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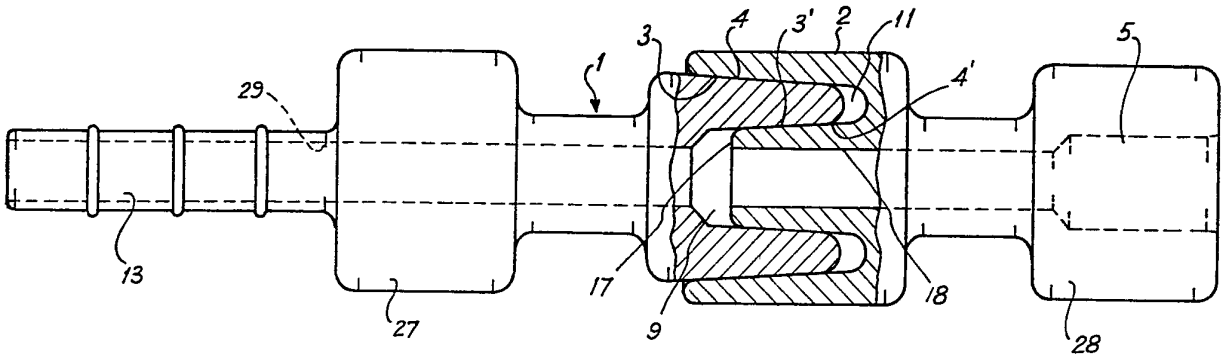
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(54) Title: STERILE FLUID LINE COUPLING MEMBERS



(57) Abstract

A pair of interengageable coupling members (1,2) for interconnecting tubing, teat parts and such parts of sterile fluid administration equipment to provide a fluid passage therebetween which is free from contamination each coupling member (1, 2) comprising a body defining a longitudinally extending fluid pathway (29, 18) and a pair of coaxial, radially spaced apart frusto-conical surfaces (3, 3'; 4, 4') which are adapted to sealingly engage with corresponding surfaces on the other coupling member (2, 1) such that the inner coupled surfaces (3', 4') interconnect the fluid pathways (29 and 18) while the outer coupled surfaces (3, 4) surround the inner coupled surfaces in such a way that the inner frusto-conical surfaces are substantially shielded to prevent contamination by persons touching those surfaces, and that there is defined between the pairs of coupled surfaces (3', 4'; 3, 4) a sealed annular space (11) which can contain a sterilising solution. The members can be moulded from suitable plastics materials.

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STERILE FLUID LINE COUPLING MEMBERS

TECHNICAL FIELD

This invention relates to connector means for minimizing contamination of sterile fluid administration equipment in the course of connecting or disconnecting a source of sterile fluid to a patient, particularly large volume sterile solutions for intravenous, irrigation, or dialysis administration.

BACKGROUND ART

Peritoneal dialysis solutions are administered into the peritoneal cavity of a patient undergoing treatment by making an incision on the linea alba (midline) of the patient and inserting tubing having a catheter for attachment to a container of dialysis solution which is to be fed into the peritoneal cavity via the incision. The solution is metered to flow from the container through tubing to the catheter and into the abdominal cavity where it remains for say 30-90 minutes, after which it is drained from the cavity by syphoning to a waste container. The procedure is repeated many times and may require say 30-50 litres of solution for daily treatment.

Thus, acute/intermittent/continuous ambulatory peritoneal dialysis involves catheter access to the peritoneal cavity, which makes the patient extremely vulnerable to infection of the peritoneal cavity, that is, peritonitis. And since peritoneal dialysis requires repeated connections of the peritoneal solution to the peritoneal cavity via the intra-peritoneal catheter as indicated above, which can be compounded by the number of parts of the administration equipment to be connected to disconnected from time to time, the degree of risk in contamination of the pathway during the repeated connecting or disconnecting procedure, which could result in peritonitis, is very high.

Large volume sterile solution for administration in peritoneal dialysis is packaged in glass or plastic containers designed to empty rapidly and containing a volume

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of more than about 1 litre. A generally preferred form of container is a plastic bag type, fabricated from transparent plasticized polyvinyl chloride and sealed in a removable, translucent, heavy-duty polyethylene casing for marketing and storage, ready for use.

The plastic bag has a thickened section at one end, the upper end when in use, which has a slit for hanging the plastic bag on a stand of the administration equipment, the opposite or lower end of the plastic bag having two teat ports for filling of the plastic bag with sterile administration solution and for access to the sterile solution contents when that solution is to be administered to a patient. One teat port has a plastic covering which is removed for insertion of a tubular spike member at one end of tubing connecting the plastic bag to the catheter, while the other teat port is plugged or capped ready for introduction of any additional medication into the sterile solution.

Connection of the opposite ends of the tubing extending between the plastic bag and the catheter is presently effected by simple male/female mating, in which the tubular spike member at one end of the tubing is inserted into the teat port of the plastic bag and a tubular spike member at the other end of the tubing is inserted into the catheter. This arrangement is particularly prone to contamination from patient's or nurse's finger or breath, or other environmental contamination and fluid leakage. In lacking adequate protection, especially around the edges of the joining parts when in position, besides presenting difficulty in correctly positioning and gauging the depth of penetration of the spike members in effecting the male/female connection.

DISCLOSURE OF INVENTION

The present invention provides connector means suitable for the administration of sterile fluids to a patient, comprising a pair of engageable and disengageable coupling members, which each include or are adapted to receive a

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longitudinally extending fluid pathway, the fluid pathway of each coupling member being surrounded by a first mating surface adapted to make sealing engagement with the corresponding first mating surface of the other coupling member, and each coupling member being provided with a further, tapered, mating surface coaxial with the first such mating surface on that coupling member and disposed radially outwardly thereof, the further mating surfaces being adapted to make sealing engagement with the corresponding further mating surface of the other coupling member when the first pair of mating surfaces are engaged, a sealed annular space being defined between the two coupling members and intermediate the two pairs of mating surfaces when the coupling members are engaged.

By providing connector means forming a protective shell or jacket for the joined end portions of the teat port of a sterile solution container and/or tubing and/or other such parts of sterile fluid administration equipment, said joined end portions are located in an enclosed sterile area which may contain an antiseptic solution as hereinafter described, whereby loss of sterility of the fluid pathway is further minimized. Moreover, the connector means of the invention can be cheaply mass-produced by molding from suitable plastics materials and can be in different sizes and shapes to suit the various modes of application indicated, while retaining the concept of an enclosed sterile area and fluid pathway around said joined end portions.

The coupling members may be slidingly engageable and disengageable or alternatively means may be provided to positively, temporarily, lock the coupling members in engagement. The locking means may comprise a tongue and groove abutment arrangement, a cam pin-and-helix cam track abutment or separately formed clip means.

In one embodiment of the invention the mating surfaces of each coupling member are frusto-conical. The two mating

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surfaces of each of such coupling members may be of the same tapering sense or they may be of opposite senses. In another embodiment of the invention the first mating surface of one of the coupling members comprises an end portion of a tube projecting into the coupling member and forming part of a sterile solution container and/or tubing and/or other such parts of sterile fluid administration equipment.

In another embodiment the present invention provides a coupling member for use in connector means according to this invention including a longitudinally extending fluid pathway surrounded by a first tapered mating surface adapted to make sealing engagement with the corresponding surface of another coupling member; and a further tapered mating surface coaxial with the first mating surface and surrounding it, the further mating surface being adapted to make sealing engagement with a corresponding mating surface of the said other coupling member when the first pair of mating surfaces are engaged such that a sealed annular space is defined between the two coupling members and intermediate the two pairs of mating surfaces when the coupling members are engaged.

In accordance with a preferred embodiment of the invention, the connector means comprises: (a) a hollow socket member having an axially-disposed tubular sleeve for receiving the teat port of a plastic bag of sterile solution or the end of tubing forming part of sterile fluid administration equipment, so that said teat or tubing can pass through the tubular sleeve and the end portion of said teat or tubing extend into the partially enclosed space of the socket member; and (b) a hollow adaptor member slidingly engageable and disengageable with said socket member and having an axially-disposed tubular member in the form of a spike extending into the partially enclosed space of the hollow adaptor member and a nozzle at the opposite side of the adaptor member, the spike being adapted for penetration into the end portion of said teat or tubing when

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the socket/adaptor members are engaged and the nozzle being adapted for insertion into the end portion of tubing forming part of sterile fluid administration equipment or the teat port of a plastic bag of sterile solution. Positioning of the hollow adaptor member in relation to the hollow socket member in the course of connecting said members together is facilitated by penetrating the spike into the end portion of said teat or tubing.

Preferably, the spike is conical for jamming or wedging of the conical point into the end portion of said teat port or said tubing so as to effect an airtight and/or fluidtight joint between the spike and said teat port or said tubing, and the engaging faces of the hollow socket member and the hollow adaptor member are tapered for jamming or wedging together so as to effect an airtight and/or fluidtight joint between said hollow socket member and said hollow adaptor member. Leakage of air and/or fluid between the spike and said teat port or said tubing, and the engaging faces of the hollow socket member and the hollow adaptor member is thereby minimized.

In accordance with another embodiment of the invention, there is provided an assembly comprising: (a) a hollow socket member having an axially-disposed tubular sleeve for receiving the teat port of a plastic bag of sterile solution or the end of tubing forming part of sterile fluid administration equipment, so that said teat or tubing can pass through the tubular sleeve and the end portion of said teat or tubing extend into the partially enclosed space of the socket member; and (b) a hollow cap member slidingly engageable with said socket member for temporarily closing the partially enclosed space of the socket member and slidingly disengageable from the socket member for removal and replacement by a hollow adaptor member to provide the hollow socket member/hollow adaptor member form of connector means as hereinbefore described. Said assembly can be

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pre-fitted to the teat port of a plastic bag containing sterile administration solution, or, pre-fitted to tubing forming part of sterile fluid administration equipment, ready for use in the administration of sterile fluid to a patient, the engaging faces of the hollow socket member and hollow cap member preferably being tapered for jamming or wedging together so as to effect an airtight and/or fluidtight joint between said hollow socket member and said hollow cap member.

BRIEF DESCRIPTION OF DRAWINGS

Several forms of connector means according to the invention are illustrated in the accompanying drawings, in which:-

Fig. 1 is a cross-sectional view of a hollow socket member and a hollow adaptor member according to a preferred embodiment of the invention, shown in the disengaged or disconnected position, with the hollow socket member shown fitted to the teat port of a plastic bag containing sterile administration fluid and the hollow adaptor member shown fitted to tubing forming part of sterile fluid administration equipment;

Fig. 2 is a part cross-sectional/part elevational view similar to Fig. 1 but showing the hollow socket member and the hollow adaptor member in the engaged or connected position;

Fig. 3 is a part cross-sectional/part elevational view showing portion of a plastic bag containing sterile administration fluid, with one teat port provided with a plastic covering and the other teat port provided with a capping for the purposes hereinbefore described;

Fig. 4 is a part cross-sectional/part elevational view showing portion of the plastic bag of Fig. 3 with the connector means of Fig. 2 interposed between the plastic bag and tubing forming part of sterile fluid administration equipment, the hollow socket member being connected to said teat port of the plastic bag and the hollow adaptor member

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being connected to said tubing, said tubing being provided with a roll-clamp for control of the fluid flow rate sighted in a drip chamber interposed in said tubing between the connector means and a catheter fitted to the end of tubing leading into the peritoneal cavity of a patient;

Fig. 5 is a part cross-sectional/part elevational view showing a hollow socket member and a hollow cap member assembly in the engaged or connected position according to said another embodiment of the invention, in which the hollow socket member is fitted either to the teat port of a sterile fluid plastic bag or to tubing forming part of sterile fluid administration equipment;

Fig. 6 is an elevational view similar to Fig. 4 but showing a hollow socket member and a hollow adaptor member according to the preferred embodiment of the invention, also fitted to the ends of tubing from a plastic bag of sterile administration fluid and leading into the peritoneal cavity of a patient, in replacement of the conventional spike/catheter connection; and

Fig. 7 is part longitudinal-sectional/part elevational view of a hollow socket member and a hollow adaptor member according to another preferred embodiment of the invention, shown in the engaged or connected position.

BEST MODE OF CARRYING OUT THE INVENTION

Referring to the drawings, there is shown a hollow socket member 1 and a hollow adaptor member 2 having complementary tapered faces 3 and 4, respectively, for sliding engagement and disengagement in connecting and disconnecting the hollow socket member 1 and the hollow adaptor member 2.

Hollow socket member 1 has an axially-disposed tubular sleeve 5 for receiving the teat port 6 of a plastic bag 7 of sterile fluid. The end portion 8 of the teat port 6 is arranged to extend into the partially enclosed space 9 of the hollow socket member 1.

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Hollow adaptor member 2 has an axially-disposed conical spike 10 constructed to extend through the partially enclosed space 11 of the hollow adaptor member 2 for penetrating and jamming into the bore 12 of the end portion 8 of teat port 6. A nozzle 13 at the opposite side of the hollow adaptor 2 is constructed for insertion into the bore 14 of tubing 15 forming part of sterile fluid administration equipment.

Conical spike 10 projects slightly beyond the outer end 16 of hollow socket member 1 for ease of sighting in being inserted into the bore 12 of the end portion 8 of teat port 6. Conical spike 10 has a fluid inlet 17 which merges into a fluid passage 18 extending lengthwise of the conical spike 10 and the nozzle 13.

Connection or disconnection of the hollow socket member 1 and the hollow adaptor member 2 is readily effected by a user grasping the wall 19 of the hollow socket member 1 and grasping the body 20 of the hollow adaptor member 2, then pushing or pulling said members so as to slidingly engage or disengage them. Fluid inlet 17 and fluid passage 18 provides a fluid pathway between the teat port 6 and the tubing 15, protected from contamination by contact with either the patient's or nurse's fingers or the environment, essentially by the shell or jacket formed by the hollow socket member 1 and the hollow adaptor member 2.

A plastic bag 7 containing dialysate or other sterile administration fluid and having a teat port 6 for attachment to the connector means of the invention is illustrated in Fig. 3. Said teat port 6 is therein shown to be provided with a removable plastic covering 21 and a capped teat port 22 provided for the introduction of any additional medication required for the patient. In accordance with the invention, however, the dialysate bag or other sterile administration fluid bag can be manufactured and marketed ready for use, with the hollow socket member 1 of the connector means fitted to the teat port 6 and the removable plastic covering 21

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fitted to the end portion of the teat port 6 which extends into the partially enclosed space 9 of the hollow socket member 1, the complete assembly being enclosed in a sterile outer casing of polyethylene or the like as hereinbefore described.

One manner of using the connector means of the invention by connecting a dialysate bag to a patient with a conventional catheter fitted to the end of tubing leading into the peritoneal cavity of the patient, is shown in Fig. 4. In this instance, the connector means is interposed between the plastic bag 7 and the tubing 15 forming part of the sterile fluid administration equipment, the hollow socket member 1 being connected to the teat port 6 of the plastic bag 7 and the hollow adaptor member 2 being connected to the tubing 15, said tubing 15 being provided with a roll-clamp 23 for control of the fluid flow rate sighted in a drip chamber 24 interposed in said tubing 15 between the connector means and a spike catheter connection 25 fitted to the end of the tubing 15A leading to the peritoneal cavity of the patient.

Another manner of using the connector means of the invention is shown in Fig. 6, in which the end of the tubing leading into the peritoneal cavity of the patient, as well as the end of tubing leading from a dialysate bag, is provided with said connector means. In this instance, a first such connector means is interposed between the plastic bag 7 and the tubing 15 forming part of the sterile fluid administration equipment, with the hollow socket member 1 being connected to the teat port 6 of the plastic bag and the hollow adaptor member 2 being connected to the tubing 15, said tubing 15 being provided with a roll-camp 23 for control of the fluid flow rate sighted in a drip chamber 24 interposed in said tubing 15, as before, and a second such connector means replacing the conventional spike/catheter connection 25 fitted to said tubing 15 and 15A. The preferred arrangement is that the end portion of tubing 15A

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leading into the peritoneal caivty of the patient, be fitted with the hollow socket member 1, and the end portion of the tubing 15 from the dialysate bag, be fitted with the hollow adaptor member 2.

In either instance, the assembly of the tubing 15 or the tubing 15A fitted with the hollow socket member 1, or, alternatively, the assembly of the tubing 15 or the tubing 15A fitted with the hollow adaptor member 2, can be manufactured and marketed, ready for use in a sterile casing as hereinbefore indicated, the assembly being capable of repeated reuse after sterilization, if desired.

When an assembly of the hollow socket member 1 and tubing 15A is employed, the invention contemplates the provision of a closure cap member 26 shown in Fig. 5 for temporarily closing the hollow socket member 1 and thus the outer end of tubing 15A, in order to minimize contamination pending connection or reconnection of a source of sterile fluid to the tubing 15A after disconnection of the source of sterile fluid to the tubing 15A. However, the invention likewise contemplates the temporary closure of the teat port 6 or the tubing 15, as well as the tubing 15A, by a closure cap member, when fitted with either a hollow socket member 1 or a hollow adaptor member 2.

Antiseptic solution may be introduced into the enclosed sterile area formed by the hollow socket member 1 and the hollow adaptor member 2 in order to further minimize the risk of contamination. Thus, the hollow adaptor member 2 may be charged with a quantity of antiseptic solution before being fitted into mating engagement with the hollow socket member 1 and in the course of which the concal spike member 10 penetrates into and jams or wedges against the bore 12 of the end portion 8 of the teat port 6.

In this way, the sterile area formed by the hollow socket member 1 and the hollow adaptor member 2 is bathed with antiseptic solution, whilst the sterile administration

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solution is sealed against entry into said sterile area by the jamming or wedging of the concial spike member 10 against the bore 12 of the end portion 8 of the teat port 6. Somewhat similarly, the internal surface of hollow socket member 1 and hollow closure cap member 26 may be washed with antiseptic solution before said members are fitted together from time to time.

Figure 7 shows an alternative embodiment of the invention and the same numerals will be used to designate similar parts of this embodiment.

The connector comprises the socket member 1 and the adaptor member 2 having two sets of complimentary tapered faces 3, 4 and 3', 4', respectively for sliding engagement and disengagement in connecting and disconnecting the socket member 1 and the adaptor member 2.

Socket member 1 has at the end opposite the tapered faces 3, 3' nozzle 13 constructed for insertion into the bore of tubing (not shown) forming part of sterile fluid administration equipment.

Adaptor member 2 has an axially disposed frusto-conical boss 10 which defines the tapered surface 4' and extends through the partially enclosed space 11 of the adaptor member 2 for jamming into the bore of the socket member 1 defined by tapered surface 3'. The boss 10 has a fluid inlet 17 which merges into a fluid passage 18 extending lengthwise of the boss 10 and leads into sleeve 5 for receiving the teat port of a plastic bag (not shown) of sterile fluid.

The socket member 1 is provided intermediate its ends with a cylindrical protruberance 27 to assist in the connection and disconnection of the socket member 1 and the adaptor member 2. The adaptor member 2 is provided with a similar protruberence 28 surrounding the sleeve 5.

Socket member 1 is also provided with an axial fluid passage 29 extending longitudinally of the nozzle 13 and of the protruberence 27 into space 9 defined by the tapered

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surface 3'.

Connection or disconnection of the socket member 1 and the adaptor member 2 is effected as described in connection with the previous embodiment of the invention. The fluid passages 18 and 29 provide a fluid pathway between a teat port engaged by sleeve 5 and a tubing surrounding the nozzle 13 protected from contamination by contact with either the patient's or nurse's fingers or the environment by the shell or jacket formed by the socket member 1 and the adaptor member 2.

As previously described with reference to the earlier embodiment of the invention antiseptic solution may be introduced into the enclosed sterile area formed between the socket member 1 and the adaptor member 2.

Although the connector means of the invention has been particularly described and illustrated with reference to the administration of dialysate sterile fluid to a patient, it will be understood that said connector means has other applications in the administration or draining of fluids in the treatment of patients. For instance, said connector means may be utilized for venous or arterial introduction of intravenous fluids and blood transfusions, or for the introduction of parenteral nutrition fluids, or in connection with urinary catheters, that is, both drainage and irrigation catheters.

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The claims:-

1. Connector means suitable for the administration of sterile fluids to a patient, comprising a pair of engageable and disengageable coupling members, which each include or are adapted to receive a longitudinally extending fluid pathway, the fluid pathway of each coupling member being surrounded by a first mating surface adapted to make sealing engagement with the corresponding first mating surface of the other coupling member, and each coupling member being provided with a further, tapered, mating surface coaxial with the first such mating surface on that coupling member and disposed radially outwardly thereof, the further mating surfaces being adapted to make sealing engagement with the corresponding further mating surface of the other coupling member when the first pair of mating surfaces are engaged, a sealed annular space being defined between the two coupling members and intermediate the two pairs of mating surfaces when the coupling members are engaged.

2. Connector means as cliamed in claim 1 in which at least one of the first mating surfaces is tapered.

3. Connector means as claimed in claim 1 in which at least one of the pair of mating surfaces are frusto-conical in shape.

4. Connector means as claimed in claim 1 in which both pairs of mating surfaces are frusto-conical in shape.

5. Connection means as claimed in claim 4 in which the two frusto-conical mating surfaces on each coupling member taper in the opposite sense.

6. Connector means as claimed lin claim 4 in which the two frusto-conical mating surfaces on each coupling members taper in the same sense.

7. Connector means comprises: (a) a hollow socket member having an axially-disposed tubular sleeve for receiving the teat port of a plastic bag of sterile solution or the end of tubing forming part of sterile fluid administration

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equipment, so that said teat or tubing can pass through the tubular sleeve and the end portion of said teat or tubing extend into the partially enclosed space of the socket member; and (b) a hollow adaptor member slidingly engageable and disengageable with said socket member and having an axially-disposed tubular member in the form of a spike extending into the partially enclosed space of the hollow adaptor member and a nozzle at the opposite side of the adaptor member, the spike being adapted for penetration into the end portion of said teat or tubing when the socket/adaptor members are engaged and the nozzle being adapted for insertion into the end portion of tubing forming part of sterile fluid administration equipment or the teat port of a plastic bag of sterile solution.

8. Connection means as claimed in claim 7 in which the spike is conical or frusto-conical for jamming or wedging of the free end thereof into the end portion of said teat port or said tubing so as to effect an airtight and/or fluidtight joint between the spike and said teat port or said tubing, and the engaging faces of the hollow socket member and the hollow adaptor member are tapered for jamming or wedging together so as to effect an airtight and/or fluidtight joint between said hollow socket member and said hollow adaptor member.

9. An assembly comprising: (a) a hollow socket member having an axially-disposed tubular sleeve for receiving the teat port of a plastic bag of sterile solution or the end of tubing forming part of sterile fluid administration equipment, so that said teat or tubing can pass through the tubular sleeve and the end portion of said teat or tubing extend into the partially enclosed space of the socket member; and (b) a hollow cap member slidingly engageable

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with said socket member for temporarily closing the partially enclosed space of the socket member and slidingly disengageable from the socket member for removal and replacement by a hollow adaptor member to provide the hollow socket member/hollow adaptor member form of connector means as hereinbefore described, said assembly being adapted to be pre-fitted to the teat port of a plastic bag containing sterile administration solution, or, pre-fitted to tubing forming part of sterile fluid administration equipment, ready for use in the administration of sterile fluid to a patient, the engaging faces of the hollow socket member and hollow cap member preferably being tapered for jambing or wedging together so as to effect an airtight and/or fluidtight joint between said hollow socket member and said hollow cap member.

10. A coupling member for use in connector means according to any one of claims 1 to 8, comprising a longitudinally extending fluid pathway surrounded by a first tapered mating surface adapted to make sealing engagement with the corresponding surface of another coupling member, and a further tapered mating surface coaxial with the first mating surface and surrounding it, the further mating surface being adapted to make sealing engagement with a corresponding mating surface of the said other coupling member when the first pair of mating surfaces are engaged such that a sealed annular space is defined between the two coupling members and intermediate the two pairs of mating surfaces when the coupling members are engaged.

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AMENDED CLAIMS
(received by the International Bureau on 29 October 1980 (29.10.80))

1. Cancelled.
2. Cancelled.
3. Cancelled.
4. Cancelled.
5. Cancelled.
6. Cancelled.
7. Cancelled.
8. Cancelled.
9. Cancelled.
10. Cancelled.

(NEW) 11. Connector means suitable for the administration of sterile fluids to a patient, comprising a pair of engageable and disengageable coupling members, which each include or are adapted to receive a longitudinally extending fluid pathway, the fluid pathway of each coupling member being surrounded by a first mating surface adapted to make sealing engagement with the corresponding first mating surface of the other coupling member, each first mating surface being tapered or being deformable into a tapered configuration upon mating with a corresponding tapered first mating surface, and each coupling member being provided with a further, tapered, mating surface coaxial with the first such mating surface of that coupling member and disposed radially outwardly thereof, the further mating surfaces being adapted to make sealing engagement with the corresponding further mating surface of the other coupling member when the first pair of mating surfaces are engaged, a sealed annular space being defined between the two coupling members and intermediate the two pairs of mating surfaces when the coupling members are engaged.

(NEW) 12. Connector means as claimed in Claim 1 in which the tapered mating surfaces are frusto-conical in shape.

13. Connector means as claimed in Claim 2 in which the two frusto-conical mating surfaces on each coupling member taper

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in the opposite sense.

(NEW) 14. Connector means as claimed in Claim 2 in which the two frusto-conical mating surfaces on each coupling member taper in the same sense.

(NEW) 15. A coupling member for use in connector means according to any one of Claims 1 to 4, comprising a longitudinally extending fluid pathway surrounded by a first tapered mating surface adapted to make sealing engagement with the corresponding surface of another coupling member, and a further tapered mating surface coaxial with the first mating surface and surrounding it, the further mating surface being adapted to make sealing engagement with a corresponding mating surface of the said other coupling member when the first pair of mating surfaces are engaged such that a sealing annular space is defined between the two coupling members and intermediate the two pairs of mating surfaces when the coupling members are engaged.

(NEW) 16. Connector means as claimed in any one of Claims 1 to 5 in which a bacteriocidal composition is contained within the sealed annular space defined between the engaged coupling members.

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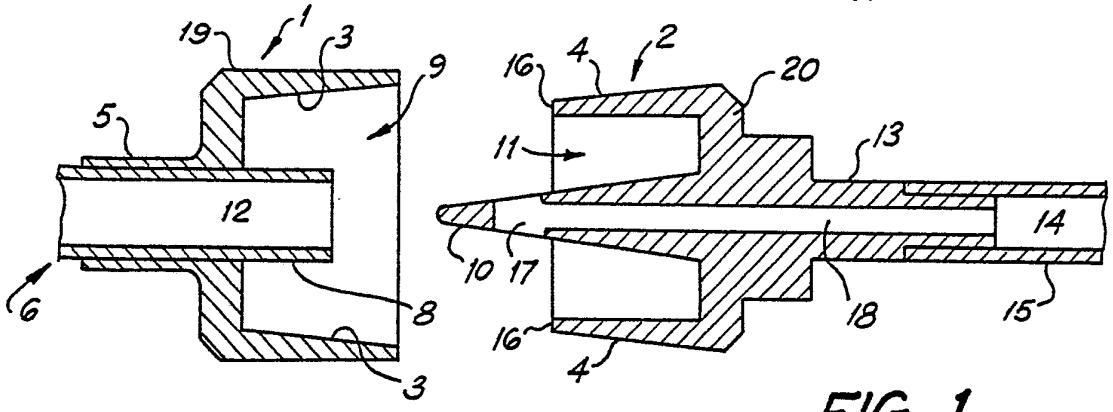


FIG. 1

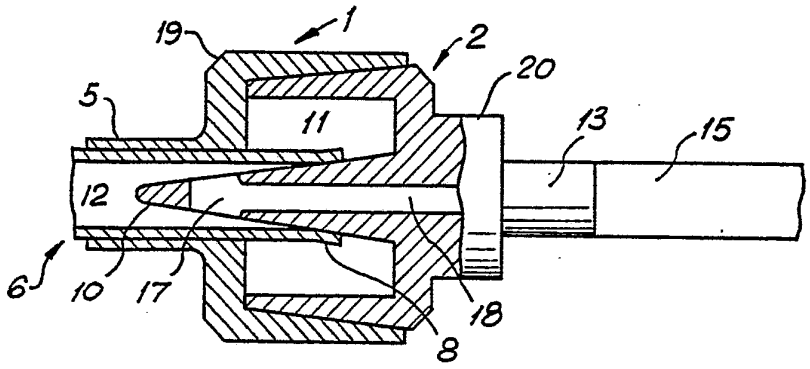


FIG. 2

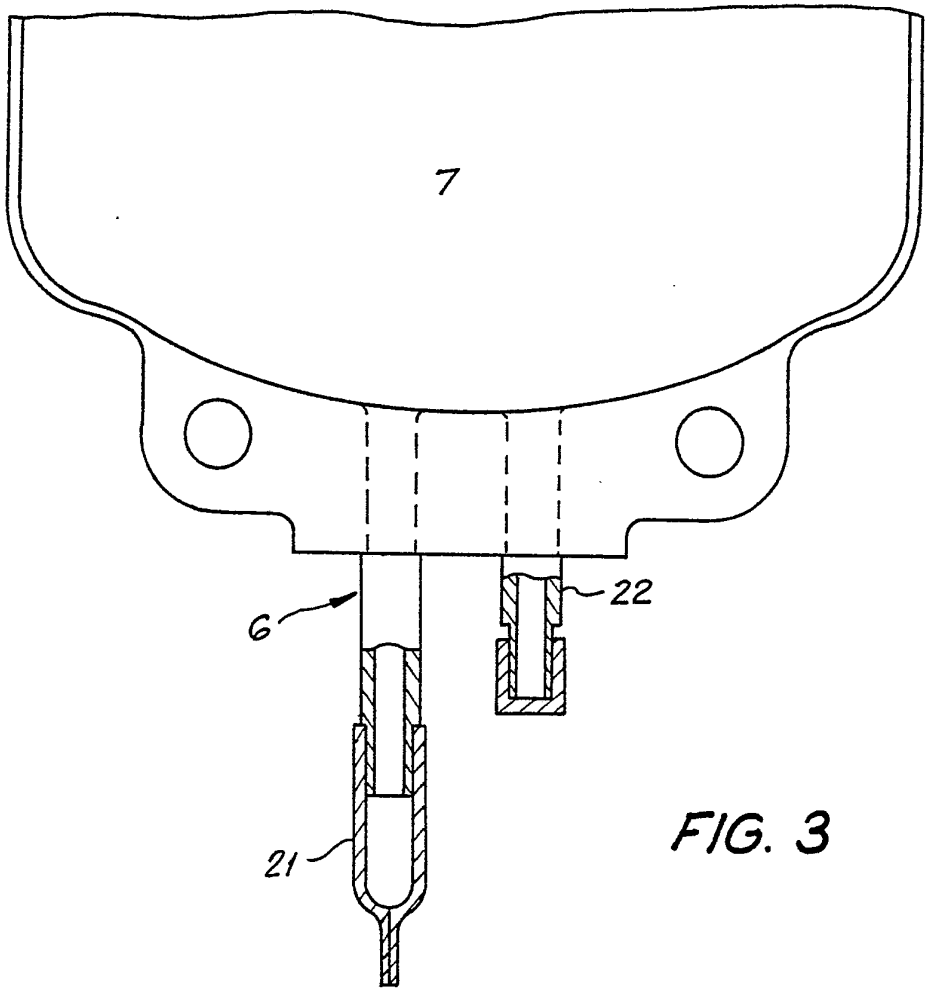


FIG. 3

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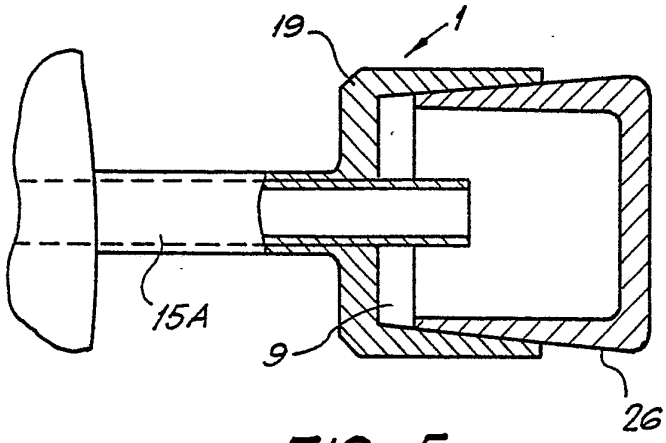


FIG. 5

FIG. 4

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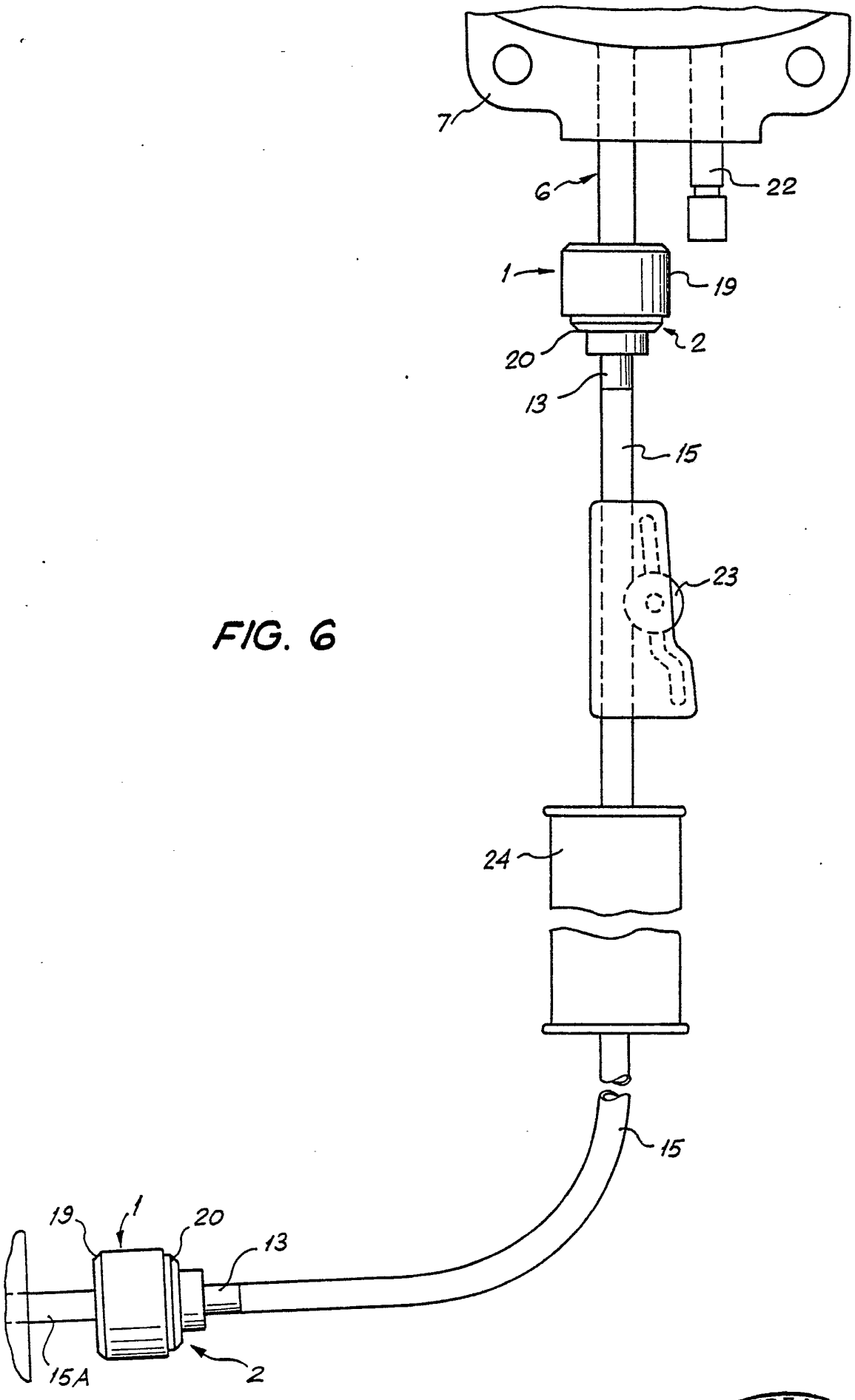


FIG. 6

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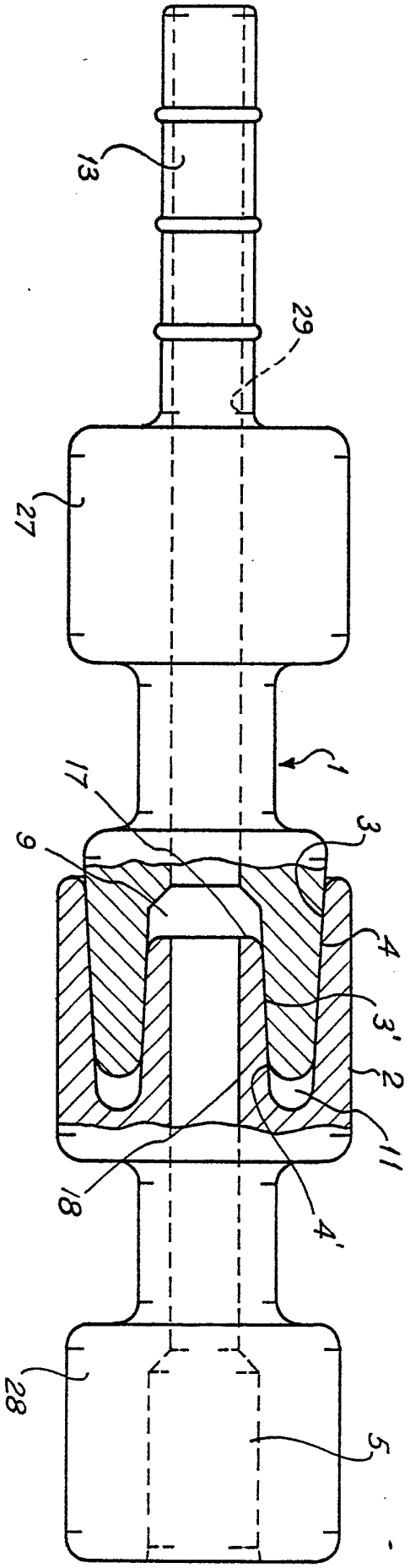


FIG. 7

BUREAU OMPI WIPO INTERNATIONAL

INTERNATIONAL SEARCH REPORT

International Application No PCT/AU 80/00031

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [3]

According to International Patent Classification (IPC) or to both National Classification and IPC

Int. Cl.[3] A61M 5/31, 5/00, F16L 35/00, 47/00, 37/00, 21/00.

II. FIELDS SEARCHED

Minimum Documentation Searched [4]

Classification System	Classification Symbols
IPC	A61M 1/02, 1/03, 5/14, 5/18, 5/31.
US Cl.	128 - 214.2, 128 - 247

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched [5]

AU: IPC as above plus F16L 33/-, 37/-, 35/-, 21/-, 19/-, 25/-, 23/-, 47/-; Australian Classification 74.532, 74.55, 87.4-0, 87.484, 87.480.

III. DOCUMENTS CONSIDERED TO BE RELEVANT [14]

Category *	Citation of Document, [16] with indication, where appropriate, of the relevant passages [17]	Relevant to Claim No. [18]
X	US, A, 4022205, published 1977, May 10, see Figures 7, 8 and column 4 line 28 to column 5 line 10, Tenczar.	(1 - 10)
X	AU, B, 22635/77 (501347), published 1978, August 31, see Figures 1, 2, 3, 6., Becton Dickson & Co. (FR, 2357261 equivalent).	(1-6, 10)
X	DE, A, 2332344, published 1975, January 16, see Figures 1 and 2, Griptight.	(1 - 10)
X	US, A, 4133312, published 1979, January 9, see Figure 7, Burd.	(1-6,10)
X	US, B, 4080965, published 1978, March 28, see Figures 1 - 6, Phillips.	(1-8, 10)
X	AU, B, 6002/32, published 1933, March 16, see Figure 2, Watson.	(1-8, 10)
X	AU, B, 85031/75 (495905), published 1977, March 24, see Figures 4, 8, 9., Otsuka. (US, 4170994, Komatsu, equivalent).	(1 - 10)

(continued on supplemental sheet (2))

* Special categories of cited documents: [15]

"A" document defining the general state of the art

"E" earlier document but published on or after the international filing date

"L" document cited for special reason other than those referred to in the other categories

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but on or after the priority date claimed

"T" later document published on or after the international filing date or priority date and not in conflict with the application, but cited to understand the principle or theory underlying the invention

"X" document of particular relevance

IV. CERTIFICATION

Date of the Actual Completion of the International Search [2]	Date of Mailing of this International Search Report [2]
28 August 1980 (28.08.80)	01 Sept. 1980 (01.09.80)
International Searching Authority [1]	**Signature of Authorized Officer [20]**
Australian Patent Office	A.S. Moore A S Moore

FURTHER INFORMATION CONTINUED FROM THE SECOND SHEET

X	AU, A, 17856/67, published 1968, August 22, see Figures 1 - 3, Gottieb Stoll.	(1-8, 10)
X	US, A, 4133314, published 1979, January 9, see Figures 2 and 3, column 2 line 62 to column 3 line 4, Bloom.	(9)
X	AU, B, 14578/62 (263276), published 1963, August 22, see Figures 4, 6., Mead Johnson & Co.	(1 - 10)
X	US, A, 3814135, published 1974, June 4, Hetzer.	(9)
X	DE, A, 2533594, published 1976, February 19, Asican A/S. (continued on extra sheet)	(1-6, 10)

V. ☐ OBSERVATIONS WHERE CERTAIN CLAIMS WERE FOUND UNSEARCHABLE [10]

This international search report has not been established in respect of certain claims under Article 17(2) (a) for the following reasons:

1. ☐ Claim numbers ....., because they relate to subject matter [12] not required to be searched by this Authority, namely:

2. ☐ Claim numbers ....., because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out [13], specifically:

VI. ☐ OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING [11]

This International Searching Authority found multiple inventions in this international application as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims of the international application.

2. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims of the international application for which fees were paid, specifically claims:

3. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claim numbers:

Remark on Protest

☐ The additional search fees were accompanied by applicant's protest.

☐ No protest accompanied the payment of additional search fees.

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)

Category *	Citation of Document, [16] with indication, where appropriate, of the relevant passages [17]	Relevant to Claim No. [18]
X	AU, B, 7590/61 (248125), published 1963, May 2, see Figures 11 to 13, Baxter Laboratories.	(1-8, 10)
X	AU, A, 60363/69, published 1971, March 4, Namikawa.	(1-8, 10)
X	DE, A, 2842153, published 1979, April 12, Wallace.	(1-8, 10)
X	AU, B, 50165/59 (236947), published 1960, January 14, Braun.	(1-8, 10)
X	US, A, 4030494, published 1977, June 21, Tenczar.	(1 - 10)