PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 4 :		(11) International Publication Number:
A61F 13/00	A1	WO 89/ 05133
		(43) International Publication Date: 15 June 1989 (15.06.89)

(21) International Application Number: PCT/SE88/00660

(22) International Filing Date: 2 December 1988 (02.12.88)

(31) Priority Application Number: 8704821-1

(32) Priority Date: 2 December 1987 (02.12.87)

(33) Priority Country: SE

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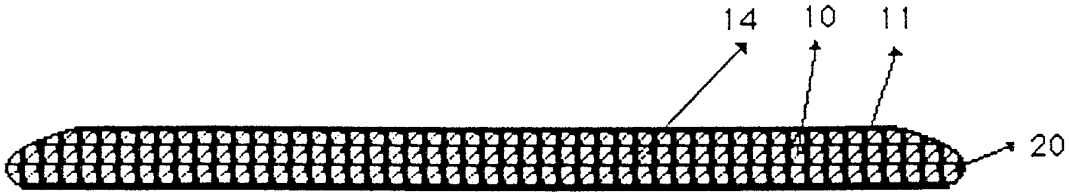
(81) Designated States: AT, AT (European patent), AU, BB, BE (European patent), BG, BJ (OAPI patent), BR, CF (OAPI patent), CG (OAPI patent), CH, CH (European patent), CM (OAPI patent), DE, DE (European patent), DK, FI, FR (European patent), GA (OAPI patent), GB, GB (European patent), HU, IT (European patent), JP, KP, KR, LK, LU, LU (European patent), MC, MG, ML (OAPI patent), MR (OAPI patent), MW, NL, NL (European patent), NO, RO, SD, SE, SE (European patent), SN (OAPI patent), SU, TD (OAPI patent), TG (OAPI patent), US.

Published
With international search report.
With amended claims.
In English translation (filed in Swedish).

(54) Title: DRESSING



(57) Abstract

A dressing with a pad (10) to be applied to a wound and consisting of a flexible, capillary-active material and stiffening elements. The stiffening elements extend at right angles to the flat side of the pad to be applied to the wound and are arranged to stabilise the volume of the pad (10) such that it can absorb a predeterminable amount of fluid, and to counteract and distribute forces acting on the pad (10). To form an occlusive dressing, the pad can be enclosed in a cover (11) of vapour-permeable, plastic film having a perforated portion (12) on the flat side of the pad facing the wound.

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DRESSING

The present invention relates to a dressing with a pad consisting of a flexible, capillary-active material to be applied to a wound.

Dressings are used for treating e.g. surgical wounds, open wounds and portions of the skin subjected to pressure. Dressings ready for use are adapted to these applications and fulfil the following functions to a varying degree.

1. PROTECTION AND IMMOBILISATION

By avoiding pressure, shocks and motion in the tissue area, it is possible to prevent or reduce tissue injury. The less the tissue injury is, the more efficient becomes infection control and healing. Pain is relieved.

2. ISOLATION

If the wound is clean, infection is prevented. If the wound is already infected, the infection is prevented from spreading to surrounding areas. Unnecessary direct contact with the patient's body fluids should be avoided, which means that leakage of pus and blood from the dressing should be prevented as far as possible. The demand for isolation has become still more justified with the advent of new sources of infection, such as AIDS.

3. PREVENTION OF EVAPORATION AND DEHYDRATION

This is of importance in open wounds. Healing here takes place e.g. by ingrowth of the cells of the skin from the edge portions of the wound. These cells are especially sensitive to an unfavourable environment, and dehydration means that healing will be considerably delayed.

4. ACTIVE INFLUENCE

This can be achieved by adding chemical substances, such as infection control agents or healing substances

or by removing bacteria and pus from the surface of the wound and the dressing.

For a better idea of the prior art, a brief account of conventional ready-for-use dressings and their major drawbacks will now be given.

1. DRESSINGS FOR SURGICAL WOUNDS

A dressing of this type consists of a pad to be applied to a wound and disposed centrally on a thin backing layer of gauze or nonwoven material. Around the pad, the backing layer is provided with adhesive for fixing the dressing to the skin surrounding the wound. The pad generally consists of a piece of absorbent felt. Superposed absorbent layers of felt having different density and rigidity are sometimes used. The backing layer is air- and liquid-permeable. In use, blood or pus is absorbed by the pad. If a dressing partially saturated with liquid is subjected to pressure, e.g. when the patient is lying on the dressing or parts of the bandage located outside are compressed, there is a reduction of the volume of the pad which is capable of retaining liquid. The backing layer is soaked and the isolating air seal against the environment is broken, which means both risk of infection and practical inconveniences. An unplanned change of dressings may be necessitated. Thus, this type of dressing cannot be considered volumetrically stable in the sense that a given volume of blood or pus can always be retained in the dressing.

2. DRESSINGS FOR OPEN WOUNDS

Occlusive dressings used are in the form of a plastic film or adhesive plate. The dressing materials are either completely occlusive or vapour-permeable to a varying degree. They are not permeable to water. Evaporation of clinical importance is prevented, like dehydration. The occlusive film consists of a piece of adhesive elastic polymer film applied

to the wound and the surrounding skin. The adhesive surface adheres to the skin whereas not to the wound, thus forming a watertight wound pocket which may contain wound exudate or pus. A considerable drawback is that such a pocket has no volume stability. If the liquid retained is subjected to pressure, the above-mentioned consequences are had. Further, the film affords no protection against pressure, shocks or motion. Active influence is not possible. The occlusion plate consists of a thin foam material having a coating of polymer film and provided on one side with a slightly thicker layer of adhesive. The adhesive forms together with the pus a low-viscosity gel. This plate suffers from the same drawbacks as the occlusive film. Since there is no volumetrically stable space, undesired leakage may take place under the conditions stated above. As opposed to the film, the plate provides a certain protection and immobilisation. Active influence on the wound is not possible. The flush dressing is a special type of occlusive dressing which also allows active influence on the wound. It consists of a wound pad which is in the form of a piece of felt covered with polymer film. One or more central perforations are facing the wound, otherwise the film is watertight. The surface of the film surrounding the perforations is adhesive and allows occlusive application to the skin surrounding the wound. The dressing has two connections which can be used simultaneously for supplying treatment liquid and for draining pus or wound exudate. The liquid supplied is distributed in the open capillary-active pore system of the pad. Drainage is effected by applying a negative pressure which is also distributed in the pore system. A major drawback here is that the dressing is not volumetrically stable and so, leakage may occur (see above). Further, functional trouble may arise if the capillary-active pore system is occluded by compres-

sion, which may also be caused by a negative pressure in the dressing.

3. PROTECTIVE DRESSING

Protracted pressure may cause injury and give rise to wounds also in normal skin. The protective dressing relieves a portion of the skin subjected to pressure and is used in the prophylaxis of pressure-induced wounds, primarily in bedridden, immobilised patients. The occlusion plate is now being used for this application. Since the plate is thin and has no reinforcement, only insufficient relief is obtained.

The object of the present invention is to overcome the drawbacks inherent in prior art dressings, by providing a dressing which can be used as an ordinary dressing and as occlusive dressing, flush dressing, dressing for surgical wounds as well as protective dressing, and which by dimensional stabilisation can absorb a predetermined amount of fluid from a wound and efficiently protects the wound from stresses. This object is achieved in that the dressing has elements of a given rigidity and length orthogonally to the flat side of the pad to be applied to the wound, said elements being adapted both to stabilise the volume of the pad so as to give it a predeterminable liquid-absorbing volume, and to counteract and distribute the forces directed against the pad.

The invention will now be described in more detail hereinbelow with reference to the accompanying drawing schematically showing an embodiment of an occlusive dressing. Fig. 1 is a bottom plan view of a dressing according to the invention. Fig. 2 is a section taken along the line II-II in Fig. 1. Fig. 3 shows an edge portion of the dressing in vertical position. Figs. 4, 5 and 6 illustrate specific embodiments of the dressing.

The dressing according to the invention consists of a pad 10 to be applied to a wound and consisting of capillary-active material, i.e. a material which

is able to absorb fluids from a wound when the pad is applied to it. This material may be woven or non-woven or consist of a foam material having open cells and being of a nature to minimise adhesion to the wound. The capillary-active material 10 is enclosed in a cover of plastic sheeting or film 11 which covers the top side of the pad and extends as a single piece therefrom around the edges of the pad so as also to cover the bottom side of the pad 10. In the part of the sheeting which covers the bottom side of the pad, there is provided a perforated portion 12 the boundary edges of which are spaced from the edges of the pad so as to form a non-perforated frame of sheeting 13 coated with a suitable adhesive, such as acrylic glue or cellulose synthetic rubber glue adhering to and absorbing moisture from the skin. The film or sheeting 11 is liquidtight, but preferably vapour-permeable and may be translucent. Instead of a film or sheeting 11 of plastic material, it is possible to use a film or sheeting of other materials, such as natural or synthetic rubber. The essential thing is that the film or sheeting is liquidtight and has the desired airtightness. The pad 10 is preferably tapering towards its edges, as indicated in Fig. 2.

The pad 10 has stiffening elements which extend between the opposite flat sides of the pad and which may be of different types. In the embodiment shown in Fig. 2, the stiffening elements consist of walls 14 extending between the opposite flat sides of the pad. In Fig. 2, the walls 14 extend between the opposite long sides of the dressing, but they may also extend between the short sides or between both the short sides and the long sides, so as to form a grating. The walls 14 can be obtained in different ways. Thus, for example, the pad may first be manufactured with the walls 14, whereupon the space between the walls is filled with capillary-active material. It

is also conceivable to manufacture the pad 10 in one working operation by also making the walls 14 from the capillary-active material, however giving them in a suitable manner during the manufacturing process a higher density than the intermediate material so that they become more rigid than this latter material. If the capillary-active material consists of thermoplastic, it is possible, by means suitably shaped, to provide e.g. tubular or hourglass-shaped formations oriented with their longitudinal direction at right angles to the flat sides of the pad 10 and having a wall of increased rigidity, counteracting and distributing the forces exerted on the outer side of the dressing. The stiffening walls 14 may also form an oblique angle or a latticework with the perforated portion 12.

According to Fig. 4, the layer of stiffening elements need not extend between the flat sides of the pad, but may consist of a thinner layer of elements 17 which, as shown in the Figure, may be disposed centrally in the pad and have capillary-active material between it and the flat sides of the pad, but which may also be located adjacent e.g. the outwardly facing side thereof, with capillary-active material filling the space between the layer of stiffening elements and the inwardly facing side of the pad.

Instead of the above-mentioned formations, the pad may be provided with cushions 18 extending between the opposite flat side surfaces of the pad. These cushions 18 may be made from a sheeting material and be filled with air or elastic material.

The stiffening elements need not necessarily be provided in the pad, but may instead be connected to the sheeting, which may be achieved e.g. by embossing the sheeting in a suitable manner. For joining the sheeting 11 to the pad, the elements are pressed down into the pad, yielding an arrangement which resembles that shown in Fig. 5.

In certain applications, it may be suitable to use a thicker and optionally also reinforced sheeting 19 on one or both of the opposite flat sides of the pad. Such a stronger sheeting is suitably used when the dressing may be expected to be subjected to substantial stress. Instead of a sheeting, it is possible to use a foam material with closed cells.

Although the volume of fluid which can thus be taken up by the pad is limited by the existing volume of air, the capillary-active component makes it possible for the pad to take up even more fluid. When, in the use of the dressing, fluid is taken up in the pad, an excess pressure is produced therein, which is however equalised if the sheeting is vapour-permeable. Thanks to the arrangement of stiffening means, it is possible to accurately determine the amount of fluid that can be absorbed, and the dressing is chosen according to the nature of the wound. Thus, if considerable amounts of fluid are expected, a dressing with an extra thick pad is chosen. As pointed out above, the stiffening elements 14, 17 and 18 also ensure that the wound is protected against stress, such as shocks, to which the dressing may unintentionally be subjected. A further advantage of the dressing is that the absorbed fluid is collected in the pocket 16 formed by folding the sheeting around the edges of the pad, as shown in Fig. 3. Thus, the fluid will not tend to leak out between the sheeting and the underlying skin 15 if the dressing is oriented as shown in Fig. 3.

To protect the wound and distribute the forces exerted on the dressing, the stiffening elements may be joined to each other in their ends adjacent the wound, by means of intermediate arms or formations which between them and the ends of the elements define liquid-permeable (capillary) openings.

The dressing according to the invention is useful for both open wounds and surgical wounds. The pad may be impregnated with healing agents, and the dressing

may also be provided with inlets and/or outlets, preferably both, for circulation of treatment liquid (flush dressings), as described in Swedish Patent 8008971-9. Moreover, the dressing can be used as a protective dressing of the design shown in Fig. 1, but in such a case the perforated portion preferably consists of a plurality of micropores in the area which in Fig. 1 is occupied by the single, large hole in the sheeting 11.

The pad may have hydrophobic or hydrophilic properties, optionally alternating in different layers. The surface may be heparinised or provided with a bactericide.

CLAIMS

1. A dressing with a pad (10) consisting of a flexible capillary-active material to be applied to a wound, c h a r a c t e r i s e d in that it has elements of a given rigidity and length orthogonally to the flat side of the pad to be applied to the wound, said elements being adapted both to stabilise the volume of the pad so as to give it a predeterminable liquid-absorbing volume, and to counteract and distribute the forces directed against the pad.

2. Dressing as claimed in claim 1, c h a r a c t e r i s e d in that the elements are connected to each other in their ends facing the wound, by means of arms or formations extending parallel to the flat side of the pad to be applied to the wound, liquid-permeable openings being defined between said arms or formations and said element ends.

3. Dressing as claimed in claim 1 or 2, c h a r a c t e r i s e d in that the opposite flat sides of the pad are coated with a sheeting (11) or film of plastic or the like, said sheeting having on the flat side facing the wound a perforated portion to be applied against the wound and, provided around said perforated portion, a coating adhesive to the skin, and said sheeting extending as a single piece from the flat side of the pad facing away from the wound, around all edges (20) of the pad and a predetermined distance from said edges to said perforated portion (12).

4. Dressing as claimed in claim 1, 2 or 3, c h a r a c t e r i s e d in that the stiffening elements (14, 17, 18) are integrally formed with the pad (10) and consist of formations therein having increased compressive strength.

5. Dressing as claimed in claim 1, 2 or 3, c h a r a c t e r i s e d in that the stiffening elements

consist of generally hourglass-shaped cells in the pad (10).

6. Dressing as claimed in any one of claims 1-4, c h a r a c t e r i s e d in that the stiffening elements (14) consist of walls extending between the opposite flat sides of the pad (10).

7. Dressing as claimed in any one of claims 1-5, c h a r a c t e r i s e d in that the stiffening elements (17) are arranged in a separate layer between the flat sides of the pad and that a capillary-active material is arranged between this layer and one or both flat sides of the pad (10).

8. Dressing as claimed in claim 1 or 2, c h a r a c t e r i s e d in that the stiffening elements (18) consist of cushions having a plastic cover and containing air or elastic material.

9. Dressing as claimed in claim 1, 2 or 3, c h a r a c t e r i s e d in that the stiffening elements (17) are integrally formed with the sheeting (11), for instance as embossments, and extend into the pad (10).

10. Dressing as claimed in any one of the preceding claims, c h a r a c t e r i s e d in that the perforated portion (12) consists of a single, large hole.

11. Dressing as claimed in any one of claims 1-7, c h a r a c t e r i s e d in that the perforated portion (12) has a large number of holes.

12. Dressing as claimed in any one of the preceding claims, c h a r a c t e r i s e d in that the thickness of the pad (10) decreases towards the pad edges (20).

13. Dressing as claimed in any one of claims 3-12, c h a r a c t e r i s e d in that liquid inlets and/or liquid outlets are arranged in the sheeting or film on the side of the pad facing away from the wound or on the edge sides of the pad.

AMENDED CLAIMS

[received by the International Bureau on 3 April 1989 (03.04.89)
original claim 7 cancelled; original claims 8-13 renumbered as claims 7-12
wherein claim 8 is amended; original claim 4 amended (2 pages)]

1. A dressing with a pad (10) consisting of a flexible capillary-active material to be applied to a wound, c h a r a c t e r i s e d in that it has elements of a given rigidity and length orthogonally to the flat side of the pad to be applied to the wound, said elements being adapted both to stabilise the volume of the pad so as to give it a predeterminable liquid-absorbing volume, and to counteract and distribute the forces directed against the pad.

2. Dressing as claimed in claim 1, c h a r a c t e r i s e d in that the elements are connected to each other in their ends facing the wound, by means of arms or formations extending parallel to the flat side of the pad to be applied to the wound, liquid-permeable openings being defined between said arms or formations and said element ends.

3. Dressing as claimed in claim 1 or 2, c h a r a c t e r i s e d in that the opposite flat sides of the pad are coated with a sheeting (11) or film of plastic or the like, said sheeting having on the flat side facing the wound a perforated portion to be applied against the wound and, provided around said perforated portion, a coating adhesive to the skin, and said sheeting extending as a single piece from the flat side of the pad facing away from the wound, around all edges (20) of the pad and a predetermined distance from said edges to said perforated portion (12).

4. Dressing as claimed in claim 1, 2 or 3, c h a r a c t e r i s e d in that the stiffening elements (14, 18) are integrally formed with the pad (10) and consist of formations therein having increased compressive strength.

5. Dressing as claimed in claim 1, 2 or 3, c h a r a c t e r i s e d in that the stiffening elements

consist of generally hourglass-shaped cells in the pad (10).

6. Dressing as claimed in any one of claims 1-4, c h a r a c t e r i s e d in that the stiffening elements (14) consist of walls extending between the opposite flat sides of the pad (10).

7. Dressing as claimed in claim 1 or 2, c h a r a c t e r i s e d in that the stiffening elements (18) consist of cushions having a plastic cover and containing air or elastic material.

8. Dressing as claimed in claim 1, 2 or 3, c h a r a c t e r i s e d in that the stiffening elements (14, 18) are integrally formed with the sheeting (11), for instance as embossments, and extend into the pad (10).

9. Dressing as claimed in any one of the preceding claims, c h a r a c t e r i s e d in that the perforated portion (12) consists of a single, large hole.

10. Dressing as claimed in any one of claims 1-6, c h a r a c t e r i s e d in that the perforated portion (12) has a large number of holes.

11. Dressing as claimed in any one of the preceding claims, c h a r a c t e r i s e d in that the thickness of the pad (10) decreases towards the pad edges (20).

12. Dressing as claimed in any one of claims 3-11, c h a r a c t e r i s e d in that liquid inlets and/or liquid outlets are arranged in the sheeting or film on the side of the pad facing away from the wound or on the edge sides of the pad.

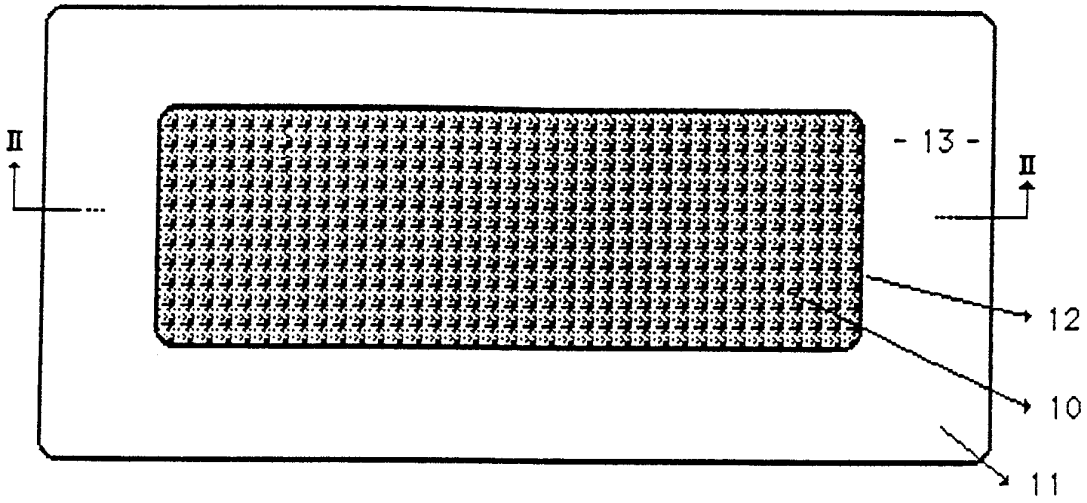

Fig. 1

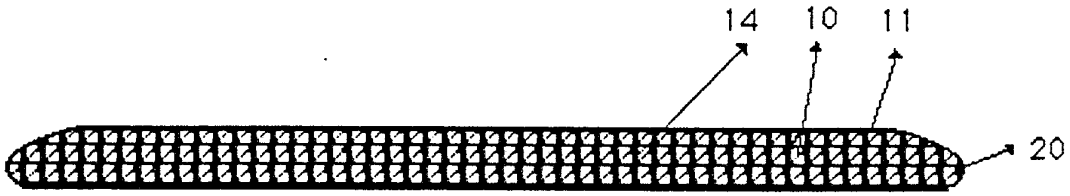

Fig. 2

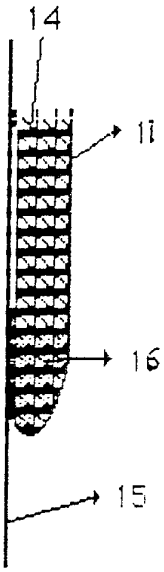

Fig. 3

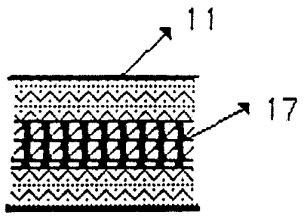

Fig. 4

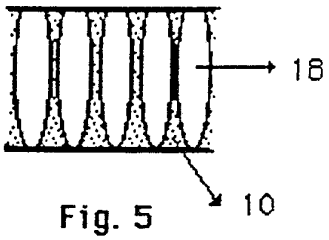

Fig. 5

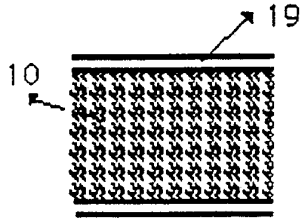

Fig. 6

INTERNATIONAL SEARCH REPORT

International Application No PCT/SE88/00660

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [6]

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

A 61 F 13/00

II. FIELDS SEARCHED

Minimum Documentation Searched [7]

Classification System	Classification Symbols
IPC 4	A 61 F

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched [8]

SE, NO, DK, FI classes as above.

III. DOCUMENTS CONSIDERED TO BE RELEVANT [9]

Category *	Citation of Document, [11] with indication, where appropriate, of the relevant passages [12]	Relevant to Claim No. [13]
X	EP, A2, 40 084 (THE PROCTER & GAMBLE COMPANY) 18 November 1981 & US, 4323069 JP, 57089861 CA, 1150904	1
X	US, A, 4 643 727 (R. J. ROSENBAUM) 17 February 1987 & WO, 86/03964 EP, 0208733 JP,T, 62501964 US, 4723953	1
X	FR, A, 2 218 079 (THE PROCTER & GAMBLE COMPANY) 13 September 1974 & NL, 7401998 DE, 2406525 BE, 811067 GB, 1457348 US, 3989867 CA, 1001831 CH, 586520 .../...	1

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IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
1989-01-13	1989 -02- 01
International Searching Authority	**Signature of Authorized Officer**
Swedish Patent Office	Hans Christer Jönsson

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

Category *	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No
	AT, 347887 JP, 49111739 SE, 382411	
X	US, A, 3 929 135 (H. A. THOMPSON) 30 December 1975 & NL, 7514895 BE, 836857 FR, 2294656 DE, 2556501 LU, 74067 CH, 595830 GB, 1526778 AT, 351156 JP, 51108943 CA, 1058801 AT, 369238 SE, 7514345	1
A	US, A, 3 561 441 (V. J. LOMBARDI) 9 February 1971	1-14