

[54] **ARTERY CLAMP**

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[58] Field of Search..... 128/325, 326, 327, 128/346, 303 R, 361; 248/361 B

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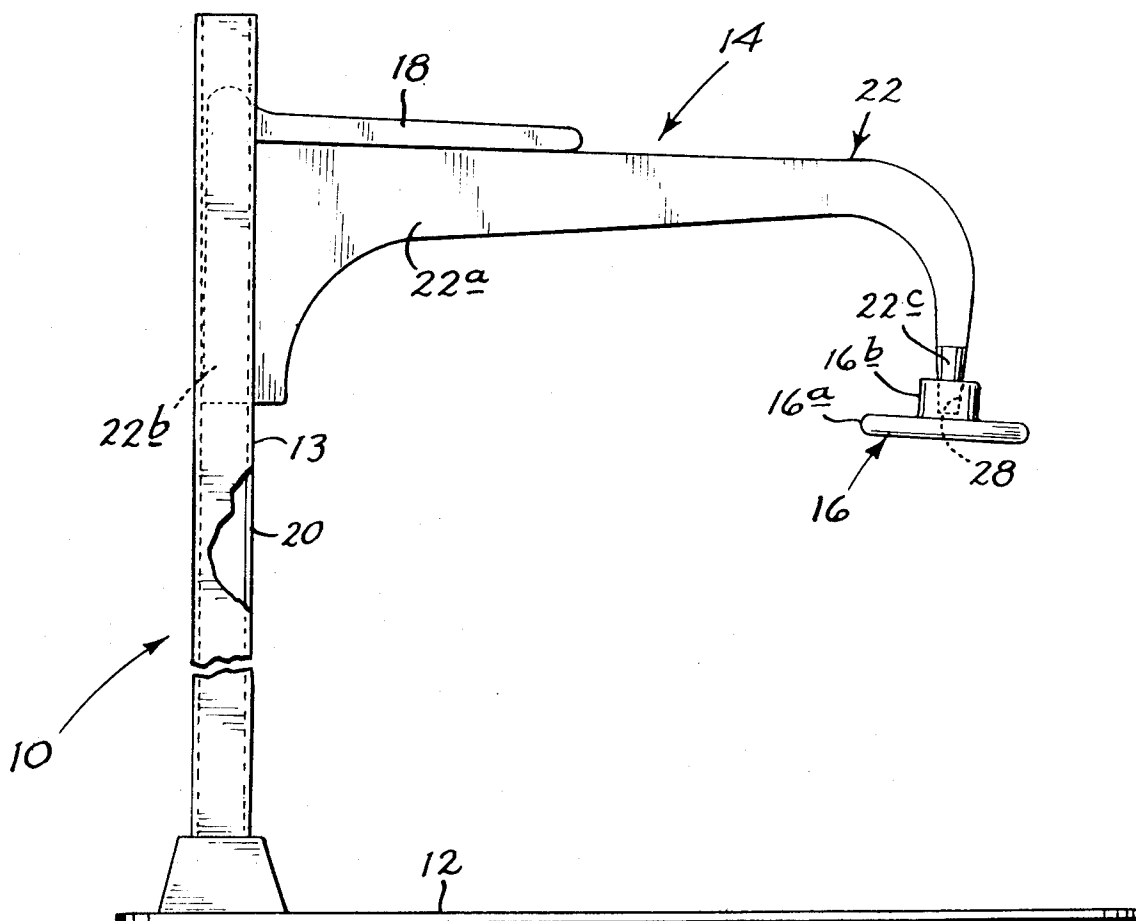
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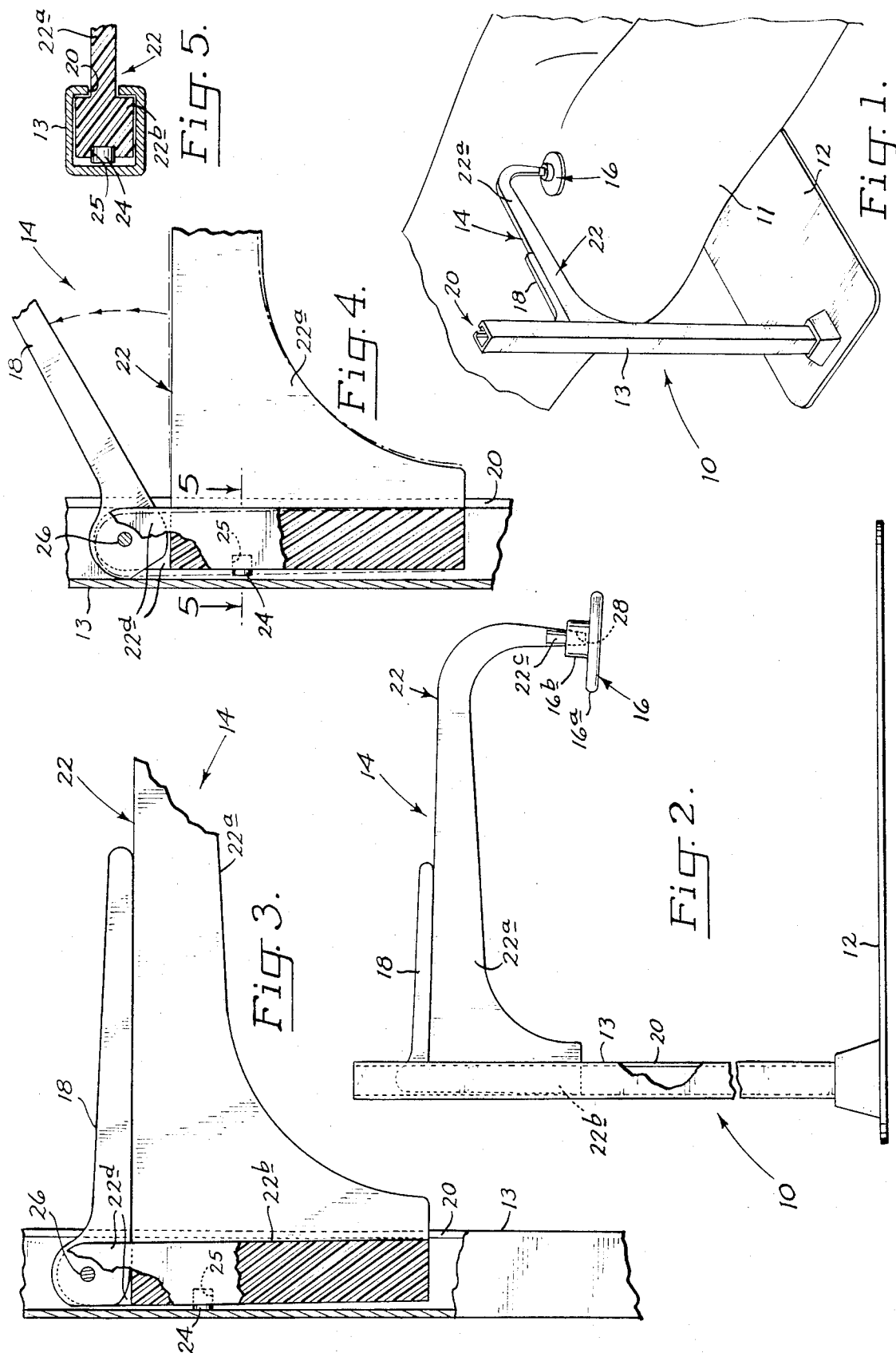
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[57] **ABSTRACT**

An artery clamp including a base, a support joined to the base, and a pressure-pad-bearing arm structure slidably mounted on, and releasably lockable at any position along, the support. The clamp is used, for example, following catheterization or needle puncture of a femoral artery to compress the artery while coagulation occurs, freeing a physician or nurse for other duties.

3 Claims, 5 Drawing Figures





ARTERY CLAMP

BACKGROUND AND SUMMARY OF THE INVENTION

Catheterization of arteries for x-ray visualization of intra-vascular pathology is a well established medical procedure. In addition, blood samples for laboratory analysis of blood gases and pH are frequently obtained by needle puncture of an artery. According to conventional procedure, following withdrawal of an arterial catheter or needle, a physician or nurse must manually compress the artery to allow coagulation to take place. This is time consuming, since pressure must be maintained, typically, for six to twelve minutes, and frequently both hands are needed for effective compression. If the patient should, for example, suddenly lose consciousness or develop a serious heart rhythm irregularity, the physician or nurse should have both hands free to render emergency care while still preventing bleeding from the punctured artery.

The invention relates generally to an artery clamp. More particularly, it relates to such a device which permits a user to quickly and conveniently apply pressure to a punctured artery to prevent bleeding, and then attend to other duties while coagulation takes place. For the purpose of illustration, a preferred embodiment of the invention is described herein which is particularly adapted for use in conjunction with femoral arterial catheterization.

The novel artery clamp of the invention consists generally of an elongated, upright tubular support member joined to a broad, flat base. Extending out over the base is a rigid, inverted-U-shaped arm structure which is slidably mounted at one end on the support member. At the other end of the arm structure is a detachable disk-shaped pressure pad. In use (during femoral arterial catheterization), before removing catheter from a patient, a physician or nurse places the base of the clamp under the patient's thigh and positions the arm structure so that the pressure pad is directly over the puncture site. As the catheter is withdrawn, the user moves the arm structure down toward the base causing the pad to compress the artery and prevent bleeding. The resulting upward pressure on the pad causes a slight angular change between the arm structure and the support member, which change results in automatic locking of the arm structure in position on the support. After a sufficient period of time for coagulation, the user unlocks the arm structure by operating a release lever mounted thereon. If bleeding recurs, the user may quickly recompress the artery by again pressing down on the arm structure.

DESCRIPTION OF THE DRAWINGS

These and other advantages of the novel clamp of the invention will become more apparent as the description which follows is read in conjunction with the accompanying drawings, wherein:

FIG. 1 illustrates the clamp of the invention in use;

FIG. 2 is an enlarged side elevation of the clamp of FIG. 1;

FIG. 3 is a fragmentary sectional view, partially broken away, showing an arm structure of the clamp in a locked condition therein;

FIG. 4 is a view similar to FIG. 3 showing operation of a releasing lever in the clamp; and

FIG. 5 is a fragmentary sectional view taken on line 5—5 of FIG. 4.

DETAILED DESCRIPTION OF THE INVENTION

Referring to the drawings, and first of all particularly to FIG. 1, indicated generally at 10 is an artery clamp as contemplated herein--the same being shown in use in this figure applying pressure to the right femoral artery of a patient (indicated generally at 11). This patient has just undergone femoral arterial catheterization, and as will be explained shortly, clamp 10 is applying pressure over a puncture site in the patient from which a catheter has previously been withdrawn. In general terms, clamp 10 includes a base 12, an elongated support 13 joined to the base, an elongated arm structure 14 slidably mounted on the support, and a pressure pad 16 carried on arm structure 14. The clamp also includes a releasing lever, or releasing means, 18, the operation of which will be explained later.

With the clamp in use as shown in FIG. 1, arm structure 14 is locked against movement on support 13, with base 12 and pressure pad 16 in contact with and bearing against opposite sides of the patient's right thigh.

Considering the construction of the various parts in clamp 10, base 12 comprises a substantially flat aluminum plate, the particular dimensions of which are not especially critical. However, for use in a femoral arterial catheterization procedure, the base should be broad enough to provide adequate stability for the clamp, and thin enough to slip easily beneath a patient's thigh (as illustrated in FIG. 1). For example, the base might have a width of about 6 inches, a length of about 12 inches, and a thickness of about three-sixteenths inch.

Referring to FIGS. 1, 2 and 5, support 13, also formed of aluminum herein, is welded to the top side, and adjacent one end, of the base (in FIGS. 1 and 2). Support 13 is disposed with its longitudinal axis substantially normal to the plane of base 12, and takes the form of a hollow, square cross section tube having an elongated slot 20 extending substantially completely along its right side in FIGS. 2 and 5.

Referring to FIGS. 2-5 inclusive, arm structure 14 includes an arm 22, and what might be thought of as a frictioning member 24 mounted on arm 22. Arm 22 includes an elongated, somewhat shallow inverted U-shaped outer part 22a which joins integrally with an inner end part 22b. As can be seen particularly in FIGS. 3-5, part 22b is elongated, and has a generally square cross-sectional configuration which is slightly smaller in area than cross-sectional area of the interior of support 13. Part 22b is slidably received in the interior of the support, with outer part 22a extending through slot 20 and over base 12. The outer (down-turned) end 22c of outer part 22a is formed with a conical outside surface. Arm 22 is made of a suitable rigid plastic material.

Frictioning member 24 takes the form, generally, of a cylindrical plug, which is secured in a socket 25 formed in arm part 22b. As can be seen clearly in FIGS. 3-5, member 24 projects to the left of the left side of arm part 22b in the figures. Preferably, member 24 is formed of fiberglass. Frictioning member 24, together with arm part 22b, comprise what is referred to herein as a mounting portion in the arm structure.

Releasing lever 18 has the side profile shown in FIGS. 3 and 4, and is pivoted by a pin 26 to and between a

pair of laterally spaced upper ears 22d formed in arm part 22b. Lever 18 extends through slot 20. This lever is formed of substantially the same plastic material used in arm 22.

As can best be seen in FIG. 2, pressure pad 16 includes a generally disk-shaped base 16a, on top of which is formed an integral mounting boss 16b. Boss 16b is provided with a conical socket 28, which matches with and receives end 22c in arm 22. The pad is detachably held (by friction) on the arm. As contemplated herein, pad 16 is formed from a suitable transparent plastic material. Preferably, this material is one which permits autoclaving and gas sterilizing of the pad for reuse purposes. A satisfactory plastic for this purpose is a polycarbonate resin made by General Electric sold under the name "Lexan."

Explaining now how clamp 10 may be used in a femoral arterial catheterization procedure and assuming that a patient is lying down (as indicated generally in FIG. 1) with a catheter inserted in his right femoral artery, base 12 of the clamp is slipped beneath the patient's right thigh with pressure pad 16 positioned essentially directly over the puncture site for the catheter. When the user is ready to remove the catheter, he moves arm structure 14 down on support 13. Substantially simultaneously with withdrawal of the catheter, he presses down on the arm structure (at a point closely adjacent the support), causing pad 16 to press against the artery at the puncture site with sufficient pressure to stop bleeding from the site. The user then lets go of arm structure 14, and, as a result of upward pressure then existing against the pad, the structure automatically locks in position on the support.

This automatic locking action obtainable in the proposed clamp is an important feature of the invention. As previously described, inner end part 22b of arm 22 is similar in cross section to, but slightly smaller than, the interior of support 13. Thus, after pad 16 has been pressed against an artery to compress it, the resulting upward pressure against the pad causes inner end part 22b to tilt slightly within the support. Such action results in relatively high-friction frictional engagement between the mounting portion of the arm structure and support 13. More specifically, this high-friction engagement results from contact between opposite interior sides of the support, the bottom end of arm part 22b (where it joins with outer arm part 22a), and frictioning member 24. FIG. 3 clearly illustrates this locked condition.

It should be noted that such high-friction engagement can occur with the arm structure at any one of an infinite number of different positions on support 13.

The locked condition of the arm structure on the support remains unchanged until actuation of lever 18. When the user decides to remove pressure from the artery in the hope that coagulation has occurred at the puncture site, he actuates lever 18 by swinging it upwardly as indicated in FIG. 4. With such swinging of the lever, the end thereof which is inside the support engages that wall of support 13 which is opposite slot 20 (as shown in FIG. 4). Continued upward swinging of lever 18 tilts arm part 22b clockwise in FIG. 4 (from its dash-dot position in the figure), releasing member 24 from frictional engagement with the support, and allowing arm structure 14 to climb slightly on the support under the influence of the upward pressure still existing on pad 16. As the arm climbs up the support, pressure

on the artery is relaxed. By then lowering the lever and repeating the operation just described several times, all clamping pressure on the artery can be gradually released.

If, as pressure is thus slowly released, bleeding recurs, it may again be stopped by pressing down on the arm assembly (as described earlier) to increase clamping pressure.

Another important feature of the invention is that the pressure pad proposed herein is transparent. A number of important advantages are thus attained. For example, during the application of pressure by the pad over the puncture site, it is easy for the user to be sure that the pad is properly positioned. Further, during the process of relaxing pressure from an artery, the user can continually view the puncture site and can note immediately if bleeding recurs.

After complete removal of clamping pressure, the arm structure may be lifted on support 13 to any desired elevated position thereon, such as the position shown in FIG. 2, in order to facilitate removal of the clamp. When the arm structure is lifted to such a position and released, the weight of the cantilevered portion of the arm within support 13 and produce frictional engagement between the two which is ample to support the structure in its raised position.

There is thus provided a convenient clamping device which allows a user to compress an artery and permit intra-vascular coagulation, while freeing the user for other duties.

Although a preferred embodiment has been described herein, it is understood that variations and modifications are possible without departing from the spirit of the invention.

It is claimed and desired to secure by Letters Patent:

1. An artery clamp comprising

a base,

an elongated upright tubular member joined to said base, said member including an axially extending slot along a portion of its length, said slot opening into the interior of said member,

an elongated rigid arm structure including an elongated mounting portion slidably received within said tubular member, and, joined to said mounting portion, an arm portion extending out through said slot and overlying said base,

said mounting portion having an exterior transverse profile similar to but smaller in area than the interior transverse profile of said tubular member, an angular change in position of said arm portion with respect to the base being thereby effective to lock the arm structure against movement along said member through axial misalignment and consequent frictional engagement between said mounting portion and member,

said arm structure further including means for releasing the same from a locked condition, said means including a release arm overlying said arm portion, joined to cam means pivotally mounted on said mounting portion within said member whereby, with the arm structure in a locked condition, movement of said release arm away from the base produces substantial axial alignment of said mounting portion and said member through engagement of the cam means with the tubular member, releasing them from frictional engagement, and

a pressure pad joined to said arm structure adjacent the other end thereof.

2. The clamp of claim 1, wherein the pressure pad is detachably joined to said arm structure.

3. The clamp of claim 1, wherein said pressure pad is transparent.

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