

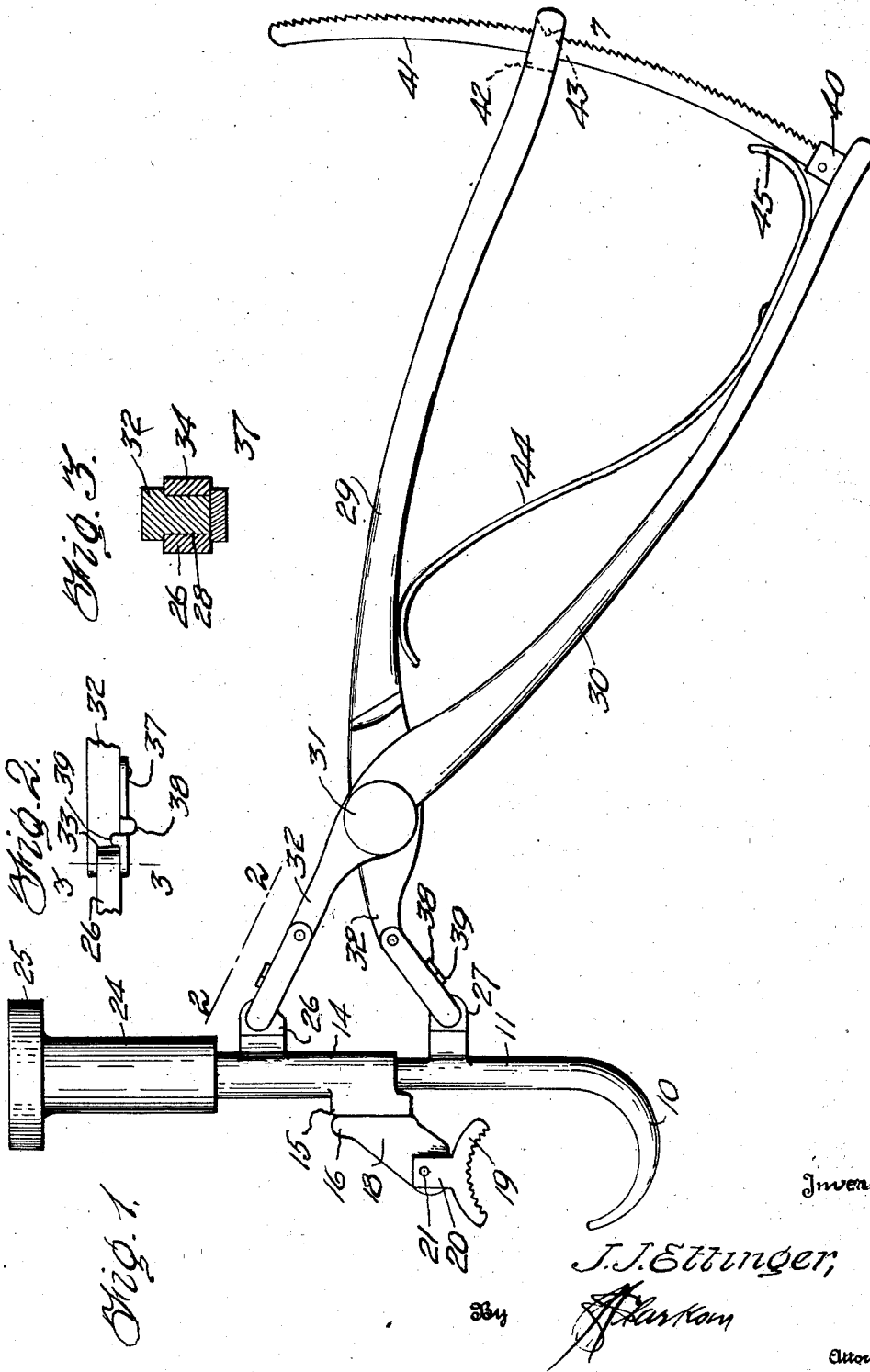
Sept. 9, 1947.

J. J. ETTINGER
SURGICAL BONE CLAMP

2,427,128

Filed Jan. 28, 1946

3 Sheets-Sheet 1



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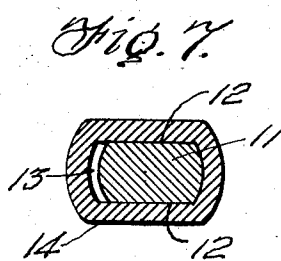
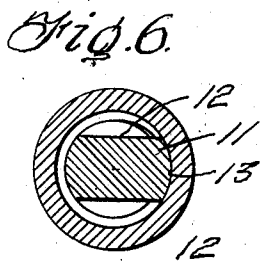
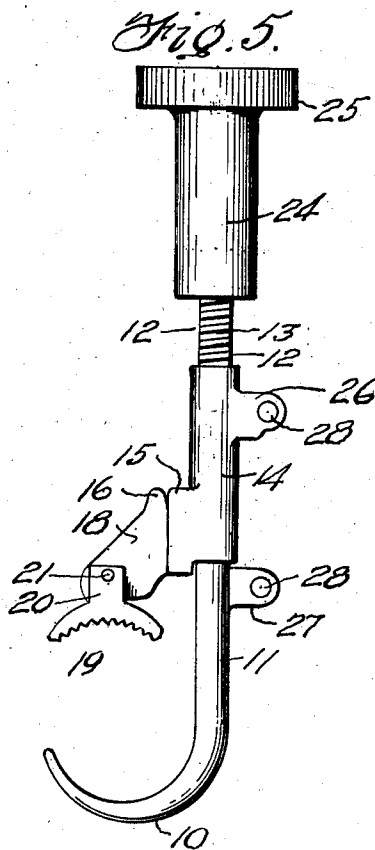
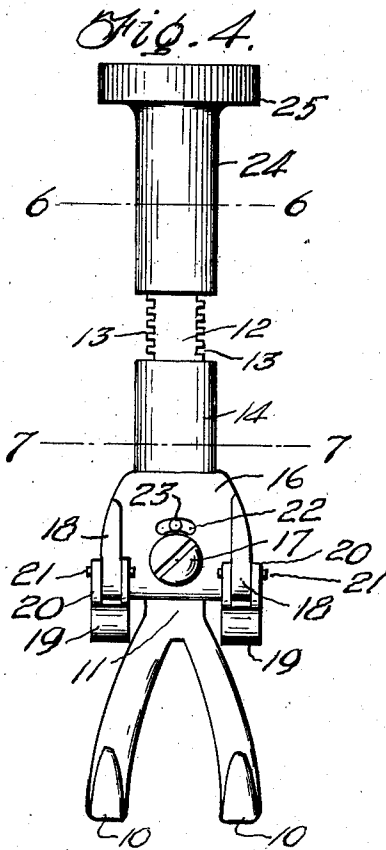
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Fig. 8.

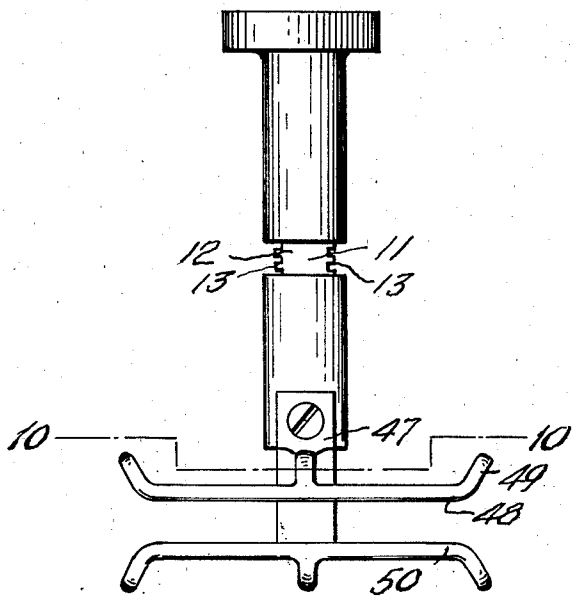


Fig. 9.

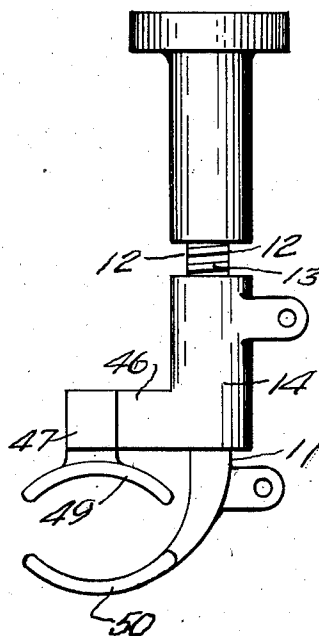
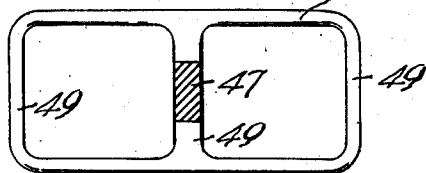


Fig. 10.



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UNITED STATES PATENT OFFICE

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SURGICAL BONE CLAMP

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Application January 28, 1946, Serial No. 643,848

18 Claims. (Cl. 128—346)

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This invention relates to surgical appliances and has special reference to a bone clamp.

Bone clamps have been heretofore known wherein the segments of a broken bone were held together by a pair of clamping jaws each grasping one side of the bone across the fracture. In these devices the jaws were held in parallelism and since bones are not generally purely cylindrical the jaws did not always effect proper clamping of the bone.

The principal object of the present invention is to provide a novel form of bone clamp wherein at least one of the jaws will be so mounted as to automatically adjust itself to the contour of the bone and thus effect uniform clamping pressure at the places wherein these jaws engage.

A second important object of the invention is to provide a device of this description which may be quickly adjusted to the bone and then securely forced and locked into position thereon, the quick adjustable means being detachable after the bone has been clamped.

A third important object of the invention is to provide a device of this character wherein there is a fixedly positioned jaw and a self adjusting jaw.

With the above and other objects in view the invention consists in general of certain novel details of construction and combinations of parts hereinafter fully described, illustrated in the accompanying drawings and particularly claimed.

In the accompanying drawings, Fig. 1 is a side elevation of the device showing the jaws open and the quick adjusting means applied thereto.

Fig. 2 is a fragmentary view from the line 2—2 of Fig. 1.

Fig. 3 is an enlarged detail section on the line 3—3 of Fig. 2.

Fig. 4 is a front elevation of the bone clamp shown in Fig. 1 with the jaws partly closed.

Fig. 5 is a side elevation of the clamp of Fig. 1 with the jaws partly closed.

Fig. 6 is an enlarged detail section on the line 6—6 of Fig. 4.

Fig. 7 is an enlarged detail section on the line 7—7 of Fig. 4.

Fig. 8 is a view similar to Fig. 4 but showing a modification of the clamping jaws.

Fig. 9 is a side elevation of the clamp employing the type of jaws shown in Fig. 8.

Fig. 10 is a detail section on the line 10—10 of Fig. 8.

In the construction of the invention as herein disclosed, two forms of the main portion of the devices are shown each of which may be pri-

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marily adjusted by the tongues shown in Fig. 1. These forms are quite similar but vary in certain details of the clamping jaws.

The first form is shown in Figs. 1 to 7 inclusive and in this form there is provided what may be termed a lower member 10 because of the provision of bone engaging jaws at the bottom of this member. A shank 11 extends up from these jaws and is flattened on two sides 12 while the other two sides are threaded as at 13. The lower part of the shank need not be threaded. On the shank 11 is mounted a flattened sleeve 14 which so fits the shank as to be slidable therealong but non-rotatable thereon as is best shown in Fig. 7.

Projecting from one flat side of the sleeve 14 is a boss 15 and on this boss is mounted a yoke 16 which is pivoted to the boss by a screw 17. This yoke 16 has a pair of forwardly extending arms 18. Mounted on each of these arms is a jaw member 19 provided with a forked portion 20 straddling the arm and pivoted thereto by a pin 21. These jaw members 19 are aligned above the jaw members 10. Concentric with the axis of the screw 17 is a slot 22 and a pin 23 is fixed in the boss 15 and extends into this slot so that the tilting of the yoke 16 on the screw 17 is limited. With this arrangement not only can the yoke tilt on the screw 17 but also each of the jaw members 19 can rock on its pin 21. Mounted on the upper end of the shank 11 is a nut 24 having a knurled head 25.

Extending rearwardly from the sleeve 14 is a lug 26 and extending rearwardly from the shank 11 below the sleeve 14 is a lug 27. These lugs are provided with eyes 28.

In connection with this arrangement there is provided a pair of tongs having members 29 and 30 pivoted together intermediate their ends as at 31. These tongs extend forwardly from the pivots to form jaws 32 and each jaw is cut away at its forward end to form a rabbit 33 from the side of which extends a pin 34 adapted to fit in the lug 26. Pivoted to each jaw 32 is a cover plate 37 which in one position lies over the end of the pin 34 but which may be moved out of this position to free the jaw and permit its removal from the lug 27. To aid in operating the plate 37 there is provided a finger grip 38 and to properly position it there is also provided a lug 39 which, when the plate is in closed position, engages the jaw 32 as shown in Fig. 2.

At the rear handle end of one of these tong members there is provided a boss 40 wherein is pivoted a ratchet member 41 which extends through an opening 42 shaped to provide a pawl-

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like side 43. A spring 44 is interposed between the handle of the tongs and this spring has an upturned end 45 which presses against the ratchet member 41 to hold teeth of the ratchet in contact with the pawl side 43. Thus the tongs may be closed and held closed but can only be released by tilting ratchet member 41 against the action of the spring end 45.

In operation the nut 24 is unscrewed, the tongs applied to the lugs 25 and 27 and the jaws placed on opposite sides of the broken bone. The tongs are then compressed to bring the jaws into close engagement with the bone whereupon the screw is screwed down to make a firm fit of said jaws on the bone. Then the tongs may be removed and the bone clamp left on the bone by itself so that a fracture plate may be applied or other means for holding the parts permanently during healing.

In the form shown in Figs. 8 to 10 the construction of the parts is very similar but in place of the boss 15 there is provided a boss 46 whereon is pivoted a rocker member 47 carrying a generally rectangular and elongated bone clamp 48, the ends and central bar of which are curved as best seen in Fig. 9. Also the jaws 10 of the previous form are supplanted at the lower end of the shank 11 by an elongated and rectangular bone clamp 53. Bone clamps 48 and 50 are of skeleton construction as will be seen. This form is used in the same manner as the previously described form.

What is claimed is:

1. In a surgical bone clamp, a lower member including a shank having a bone engaging jaw at its lower end, an upper member mounted on said lower member for sliding movement along said shank, adjusting means to move said upper member along said lower member, and bone engaging means pivoted to said upper member and rockable relative to said jaw.

2. In a surgical bone clamp, a lower member including a shank having a bone engaging jaw at its lower end, an upper member mounted on said lower member for sliding movement along said shank, adjusting means to move said upper member along said lower member, and bone engaging means pivoted to said upper member and rockable relative to said jaw, said last means including a base portion pivoted to the upper member and at least one secondary portion pivoted to the base portion, the pivoted axes of said base and secondary portions being at right angles to each other.

3. In a surgical clamp, a lower member including a shank having a bone engaging jaw at its lower end, an upper member mounted on said lower member for sliding movement along said shank, adjusting means to move said upper member along said lower member, and bone engaging means having universal joint connection with said upper member and opposed to said jaw.

4. In a surgical bone clamp, a lower member including a shank having a bone engaging jaw at its lower end, an upper member mounted on said lower member for sliding movement along said shank, adjusting means to move said upper member along said lower member, said adjusting means including a pair of tongs having detachable connection with said upper and lower members, and bone engaging means pivoted to said upper member and rockable relative to said jaw.

5. In a surgical bone clamp, a lower member including a shank having a bone engaging jaw at its lower end, an upper member mounted on said lower member for sliding movement along said shank, adjusting means to move said upper mem-

ber along said lower member, said adjusting means including a pair of tongs having detachable connection with said upper and lower members, and bone engaging means pivoted to said upper member and rockable relative to said jaw, said last means including a base portion pivoted to the base portion, the pivoted axes of said base and secondary portions being at right angles to each other.

6. In a surgical clamp, a lower member including a shank having a bone engaging jaw at its lower end, an upper member mounted on said lower member for sliding movement along said shank, adjusting means to move said upper member along said lower member, and bone engaging means having universal joint connection with said upper member and opposed to said jaw, said adjusting means including a pair of tongs having detachable connection with said upper and lower members.

7. In a surgical bone clamp, a lower member including a shank having a bone engaging jaw at its lower end, an upper member mounted on said lower member for sliding movement along said shank, adjusting means to move said upper member along said lower member, said adjusting means including a nut screwed on the upper end of the lower member and engaging the upper end of the upper member, and bone engaging means pivoted to said upper member and rockable relative to said jaw.

8. In a surgical bone clamp, a lower member including a shank having a bone engaging jaw at its lower end, an upper member mounted on said lower member for sliding movement along said shank, adjusting means to move said upper member along said lower member, said adjusting means including a nut screwed on the upper end of the lower member and engaging the upper end of the upper member, and bone engaging means pivoted to said upper member and rockable relative to said jaw, said last means including a base portion pivoted to the upper member and at least one secondary portion pivoted to the base portion, the pivoted axes of said base and secondary portions being at right angles to each other.

9. In a surgical clamp, a lower member including a shank having a bone engaging jaw at its lower end, an upper member mounted on said lower member for sliding movement along said shank, adjusting means to move said upper member along said lower member, and bone engaging means having universal joint connection with said upper member and opposed to said jaw, said adjusting means including a nut screwed on the upper end of the lower member and engaging the upper end of the upper member.

10. In a surgical bone clamp, a lower member including a shank having a bone engaging jaw at its lower end, an upper member mounted on said lower member for sliding movement along said shank, adjusting means to move said upper member along said lower member, and bone engaging means pivoted to said upper member and rockable relative to said jaw, said adjusting means including a pair of tongs having detachable connection with said upper and lower members and including a nut screwed on the upper end of the lower member and engageable with the upper end of the upper member.

11. In a surgical bone clamp, a lower member including a shank having a bone engaging jaw at its lower end, an upper member mounted on said lower member for sliding movement along

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said shank, adjusting means to move said upper member along said lower member, and bone engaging means pivoted to said upper member and rockable relative to said jaw, said adjusting means including a pair of tongs having detachable connection with said upper and lower members and including a nut screwed on the upper end of the lower member and engageable with the upper end of the upper member, said last means including a base portion pivoted to the upper member and at least one secondary portion pivoted to the base portion, the pivoted axes of said base and secondary portions being at right angles to each other.

12. In a surgical clamp, a lower member including a shank having a bone engaging jaw at its lower end, an upper member mounted on said lower member for sliding movement along said shank, adjusting means to move said upper member along said lower member, and bone engaging means having universal joint connection with said upper member and opposed to said jaw, said adjusting means including a pair of tongs having detachable connection with said upper and lower members and including a nut screwed on the upper end of the lower member and engageable with the upper end of the upper member, said engaging means including a base portion pivoted to the upper member and at least one secondary portion pivoted to the base portion, the pivoted axes of said base and secondary portions being at right angles to each other.

13. In a surgical bone clamp, a lower member including a shank having a bone engaging jaw at its lower end, an upper member mounted on said lower member for sliding movement along said shank, adjusting means to move said upper member along said lower member, and having a sleeve non-rotatably fitting on the shank of the lower member, and bone engaging means pivoted to said upper member and rockable relative to said jaw.

14. In a surgical clamp, a lower member including a shank having a bone engaging jaw at its lower end, an upper member mounted on said lower member for sliding movement along said shank, adjusting means to move said upper member along said lower member, and having a sleeve non-rotatably fitting on the shank of the lower member, said last means including a base portion pivoted to the upper member and at least one secondary portion pivoted to the base portion, the pivoted axes of said base and secondary portions being at right angles to each other.

15. In a surgical clamp, a lower member including a shank having a bone engaging jaw at its lower end, an upper member mounted on said lower member for sliding movement along said shank, adjusting means to move said upper member along said lower member, and having a sleeve

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non-rotatably fitting on the shank of the lower member, and bone engaging means pivoted to said upper member and rockable relative to said jaw.

16. In a surgical clamp, a lower member including a shank having a bone engaging jaw at its lower end, an upper member mounted on said lower member for sliding movement along said shank, adjusting means to move said upper member along said lower member, and having a sleeve non-rotatably fitting on the shank of the lower member, and bone engaging means pivoted to said upper member and rockable relative to said jaw, said adjusting means including a pair of tongs having detachable connection with said upper and lower members and including a nut screwed on the upper end of the lower member and engageable with the upper end of the upper member.

17. In a surgical bone clamp, a lower member including a shank having a bone engaging jaw at its lower end, an upper member mounted on said lower member for sliding movement along said shank, adjusting means to move said upper member along said lower member, and having a sleeve non-rotatably fitting on the shank of the lower member, and bone engaging means pivoted to said upper member and rockable relative to said jaw, said adjusting means including a pair of tongs having detachable connection with said upper and lower members and including a nut screwed on the upper end of the lower member and engageable with the upper end of the upper member, said engaging means including a base portion pivoted to the upper member and at least one secondary portion pivoted to the base portion, the pivoted axes of said base and secondary portions being at right angles to each other.

18. In a surgical clamp, a lower member including a shank having a bone engaging jaw at its lower end, an upper member mounted on said lower member for sliding movement along said shank, adjusting means to move said upper member along said lower member, and having a sleeve non-rotatably fitting on the shank of the lower member, and bone engaging means having universal joint connection with said upper member and opposed to said jaw, said adjusting means including a pair of tongs having detachable connection with said upper and lower members and including a nut screwed on the upper end of the lower member and engageable with the upper end of the upper member, said engaging means including a base portion pivoted to the upper member and at least one secondary portion pivoted to the base portion, the pivoted axes of said base and secondary portions being at right angles to each other.

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