Dec. 8, 1970 R. S. COLLEY 3,545,046

TOGGLE-TYPE CLAMP

Original Filed Nov. 20, 1968 3 Sheets-Sheet 1

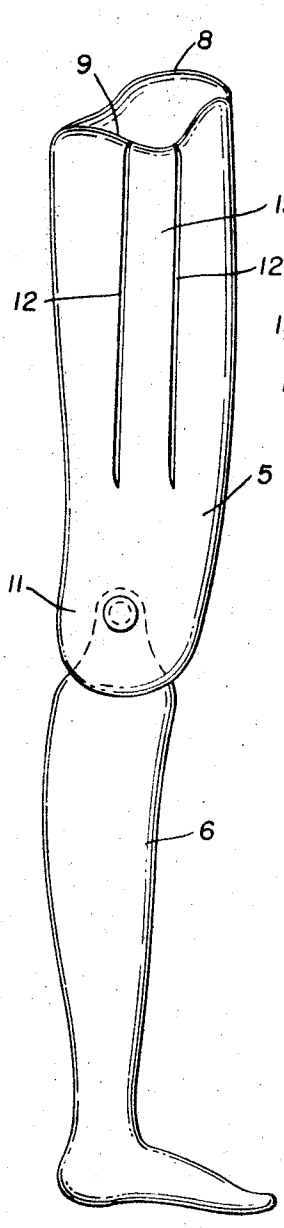
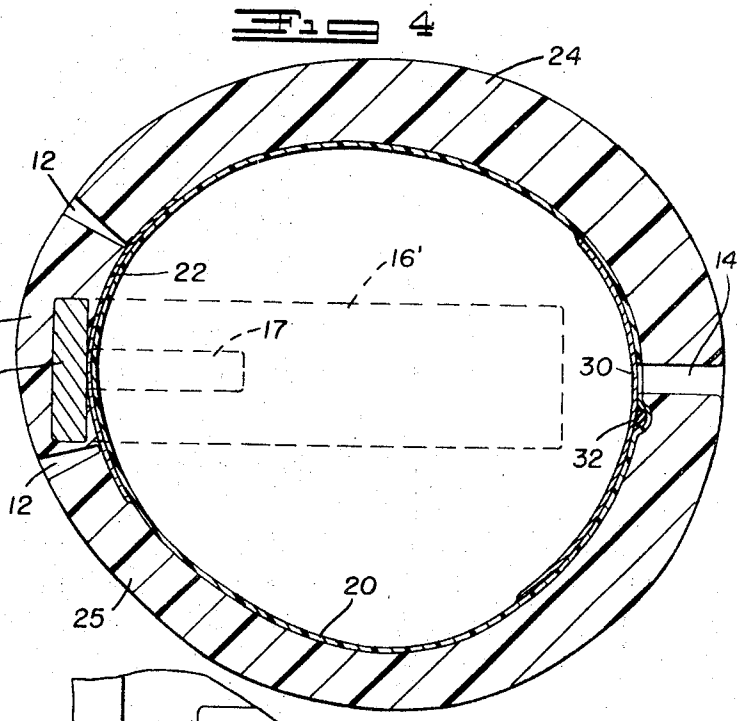


FIG 1

FIG 4



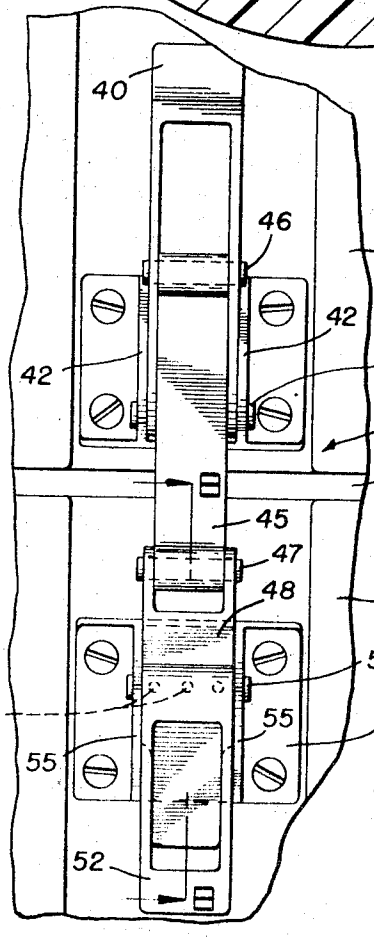


FIG 7

INVENTOR.
RUSSELL S. COLLEY

Dec. 8, 1970 R. S. COLLEY 3,545,046

TOGGLE-TYPE CLAMP

Original Filed Nov. 20, 1968 3 Sheets-Sheet 2

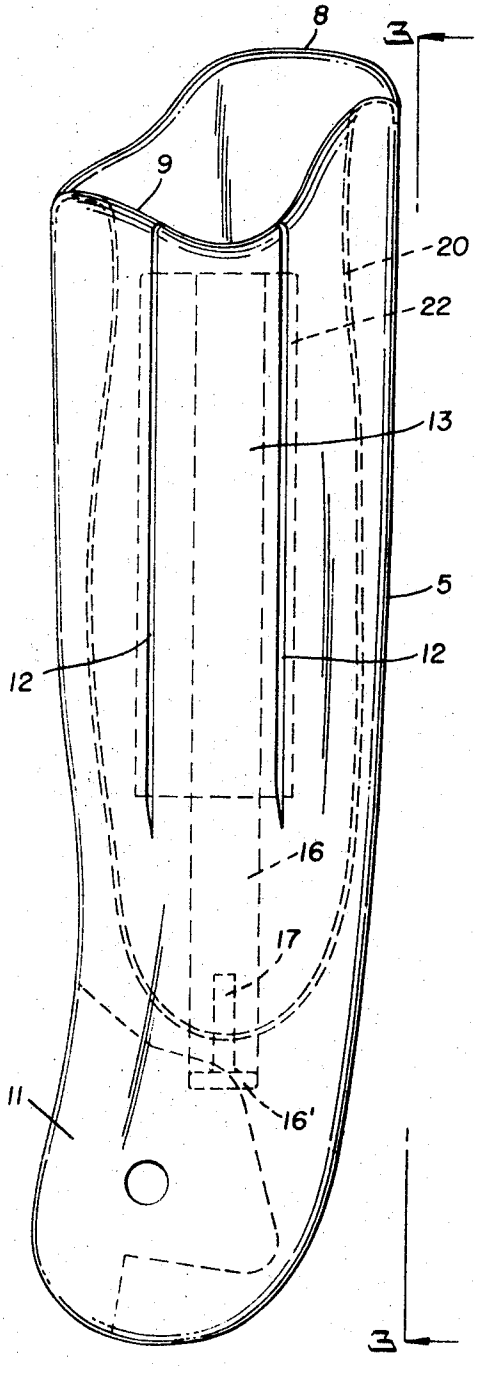


Fig 2

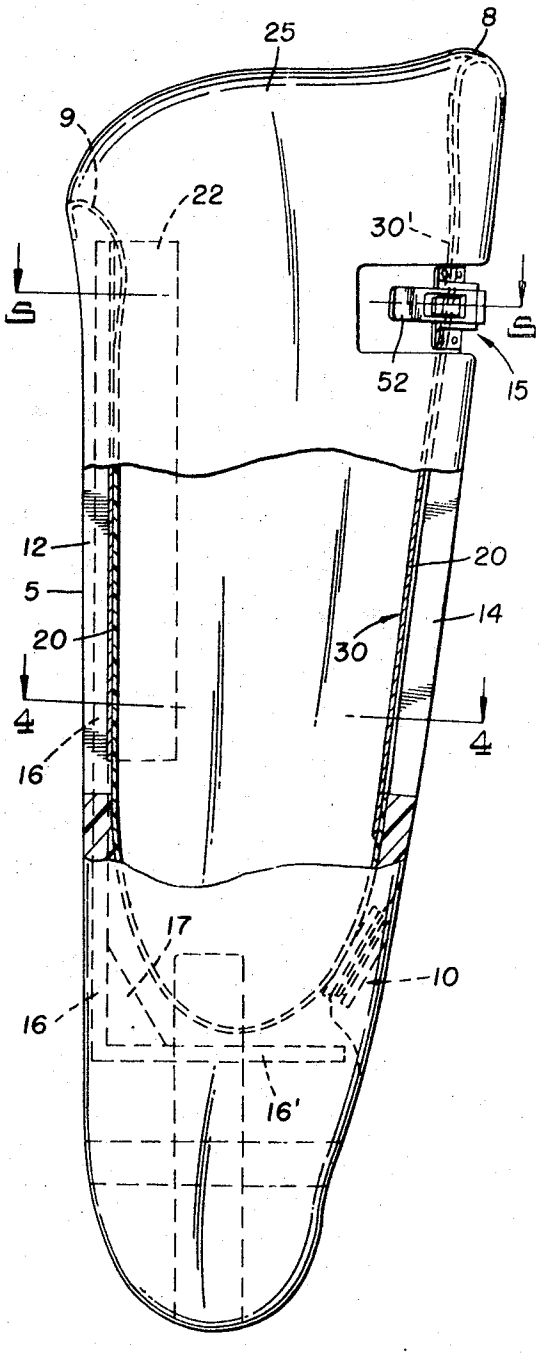


Fig 3

INVENTOR.
RUSSELL S. COLLEY

Dec. 8, 1970 R. S. COLLEY 3,545,046

TOGGLE-TYPE CLAMP

Original Filed Nov. 20, 1968 3 Sheets-Sheet 3

FIG 5

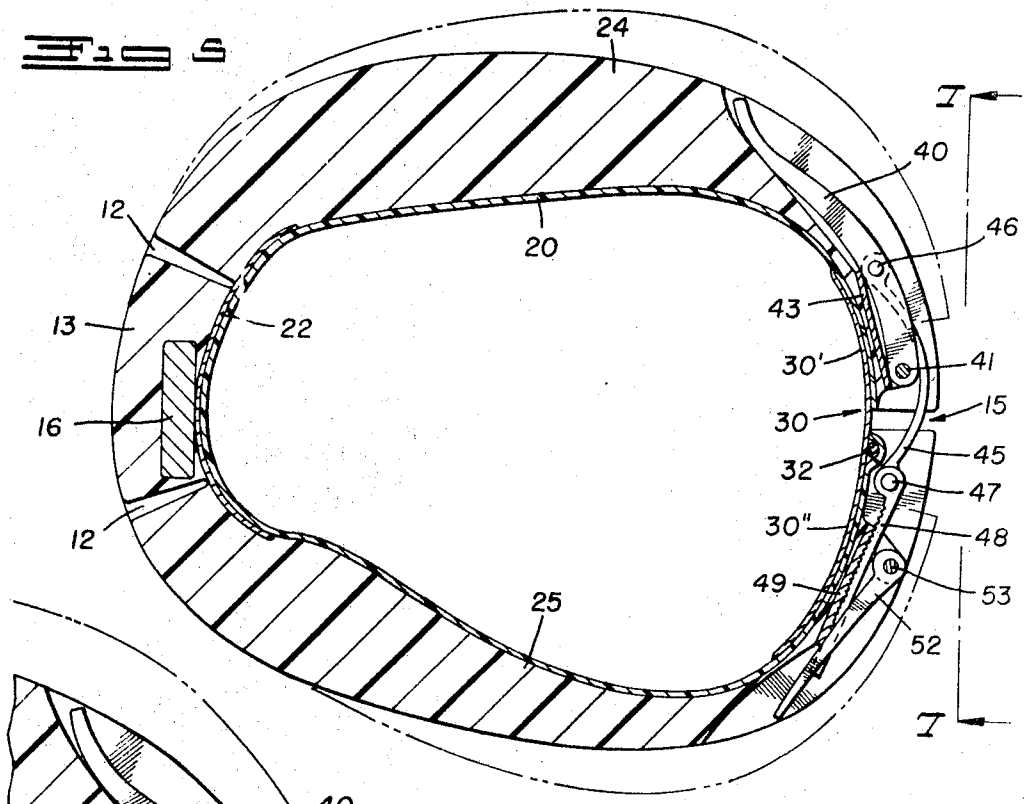


FIG 6

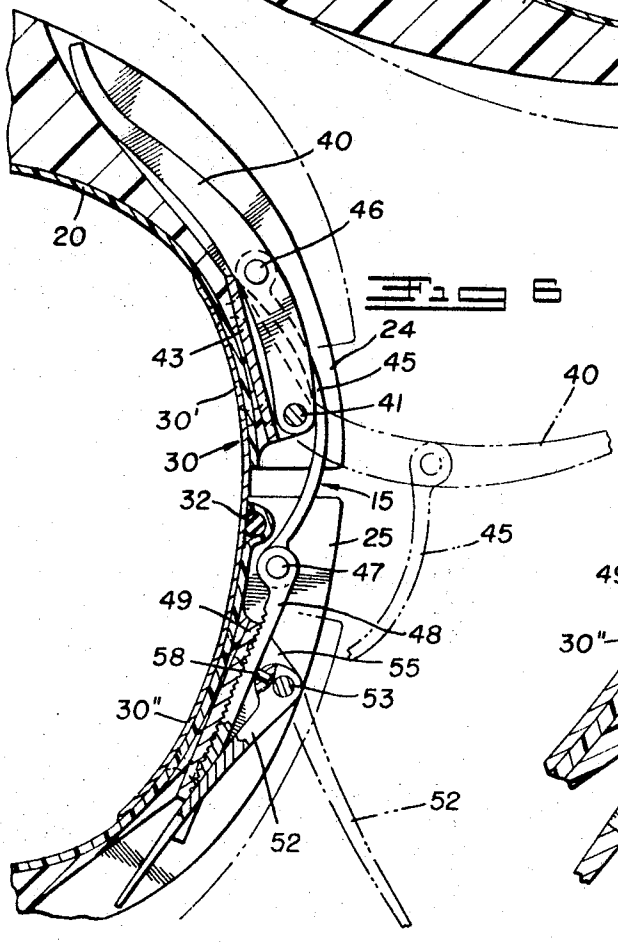
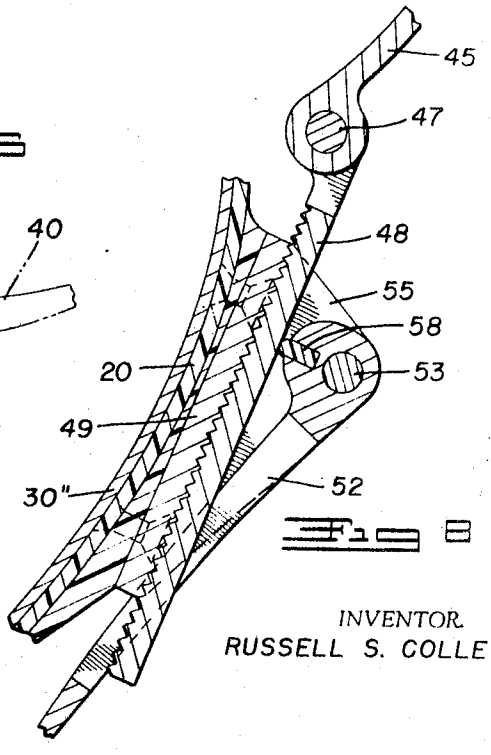


FIG 8



INVENTOR.
RUSSELL S. COLLEY

United States Patent Office 3,545,046
Patented Dec. 8, 1970

3,545,046

TOGGLE-TYPE CLAMP

Russell S. Colley, Cuyahoga Falls, Ohio, assignor to Ernest S. Ferry, Kent, Ohio

Original application Nov. 20, 1968, Ser. No. 777,410. Divided and this application Sept. 8, 1969, Ser. No. 855,845
Int. Cl. A43c 11/14; A61f 1/02
U.S. Cl. 24—68 3 Claims

ABSTRACT OF THE DISCLOSURE

A toggle-type clamp having a variable bite.

This application is a division of my application Ser. No. 777,410 filed Nov. 20, 1968.

This invention relates to a toggle-type clamp having a variable bite. Although it will be described more particularly in connection with a socket for an amputee, it has many other uses.

The upper portion of the socket is slit, and it is provided with a clamp, preferably one having a variable bite, so that the cavity within the socket can be readily enlarged for insertion of the amputated limb, and can then be closed. The advantage of using a clamp with a variable bite is that the diameter of the cavity can be adjusted, even after the amputated limb is positioned in it, by varying the extent to which the slit is closed.

In applying a socket, an amputee slips one end of a long cloth sleeve over the amputated limb, and feeds the other end into the socket and out through a valved opening near the base of the socket. Then, as his limb is fitted into the socket, the sleeve is removed through the opening, and the valve is closed. The tight fit of the socket around the limb seals the limb in the socket and it is held there by negative pressure. The procedure may be followed with the socket of this invention, but under the proper circumstances the sleeve may be omitted.

The present sockets are uncomfortable because the diameter of the limb is not constant. Heat enlarges it; cold contracts it. Furthermore, the use of the limb may cause the diameter of the limb to vary, because, for example, a foot increases in diameter after walking or standing a long time, and the diameter is usually greater at night than in the morning. An advantage of the socket of this invention is that its diameter can easily be increased or decreased without removing it from the limb.

The invention is further described in connection with the accompanying drawings, in which:

FIG. 1 is a side view of a socket for a leg amputated above the knee, with a lower artificial leg pivotally attached;

FIG. 2 is a side view of the socket taken from the inner side;

FIG. 3 is a front view of the socket on line 3—3 of FIG. 2;

FIG. 4 is a section through the socket on line 4—4 of FIG. 3;

FIG. 5 is a section through the socket at the clamp on line 5—5 of FIG. 3;

FIG. 6 is an enlarged partial view of the same, showing movable parts of the clamp in the open position, in dotted lines;

FIG. 7 is an enlarged view of the front of the clamp on line 7—7 of FIG. 5; and

FIG. 8 is an enlarged view of the adjustment mechanism of the clamp.

The socket 5 is fitted with a removable lower leg 6 in any usual manner. The socket may be of any suitable composition such as wood or plastic or a plastic reinforced with fiber glass, etc. There is nothing novel about the general shape of the socket, the upper edge 8 being higher than the edge 9 to fit tight under the crotch. The removable valve 10 (FIG. 3) is of any usual design. The socket is depressed at 11 to accommodate the upper portion of the lower limb.

Slots 12 are provided on one side of the socket to separate the sides of the rigid segment 13 from the rest of the socket, the bottom of segment 13 being integral with the socket. The slot 14 on the other side of the socket permits the parts of the upper portion of the socket to be separated and brought together by the clamp 15 in order to change the size of the cavity within the socket. The socket must be rigid or the amputee cannot manipulate it readily. He cannot walk easily if it is loose on a leg, and he cannot move his hand accurately if it is loose on an arm. The segment 13 is therefore reinforced with a metal bar 16 which includes the angular extension 16'. This bar 16 extends through segment 13 into the balance of the socket. The angle of the extension 16' is held constant by the plate 17 which is adhered to the bar 16.

The inner surface of the socket is completely covered with an inner lining 20, usually formed of plastic and fiber glass. This lining must be non-toxic and must maintain the negative pressure within the socket. Under this coating 20 is a hinge plate 22, usually metal such as stainless steel, which is adhered to the bar 16, the segment 13 and the front and back portions 24 and 25 of the socket. Opposite the plate 22 is the sheet of stainless steel or the like 30 which lies over the lining 20. The portion 30' is adhered to the lining, and the portion 30'' slides over the lining as the clamp is opened and closed. The stump forces this plate 30 outward to maintain negative pressure within the socket. As the slot 14 is widened and narrowed, the elastomeric O-rod 32 maintains a seal between the plate 30 and the lining 20 so as to maintain negative pressure in the socket. It extends below the bottom of slot 14.

The clamp 15 is a toggle-type clamp of variable bite. It is operated by lever 40 pivoted at 41 to projections 42 (FIG. 7) on the base plate 43 which is adhered to the socket. The connecting link 45 is pivoted at one end by pivot 46 to lever 40 and at the other end by pivot 47 to the adjustment arm 48 which is corrugated on its under surface. The portion of base plate 49 contacted by arm 48 is corrugated on its upper surface. The two sets of corrugations are evenly spaced so that these surfaces may be mated in any position, permitting the width of the slot 14 to be varied as desired by merely mating the corrugations in different positions. Cam closure lever 52 is pivoted at 53 between projections 55 on base plate 49, adhered to the socket, and nylon button 58 keeps the lever 52 and arm 48 locked in any previously selected position.

By lifting lever 40, the clamp is opened to fit the socket over the stump. After the stump is properly positioned in the socket, the clamp is closed. Lever 40 when closed returns the sides of the slot to any predetermined position. The circumference of the cavity within the socket may be varied at any time by lifting cam lever 52 and adjusting the position of the mating corrugations to control the width of the slot, and this can be done without breaking the negative pressure within the socket.

The drawing and description are illustrative. The invention is covered in the claims which follow.

I claim:

1. A toggle-type clamp which comprises first and second levers and first and second pivots which pivot them respectively to first and second base portions which are movable toward and away from one another, the first lever comprising a handle portion, a connecting link pivotally connected at one end to said handle portion away from the first pivot, an arm between the second pivot and the

second base portion, with the other end of the link pivotally engaged therewith, the second lever being provided with a cam at said second pivot which on movement of the second lever presses said arm against the second base portion and locks the second lever in contact with the arm.

2. The clamp of claim 1 in which teeth on the under side of said arm and teeth on the upper side of the second base portion are adapted to be mated with one another at any of a plurality of positions in which they are located when the lever is locked.

3. The clamp of claim 2 with a nylon button in said cam which is adapted to be pressed against said arm to lock the lever in position.

References Cited

UNITED STATES PATENTS

455,967	7/1891	Lusk et al.	24—271
560,694	5/1896	Davis et al.	24—271
3,204,307	9/1965	Dunn	24—68 SK

FOREIGN PATENTS

1,352,593	1/1964	France	24—70 SK

DONALD A. GRIFFIN, Primary Examiner

U.S. Cl. X.R.

3—17