Dec. 8, 1964 W. C. PROUT 3,159,847

PROSTHETIC WRIST UNIT

Filed March 7, 1963 2 Sheets-Sheet 1

FIG_1

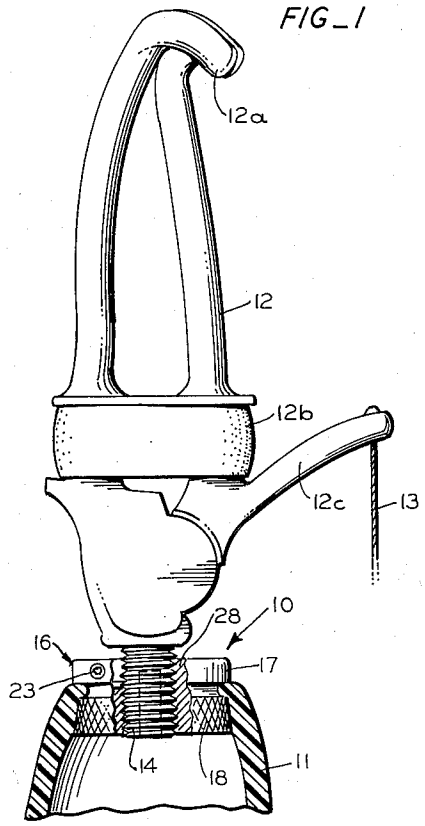


FIG_2

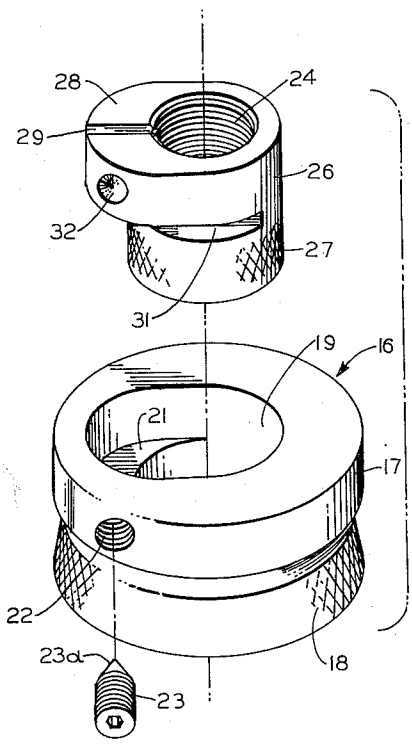


FIG_3

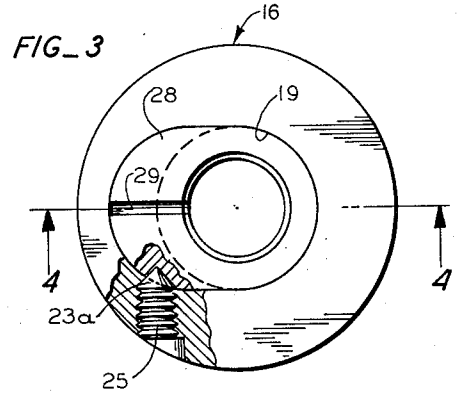
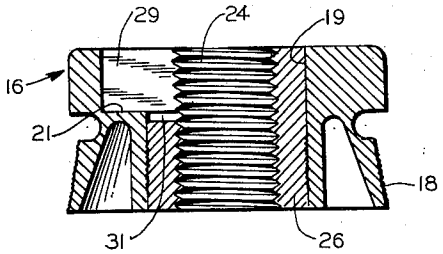


FIG_4



INVENTOR.
WESLEY C. PROUT
BY
Allen and Chaney
ATTORNEYS

Dec. 8, 1964 W. C. PROUT 3,159,847

PROSTHETIC WRIST UNIT

Filed March 7, 1963 2 Sheets-Sheet 2

FIG_5

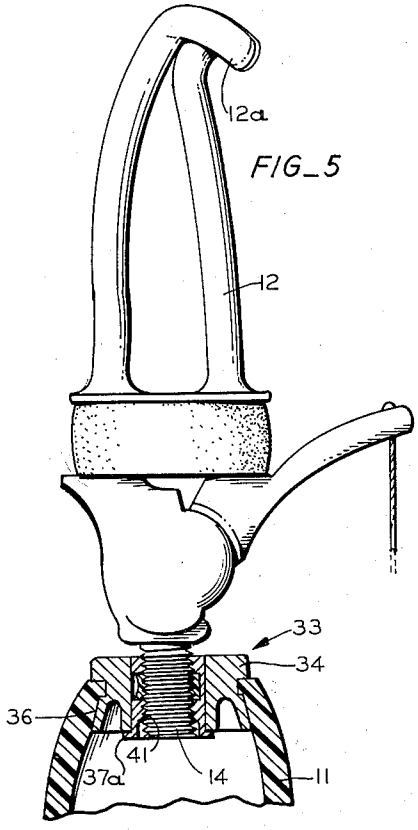
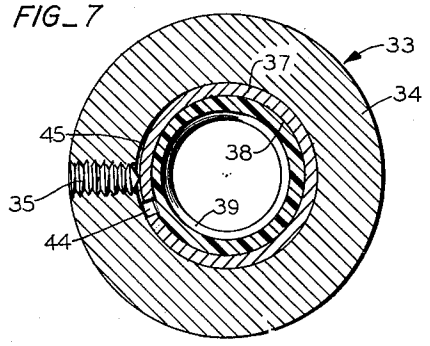


FIG_7



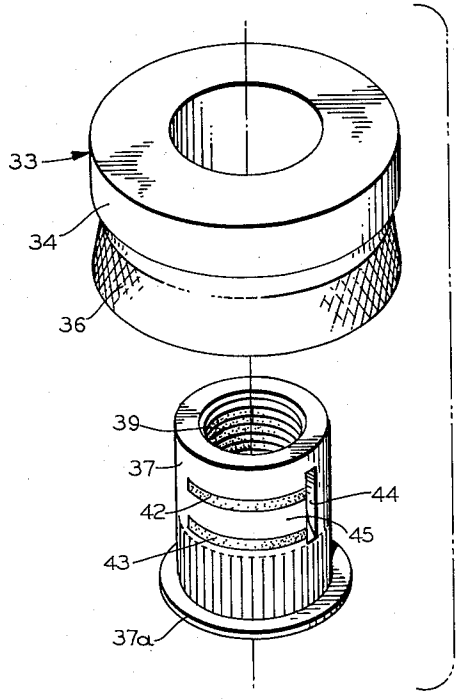
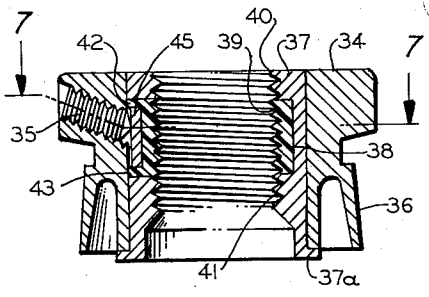


FIG_8

FIG_6



INVENTOR.
WESLEY C. PROUT

BY Allen and Chaney

ATTORNEYS

United States Patent Office 3,159,847 Patented Dec. 8, 1964

3,159,847

PROSTHETIC WRIST UNIT

Wesley C. Prout, Los Gatos, Calif., assignor to A. J. Hosmer Corporation, Santa Clara, Calif., a corporation of California

Filed Mar. 7, 1963, Ser. No. 264,481
6 Claims. (Cl. 3—12.4)

The present invention relates to prosthetic wrist units of the type used between a prosthetic arm and a prosthetic terminal device or hook and is concerned more particularly with a friction type wrist unit constructed to enable easy assembly into a prosthetic appliance, and to enable easy adjustment and accurate setting of the amount of friction holding to prevent turning movement of the hook while in use.

This application is a continuation in part of my application Serial No. 129,430, filed August 4, 1961, for Prosthetic Wrist Unit, now abandoned.

It is a general object of the invention to provide an improved prosthetic wrist unit.

Another object of the invention is to provide an improved prosthetic wrist device which insures against twisting movement of the prosthetic hook with reference to the prosthetic arm unless a certain predetermined force is exerted.

Another object of the invention is to provide a holding means for preventing twisting movement of prosthetic hand in which the wearer can easily adjust the amount of resistance to be applied.

Still another object of this invention is to provide an improved holding means in a prosthetic wrist device with plastic braking means that is pressed against the threaded extension of the prosthetic device to prevent twisting movement of the prosthetic hand unless a certain predetermined force is exerted thereon.

Still a further object of this invention is to provide an improved holding means that is adapted to receive the threaded member of a prosthetic hook, said holding means being provided with a plastic braking insert to prevent twisting of the hook unless a predetermined force is exerted thereon, said holding means also being provided with additional threaded means to prevent the plastic insert from being pulled out of the device.

Still another object of this invention is to provide an improved holding means for holding the threaded member of a prosthetic hook against undesired turning or rotation, said holding means being in the shape of a tubular member made of suitable metal or alloy such as stainless steel, for example, having the inside thereof threaded to receive the threaded member of the prosthetic hook, said holding means also having a threaded plastic insert in the central part thereof, a part of the wall of the tubular member being adapted to be pressed against the plastic insert to cause said plastic insert to engage the threaded rod of the prosthetic hand or hook to provide the desired friction thereon whereby undesired turning of the prosthetic hook is prevented.

The above and other objects of the invention are obtained as described in the following description of a preferred embodiment of the invention, as illustrated in the accompanying drawings, in which:

FIG. 1 is a sectional elevational view of a prosthetic arm and a prosthetic hand connected by the prosthetic wrist unit of this invention;

FIG. 2 is an exploded perspective view showing the component parts of the prosthetic wrist unit;

FIG. 3 is a plan view of the prosthetic wrist unit with certain parts broken away and shown in section;

FIG. 4 is a sectional view of the prosthetic wrist unit taken in a plane indicated by the line 4—4 in FIG. 3;

FIG. 5 is a sectional elevational view of the prosthetic arm and prosthetic hand connected by another form of wrist unit;

FIG. 6 is an enlarged sectional view of the wrist unit to show the plastic insert rotation braking means;

FIG. 7 is a sectional view taken along the line 7—7 of FIG. 6; and

FIG. 8 is an exploded perspective view showing the component parts of the prosthetic wrist unit shown in FIGS. 6 and 7.

Referring to the drawings, the prosthetic wrist unit 10 of the present invention is shown as embodied in the connection of a prosthetic arm 11 and a prosthetic terminal device or hook 12, the prosthetic terminal device 12 comprising a pair of hook parts 12*a* which have a hinged connection and are urged together by a rubber band spring 12*b* in the usual manner. One of the hook parts 12*a* has an extension 12*c* which can be connected by a cable 13 with the shoulder of the wearer for operation in the usual manner. This prosthetic hook has a threaded extension or shaft 14 which is adapted to be threaded into the wrist unit 10, the prosthetic arm 11 being a plastic composition and being adapted to be molded around the prosthetic wrist unit 10.

The prosthetic wrist unit comprises a tubular body 16 provided with an annular collar 17 which is adapted to project to the outside of the prosthetic arm 11 and to be available to the wearer. The body 16 is provided with a base portion 18 which in the present instance has a frusto-conical roughened exterior surface in the form of diamond shaped knurling. The body 16 is provided with an internal axial bore 19 which extends from end to end, and at its upper portion within the collar 17 it is extended in elliptical fashion to one side to provide a side recess 21, with which a threaded hole 22 communicates to receive a set screw 23 of the Allen head type having a pointed end 23*a*. To cooperate with the body of the prosthetic wrist unit there is a tubular insert 26 having an internal axial bore which is threaded at 24. The lower portion of this insert has its exterior knurled at 27 and is adapted to be pressed within the lower portion of the bore 19 of the body with a light press fit. The top of the insert 26 is provided with friction means in the form of a lateral bifurcated extension 28 which is shaped complementary to the side recess 21 of the bore 19 of the body, and this extension 28 is split by a radial slot 29 which intersects the threaded portion 24. Also, beneath the extension 28 of the insert 26 there is provided a partial circumferential slot 31 which effectively isolates the split portions of the extension 28 so that they can act independently of the tubular portion of the body 16 as resilient clamping arms. One arm of the extension 28 is provided with a tapered recess or seat 32 to receive the pointed end 23*a* of the screw 23.

As seen in FIG. 3, when the insert 26 is seated within the body 16, and the set screw 23 is in place, a predetermined pressure can be exerted to close the two arms of the extension 28 so as to hold the screw 14 of the prosthetic hand within the threaded interior 24 of the insert 26, thereby effectively applying a desired amount of friction to resist twisting of the hook with respect to the wrist unit in the absence of the application of a predetermined force. The set screw 23 being available from the exterior of the prosthetic arm, it can be adjusted to suit the individual wearer and to suit the particular use with which the prosthetic hand is to be employed.

Another form of prosthetic wrist unit of this invention is shown in FIGS. 5 to 8 as embodied in the connection of the prosthetic arm 11 and prosthetic terminal device or hook 12. This form of the prosthetic wrist unit comprises a tubular body 33 which is provided with an annular collar 34 that is adapted to project to the outside

of the prosthetic arm 11 so that the adjusting screw 35 which is threaded into this collar is available for adjustment. The body 33 is provided with a base portion 36 the exterior surface of which is knurled so that said surface is rough and is thus more positively gripped by the inner surface of the prosthetic arm 11 which is pressed against this knurled surface.

The body 33 is provided with a tubular insert 37 which is press-fitted into it and the bottom of this insert is formed with a flange 37*a* thereon to engage the bottom of the body 33. The tubular insert 37 is formed with an internal recess 38 for receiving the plastic member 39 which is of material, such as nylon, Delrin and the like. This plastic insert is provided with internal threads for receiving the threaded rod 14 of the prosthetic device 12 and the end portions of the metal insert 37 which is of metallic material such as stainless steel, are likewise similarly threaded to receive this rod 14. Thus the threaded portions 40 and 41 of the insert 37 prevent axial movement of the threaded rod 14 and the force of any pull on the prosthetic hook is borne by these threaded metal portions 40 and 41 instead of the plastic insert 39.

Parallel slots 42 and 43 are cut through the tubular insert 37 and these slots are also filled with the plastic from the plastic insert 39. Another slot 44 is cut through the tubular insert 37 at right angles to the slots 42 and 43 and thus there is provided a tongue 45 in the wall structure of the tubular insert 37. One end of this tongue is anchored to the tubular insert and the opposite end is adapted to be engaged by the screw 35 so that this tongue may be pressed by the screw 35 against the adjoining part of the plastic sleeve 39 so that the plastic sleeve is pressed with considerable force against the threaded rod 14. Pressing on one side of the plastic sleeve 39 causes this sleeve to press against the rod 14 all the way around the rod because the plastic sleeve has a certain amount of resilience. A braking action is thus provided to prevent undesired rotation of the rod 14 in the tubular insert 37 and with respect to the body 33. The plastic insert because of its resilient nature and resistance to wear forms a very efficient braking member in this application.

While I have shown and described a preferred form of the invention, it will be apparent that the invention is capable of variation and modification from the form shown so that the scope thereof should be limited only by the scope of the claims appended hereto.

What I claim is:

1. In a prosthetic wrist unit, a tubular body adapted for molding in a prosthetic arm, said body comprising a collar for placement exterior of the prosthetic arm and a frusto-conical portion separated from said collar by an annular groove, said frusto-conical portion having a roughened exterior for engagement with the molding material of the prosthetic arm, said body having an axial bore provided with an offset recess interiorly of said collar, and a tubular friction insert for said body having a threaded interior bore, and having a portion to fit snugly with said axial bore of said bore, and said insert also having a bifurcated extension seating in the offset recess of said axial bore, said extension being bifurcated by means providing a slot extending through said extension and intercepting said threaded interior bore of said insert, a seat in said extension, means providing a partial circumferential slot underlying said extension, and a screw threadedly engaged with said collar for engaging said seat, said threaded bore of said insert being adapted to receive a threaded extension of a prosthetic hook, and said bifurcated extension and said screw providing adjustable friction means for holding the hook against turning.

2. In a prosthetic wrist unit, a tubular body adapted for molding in a prosthetic arm, said body having an axial passage and an offset recess communicating therewith, and a friction insert positioned in said axial passage of said body having a threaded hole, said insert having a pair of clamping arms disposed in the offset recess, said insert also having a screw-receiving seat in one of said clamping arms, and a screw threadably engaged with said body for engaging said seat, said threaded hole of said insert being adapted to receive a part of a prosthetic hook, and said clamping arms and said screw providing friction means for holding said hook against turning.

3. In a prosthetic wrist unit, a tubular body adapted for molding in a prosthetic arm, said body comprising a collar for placement exterior of the prosthetic arm and a portion adapted to be molded into said prosthetic arm, said body having an axial bore, a tubular friction insert positioned in said axial bore, said tubular insert having a threaded interior bore, said insert having a pair of slots cut through the wall thereof, said insert being adapted to receive the threaded extension of a prosthetic hook in said threaded bore thereof, said slots defining a part of the wall structure of said tubular insert that is slightly movable with respect to the other part of the wall structure thereof, and a screw threaded into said collar of said body, said screw being accessible from the exterior of the prosthetic arm for engaging said part of said wall structure for clamping said part against the threaded extension of the prosthetic hook and provide friction for holding said hook against turning.

4. In a prosthetic wrist unit, a tubular body adapted for molding in a prosthetic arm, said body comprising a collar for placement exterior of the prosthetic arm and a portion adapted to be molded into said prosthetic arm, said body having an axial bore, a tubular friction insert positioned in said axial bore, said tubular insert having a threaded interior bore, said insert having a pair of slots cut through the wall thereof, said insert being adapted to receive the threaded extension of a prosthetic hook in said threaded bore thereof, said slots defining a tongue shaped part of the wall structure of said tubular insert that is slightly movable with respect to the other part of the wall structure thereof, and a screw threaded into said body for engaging said movable part of said wall structure for clamping said part against the threaded extension of the prosthetic hook and provide friction for holding said hook against turning.

5. In a prosthetic wrist unit, a tubular body adapted for molding in a prosthetic arm, said body comprising a collar for placement exterior of the prosthetic arm and a portion adapted to be molded into said prosthetic arm, said body having an axial bore, a tubular friction insert positioned in said axial bore, said tubular insert having a threaded interior bore, said insert having a pair of substantially parallel slots cut through the wall thereof, said insert being adapted to receive the threaded extension of a prosthetic hook in said threaded bore thereof, said slots defining a tongue shaped part of the wall structure of said tubular insert that is slightly movable with respect to the other part of the wall structure thereof, said insert having a part of the threaded bore thereof opposite said movable part recessed, said recessed part being filled with a plastic sleeve which is also threaded to receive the threaded extension of said prosthetic hook, and a screw threaded into said body for engaging said movable part of said wall structure for pressing said plastic sleeve firmly against the threaded extension of the prosthetic hook and provide friction for holding said hook against turning.

6. In a prosthetic wrist unit, a tubular body adapted for molding in a prosthetic arm, said body comprising a collar for placement exterior of the prosthetic arm and a portion adapted to be molded into said prosthetic arm, said body having an axial bore, a tubular friction insert of metallic material positioned in said axial bore, said insert having a middle part of the bore thereof recessed to receive a plastic sleeve, said tubular insert including said plastic sleeve having a threaded interior bore formed such that the threaded end parts of said bore are through said metallic material and the threaded middle part is through said plastic sleeve, said insert having a pair of slots cut through the wall thereof opposite said plastic sleeve, said insert being adapted to receive the threaded extension of a prosthetic hook in said threaded bore there-

of, said slots defining a part of the wall structure of said tubular insert that is slightly movable with respect to the other part of the wall structure thereof, and a screw threaded into said body for engaging said movable part of said wall structure for pressing said threaded plastic sleeve against the threaded extension of the prosthetic hook and provide friction for holding said hook against turning.

References Cited by the Examiner

UNITED STATES PATENTS

1,323,967	12/19	Dickinson	279—99
1,740,230	12/29	Dorrance	3—12.8
2,561,523	7/51	Lux	3—12.4
2,692,390	10/54	Motis	3—12.4

RICHARD A. GAUDET, *Primary Examiner.*