631923

Form 1
Regulation 9

COMMONWEALTH OF AUSTRALIA

Patents Act 1952

CONVENTION APPLICATION FOR A STANDARD PATENT

WE, **TERUMO KABUSHIKI KAISHA**, of 44-1, Hatagay 2-chome, Shibuya-ku, Tokyo, Japan, hereby apply for the grant of a standard patent for an invention entitled **FILTER FOR PURIFICATION OF PLATELETS** which is described in the accompanying complete specification.

The actual inventors of the said invention are: Hitoshi KUROKI and Shinichiro KURODA

Details of Basic Applications:-

Number of Basic Application:	1-240221
Convention Country in which Basic Application was filed:	Japan
Date of Basic Application:	18th September, 1989
ISO Code:	JP
Number of Basic Application:	2-131242
Convention Country in which Basic Application was filed:	Japan
Date of Basic Application:	23rd May, 1990
ISO Code:	JP

OUR address for service is SMITH SHELSTON BEADLE, 207 Riversdale Road, (P O Box 410), Hawthorn, 3122, Victoria, Australia (Attorney Code SA).

DATED THIS 11th DAY OF September, 1990

SMITH SHELSTON BEADLE
Patent Attorneys for the Applicant

TO: The Commissioner of Patents
Our Ref: #6203 JC:WB 10ter

FORM 7 & 8

AUSTRALIA
PATENTS ACT 1952

PATENT DECLARATION FORM
(CONVENTION OR NON-CONVENTION)

DECLARATION IN SUPPORT OF APPLICATION FOR A PATENT

Insert name of applicant.

In support of the application made by Terumo Kabushiki Kaisha

Insert title of invention.

for a patent for an invention entitled: FILTER FOR PURIFICATION OF PLATELETS

Insert full name(s) and address(es) of person(s) making declaration. If applicant a company person must be authorised to make declaration.

~~I/We~~ Masatoshi IWADE of 44-1, Hatagaya 2-chome, Shibuya-ku, Tokyo, Japan

do solemnly and sincerely declare as follows:

* Delete alternatives which do not apply

* 1. ~~(a) I am/We are the applicant(s) for the patent.~~

* OR (b) I am authorized by the abovementioned applicant to make this declaration on its behalf.

* 2. ~~(c) I am/We are the actual inventor(s) of the invention.~~

Insert name(s) and address(es) of actual inventor(s).

* OR (b) Hitoshi KUROKI of c/o Terumo Kabushiki Kaisha, 1500, Inokuchi, Nakai-cho, Ashigarakami-gun, Kanagawa-ken, Japan and Shinichiro KURODA of c/o Terumo Kabushiki Kaisha, 1500, Inokuchi, Nakai-cho, Ashigarakami-gun, Kanagawa-ken, Japan

~~is~~/are the actual inventor(s) of the invention and the facts upon which the applicant~~(s)~~ is/~~are~~ entitled to make the application are as follows:—

Insert details of entitlement to apply, e.g. Applicant is assignee of inventor(s)

The said applicant is the assignee of said inventors.

Delete 3 and 4 if application non-convention. Otherwise insert details of basic application(s).

3. The basic application(s) as defined by Section 141 of the Act ~~was~~/were made in the following country or countries on the following date(s) by the following applicant(s)

in Japan on September 18 19 89
by Terumo Kabushiki Kaisha
in Japan on May 23 19 90
by Terumo Kabushiki Kaisha
in _____ on _____ 19 _____
by _____
in _____ on _____ 19 _____
by _____

4. The basic application(s) referred to in paragraph 3 of this Declaration ~~was~~/were the first application(s) made in a Convention country in respect of the invention the subject of the application.

Place and date of Signature.

Declared at Tokyo, Japan this 4th day of September 19 90

NO ATTESTATION
OR SEAL

Masatoshi Iwade

Masatoshi IWADE, Director & General Manager of Patent Department

Signature(s) of declarant(s).

To: The Commissioner of Patents,
Australia

SMITH SHELSTON BEADLE

(12) PATENT ABRIDGMENT (11) Document No. AU-B-62500/90
(19) AUSTRALIAN PATENT OFFICE (10) Acceptance No. 631923

(54) Title
FILTER FOR PURIFICATION OF PLATELETS

International Patent Classification(s)
(51)[5] B01D 029/05 A61M 001/34

(21) Application No. : 62500/90 (22) Application Date : 13.09.90

(30) Priority Data

(31) Number	(32) Date	(33) Country
1-240221	18.09.89	JP JAPAN
2-131242	23.05.90	JP JAPAN

(43) Publication Date : 21.03.91

(44) Publication Date of Accepted Application : 10.12.92

(71) Applicant(s)
TERUMO KABUSHIKI KAISHA

(72) Inventor(s)
HITOSHI KUROKI; SHINICHIRO KURODA

(74) Attorney or Agent
CARTER SMITH & BEADLE . Qantas House, 2 Railway Parade, CAMBERWELL VIC 3124

(56) Prior Art Documents
AU 610264 23824/88 A61M 1/34
AU 493985 79451/75 A61M 1/34
AU 465712 45825/72 A61M 1/34

(57) Claim

1. A filter for purifying platelets by removing leucocytes from a solution containing blood components, said filter comprising a porous body which has a three-dimensional reticularly continuous texture defining therein continuous open pores to establish fluid communications between the opposite sides of the filter, said continuous open pores having no acute projections present and said continuous open pores having an average diameter in the range of 6 to 12 μm and a pore diameter distribution in the range of 2 to 30 μm for allowing platelets to pass through the filter while preventing leucocytes from passing therethrough.

631923

COMPLETE SPECIFICATION

FOR OFFICE USE

Application Number:
Lodged:
Class:
Int. Class:

Complete Specification – Lodged:
Accepted:
Published:
Priority:

Related Art:

TO BE COMPLETED BY APPLICANT

Name of Applicant: TERUMO KABUSHIKI KAISHA

Address of Applicant: 44–1, Hatagaya 2–chome, Shibuya–ku, Tokyo, Japan

Actual Inventor/s: Hitoshi KUROKI and Shinichiro KURODA

Address for Service: **SMITH SHELSTON BEADLE**
207 Riversdale Road (P O Box 410)
Hawthorn Victoria 3122 Australia
(Attorney Code SA)

Complete Specification for the invention entitled:

FILTER FOR PURIFICATION OF PLATELETS

The following statement is a full description of this invention, including the best method of performing it known to us:

Our Ref: #6203 JC:WB 10ter

This invention relates to a filter for the purification of platelets. More particularly, it relates to a filter for passing a platelet suspension thereby effecting selective removal of leucocytes as extraneous matter therefrom and consequent separation of platelets in a purified form.

Description of the Prior Art:

Today, the form of blood transfusion is increasingly tending from the whole blood transfusion toward the component blood transfusion using only the blood component required for a given patient. The number of kinds of medicines using platelets is increasing year after year. In recent years, the transfusion of platelets has been steadily gaining in importance in proportion to continuous increase of patients of thrombocytopania caused by heavy dosage of chemotherapeutic agents used against malignant tumors.

The platelet medicines actually put to use to date include the bag PC (platelet concentrate) prepared after collection of blood in a bag and the apheresis PC obtained by the use of a component blood collecting device. They both require separation of platelets from blood by the method of centrifugal separation.

The current method of centrifugal separation, however, inevitably suffers leakage of leucocytes (mainly lymphocytes) into the PC. It is held that the leucocytes in the PC induce fever and other similar secondary effects after the transfusion of platelets and most patients taking frequent transfusion of platelets acquire refractoriness to the effect of transfusion. These adverse effects are logically explained by a supposition that the leucocytes give rise to human leucocyte antigen (HLA) and lymphocytetoxic antigen (LCT) in the patients' body.

The platelet transfusion is required to be performed frequently in large doses. The patient is consequently affected by many and unspecified antigens. It is said that the LCT antigen is detected in not less than 90% of the patients taking transfusion of 100 units or more of platelet medicine. When platelets are transfused into patients who have already developed such antibodies, the transfusion manifests the expected effect because the platelets are prone to destruction in the patients' bodies.

Various types of filters have been developed for the removal of leucocytes and have been already introduced to the market. They are either formed by having various kinds of fibers such as natural fibers like natural cellulose, synthetic fibers of polyesters, polyamides, and polyacrylonitrile, and inorganic fibers like glass fibers simply packed in their unmodified form in columns or provided with a filter part of secondarily fabricated non-woven fabric. They are chiefly intended to remove leucocytes mingling into such an erythrocyte medicine as the CRC (concentrated red corpuscles). Though these filters for the removal of leucocytes manifest their performance above a certain level concerning the removal of leucocytes, they are not prevented from removing platelets at the same time. They bring about an improper effect, therefore, when they are used for the removal of leucocytes from the platelet suspension or from the whole blood.

In the circumstances, a desire has been expressed

for a method or apparatus for permitting transfusion of pure platelets by removal of leucocytes, particularly lymphocytes, from such blood components as platelet suspension and whole blood which contain leucocytes and platelets.

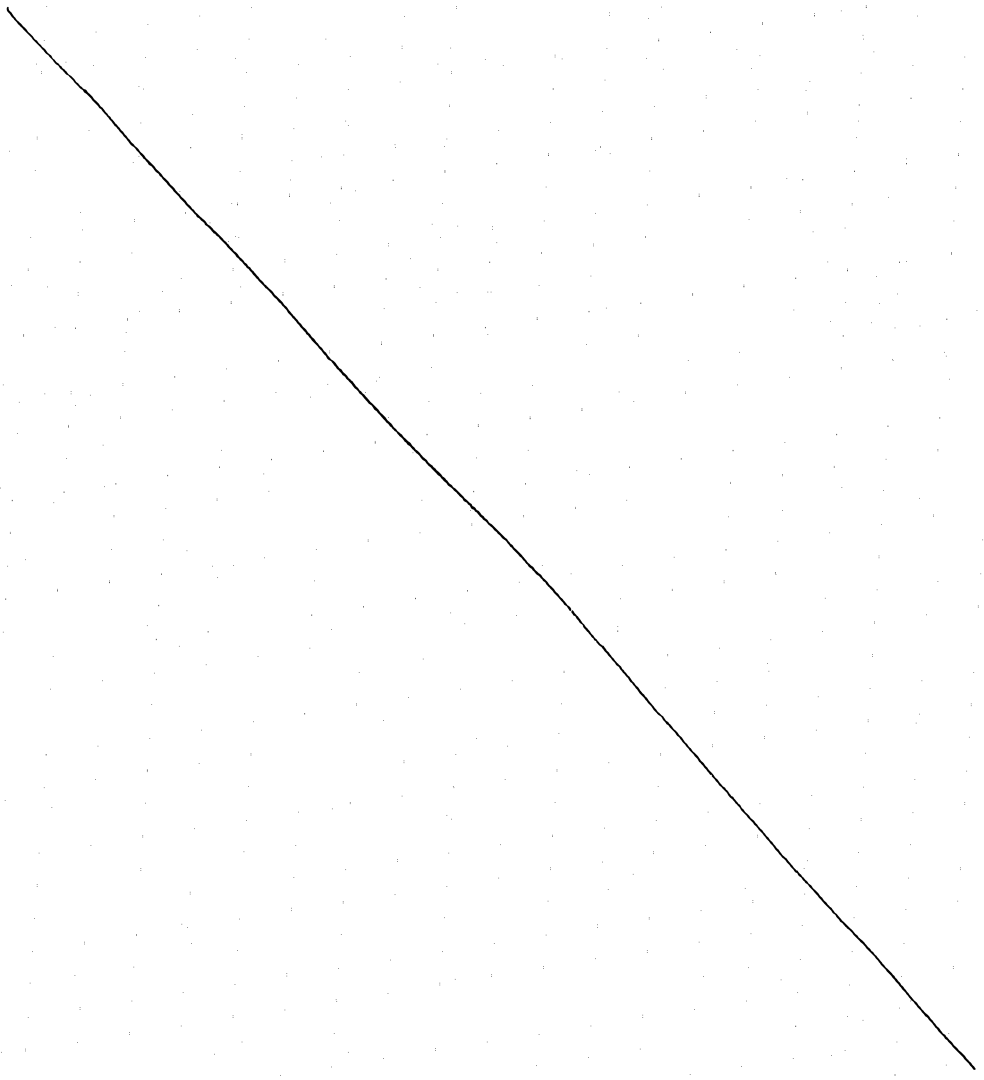
SUMMARY OF THE INVENTION

The invention provides a filter for purifying platelets by removing leucocytes from a solution containing blood components, said filter comprising a porous body which has a three-dimensional reticularly continuous texture defining therein continuous open pores to establish fluid communications between the opposite sides of the filter, said continuous open pores having no acute projections present and said continuous open pores having an average diameter in the range of 6 to 12 μm and a pore diameter distribution in the range of 2 to 30 μm for allowing platelets to pass through the filter while preventing leucocytes from passing therethrough.

This invention further discloses a filter for the purification of platelets, wherein the porous body is formed of polyurethane resin.

The present invention is directed to a filter which is constructed as described above to permit purification of platelets. This filter, therefore, has a distinct and stable ability to seize leucocytes. Since this film possesses a porous structure such as to avoid inducing viscosity relative to leucocytes, it is capable of effecting highly efficient separation of leucocytes as extraneous matter from the platelet suspension such as the platelet concentrate or from whole blood and

consequently accomplishing purification of the platelet suspension or the whole blood. Use of the purified platelet suspension or the purified whole blood is expected to allow effective prevention of the induction of fever and other similar side effects after the transfusion of platelets and the development of refractoriness to the effect of transfusion. Further, since the film has as a main part thereof a porous body of a three-dimensional reticularly continuous texture, it can be very easily sealed in a container such as a housing and can be very conveniently manufactured. The



filter has no possibility of falling off its container and leaving behind a gap for leakage of extraneous matter. In the filter of this invention, when the porous body is formed of polyurethane resin and the pores therein have diameter distribution in the range of 2 to 30 μm, the ratio of removal of leucocytes and the ratio of recovery of platelets are further improved.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a schematic cross section illustrating a filter for the purification of platelets as one embodiment of this invention,

Fig. 2 and Fig. 3 are schematic diagrams illustrating blood treating apparatuses each incorporating therein a filter for the purification of platelets as one embodiment of this invention,

Fig. 4 is a photomicrograph illustrating the structure of a filter to be used in the present invention, and

Fig. 5 is a photomicrograph illustrating the structure of a filter used for the purpose of comparison.

EXPLANATION OF THE PREFERRED EMBODIMENT

For selective removal of leucocytes mingling as extraneous matter in a platelet suspension, it is necessary to seize leucocytes of low viscosity and avoid seizing platelets of high viscosity. The filter of the present invention for the purification of platelets is characterized by having as a main part thereof a porous body possessing a three-dimensional reticularly continuous texture containing continuous open pores 6 to 12 μm in average diameter and allowing substantially no presence of acute projections inside the pores. When this filter is used for treating blood components such as platelet suspension and whole blood which contain both leucocytes and platelets, the leucocytes contained as extraneous matter in the blood components are efficiently seized while they are flowing through complicated paths of continuous open pores having diameters

in the aforementioned fixed range and formed in the matrix of the porous body. In the meantime, the platelets are completely passed through the filter without being seized in the paths because the paths are the continuous open pores formed in the matrix of the porous body, because the paths preclude the presence of a three-dimensional structure such as to induce high viscosity relative to the platelets unlike the conventional filter for the removal of platelets which uses an intertwined mass of fine fibers as a filter material, and further because the continuous open pores have diameters amply large as compared with diameters of platelets. Thus, the purification of platelets can be attained with high efficiency.

Further, since the flow paths of the filter are continuous open pores formed in the matrix of the porous body and they are formed while the porous body is taking shape finally during the course of its production, the process employed in the production of the filter for purification of platelets by the use of this porous body is very simple and the possible dispersion of quality among a lot of products is very small. Moreover, the matrix of the porous body possesses a continuous texture, the inner walls of the continuous open pores allow substantially no presence of acute projections, and the film surfaces formed by cutting the porous body have no projection of any kind. The filter, therefore, enjoys stability of quality and substantial freedom from the problem of exudation of foreign matter through the porous body or channeling of the flow paths while the filter is in service.

Now, the present invention will be described more specifically below with reference embodiments thereof.

The filter of the present invention for the purification of platelets has as a main part thereof a porous body possessing a three-dimensional reticularly continuous texture containing continuous open pores and allowing substantially no presence of acute projection

inside the pores. The filter surfaces are preferable to have the same structure as the filter interior or to be flat and smooth.

In the porous body of the present invention which is constructed as described above, the continuous open pores are preferable to have an average pore diameter in the range of 6 to 12 μm, preferably 8 to 10 μm. If the average pore diameter is less than 6 μm, there arises the possibility that the platelets will be seized on account of their size and the leucocytes will be seized substantially wholly in the surface layer parts of the porous body and consequently the filter will incur the problem of clogging. Conversely, if the average pore diameter exceeds 12 μm, the ability of the filter to seize leucocytes owing to difference in size will be degraded.

If the porous body has an unduly small pore diameter distribution, it has the possibility of inducing the phenomenon of clogging because the leucocytes are substantially wholly seized in the surface layer parts of the porous body. The pore diameter distribution, therefore, is preferable to fall in the range of 2 to 30 μm, more preferably 5 to 20 μm. When the porous body has pores of suitable size and distribution as described above, the leucocytes mingling as extraneous matter in the blood components flowing through the porous body are seized in the surface layer parts or the inner part of the porous body or caused to adhere to the inner part of the porous body in which the flow is suffered to stagnate.

The term "average pore diameter" as used in the present specification refers to the magnitude determined by the mercury injection method on the percentage scale in which 0% stands for a pore diameter resulting in perfect absence of injected mercury in all of the pores of the porous body and 100% for a pore diameter resulting in presence of injected mercury in all of the pores of the porous body and 50% for a pore diameter intermediate between

the two pore diameters mentioned above, namely the "average pore diameter" contemplated by the present invention. Specifically, the average pore diameter has a significance in this invention such that when various particles are passed through the filter of the porous body, particles of diameters exceeding the average diameter of the pores in the porous filter are not easily passed through the filter. The term does not necessarily mean that particles of diameters exceeding the average pore diameter are never passed through the filter under any condition.

The term "pore diameter distribution" as used in the present specification refers to the pore diameters corresponding to the range of 10 to 90% of voluminal change of injected mercury during the determination by the mercury injection method. The term has a significance that pore diameters deviating from the pore diameter distribution are not completely absent but are present in a small proportion.

The porosity of the porous body, though variable with such factors as average pore diameter, is preferable to be approximately in the range of 30 to 95%, preferably 75 to 95%. If the porosity is less than 30%, there arises the possibility that the operation of the filter for the purification of platelets will call for an extended time. Conversely, if the porosity exceeds 95%, there is the possibility that the filter will suffer from insufficient strength.

The thickness of the porous body, though various factors such as average pore diameter, porosity, and microstructure of the three-dimensional reticularly continuous texture of the matrix, is preferable to be approximately in the range of 0.3 to 10.0 mm, preferably 0.5 to 3 mm. If the thickness of the porous body is less than 0.3 mm, there arises the possibility that the filter will fail to seize leucocytes. Conversely, if the thickness of the porous body exceeds 10.0 mm, there ensues the possibility that the filtration layer will have a depth so

large as to add appreciably to the time required for the operation of the filter.

The present invention does not particularly discriminate the porous body on account of the material used therefore so long as the porous body possesses the required structure. The material nevertheless is required to be such that it will neither allow ready adhesion thereto of platelets nor cause ready infliction of damage to blood corpuscles. The materials which are usable herein include polyurethane, polytetrafluoroethylene, polypropylene, and polycarbonates, for example. Particularly, the synthetic resin foam of polyurethane, for example, or the porous body of synthetic resin having the surface thereof coated with such a material as segmented polyurethane which defies ready adhesion of blood corpuscles proves to be preferable.

Fig. 1 is a cross section illustrating a filter for the purification of platelets as one embodiment of the present invention. In the present embodiment, a filter 1 comprises a housing 4 provided with a blood component inlet 2 and a blood component outlet 3 and a porous body 5 endowed with such a structure as described above and laid across the empty space inside the housing 4. In the filter 1 for the purification of platelets constructed as described above, the porous body 5 may be optionally provided in the front and rear parts thereof with liquid-permeable supporting members 6a, 6b adapted to pinch the porous body 5 and keep it fast in place so that the porous body may be retained stably inside the housing 4.

The filter 1 for the purification of platelets is usable in an apparatus constructed as illustrated in Fig. 2. In the apparatus illustrated in Fig. 2, a liquid guide tube 8a extended from inside a container 7 holding a leucocyte-containing PRP (platelet rich plasma) under treatment is laid through the medium of a suction pump 9 and connected to the platelet suspension inlet 2 of the filter 1 for the purification of platelets and a liquid guide tube 8b

connected to the platelet suspension outlet 3 of the fi ter 1 is extended into a platelet suspension recovery container 10. The operation of this apparatus for the purification of platelets is effected by actuating the suction pump 9 thereby leading the leucocyte-containing PRP out of the container 7, advancing it through the platelet suspension inlet 2 into the filter 1 for the purification of platelets, and allowing it flow through the paths formed of continuous open pores of the porous body 5 inside the filter 1. The PRP which has been derived of leucocytes owing to the seizure by the porous body 5 and which has completed its travel through the porous body 5 is led through the platelet suspension outlet 3 to the outside of the filter 1 is recovered inside the platelet suspension recovery container 10.

Where a blood component of high platelet concentration is to be produced from whole blood by the removal of leucocytes, the filter 1 is formed by having the porous body 5 fixed inside the housing 4 provided with the blood inlet 2 and the blood outlet 3 as illustrated in Fig. 3 and tubes of polyvinyl chloride 12b, 13b are formed and disposed in order for the tube 12b to interconnect the blood inlet 2 of the filter 1 and a blood outlet 12a of a blood container 1 and the tube 13b substantially equal in length to the tube 12 b to join the blood outlet 3 of the filter and terminate in an open end 14, below which a blood recovery container 15 is disposed. The level of the blood held in the blood container 11 is at a distance of 70 cm from the open end 14 of the tube 13b. This head of 70 cm is utilized in causing flow of 50 ml of blood.

Now, the present invention will be described more specifically below with reference to working examples.

Example 1

A disk 1 mm in thickness and 25 mm in diameter was punched out of a porous body of polycarbonate type polyurethane resin (produced by Toyo Polymer K.K.)

possessing a texture illustrated in Fig. 4 containing pores of an average of 10 μm and allowing substantially no presence of acute projection side the pores. This disk was incorporated in a filter assembly (available area 2.4 cm^2) formed as illustrated in Fig. 1 to complete a filter 1 for the purification of platelets. This filter 1 was installed in an apparatus constructed as illustrated in Fig. 2.

A lymphocyte-containing PRP (number of platelets 3.5 x 10^5 to 5.5 x $10^5/\mu l$ and number of leucocytes 3.5 x 10^3 to 4.5 x $10^3/\mu l$) was prepared by suspending in the PRP collected from CPD-added fresh blood of a healthy man autolymphocytes separated by the density gradient centrifugal method.

In an apparatus constructed as illustrated in Fig. 2, the lymphocyte-containing PRP was fed at a flow rate of 1 $ml/mm.cm^2$ to the filter 1 (1 $ml/min \cdot cm^2$ of the filter surface). The number of leucocytes and the number of platelets of the lymphocyte-containing PRP before and after passage the filter were calculated by the use of a blood corpuscle calculating device (produced by Orthodiagnostic System Corp. and marketed under product code of "ELT-8"). The ratio of removal of leucocytes and the ratio of recovery of platelets were found in accordance with the following formulas.

Ratio of removal of leucocytes (%) = [1 - (Number of leucocytes after passage/number of leucocytes before passage)] x 100

Ratio of recovery of platelets (%) = (Number of platelets after passage/number of platelets before passage) x 100

The results are shown in Table 1.

Example 2

A disk 1 mm in thickness and 47 mm in diameter was punched out of a porous body of polycarbonate type polyurethane resin (produced by Toyo Polymer K.K.) similar to that of Example 1 and incorporated in a filter assembly

formed as illustrated in Fig. 1 to complete a filter 1 for the purification of platelets. This filter 1 was installed in an apparatus constructed as illustrated in Fig. 3.

In the apparatus constructed as illustrated in Fig. 3, 50 ml of a CPD-added blood of a normal man was fed at a head of 70 cm. The number of leucocytes and the number of platelets of the blood were calculated by the use of a blood corpuscle calculating device (produced by Orthodiagnostic System Corp. and marketed under product code of "ELT-u"). The ratio of removal of leucocytes and the ratio of recovery of platelets were found in the same manner as in Example 1. The results are shown in Table 1.

Control 1

An experiment similar to that of Example 1 was carried out by the use of a body of continuous structure of polyvinyl formal resin (produced by Kanebo Ltd.) possessing a surface structure illustrated in Fig. 3 containing pores of an average diameter of 10 μm, allowing presence of numerous acute projections inside the pores and also allowing occurrence of thornlike projections on the filter surface, to find the ratio of removal of leucocytes and the ratio of recovery of platelets. The results are shown in Table 1.

Control 2

An experiment similar to that of Example 2 was performed by the use of a body of continuous structure of polyvinyl formal resin similar to that of Control 1, to find the ratio of removal of leucocytes and the ratio of recovery of platelets. The results are shown in Table 1.

Table 1

	Ratio of removal of leucocytes (%)	Ratio of recovery of platelets (%)
Example 1	100	95
Example 2	100	72
Control 1	100	60
Control 2	100	35

Examples 3 to 6 and Controls 3 and 4

A disk 1 mm in thickness and 25 mm in diameter was punched out from a porous body of polycarbonate type polyurethane resin (produced by Toyo Polymer K.K.) possessing a structure similar to that illustrated in Fig. 4 and containing pores of varying average pore diameter and varying pore diameter distribution indicated in Table 2 and allowing substantially no presence of acute projections inside the pores. The disk was incorporated in a filter assembly formed as in Fig. 1 (available area 2.4 cm^2) to complete a filter 1 for the purification of platelets. This filter 1 was installed in an apparatus constructed as illustrated in Fig. 2.

A lymphocyte-containing PRP (number of platelets 3.5 x 10^5 to 5.5 x 10^5/µl and number of leucocytes 3.5 x 10^3 to 4.5 x 10^3/µl) was prepared by suspending autolymphocytes separated by the density gradient centrifugal method in the PRP collected from a CPD-added fresh blood from a healthy man.

In an apparatus constructed as illustrated in Fig. 2, the lymphocyte-containing PRP was fed to the filter 1 at a flow rate of 1 ml/min·cm^2 (1 ml/min per cm^2 of the filter 1). The concentration of leucocytes and the concentration of platelets of the PRP before and after the passage through

the filter 1 were calculated by the use of a blood corpuscle calculating device (produced by Orthodiagnostic Systems Corp. and marketed under product code of "ELT-8"). Then the absolute numbers of these blood corpuscle components were found based on the amounts of PRP and the ratio of removal of leucocytes and the ratio of recovery of platelets were found consequently. The results are shown in Table 2.

The claims form part of the disclosure of this specification

Table 2

	Control 3	Example 3	Example 4	Example 5	Example 6	Control 4
Average pore diameter (μm)	5	6	8	9	11	14
Pore diameter distribution (μm)	3~14	2~19	4~22	5~20	7~30	8~39
Proportion of pore diameters distributed (%)						
30μm~	2	4	6	4	9	15
25~30μm	1	1	2	2	4	5
20~25μm	1	3	3	3	8	9
18~20μm	3	2	3	4	4	4
16~18μm	1	3	4	3	5	5
14~16μm	2	4	6	6	8	10
12~14μm	2	5	7	4	9	17
10~12μm	3	9	6	4	23	16
8~10μm	5	9	10	35	19	9
6~8μm	15	9	25	22	6	5
4~6μm	33	17	15	9	3	4
2~4μm	26	27	10	3	1	1
~2μm	5	7	3	1	1	0
Ration of removal of leukocytes (%)	100	100	100	100	75	55
Ratio of recovery of platelet (%)	60	80	90	95	95	95

The claims defining the invention are as follows :-

1. A filter for purifying platelets by removing leucocytes from a solution containing blood components, said filter comprising a porous body which has a three-dimensional reticularly continuous texture defining therein continuous open pores to establish fluid communications between the opposite sides of the filter, said continuous open pores having no acute projections present and said continuous open pores having an average diameter in the range of 6 to 12 μm and a pore diameter distribution in the range of 2 to 30 μm for allowing platelets to pass through the filter while preventing leucocytes from passing therethrough.

2. A filter according to claim 1, wherein said porous body is formed of polyurethane resin.

3. A filter according to claim 1 or claim 2, wherein said average pore diameter is in the range of 8 to 10 μm.

4. A filter according to any one of the preceding claims, wherein the thickness of said filter is in the range of 0.3 to 10.0 mm.

5. A filter according to any one of claims 1 to 3, wherein the thickness of said filter is in the range of 0.5 to 3 mm.

6. A filter according to any one of the preceding claims, wherein said solution containing blood components is a platelet suspension.

7. A filter according to any one of claims 1 to 5, wherein said solution containing blood components is whole blood.

8. A filter substantially as herein described with reference to the accompanying drawings.

DATED this 8 October 1992

CARTER SMITH & BEADLE

Fellows Institute of Patent Attorneys of Australia

Patent Attorneys for the Applicant:

TERUMO KABUSHIKI KAISHA

FIG. 1

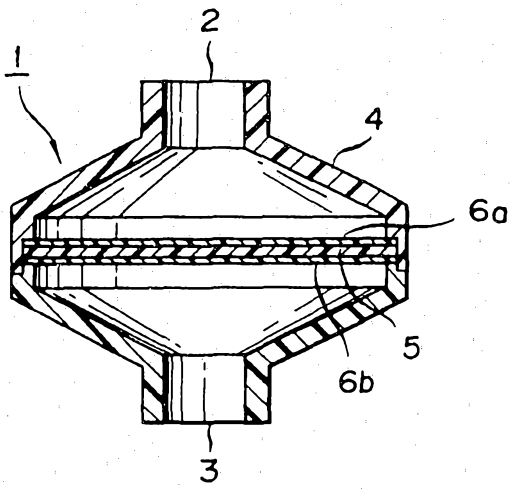


FIG. 2

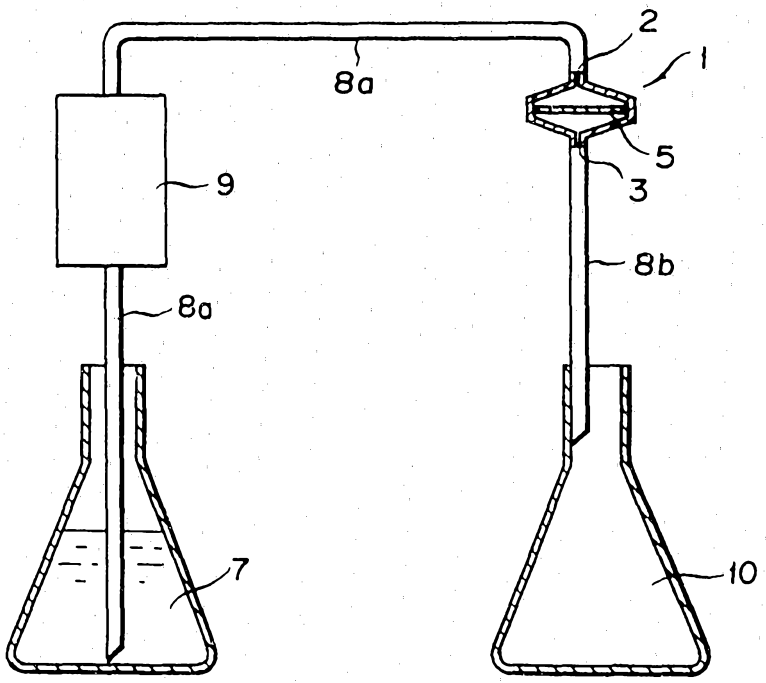


FIG. 3

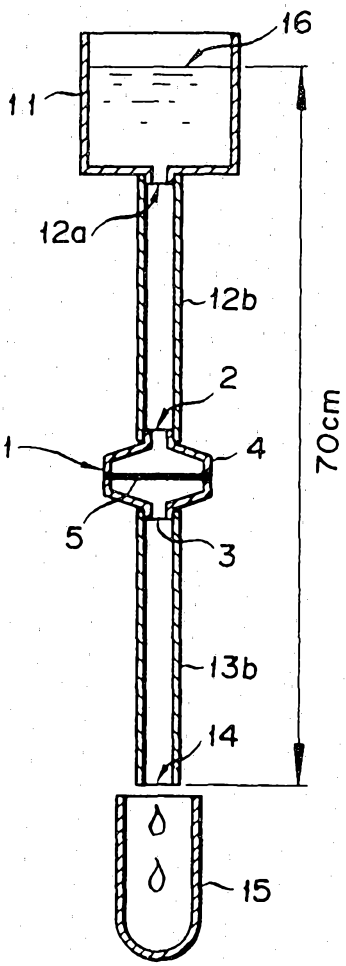


FIG.4

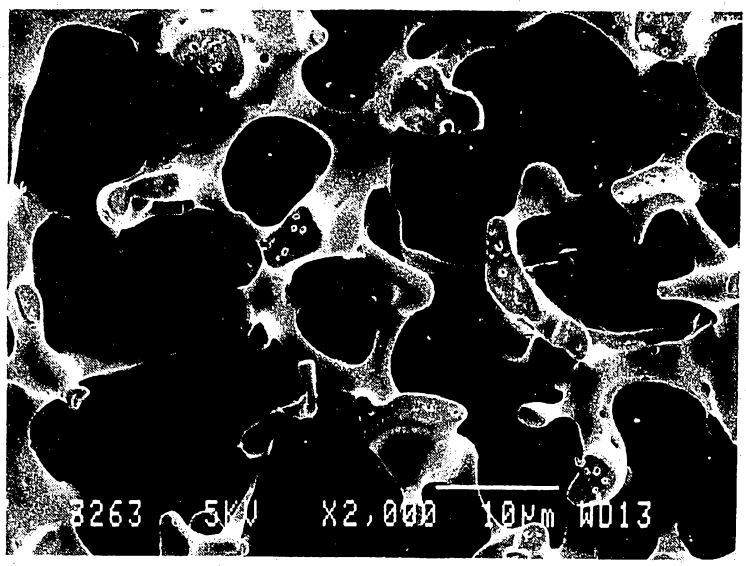


FIG.5