May 23, 1961 S. JONAS ET AL 2,985,168

BONE-ALIGNING INSTRUMENT

Filed March 19, 1959

Fig. 1.

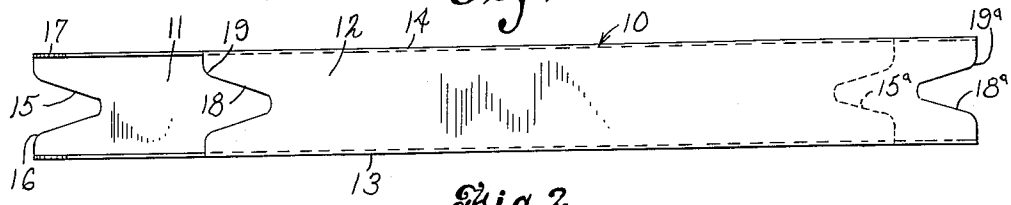


Fig. 2.

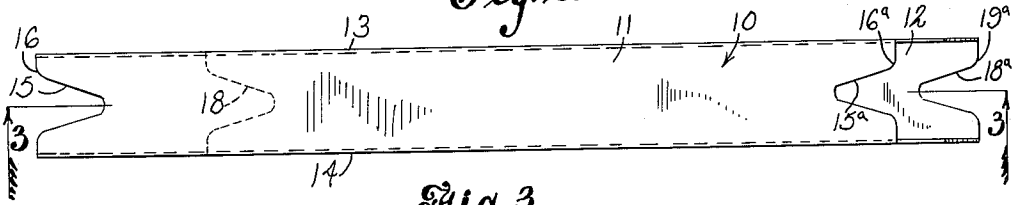


Fig. 3.

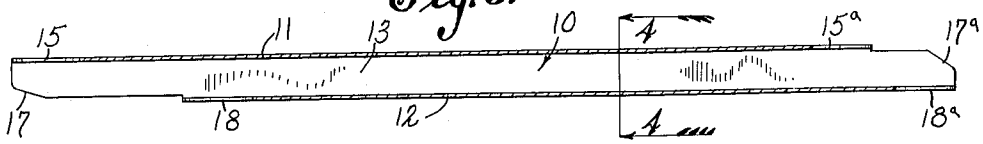


Fig. 6.

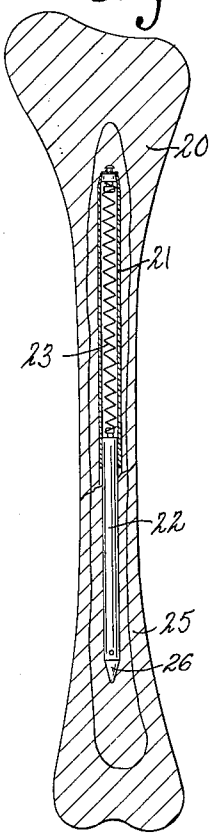


Fig. 5.

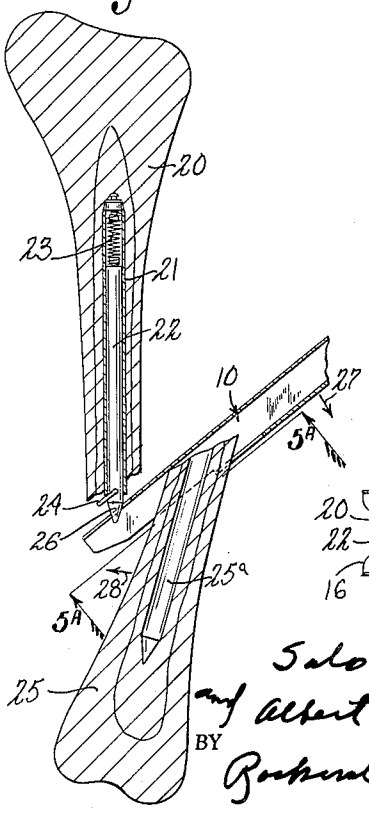


Fig. 4.

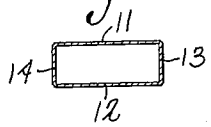
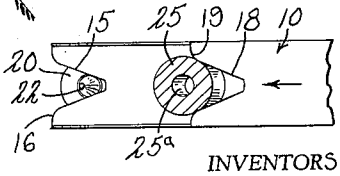


Fig. 5A.



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BONE-ALIGNING INSTRUMENT

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This invention relates to an instrument for aligning broken bones, particularly where there is overriding or displacement of the bone fragments necessitating an open reduction of the fracture.

Where a bone has been completely fractured and the fragments have been displaced and perhaps override or overlap each other at their adjacent ends, it is necessary to perform an open reduction of the fracture in order that the bone fragments may be properly aligned and in most cases held together by the use of a medullary pin. In our United States Patent No. 2,672,861, issued March 23, 1954, we have illustrated a medullary splint or pin which may be introduced into the bone fragments at the point of fracture, thus requiring an incision only at this point. In the use of this splint or for that matter any other splint, it is sometimes difficult to quickly bring the two adjacent ends of the bone fragments into apposition. It is contemplated by the present invention to provide an instrument which may be employed through the incision at the point of fracture to assist in bringing the ends of the bone fragments into alignment quickly and expediently so as to not only insure the proper positioning of the bones, but also to enable their proper alignment to be effected with the expenditure of much less time than is ordinarily involved in such an operation and without any damage to surrounding muscles as the bone-aligning instrument is applied directly on the ends of the fractured bones without any impingement on soft tissue. While the instrument presently illustrated is particularly useful with the medullary extension splint shown in our patent to which reference has been made above, it will be understood that it is not limited to this use.

One object of the present invention is to provide a new and improved instrument for aligning the fragments of a fractured bone.

Still another object of the invention is to provide an instrument of this character of simple and relatively inexpensive construction which will nevertheless be efficient and positive in operation and by which both bone fragments may be engaged and readily moved into proper alignment.

A still further object of the invention is to provide an instrument for aligning the fragments of a fractured bone wherein a Jonas extension medullary splint is employed, the instrument having means for engaging the point of the pin when inserted into one of the fragments and also having means to engage the other bone fragment so as to properly align the two and permit the projection of the pin into the second fragment.

To these and other ends the invention consists in the novel features and combinations of parts to be hereinafter described and claimed.

In the accompanying drawings:

Fig. 1 is a bottom plan view of a bone-aligning instrument embodying our invention;

Fig. 2 is a top plan view thereof;

Fig. 3 is a sectional view on line 3—3 of Fig. 2;

Fig. 4 is a sectional view on line 4—4 of Fig. 3;

Fig. 5 is a sectional view of a malaligned fractured bone showing the use of the instrument;

Fig. 5^A is a sectional view on line 5^A—5^A of Fig. 5 showing the engagement of the medullary pin and one of the bone fragments by the instrument at the beginning of the operation of bringing the bone fragments into alignment; and

Fig. 6 is a sectional view showing the bone after alignment has been effected and the medullary pin extended.

As illustrated the instrument comprises a hollow tubular member designated by the numeral **10** which, as illustrated in Fig. 4, is of hollow rectangular form in cross section although not limited to this particular shape. Over most of its length the instrument comprises upper and lower members **11** and **12** and side members **13** and **14**. As shown in Figs. 1 to 3, the upper member **11** is extended beyond the lower member **12** so as to expose the underside of the former for a short distance so that, as will be hereinafter explained, one of the bone fragments may be received within the instrument, the end of the fragment bearing against the under or inner side of the top wall **11**.

At its extreme end this upper wall is provided with a substantially V-shaped recess **15** opening outwardly and having rounded corners **16** at its outer end. The side walls **13** and **14** are coextensive in length with the upper wall at this end of the instrument to provide side flanges but may be beveled, as shown at **17**, adjacent their ends. Thus at the end of the instrument an open channel-shaped portion is provided by the wall **11** and the flanges formed by the side walls **13** and **14**.

Also the lower or bottom wall **12** is provided with a V-shaped recess or slot **18** similar to the recess **15** and opening in the same direction as the latter, the sides of this slot also being provided with rounded corners **19**, the rounded corners being provided so that there will be no sharp corners or points to injure the bone fragments when the instrument is used.

At its opposite end the instrument may be similarly formed except that in this case the bottom wall **12** is extended beyond the upper wall **11** and the side walls are coextensive with the bottom wall and are provided with beveled end portions 17^a. Likewise at this end of the instrument V-shaped recesses 15^a and 18^a are provdied in the upper and lower walls respectively, these recesses being formed similarly to the recesses **15** and **18** previously described and provided with rounded corners 16^a and 19^a at their outer ends. It will be noted, however, that the recesses at this end of the tool may be slightly narrower than those previously described and also that the difference in length between the top and bottom walls of the tool is less than that at the other end. The difference in size between the formations at the two ends of the instrument enables the instrument to be used with bones of different sizes and where different conditions are encountered.

In Figs. 5, 5^A and 6 of the drawings there is illustrated the use of the instrument in the open reduction of a bone fracture where there is considerable misalignment of the two bone fragments as well as some overlapping thereof. In this instance the Jonas medullary splint is employed. The upper bone fragment **20** has been reamed out and the splint inserted therein. This splint includes an outer sleeve member **21**, a pin **22** slidably mounted therein, and a spring **23** above the pin and urging it downwardly. The pin is held in its retracted position as illustrated by a cotter pin **24** inserted through registering openings in the pin **22** and sleeve member **21**. The lower bone fragment **25** has also been reamed out, as shown at 25^a, for the reception of the pin **22** after the fragments have been aligned.

With the parts in the position shown in Fig. 5, the

splint has been inserted into the upper fragment and the instrument 10 is inserted between the bone fragments as shown. The lower end of the pin 22 is tapered, as shown at 26, and this tapered end of the pin is engaged in the inner end of the recess 15 so that the bone fragment 20 will be held against lateral movement with respect to the instrument 10. The upper end of the lower bone fragment is received between the side walls 13 and 14 of the instrument, as shown, and engaged to some extent in the outer end of the recess 18.

With the parts in this position the outer end of the instrument is swung downwardly in the direction of the arrow 27 while at the same time the forefinger of the surgeon may embrace the lower end of the bone fragment 20 and hold the tapered end 26 of the pin 22 in place within the recess 15. Moving the outer free end of the instrument downwardly in this manner exerts an upward pressure on the upper fragment 20 and a downward pressure on the lower fragment 25 to bring the two into a position in which the ends do not overlap. Then by pressure of the surgeon's thumb on the bone fragment 25 in the direction of the arrow 28, the two fragments may be properly aligned.

During this operation it will be seen that the upper bone fragment is prevented from moving away from the tool by the end 26 of the pin 22 engaging in the recess 15 and by the engagement of the upper end of the fragment 25 in the channel of the instrument between the side walls 13 and 14 and the outer end of the recess 18. By this arrangement the bone fragments cannot slip away from the instrument but will be accurately held by it and brought into alignment.

When the two bone fragments have been aligned and before the instrument is removed from position, the cotter pin 24 may be withdrawn from the registering openings in the pin 22 and sleeve member 21, and the pin 22 will then be projected by the spring 23 into the reamed opening 25a in the lower fragment. The instrument 10 may then be withdrawn by a movement in the direction of its length and the reduction will be completed, as shown in Fig. 6.

It will be understood that the other end of the instrument may be employed in exactly the same manner, the particular end which is used depending upon the size of the fractured bone or other conditions.

It will be apparent that the construction at each end of the tool provides an extended surface of the upper or the lower walls to support one of the bone fragments, which surface is provided with the V-shaped recess 15 or 15a to permit the projection therethrough of the pin 22 if the Jonas splint is employed. The lower surface of this extension rests upon the end of the other bone fragment and receives this end in the channel formed by one of the walls 11 or 12 as the case may be and the side flanges extending therefrom. The edges of the slots 18 or 15a provide stop means for the lower bone fragment to hold it in position during the aligning operation, this stop means being at the inner end of the channel-shaped portion provided by the side walls 13 and 14 and one of the walls 11 or 12.

While, as illustrated, the body of the instrument is hollow, tubular and of substantially rectangular form in cross section, this may be varied as desired. For example, the body portion of the instrument may be of ellipsoidal form in cross section, if desired, or may consist of a round or cylindrical tubular member. In the latter case the end portions would be cut off at an agle to the axis of the tube so as to provide a bone-supporting portion projecting beyond the end of the closed tubular portion. In this event the walls of the tubular portion so cut would provide the flanges formed by the side walls 13 and 14 of the rectangular tubular body illustrated.

Also it will be obvious that the body of the instrument may be a plain flat solid member of any desired thickness, the ends of which will be formed as shown in the drawing and described in the accompanying claims. That is to say, it is the ends of the instrument which are the parts employed in the use of the tool and the intermediate or body portion serves as a handle, and this portion may be hollow or solid as desired.

While we have shown and described a preferred embodiment of our invention, it will be understood that it is not to be limited to all of the details shown, but is capable of modification and variation within the spirit of the invention and within the scope of the claims.

What we claim is:

1. An aligning instrument for use in the open reduction of a bone fracture comprising an elongated tubular body member having upper and lower walls and opposite side walls, one of the upper or lower walls extending beyond the other to provide upon its outer face a supporting surface for a fragment of the fractured bone and to provide at its inner side together with said side walls an open channel-shaped portion to receive the other bone fragment, and each of said upper and lower walls having an outwardly opening substantially V-shaped recess therein, said recesses being offset in a direction longitudinally of the instrument.

2. An aligning instrument for use in the open reduction of a bone fracture comprising an elongated tubular body member having upper and lower walls and opposite side walls, one of the upper or lower walls extending beyond the other to provide upon its outer face a supporting surface for a fragment of the fractured bone and to provide at its inner side together with said side walls an open channel-shaped portion to receive the other bone fragment, each of said upper and lower walls having an outwardly opening substantially V-shaped recess therein, said recesses being offset in a direction longitudinally of the instrument, and the other end of said instrument being similarly formed with the projection of the extended wall beyond the opposite wall being of less length than at said first end portion.

References Cited in the file of this patent

UNITED STATES PATENTS

1,920,821	Wassenaar	Aug. 1, 1933
2,695,607	Hipps et al.	Nov. 30, 1954
2,753,150	Gibson	July 3, 1956

OTHER REFERENCES

"Journal of Bone and Joint Surgery," vol. 13, 1931, pages 378–379 relied on. (Copy in Div. 55.)