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W. G. CRUTCHFIELD

3,401,688

SKULL TONGS

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FIG 1.

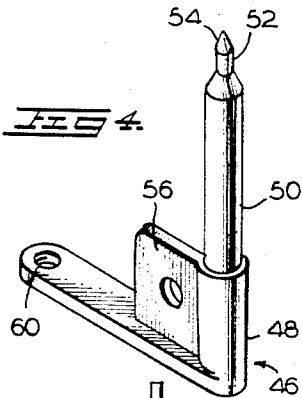
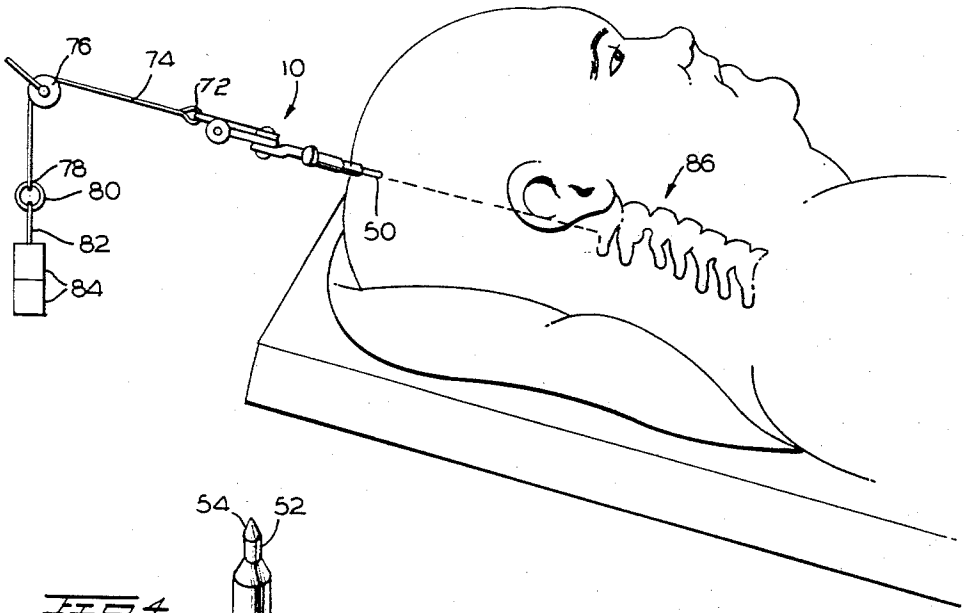


FIG 2.

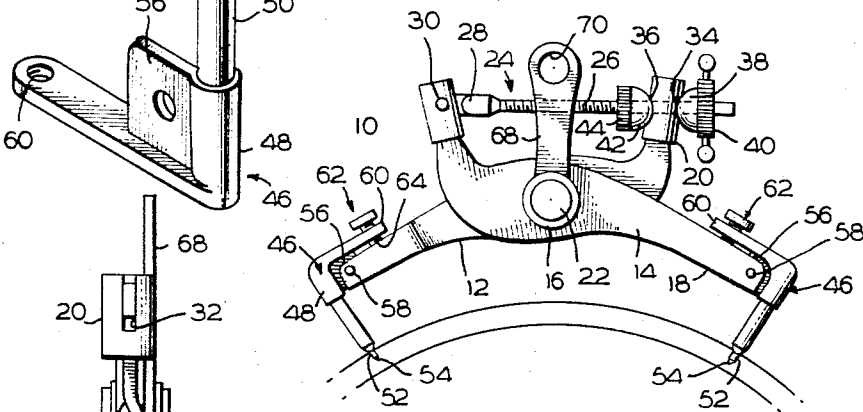
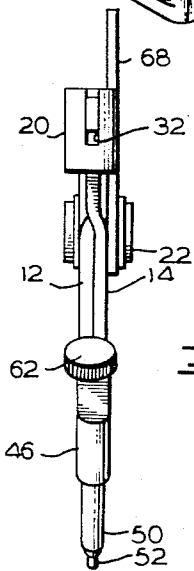


FIG 3.



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SKULL TONGS

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1 Claim. (Cl. 128—84)

This invention relates to an improved skull tong and in particular to the type of skull tongs employed in applying skeletal traction in treatment of injuries to the cervical spine.

The use of skeletal traction in the treatment of injuries to the cervical spine, in some form or another, has become generally routine with most surgeons and when properly applied, skeletal traction is considered to be the safest, most effective and simplest method of treating patients with acute injuries of the upper spine, as summarized in the article in the "Journal of the American Medical Association," May 1, 1954, vol. 155, pages 29 through 32, by W. Gayle Crutchfield.

Notwithstanding the wide acceptance of the use of skull tongs in the treatment of injuries to the cervical spine, basically skull tongs are essentially the same as those originally made over 30 years ago and pressure necrosis of the skull has resulted from prolonged traction. To compensate for this it has been necessary to tighten the instrument from time to time and penetration of the inner table of the skull by the skull tong pins, has been a matter of some concern to the profession. In a few instances it has been expedient to replace the skull tong points and to prepare new skull holes when it was necessary to apply traction over an extended period.

It is a principal object of the present invention to provide improved skull tongs which significantly lessen these problems inherent in prior art devices.

It is a further object of the invention to provide skull tongs which are relatively small in size so that the patient can be turned from side to side as an aid in the prevention of pressure sores over the back of the head, sacrum and hips.

It is another object of the invention to provide improved skull tongs using a combination of "squeeze" and "hook" forces to thereby lessen the danger of penetration of the inner table of the skull by the skull tong pins.

Another object is to provide such improved skull tongs employing skull tongs points of the same dimensions as commonly used by surgeons, whereby standard skull pin drill bits and the drilling techniques may be employed.

These and other objects and advantages of the present invention are provided by a skull tong comprising a pair of generally rigid members, each of the members including a center or body portion, and integral end portions, pivot means interconnecting the body portions of the rigid members in a scissors-like pivotal arrangement, one of the end portions of each member being curved in relation to the center portion such that the said one end portions lie in spaced generally parallel relationship during use of the tongs, means engageable by each of said one end portions of the members for pivoting the members about the pivot means to urge the end portions toward and away from each other, skull pins mounting means pivotally supported on each of the other ends of each of said members, said skull pin mounting means including means for independently pivoting said pin mounting means relative to the said other ends of the members, and a traction force attaching means connected to said tongs.

The invention will be more particularly described in reference to the accompanying drawings wherein;

FIGURE 1 diagrammatically illustrates the use of the improved skull tongs in applying traction in the plane of the articulating facets of the cervical spine of a patient;

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FIGURE 2 is an enlarged plan view of the improved skull tongs showing the skull tong pins properly engaged in bores in the skull of a patient;

FIGURE 3 is an enlarged end view of FIGURE 2; and FIGURE 4 is a perspective view of one of the pins and pin mounting means.

Referring to the drawings, 10 generally designates the improved skull tongs of the present invention. The skull tongs comprise a pair of members 12 and 14 constructed of relatively rigid generally non-corrodible material which may be sterilized by conventional steam sterilization processes. Steel that is chromium-plated, stainless steel, or stainless steel chromium-plated are examples of suitable construction materials.

Each of members 12 and 14 includes a body portion 16 and a pair of end portions 18 and 20. The end portions 18 are, in the illustrated form of the invention, tapered from the body portion 16 and generally rectilinearly aligned therewith; whereas the end portions 20 are tapered from the body portions and are positioned angularly to the body portions.

The body portions are interconnected by a pivot pin 22, which in the illustrated form of the invention, consists of a bolt which is threadedly received in one of the members whereby the two members 12 and 14 are mounted for pivotal movement in a scissors-like fashion. The angular relationship between the ends 20 of members 12 and 14 is such that when the tongs are in use, as illustrated for example in FIGURE 2 of the drawings, the longitudinal axes of the members 20 are generally parallel and in spaced relationship.

The extended ends of the end portions 20 of members 12 and 14 are releasably interconnected by means 24 to enable the surgeon to urge the ends of the members 12 and 14 toward and away from each other.

The means 24 comprises a threaded shaft 26 having an unthreaded end 28. The unthreaded end 28 is pivotally mounted in a slot 32 in end element 20 of member 14, by pivot pin 30. End portion 20 of element 12 is also slotted, as at 32, and opposite faces of the end portion 20 of member 12 are provided with detents or recess portions 34 and 36. Recess 34 is adapted to receive the spherical end portion 38 of a capstan nut 40 which is internally threaded to mate with the threads on the shaft 26. Recess 38 is adapted to receive the spherical portion 42 of a lock nut 44 which also has internal threads which mate with the threads on shaft 26. The other extended end 18 of each of the members 12 and 14 pivotally receives skull pin mounting means generally designated 46.

Each of the skull pin receiving members 46 is of generally L-shaped configuration and each includes an end portion 48 which slidably receives a skull pin 50. The skull pins 50 have lower generally cylindrical end portions 52, which terminate in generally conical portions 54, as more clearly illustrated in FIGURE 4 of the drawings.

At the junction of the two end portions of the L-shaped mounting means 46 is an internal web 56, which internal web is received in a slot in its respective end portion 18. A pivot pin 58 pivotally mounts its respective web 56 between the bifurcations of its end member 18. The other extended end 60 of each of the mounting means 46 is bored and internally threaded to receive adjustment screws generally designated 62.

The adjustment screws 62 have end portions 64 which engage the upper surface of their respective end portions 18, whereby when the adjustment screws 62 are turned inwardly, the extended ends 52 of the skull pins are moved toward each other and the opposite movement of the adjustment screws 62 moves the pins in a direction such that the extended ends of the pins move away from each other.

The assembly also includes a traction force coupling element 68, one end of which is pivotally mounted to the tongs 10 via the pivot pin 22, while the other end is provided with a bore 70 which, as more clearly shown in FIGURE 1 of the drawings, receives a link 72 connected to a flexible draft member 74. As well known in the art the member 74 passes over a sheave 76 and the lower end 78 of the flexible draft member is provided with a ring 80 which receives a hooked standard 82, which in turn carries one or more weights 84, whereby traction is placed upon a patient as illustrated, for example, in FIGURE 1.

As illustrated in FIGURE 1 of the drawing, the bores for receiving the pins 50, of the skull clamp, are in the plane of the patient's spine generally indicated at 86 whereby the traction is properly applied in the plane of the articulating facets, thereby avoiding deformity which may occur in cases where the plane of the traction is anterior of the upper segment of the spine.

In operation of the improved skull tongs of the invention a pair of bores is made in the skull at the proper locations with, for example, a hand drill and conventional drill points provided with stop elements such that the bores formed in the skull are only of a depth to receive the reduced diameter portions of the pins 50. The cap screws 62 are then positioned such that the plane of the top portion of the pin receiving members are generally parallel with the top plane of the end portions 18 of the tongs. Further, the locking nut 44 and the capstan nut 40 are moved out of engagement with their respective recesses 34 and 36 in the end portions 20 of member 12. The pins are then inserted in their bores, the clamp is tightened to the proper degree by screwing capstan nut 40 inwardly whereby when the hemispherical surface 38 thereof engages its mating detent 34, the pins 50 are squeezed and hooked into their cooperating bores. Further setting of the pins may be obtained by turning the cap screws 62 counter-clockwise to provide further hooking of the extended ends of the pins in their bores.

It has been found that with the clamp mounted as described above the pins do not require retightening under 7 to 10 days. However, if the instrument becomes loose the cap screws 62 are again turned counter-clockwise until a firm grasp is re-established. The cap screws force the points of the pins medially and upward away from the inner table of the skull, whereas the master locking capstan nut 40 forces the pins downward in the direction of the inner table and different forms of movement may require slight tightening of the capstan nut 40 after resetting of the skull pins. Due to the firmness of

the grasp which can be accomplished with skull clamps constructed in accordance with the present invention, its removal from the skull may require that the pins 50 be returned to their installation position in addition to the usual unlocking procedures.

From the foregoing description it will be seen that the present invention fully accomplishes the objects and advantages hereinbefore set forth.

I claim:

1. Skull tongs comprising a pair of generally rigid members, each of said members including a center or body portion and integral end portions, pivot means interconnecting the body portions of the rigid members in a scissors-like pivotal arrangement, one of the end portions of each member being curved in relation to the center portion such that said one end portions lie in spaced generally parallel relationship during use of the tongs, means engageable by each of said one end portions of the members for pivoting the members about the pivot means to urge the end portions toward and away from each other, a pair of generally L-shaped skull pins mounting members, pivot pins mounting each of the L-shaped members on each of the other ends of each of said members adjacent the apex of the L-shaped members, a pair of skull pins, each of said skull pin mounting members having one of the skull pins projecting from one leg of each of the L-shaped members with each of said skull pins positioned generally parallel with its leg, an adjustment screw received in the extended end of each of the other legs of the L-shaped members and adapted to bear against its respective rigid member of the skull tongs and a traction force attaching means connected to said tongs.

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