

627018

APPLICATION FOR A STANDARD PATENT
OR A STANDARD PATENT OF ADDITION

Form 1
Regulation 9

I, DIETZEL GESELLSCHAFT M.B.H.
of Haideguerstrabe 3, 1111 Wien, AUSTRIA.

hereby apply for the grant of a ~~patent of addition~~ ^{standard patent} for an invention entitled "PIPE COUPLING"
~~XXXXXXXXXX~~

which is described in the accompanying ~~XXXXXXXXXX~~ ^{complete} specification.

*(To be included in the case of a Convention application)

Details of basic application(s) -

Number of basic application P.003814 120490

Name of Convention country in which basic application was filed

Date of basic application

*(To be included in the case of an application made by virtue of section 51)

Number of original application

Person by whom made

*(To be included in the case of an application for a patent of addition)

I request that the patent may be granted as a patent of addition to the patent applied for on Application

No. Patent No.

In the name of

I request that the term of the patent of addition be the same as that for the main invention or so much of

the patent for the main invention as is unexpired.

My address for service is KELVIN LORD & COMPANY, Patent & Trade Mark Attorneys,
4 Douro Place, West Perth, Western Australia, 6005, AUSTRALIA.

Dated this 12th day of APRIL 19 90

To :

THE COMMISSIONER OF PATENTS

Heidi W.
(Signature)
DIETZEL GESELLSCHAFT M.B.H.
By their Patent Attorneys
KELVIN LORD AND COMPANY
PERTH, WESTERN AUSTRALIA.

This form must be accompanied by either a provisional specification (Form 9 and true copy) or by a complete specification (Form 10 and true copy).

* These sections are to be completed only where applicable..

AUSTRALIA

Patents Act 1952

DECLARATION IN SUPPORT OF A CONVENTION OR NON-CONVENTION
APPLICATION FOR A PATENT OR PATENT OF ADDITION

In support of the application made by: DIETZEL GESELLSCHAFT
M.B.H.

For a patent for an invention entitled: "PIPE COUPLING".

I/WE: Dr. Ernst Pocksteiner, of A-1111 Vienna, 1. HaidequerstraBe
3, AUSTRIA.

do solemnly and sincerely declare as follows:-

1. I am/we are the applicant(s) for the patent, or am/are
authorised by the abovementioned applicant to make this
declaration on its behalf.

2. 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) namely:-

in on 19
by

3. The said basic application(s) was/were the first
application(s) made in a Convention country in respect
of the invention the subject of the application.

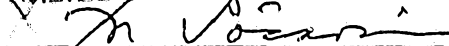
4. The actual inventor(s) of the said invention is/are:
Dr. Ernst Pocksteiner and Oswald Hofmann, both of
A-1111 Vienna, 1. HaidequerstraBe 3, Austria.

5. The facts upon which the applicant(s) is/are
entitled to make this application are as follows:-

The applicant would, if a Patent were granted upon
an application made by the said actual inventors,
be entitled to have the Patent assigned to it.

DECLARED at Vienna this 26th day of June 19 80

DIETZEL GESELLSCHAFT M.B.H.



Dr. Ernst Pocksteiner, A-1111 Vienna,
1. HaidequerstraBe 3

(12) PATENT ABRIDGMENT **(11) Document No. AU-B-53180/90**
(19) AUSTRALIAN PATENT OFFICE **(10) Acceptance No. 627018**

(54) Title
PIPE COUPLING

International Patent Classification(s)
(51)⁵ **F16L 021/04** **F16L 021/03**

(21) Application No. : **53180/90**

(22) Application Date : **12.04.90**

(43) Publication Date : **17.10.91**

(44) Publication Date of Accepted Application : **13.08.92**

(71) Applicant(s)
DIETZEL GESELLSCHAFT M.B.H.

(72) Inventor(s)
DR. ERNST POCKSTEINER; OSWALD HOFMANN

(74) Attorney or Agent
KELVIN LORD & COMPANY , 4 Douro Place, WEST PERTH WA 6005

(56) Prior Art Documents
AU 67721/81 F16L 21/02 21/04
AU 56436/80 F16L 21/04
GB 1574298

(57) Claim

1. A pipe coupling, 'preferably for pipes of plastics material or metal whereby an end of a pipe with a cylindrical external surface except for a tapered end is inserted into an end of another pipe expanded to a flange coupling and whereby this flange contains, at a distance from the end, a circumferential groove of varied depth which holds a sealing ring in the area of the groove only, with the internal surface of the flange being cylindrical except for the groove and the sealing ring having portions of varying thickness, whereby provision is made for a thicker portion of that sealing ring in the area closer to the end of the flange and whereby a sealing element which is thinner than that portion is joined to the thicker portion of that sealing ring characterised in that, in a coupling join, the cylindrical inside surface of the coupling flange has a constant diameter on either side of the groove and in that an inserted pipe has, at least over the full length of the coupling join, except for the tapered end, a constant outside diameter that

(11) AU-B-53180/90
(10) 627018

-2-

is smaller than the inside diameter of the coupling flange and in that, where the axis of the flange and the axis of the inserted pipe are coincident, provision is made for a constant clearance between even when the pipes are joined an outside diameter of the pipe (2) and the inside diameter of the flange on both sides of the groove, except for a flange neck and the tapered end (10) of the pipe (2), whereby the thinner portion of the sealing ring is already shaped to parallel, in general, the axis prior to the insertion of the sealing ring in the pipe coupling.

AUSTRALIA
PATENTS ACT 1952

COMPLETE SPECIFICATION
(ORIGINAL)

FOR OFFICE USE:

Application Number:
Lodged:

Class

Int. Class

Complete Specification Lodged:
Accepted:
Published:

627018

• Priority:

• • • • •

• Related Art:

• • • • •

• • • • •

Name of Applicant(s): DIETZEL GESELLSCHAFT M.B.H.

• • • • •

• • • • •

Address of Applicant(s): Haidequerstrabe 3
1111 Wien
AUSTRIA

• • • • •

• Actual Inventor(s):

• • • • •

Address for Service: Kelvin Lord & Co.,
4 Douro Place,
WEST PERTH,
Western Australia 6005.

Complete Specification for the invention entitled:

"PIPE COUPLING"

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

PIPE COUPLING

5 The invention relates to a pipe coupling, specifically a plug join, preferably for plastic or metal piping whereby the end of one pipe with a cylindrical external surface except for a tapered end is inserted into the end of another pipe expanded to a flange coupling and whereby this flange contains, at a distance from the end, a circumferential groove of varied depth which holds the sealing ring in the area of the groove only, with the internal surface of the flange being cylindrical except for the groove and the sealing ring having portions of varying thickness, whereby provision is made for a thicker portion of that sealing ring in the area closer to the end of the flange and whereby at least one sealing element which is thinner than that portion is joined to the thicker portion of that sealing ring.

10 The purpose of the invention is to ensure a tight coupling of pipes together with easily obtained manufacturing tolerances and fitting requirements that can be adapted to on-site conditions. At the same time, it aims to make possible a reduction in the prestressing of the sealing element and/or sealing ring, whereby fitting is simplified. It is also intended to simplify the manufacturing process.

25 This requirement is not fulfilled in a satisfactory manner by the ^{known} plug joins, ~~as described in AT-PS 430 723~~, the reason for this being that, on the one hand, the length of the sealing ring is relatively limited and, on the other hand, in particular, the inside surface of the flange between the sealing ring and the neck of the flange is tapered. Consequently, problems arise during laying of pipes, especially where it proves difficult to line-up more or less exactly the axes of the flange and of the pipe to be inserted. Additionally, the manufacturing of the tapered inside surface of the flange and the subsequently required exact fit at the neck of the flange constitutes a considerable increase in cost and effort.

35 Further, known constructions do not ~~Even the construction as described in AT-PS 366 210 does not~~ provide a satisfactory solution mainly due to the shape of the



seal and of the corresponding groove. Although there is a relatively long sealing ring which consists of a thicker portion connected to a thinner one, the thicker portion has, in particular on the side of the flange neck, a relatively flat edge, which may have an adverse effect on how that part of the sealing ring fits into the flange groove provided. In addition, this part of the sealing ring has a shortened side on the portion facing the flange end so that foreign bodies can easily enter the seal when a pipe is inserted, which affects the efficient functioning of the seal. Furthermore, the thinner portion of the seal tapers off like a funnel in the direction of the pipe's insertion into the flange and has a conically flared lip which adjoins the surface of the flange groove whilst unconnected. When the pipe is inserted into the coupling and/or seal, a strong resistance must be overcome as the seal must expand considerably.

The invention helps to avoid, to the greatest possible extent, the disadvantages and/or difficulties as described and, at the same time, serves the purposes as outlined initially to a large extent in that, in the case of pipe couplings as described at the outset, the inside diameters of the flange in the area of the coupling are identical on both sides of the groove, and in that, at least in the area of the coupling, the constant outside diameter of the inserted pipe is, along its full length and except for the tapered end, smaller than the inside diameter of the flange, and in that, when the axes of the flange and of the inserted pipe are coincident, provision is made for equal clearance on either side of the groove, even when the pipes are joined, between the outside surface of the pipe and the inside surface of the flange except for the area of the flange neck and the tapered end of the pipe, whereby the thinner portion of the seal shows, even prior to the fitting of the seal into the pipe coupling, a shape generally paralleling the axis. The play and/or clearance in the coupling area between the inside surface of the flange and the outside surface of the inserted pipe exists even if extreme manufacturing tolerances occur and/or are permitted, i.e. if the smallest inside diameter of the flange and the greatest outside diameter of the inserted pipe

come together and/or exist during the manufacturing of the above-mentioned parts of a pipe coupling. The clearance as mentioned, combined with the design of the seal, facilitates the fitting of pipe couplings to a large extent, in particular since the coupling is made possible even where curved pipes are laid. This is due to the clearance permitting variations between the axes of the flange and the pipe, and/or angular movement between the flange and the inserted pipe, whereby the inventive design of the seal not only facilitates pipe insertion but also ensures the necessary sealing function. According to the invention, the desired clearance is guaranteed in particular where the inside diameter of the flange on both sides of the groove and the outside diameter of the inserted pipe show a ratio of approx. 11.1:11 (i.e. where these diameters are, for instance, 111 mm and 110 mm respectively. Further advantages result during the manufacturing of pipe couplings and/or during pipe laying, including, in particular, a satisfactory guiding of the pipe end during insertion, if the sealing ring (consisting of a thinner seal portion shaped to parallel the axis and an attached thicker portion with steep sides, especially with a trapezoidal profile) and the flange groove receiving the sealing ring (having a profile with steep sides, in particular trapezoidal sides in the area of the groove) are situated closer to the end of the flange than to the neck of the flange, whereby the distances show a ratio of preferably 50:80 and amount to approx. 50 to 80 mm for a total length of the sealing ring and/or the flange groove of approx. 37.5 mm and/or 46 mm.



In accordance with a further design of the invention, an annular reinforcement is positioned transversely on the inside surface, and in particular on the centre of that inside surface, of the thicker portion of the sealing ring which is attached to the thinner portion of the sealing ring paralleling the axis. Thus the sealing effect is improved and the introduction of foreign bodies reduced. The exclusion of foreign bodies when inserting the pipe is improved, in particular where the sides of the thicker portion of the sealing ring attached to the thinner portion of the sealing ring paralleling the axis and/or the sides of the deeper part of the groove, especially the trapezoidal sides and above all the sides facing the end of the flange, form an angle of 15 to 25 degrees, and preferably of 20 degrees, with transversal planes. The guiding and/or sealing effects are particularly favourable where the ratio of the length of the sealing ring, including the thinner portion of the sealing ring paralleling the axis, to the pipe diameter is not less than 0.2:1 and not greater than 0.8:1.

In order to ensure high reliability of operation and a long period of operation, it is advisable to select a Shore hardness of between 40⁺-5 and 56⁺-5 Shore A for the sealing ring and the attached thinner portion of the seal paralleling the axis whereby the material of the ring should preferably consist of elastomers, copolymers, age hardening and/or thermoplastic elastoplastics and polyethylene, for example, rubber. The enhanced sealing effect is reinforced in particular where the thinner portion of the sealing ring almost parallels the axis and/or is shaped cylindrically with



an undulating profile of approx. constant thickness whereby provision is made for, preferably, at least two undulations per sealing ring and, advisably, for the end of a series of undulations, normally three, pointing inwards, and/or where

5 the thinner portion of the sealing ring is shaped cylindrically and/or to parallel the axis with provision for two or more annular sealing ribs on the inside surface whereby it is preferable that, in addition, annular sealing ribs exist on the outside of the cylindrical surface

10 staggered axially in relation to the inside sealing ribs. On insertion of the pipe, a good sealing effect can be obtained where the inside diameter of all sealing ribs and/or all undulations pointing inwards are approx. identical and/or where the outside diameters of all sealing ribs and/or of all

15 undulations pointing outwards are approx. identical and/or where the inside diameter of the thinner portion of the sealing ring and/or its inner ribs and/or its sealing undulations pointing inwards is smaller than the inside diameter of the thicker portion of the sealing ring, in

20 particular at the side facing the end of the flange and/or the annular reinforcement in the centre of the inside surface, in a ratio of preferably 10.5:10.9, which, for instance, amounts to 105 mm and 109 mm respectively where the reinforced portion of the sealing ring is 15.5 mm thick.

25 Effective elasticity and weight can be produced if the thicker portion of the sealing ring which is attached to the thinner portion of the sealing ring, in particular the part of the sealing ring with a trapezoidal profile, is hollowed out on the inside surface between the sides and the annular



reinforcement. When inserting the pipe into the flange, pipe guiding is improved where, for example, the ratio of the length of the cylindrical inside surface from the end of the flange to the sealing expansion to the diameter of the

5 tapered pipe end is 0.2:1, especially 0.4:1. The introduction of foreign bodies is avoided in particular where the side of the reinforced portion of the sealing ring facing the end of the flange protrudes inwards and/or is longer than the side of the flange groove seating that portion of the
10 sealing ring and making contact when the pipes are connected, and preferably even longer than the side of the flange.

The diagram shows different versions of the invention. Fig. 1 illustrates both an axial section and a top view of a pipe coupling, Fig. 2 a detail thereof, i.e. a cross-section of
15 the sealing area, and Figs. 3 and 3a a cross-section of the sealing ring, whereby Figs. 2 and 3 are drawn on a larger scale than Fig. 1 Figs. 4 to 24 illustrate partial axial views of sealing rings than can be used, and Fig. 25 shows the axial section and a top view of another version of the
20 pipe coupling, whereby the portion of the flange between the groove of the sealing ring and the end of the flange is extended compared with Fig. 1.

In the following, parts which are identical and/or similar and/or of similar function, are attributed identical

25 reference numbers. According to Figs. 1, 2 and 25, the pipe coupling consists of the tapered end 1 of pipe 2 and of the flanged end 3 of pipe 4. At a certain distance from the end, the flange 3 contains a circumferential groove 6 which seats the sealing ring 5.



As can be seen from 7 and 8, this groove is of varying depth; see Fig. 2 in particular. The pipes may be made from plastics, e.g. polyvinyl chloride, polyethylene, polypropene, plexiglas, polymethacrylate, polyphenylene oxide,

5 polyphenylene ether and/or polycarbonate, or of reinforced and/or fibre-reinforced and/or glass fibre-reinforced plastics. Metals, such as steel, cast iron, alloy steel, and also non-ferrous metals such as aluminium and copper are suitable as well. The pipe couplings and seals as described
10 may also be used for piping made from stoneware, fibre, in particular asbestos cement and reinforced and non-reinforced concrete. The seals may be made from elastomers, which may be thermoplastic and/or age hardening, or rubber and/or other elastoplastics and similar materials, with copolymers,
15 polyethylene etc. also being suitable. The pipe coupling as described may be used not only for piping with straight surfaces but also for pipes with a profile, especially corrugated pipes.

The outside surface 9 of the pipe 2 is always cylindrical
20 except for the tapered end 10. Portions 11 and 12 on either side of the groove 6 of the inside surface of the flange 3 are cylindrical, and have an identical diameter and/or identical inner diameter except for the neck 13 of the flange. There is a clearance between the above-mentioned
25 outside surface 9 and the inside surface of portions 11 and 12, which is constant from the end of the flange to the groove 6 edge facing 14 the end of the flange and from the groove 6 edge furthest away 15 from the end of the flange to the beginning 16 of the narrowing of the flange neck 13



and/or to the beginning 17 of the tapered end 10 of the
inserted pipe 2 where the axes of the pipe and of the flange
are coincident. Consequently, the outside diameter of the
inserted pipe 2 could be, for example, 110 mm, at least in
5 the area of the pipe coupling, with the inside diameter of
the flange being 111 mm in the areas 11 and 12. This play
and/or clearance between the inside surface of the flange and
the outside surface of the inserted pipe in the area of the
coupling exists even where extreme manufacturing and/or
10 production tolerances exist and/or are permitted, i.e. where
the smallest possible diameter of an inside flange surface is
present and/or comes together with the greatest possible
outside diameter of an inserted pipe during the manufacturing
of the above-mentioned parts of a pipe coupling. The base of
15 the groove 6, i.e in this case of groove portions 7 and 8, is
also

20

25



5 cylindrical and has a diameter of, for example, 115 mm in portion 8 and of 124.6 mm in portion 7. The base of these groove portions may also be of concave or convex shape (when shown in cross-section). In general, the preferred ratio of the outside diameter of the inserted pipe 1, 2 to the inside diameter of flange portions 11 and 12 is approx. and/or exactly 110.:111 and 11.0:11.1 respectively.

10 The sealing ring 5 has a thicker portion 18 the profile 19 of which shows steep sides 20,21 and, in the present case, an almost trapezoidal shape (Figs. 1,3). Portion 7 of the flange groove 6 has equally steep sides 22,23 and also a trapezoidal shape whereby the shape of the sealing ring and that of the groove are made to fit each other in the area of the thicker portion 18 of the sealing ring whilst taking into consideration any deformation due to usage.

15
20 The thicker portion 18, 19 of the sealing ring 5 is attached to a relatively thinner portion 24 of the sealing ring shaped cylindrically with an undulating profile and paralleling the axis of the flange. The profile of these undulations is approx. level and/or of constant height. Provision is made for three undulations whereby the undulation 25, which is furthest away from the thicker portion of the sealing ring 18,19, ends in a partial undulation 26 turned inwards (Figs. 2,3,3a).

25
30
35 As can be seen from Figs. 2 and 3, the side 20, 22 facing the end of the flange and pertaining to the thicker portion 18,19 of the sealing ring and/or the groove 7 seating that portion is longer than the adjoining inside surface 27 of this portion of the sealing ring and/or the side 21 to which the thinner sealing element 24, approx. paralleling the axis, is attached. It is thus possible that even after installation of the sealing ring 5 in the flange groove and/or flange expansion provided for that purpose and/or after coupling the pipes, the side facing the end of the flange 20 of the thicker portion of the sealing ring 18, 19 may protrude, at point 30, inwards and/or in the direction of the ring and/or pipe and/or flange axes, not only past the inside surface 27 of this portion of

the sealing ring, but also past the inside edge 28 of the adjoining side 22 of the receiving groove (Figs. 2,3). Additionally, provision is made for an annular reinforcement 29 in the centre of the thicker trapezoidal portion 18,19 of the sealing element in order to achieve an additional sealing effect.

Sides 20, 21 of the thicker portion 18,19 of the sealing ring and/or sides 22, 23 of portion 7 of the groove 6 with a greater depth and/or the sides of the trapezoidal portion, form an angle α of approx. 20 degrees with transversal planes (Figs. 2, 3). Angles α of 15 and 25 degrees are possible.

As illustrated in Fig. 1, the groove 6 for the sealing ring 5 is preferably situated closer to the end of the flange, i.e. here at a distance of approx. 50 mm from the end of the flange and at a greater distance, here of approx. 80 mm, from the neck of the flange 13.

As a result of the design of the sealing ring as illustrated and its positioning in the pipe flange and/or the pipe coupling as shown, an excellent sealing effect is achieved in the area of the pipe coupling. This is valid for all types of substances which these pipes are intended to carry and/or to transport, i.e. liquids, in particular water, as well as gases, in particular air. This is equally valid for low pressure and/or vacuum pipes. These pipes may be feed pipes or outlet pipes, drains and/or ducts for chemicals and/or sewerage. In practice, a complete and/or at least almost complete sealing effect can be obtained in the area of the pipe coupling.

As shown in the above-mentioned diagram, the annular multifunctional sealing element 5 consists of a scraper lip and/or cleaner lip 30, a primary dirt collector 31 (Fig. 3), a reinforcement and sealing lip 29 as previously mentioned, a second dirt collector 32 and four additional sealing lips 33, 34, 35 and 26. Due to its specific shape, the sealing element 5 with its trapezoidal sides 20,21 in the first third, whereby the side 20 is extended thus becoming a scraper lip 30, is

firmly seated in a matching groove 6, particularly in the presence of considerable friction affecting these sides. The undulations and/or ribs 33, 34 and 35 have approx. the same inside diameter. All undulations as illustrated also have approx. the same outside diameter.

First, the scraper lip cleans all dirt such as soil, sand or small stones from the inserted pipe 2 and/or its tapered end 1. This dirt is deposited in the cavity formed at the frontal side 20 by the clearance between the outside surface 9 of the pipe 2 and the inside surface 11 of the flange 3. When the pipe 2 is inserted further, the tapered end 1 pushes across the sealing and reinforcement ring 29 positioned in the centre of the trapezoidal first third portion of the sealing element 5 and drives it and/or the thicker portion 18,19 of the sealing ring into the groove 6, 7, 8 provided in the flange 3 and/or in particular against the trapezoidal sides 22, 23 (side angle α between 15 and 25 degrees) of the flange 3. As a result, it is practically impossible for it to slip out, as can occur with existing systems, and gluing is not necessary.

In order to achieve a concentric insertion of the pipe 2, and/or of its tapered end 1, into the sealing element and/or the sealing ring 5, and to avoid damaging the seal due to a short pipe guide as happens repeatedly otherwise, the flange portion in front of the element forms in this case a so-called "long flange" (guide length) whereby the ratio of the outside diameter of the pipe to the guide length may be, for instance, 0.2 but above all not less than 0.4 and not greater than 1.0.

On continuing the coupling of the pipes, the inserted pipe subsequently reaches the second sealing lip 33 (should there still be any dirt on the pipe, it is deposited in the second cavity 32 in front of that lip) and stretches portion 24, which has three additional sealing lips and an undulating surface, in an axial direction towards the neck of the flange 13, whereby the remaining sealing lips are pressed against the pipe 2.



This specific design of the multifunctional sealing element and/or sealing ring 5 permits a greater clearance than usual between the outside diameter of the pipe and the inside diameter of the flange, whereby possible manufacturing tolerances are achieved without any problem and whereby the prestressing of the sealing element with regard to the pipe 2 to be inserted may be reduced so that fitting is simple and easy and can be performed manually without using any tools or equipment. Furthermore, the flange area can be made completely cylindrical, whereby the manufacturing process and the toolmaking is simplified to a large extent and costs are greatly reduced. Additionally, the broad and/or long shape of the seal together with a greater clearance and numerous (here a total of 5) sealing lips facilitate a greater flexibility of the flange connexion despite an optimum sealing effect, which is of particular advantage where a shift in the central axis of the pipes that are to be connected cannot be avoided on site due to different levels at the bottom of the ditch and/or due to a curved laying of pipes which may be possible with certain materials. In order to obtain this effect to the greatest possible extent, the preferable ratio of the pipe diameter d to the length l of the sealing element is not less than $1:0.2$ and should not exceed $1:0.8$ for economic reasons. Another important factor is the Shore hardness of the sealing element, which should be not less than 40^{+5} and not greater than 56^{+5} Shore A.

As far as pressure, outflow and drain pipes are concerned, i.e. systems with internal pressure, this pressure has an effect on the undulating second and third portion 24 of the sealing ring and/or sealing element 5 and pushes that portion towards the opening of the flange thereby creating a direct relation between pressure and tightness: the higher the pressure the tighter the pipe coupling.

Pressure on the outside caused by groundwater, as in the case of cable duct systems, is directed towards the scraper lip 30 and presses that lip against the pipe towards the neck 13 of the flange thereby becoming a sealing lip together

with sealing lips 29, 33, 34, 35 and 26. Consequently, six sealing lips effectively prevent the penetration of ground-water.

Figures 4 to 24 illustrate further versions of the sealing ring 5 that may be inserted into the pipe coupling as described above. The thinner portion of the seal is again designed for surfaces 36 that are cylindrical and/or paralleling the axis and carry ribs 37 on the inside (Fig. 5, Fig. 12, Fig. 16). The design may also call for ribs 38 on the outside surface (Fig. 4, Fig. 6, Fig. 7, Fig. 8, Fig. 9, Fig. 11, Fig. 14, Fig. 15, Fig. 17, Fig. 18, Fig. 19., Fig. 20, Fig. 22, Fig. 24) which may be staggered in relation to ribs 37 (Fig. 4, Fig. 6, Fig. 9, Fig. 15, Fig. 17, Fig. 20). For the majority of these sealing rings, the thicker portion 18 shows an approx. trapezoidal profile (Fig. 4 to 12, Figs. 14 to 24). In these designs, a further modification according to Figs. 15 to 24 consists in the hollowing out of the thicker portion 18 of the sealing ring with an approx. trapezoidal profile on the inside between its sides and the annular reinforcement 29 used again for this design, which may have a bearing on the elasticity and weight of the sealing ring. Fig. 13 illustrates a further version of the sealing ring with a thicker annular portion 39 the profile of which differs from the trapezoidal shape. We have here an almost circular profile with an extension 40 serving as a scraping and/or cleaning lip. This version again has a sealing ring with a thinner undulating portion 24. As shown in Figs 10 and 21, designs may also include angular shapes with a zig



zag profile instead of the undulations. The
above-mentioned ribs may be square, triangular or
semi-circular. It is preferable that the inside ribs 37 on
the thinner sealing element portion and/or its surface 36
5 be of identical inside diameter. The same applies to the
undulations. it is advisable that the ribs 38 on the
outside surface be of identical outside diameter.
Fig. 25 shows a further version of the invention, which
essentially resembles that of Figs. 1 to 3 whereby,
10 however, the flange groove 6 destined to seat the sealing
ring 5, as well as that sealing ring itself, are situated
at a greater distance from the end of the flange so that a
further improved guiding of the tapered end 1 is attained
when the pipe 2 is inserted in the flange 3 and/or seal 5.
15 The optimum ratio of the length of the

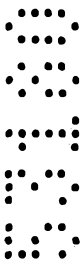
20

25

20
20
20
20



end portion of the flange in front of the seal to the diameter of the tapered end of the pipe is in general 0.2:1, and in particular at least 0.4:1. Again, provision is made for a constant clearance in the area of the pipe coupling between the outside surface 9 of the pipe and the inside surface of flange portions 11, 12. As a result, there is a greatly increased clearance in the area of the seal 5 due to the existing flange groove. As mentioned above, the ratio of the length of the sealing ring to the outside diameter of the pipe should be no greater than 0.8:1 and no less than 0.2:1.



The claims defining the invention are as follows:-

1. A pipe coupling, preferably for pipes of plastics material or metal whereby an end of a pipe with a cylindrical external surface except for a tapered end is inserted into an
5 end of another pipe expanded to a flange coupling and whereby this flange contains, at a distance from the end, a circumferential groove of varied depth which holds a sealing ring in the area of the groove only, with the internal surface of the flange being cylindrical except for the groove
10 and the sealing ring having portions of varying thickness, whereby provision is made for a thicker portion of that sealing ring in the area closer to the end of the flange and whereby a sealing element which is thinner than that portion is joined to the thicker portion of that sealing ring
15 characterised in that, in a coupling join, the cylindrical inside surface of the coupling flange has a constant diameter on either side of the groove and in that an inserted pipe has, at least over the full length of the coupling join, except for the tapered end, a constant outside diameter that
20 is smaller than the inside diameter of the coupling flange and in that, where the axis of the flange and the axis of the inserted pipe are coincident, provision is made for a constant clearance between even when the pipes are joined an outside diameter of the pipe (2) and the inside diameter of
25 the flange on both sides of the groove, except for a flange neck and the tapered end (10) of the pipe (2), whereby the thinner portion of the sealing ring is already shaped to parallel, in general, the axis prior to the insertion of the sealing ring in the pipe coupling.



2. A pipe coupling according to claim 1, characterised in that the ratio of the diameter of the inner surface of the coupling flange on both sides of the groove to the outside diameter of the inserted pipe is 11.1:11 (i.e. in that these diameters are, for example, 111 mm and 110 mm respectively).
3. A pipe coupling according to claim 1 or 2, characterised in that the sealing ring consisting of a thinner sealing ring portion parallel to the axis and a thicker portion with a profile of steep sides, preferably a trapezoidal profile attached to it, and in that the groove receiving the sealing ring and having a profile with steep, preferably substantially trapezoidal sides in the area of the groove portion, is placed at a shorter distance from the cylindrical end of the flange than from the neck of the flange whereby the ratio of these distances is preferably 50:80, i.e. approx. 50 mm:80 mm, with the total length of the sealing ring (5) and/or flange groove being approx. 37.5 mm and 46 mm respectively.
4. A pipe coupling according to any one of claims 1 to 3, characterised in that an annular transversal reinforcement is placed on the inside surface of the thicker portion of the sealing ring attached to the thinner portion of the sealing ring parallel to the axis, specifically at the centre of that inside surface.
5. A pipe coupling according to any one of claims 1 to 4, characterised in that the sides of the thicker portion of the sealing ring attached to the thinner portion of the sealing ring parallel to the axis and/or the sides of the groove portion with the greater depth, in particular the trapezoidal



sides and above all the sides facing the end of the flange, form an angle of 15 to 25 degrees, preferably 20 degrees with planes transversal to the axes of the pipes.

6. A pipe coupling according to any one of claims 1 to 5, characterised in that the ratio of the length of the sealing ring attached to the thinner portion of the sealing ring parallel to the axis to the diameter of the pipe is no less than 0.2:1 and not greater than 0.8:1.

7. A pipe coupling according to any one of claims 1 to 6, characterised in that the Shore hardness of the sealing ring attached to a thinner sealing ring portion parallel to the axis is between 40^{+5} and 56^{+5} Shore A whereby the ring material consists of, preferably, elastomers, copolymers, age hardening and/or thermoplastic elastoplastics, polyethylene, for example, rubber.

8. A pipe coupling according to any one of claims 1 to 8 characterised in that the thinner portion of the sealing ring is shaped cylindrically and generally parallel to the axis with an undulating profile of generally constant height whereby provision is made, preferably, for a minimum of two sealing ring undulations and whereby the end of the last of several undulations, specially of three, is turned inwards.

9. A pipe coupling according to any one of claims 1 to 8, characterised in that the surface of the thinner portion of the sealing ring generally parallel to the axis and/or is cylindrical with the provision for two or several annular sealing ribs whereby it is preferred that, additionally, the cylindrical outside surface is equipped with annular sealing ribs staggered axially in relation to the inside sealing



ribs.

10. A pipe coupling according to claim 8 or 9, characterised in that the inside diameters of all sealing ribs and/or of all undulations facing inwards are generally equal.

5 11. A pipe coupling according to any one of claims 8 to 10, characterised in that the outside diameters of all sealing ribs and/or of all undulations facing outwards are generally equal.

12. A pipe coupling according to any one of claims 8 to 11,
10 characterised in that the inside diameter of the thinner portion of the sealing ring and/or the inside ribs of that portion and/or the sealing undulations of that portion facing inwards is smaller than the inside diameter of the thicker portion of the sealing ring, in particular of the side of
15 that portion facing the end of the flange and/or of the annular reinforcement at the centre of the inside surface of that portion, with the ratio being, preferably, 10.5:10.9 which results in 105 mm and 109 mm respectively and the height of the thinner portion of the sealing ring being
20 15.5 mm.

13. A pipe coupling according to any one of the claims 1 to 12, characterised in that the thicker portion of the sealing ring attached to the thinner portion of the sealing ring, in particular the portion of the sealing ring with a trapezoidal
25 profile, is hollowed out on the inside surface between the sides and the annular reinforcement.

14. A pipe coupling according to any one of claims 1 to 13, characterised in that the ratio of the length of the cylindrical inside surface of the flange portion in front of

the flange groove to the diameter of the tapered end of the pipe is at least 0.2:1, in particular 0.4:1.

15. A pipe coupling according to any one of claims 1 to 14, characterised in that the side of the thicker portion of the sealing ring facing the end of the flange protrudes inwards and/or is longer than the side of the flange groove of the flange seating that portion of the sealing ring and making contact when the pipes are connected, and preferably even longer than the side of the flange.
- 10 16. A pipe coupling substantially as hereinbefore described with reference to Figure 1, 2 or 25 of the accompanying drawings.

15

DATED MAY 22 1992

DIETZEL GESELLSCHAFT M.B.H

By their Patent Attorneys

KELVIN LORD AND COMPANY

20

PERTH, WESTERN AUSTRALIA.

25

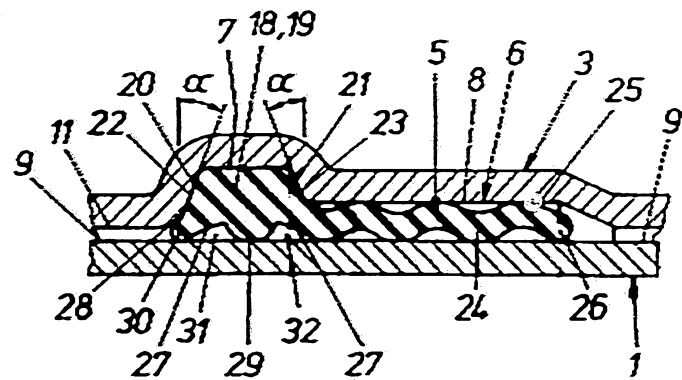
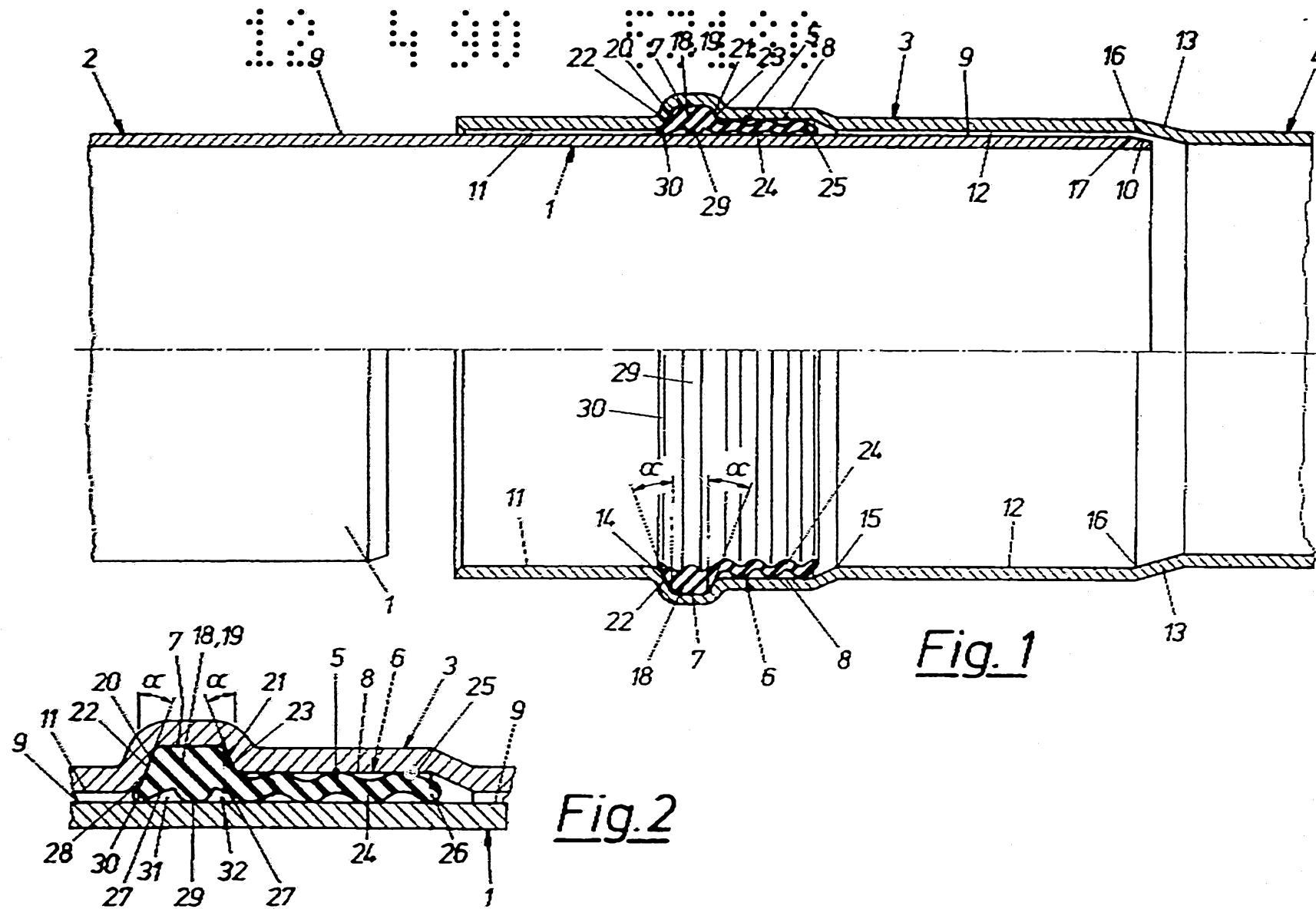
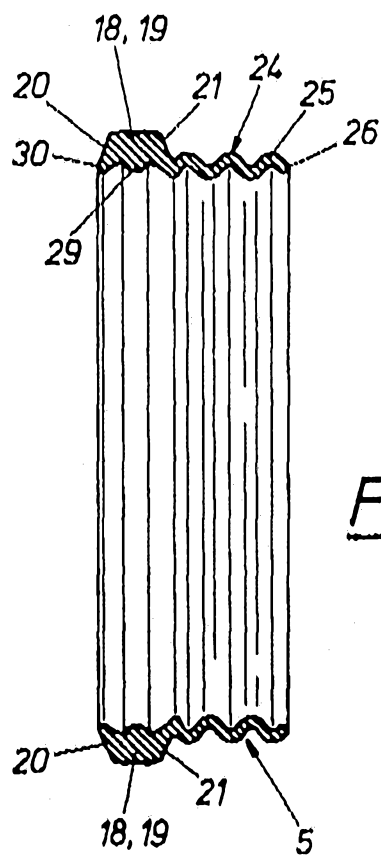
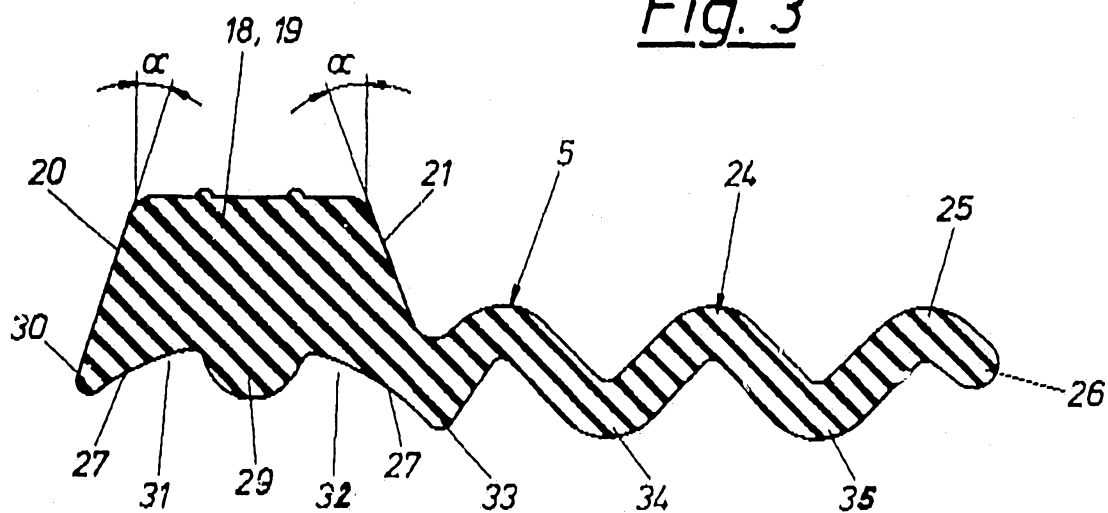


Fig. 3Fig. 3a

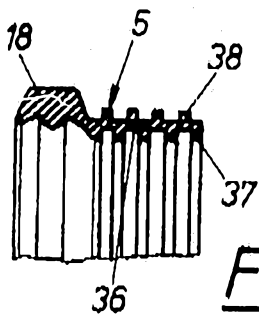


Fig. 4

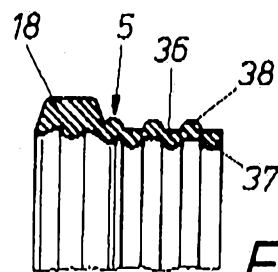


Fig. 9

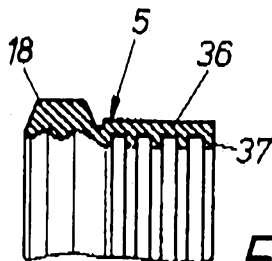


Fig. 5

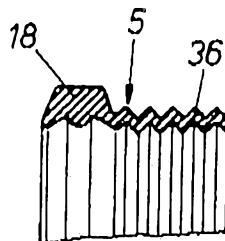


Fig. 10

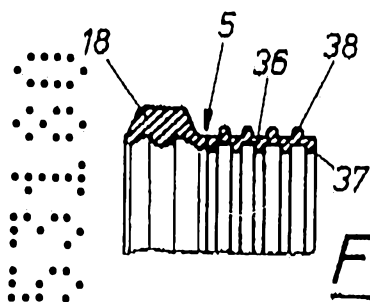


Fig. 6

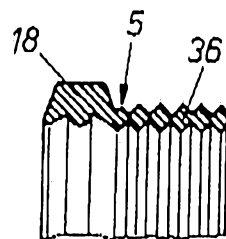


Fig. 11

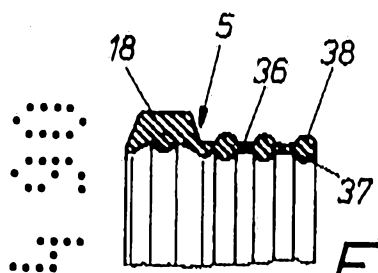


Fig. 7

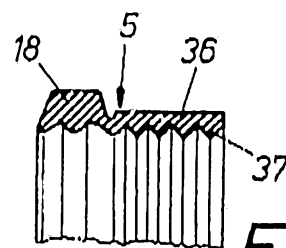


Fig. 12

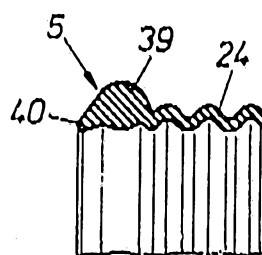


Fig. 13

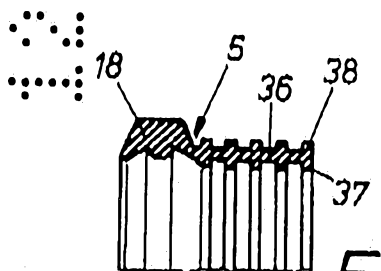


Fig. 8

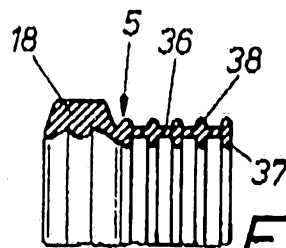
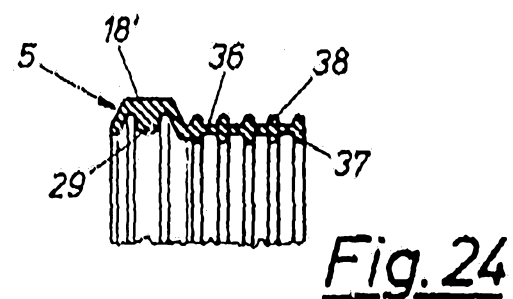
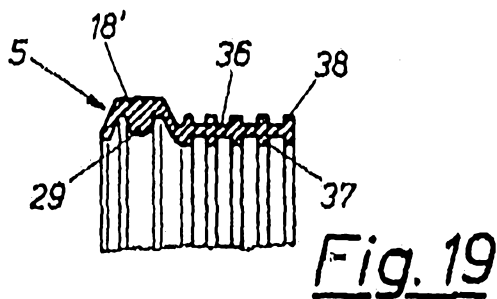
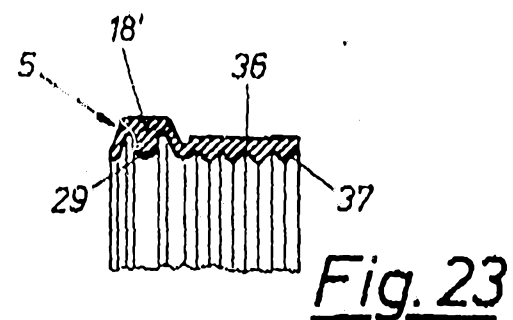
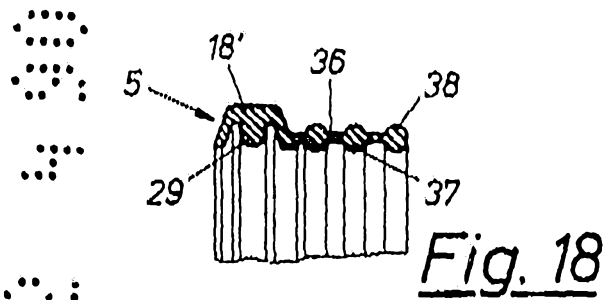
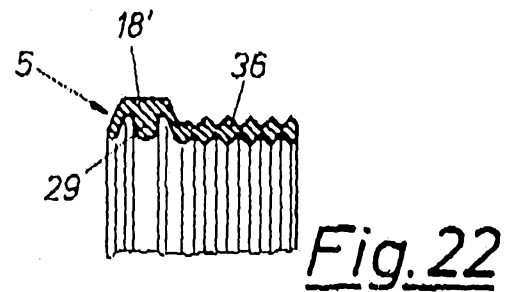
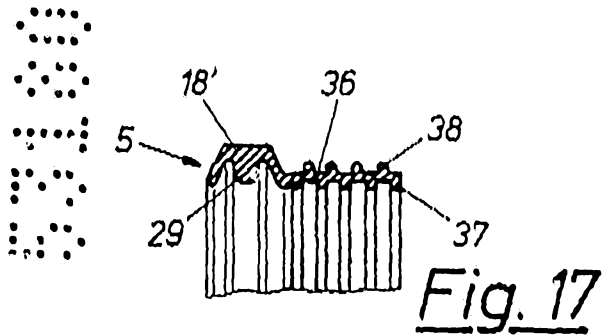
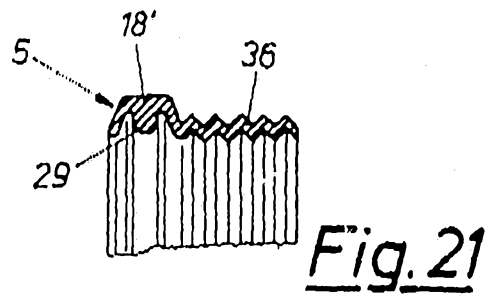
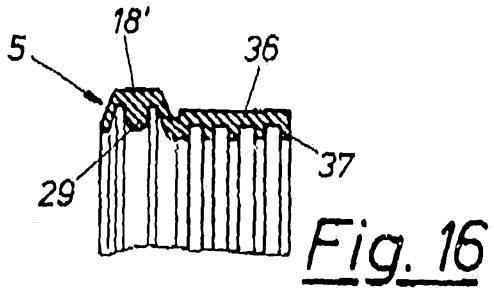
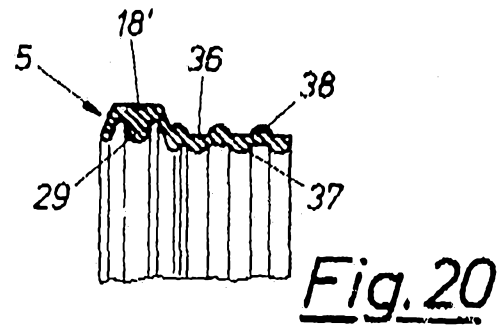
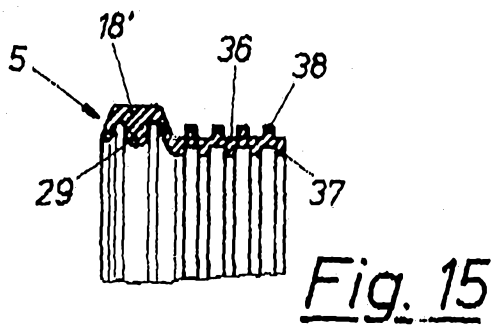


Fig. 14

53180/00



[illegible]