

[54] **PIN ATTACHMENT MEANS FOR SURGICAL BOW**  
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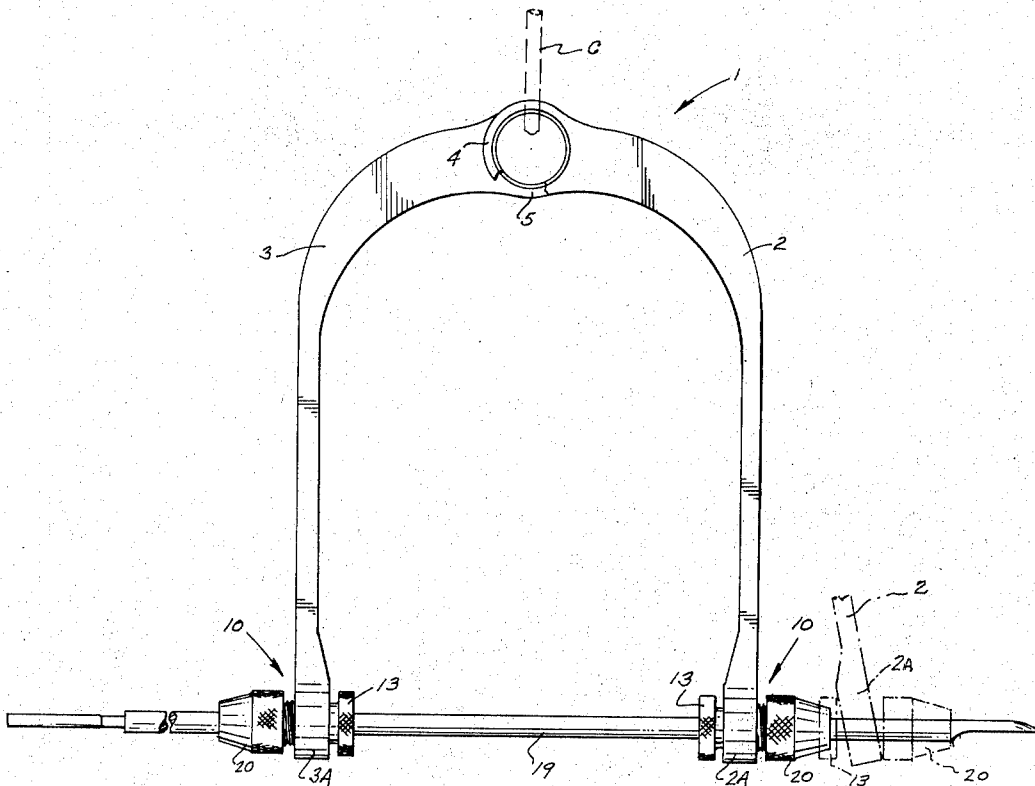
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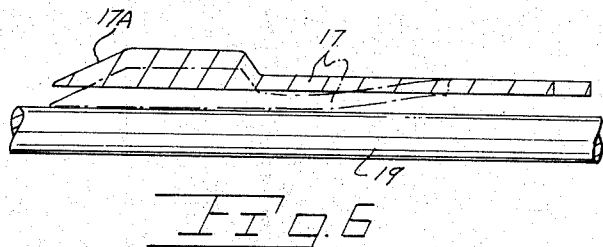
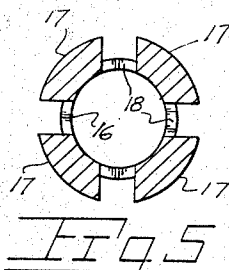
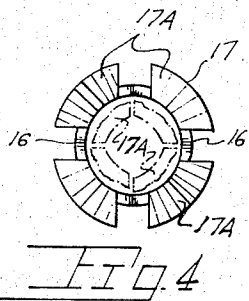
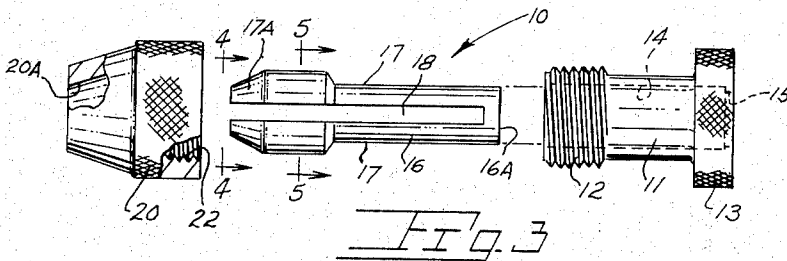
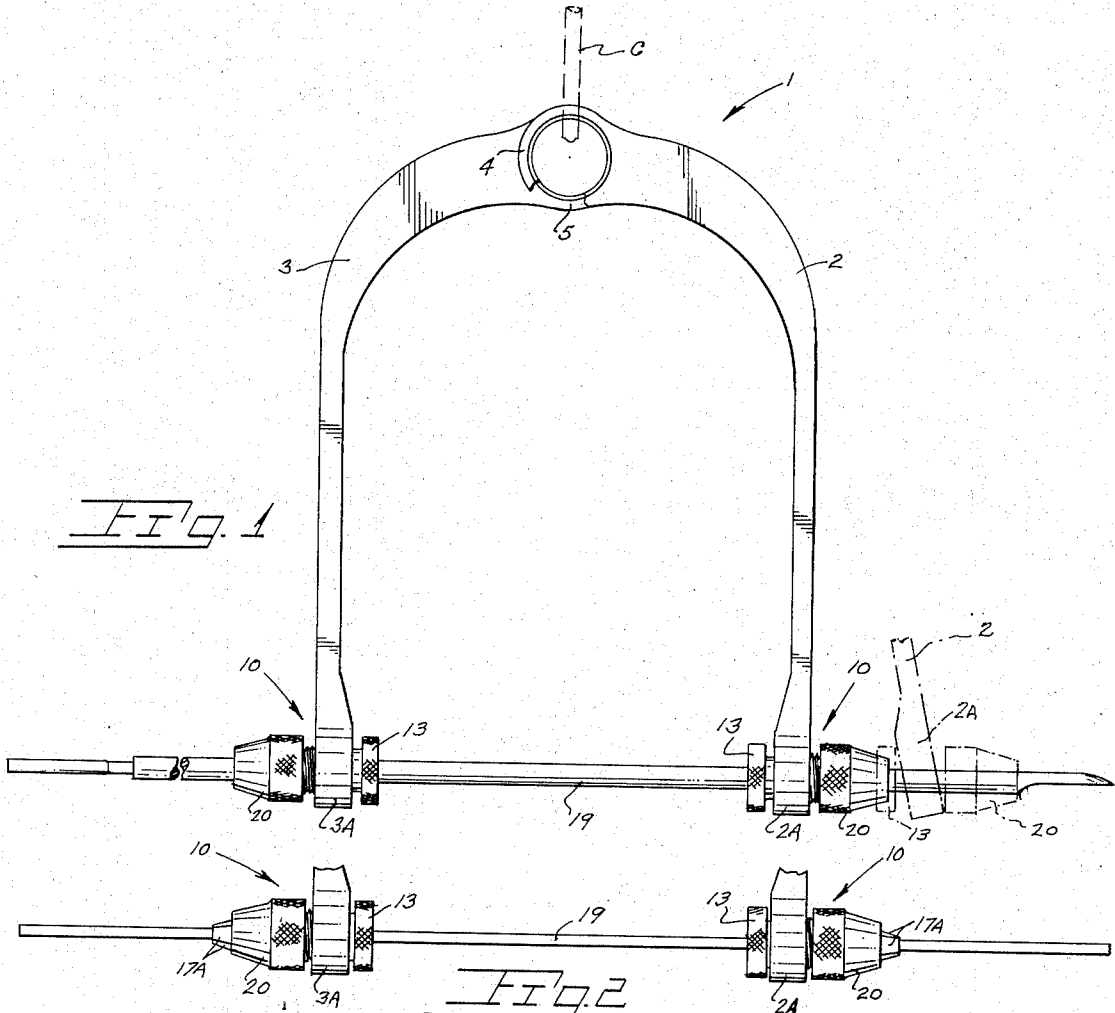
[57] **ABSTRACT**

Attachment means for securing bow extremities to the bone penetrating member. Included in the attachment means is a slotted component closeable into gripping engagement with a segment of the bone penetrating member to hold same against axial movement and accidental separation. Conveniently sized fingergrrips permit installation or removal of the present attachment means without tools.

[56] **References Cited**  
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**4 Claims, 6 Drawing Figures**





**PIN ATTACHMENT MEANS FOR SURGICAL BOW****BACKGROUND OF THE INVENTION**

The present invention relates generally to surgical bows of the type used in combination with a bone penetrating member for retention of the bone against muscle action during healing.

The prior art to the extent known includes numerous surgical bow configurations having pin or wire gripping means or fittings located at the bow extremities. Said means permits both attachment and removal of the bow to the bone penetrating pin or wire after insertion into the bone.

Known in the prior art are various arrangements permitting removable attachment of the bow structure from the bone penetrating member. Not uncommonly in these prior art structures loosening of the attachment means can occur between the bow and penetrating member to the extent that accidental separation occurs. During the lengthy healing process the body member, under traction for a substantial period of time, will impart rotational forces to the pin causing same to work loose from one or both bow end fittings. If unnoticed, separation can occur resulting in re-injury to the body member being treated.

**SUMMARY OF THE INVENTION**

The present invention is embodied within attachment means disposed at the ends of a surgical bow for positive retentive engagement of the bow to the bone penetrating member. The attachment means includes a highly flexible slotted component adapted for locking engagement with bone penetrating members of various diameters. The slotted component is of elongate shape for closure into surface engagement with said penetrating member.

A primary object of the present invention is to provide for secure attachment for a bone penetrating member with the end of a surgical bow to avoid all risk of accidental separation.

A further object resides in the attachment means accomplishing the desired pin to bow attachment in a very secure manner without the use of tools and yet permitting separation in a convenient manner when so desired.

A further object of the present invention is to provide attachment means which permits a degree of movement between the bow members and the pin if so desired which permits inclination of the bow member to the axis of the pin if desired.

These and other objects will become readily apparent upon an understanding of the following description.

**BRIEF DESCRIPTION OF THE DRAWING**

In the accompanying drawing:

FIG. 1 is a front elevational view of a surgical bow having the present attachment means installed at the bow outer ends,

FIG. 2 is a fragmentary elevational view of the surgical bow with the attachment means securing a bone penetrating member of reduced diameter,

FIG. 3 is a side elevational view of the attachment mean components removed from the bow end and separated for purposes of illustration,

FIG. 4 is an end elevational view of the slotted component taken along line 4—4 of FIG. 3,

FIG. 5 is a sectional view of the slotted component taken along line 5—5 of FIG. 3, and

FIG. 6 is a diagrammatic view of a flexible slotted component in operative and inoperative positions.

**DESCRIPTION OF THE PREFERRED EMBODIMENT**

With continuing reference to the accompanying drawing wherein applied reference numerals indicate parts similarly identified in the following specification, the reference numeral 1 indicates a segmented surgical bow which is formed of identical opposing legs 2 and 3 each terminating outwardly in annularly shaped ends 2A and 3A. Enlarged corresponding ends at 4 and 5 are of circular matching shape defining an opening for reception of a tensioned cord C. The bow construction disclosed is not part of the instant invention and accordingly the same may, if desired, be of any size or configuration to best suit the task at hand.

Indicated generally at 10 are identical attachment means in place within the bow extremities with the following description in regard to but one of the means being sufficient. With attention to FIG. 3 said attachment means comprises a base 11 of a tubular nature threaded externally at 12 while at its opposite end having a knurled annularly enlarged finger grip 13. Base 11 defines a bore 14 extending therethrough with an inwardly extending shoulder at 15 for purposes later described.

Normally carried within bore 14 of base 11 is an elongate, slotted locking member 16 having an inner end 16A in seated abutment against shoulder 15. Said locking member comprising a series of flexible arms 17 each adapted for biased gripping engagement with a pin 19 or other bone penetrating members as schematically shown in broken lines in FIG. 6. Slotted areas 18 in the locking member are of a substantial transverse dimension permitting centripetal movement of the arms through a wide range of travel to engage bone penetrating members 19 of different diameters.

Each arm 17 terminates forwardly in an inclined conical wall 17A for cooperation with a corresponding conical surface 20A formed interiorly of a threaded traveler element 20. Also formed interiorly of traveler element 20 are screw threads 22 for the reception of threads 12 of the tubular base. Accordingly, with locking means 16 seated within base 11 and with traveler element 20 in threaded engagement with the base, threaded advancement of element 20 results in the arms 17 being urged inwardly by surface 20A into the broken line position of FIG. 6. The flexible nature of the arms 17 permits each arm to flex inwardly into substantial surface engagement with bone penetrating members of various diameters to firmly engage same. As viewed in FIG. 4 the forward end of the slotted locking member 16 may close to the broken line position shown.

In applying the attachment means 10 to the bone penetrating member 19, the base 11 with locking member 16 therein is initially placed thereon after which the annular bow extremity 2A-3A is applied. Traveler element 20 is then advanced along threads 12 of the base to cause traveler surface 20A to act on the arm surfaces 17A. Finger tightening of traveler element 20 and base 11 results in firm engagement of locking member 16 with the pin or wire member 10 and of traveler element 20 with base 11. Such engagement with finger tip effort

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alone on the knurled surfaces is entirely adequate to achieve a snug fit.

In the embodiment shown the bone inserted member 19 locked in place may range in diameter from approximately three thirty-seconds to seven thirty-seconds of an inch with other size pins or wires being permitted by a change in the configuration of locking member 16. For example, the slotted areas 18 may be increased in width to permit further centripetal movement of the arm 17.

As viewed in FIG. 1 in broken lines, the present attachment means permits a bow leg to be inclined relative to the axis of the pin or wire 19 if so desired. Such leg movement if not desired may be prevented by the use of washer-like spaces between the grip 13 on base 11 and the annular leg end 2A-3A.

While I have shown but one embodiment of the invention, it will be apparent to those skilled in the art that the invention may be embodied still otherwise without departing from the spirit and scope of the invention.

Having thus described the invention what I desire to secure under a Letters Patent is:

1. In combination with a surgical bow and bone penetrating member carried thereby for the application of traction to an injured body member, the improvement comprising attachment means securing the bone penetrating member to annular bow extremities, each of

said attachment means including, a tubular base for insertion through a bow extremity, a threaded traveler element for engagement with the inserted end of said base for advancement therealong, said base and said threaded element confining a bow extremity therebetween, a locking member including flexible arms normally in radial spaced relationship to a segment of the bone penetrating member, each of said arms and said traveler element having cooperating surfaces thereon for simultaneously urging the arms inwardly into gripping engagement with the bone inserted member upon advancement of the traveler element along the base which movement additionally secures said traveler to said base.

2. The improvement claimed in claim 1 wherein said tubular base and said threaded traveler element are both provided with knurled surfaces facilitating the application of manual force to obviate the use of tools in the application or removal of the attachment means.

3. The improvement claimed in claim 1 wherein said locking member is in seated telescoped relationship within the tubular base.

4. The improvement claimed in claim 1 wherein the arms of the locking member are defined by slotted areas extending lengthwise along the locking member with each of said arms adapted for flexed engagement with the surface of the bone penetrating member.

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