaws toward each other when said arms are forced together by hand; a hardened metal insert secured to the inner abutting face of each of said jaws comprising a needle engaging surface having a sawtoothed configuration including an angular surface converging with an inwardly extending wall at a predetermined depth from the abutting plane of each of said jaws, said sawtooth configurations extending diagonally relative to the longitudinal axis of said jaws to thereby form a ridge line on the upper surface of each of said tooth formations adapted to engage a needle disposed between said hardened metal inserts, and the inwardly extending walls of the tooth configuration on one of said inserts facing the inwardly extending walls of the tooth configurations on the opposite one of said inserts whereby to effect forces for effecting anti-turning action of a needle engaged by the tooth configurations on a pair of said inserts when said jaws are urged toward each other.

8. In a surgical needle holder of the type including a pair of jaws formed on a pair of pivoted scissor arms having springlike characteristics for urging said jaws toward each other when said arms are forced together by hand; a hardened metal insert secured to the inner abutting face of each of said jaws comprising a needle engaging surface having a sawtoothed configuration including an angular surface converging with an inwardly extending wall at a predetermined depth from the abutting plane of each of said jaws, said inwardly extending wall of said tooth being cut back under the angular surface thereof and being disposed at an acute angle relative to the adjacent angular surface with which it merges so that the apex thereabove extends over the said adjacent angular surface, said sawtooth configurations extending diagonally relative to the longitudinal axis of said jaws to thereby form a ridge line on the upper surface of each of said tooth formations adapted to engage a needle disposed between said hardened metal inserts, and the inwardly extending walls of the tooth configuration on one of said inserts facing the inwardly extending walls of the tooth configurations on the opposite one of said inserts whereby to effect forces for effecting anti-turning action of a needle engaged by the tooth configurations on a pair of said inserts when said jaws are urged toward each other.

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No references cited.