632190

COMMONWEALTH of AUSTRALIA
Patents Act 1952

APPLICATION FOR A STANDARD PATENT

I/We

Pont-a-Mousson S.A.

of

91 avenue de la Liberation, 54000 Nancy, France

hereby apply for the grant of a Standard Patent for an invention entitled:

Composite gasket for the locked assembly of spigot and socket pipes

which is described in the accompanying complete specification.

Details of basic application(s):-

Number	Convention Country	Date
8916524	France	11 December 1989

The address for service is care of DAVIES & COLLISON, Patent Attorneys, of 1 Little Collins Street, Melbourne, in the State of Victoria, Commonwealth of Australia.

DATED this TENTH day of DECEMBER 1990

To: THE COMMISSIONER OF PATENTS

.....
a member of the firm of
DAVIES & COLLISON for
and on behalf of the
applicant(s)

Davies & Collison, Melbourne

COMMONWEALTH OF AUSTRALIA

PATENTS ACT 1952–1973

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

Insert title of invention.

In support of the Application made for a patent for an invention entitled: "Composite gasket for the locked assembly of spigot and socket pipes"

Insert full name(s) and address(es) of declarant(s) being the applicant(s) or person(s) authorized to sign on behalf of an applicant company.

I/We Jean Sutter of
Pont-a-Mousson S.A.
of 91, avenue de la Liberation
54000 Nancy
France

do solemnly and sincerely declare as follows :–

Cross out whichever of paragraphs 1(a) or 1(b) does not apply

1(a) relates to application made by individual(s)
1(b) relates to application made by company; insert name of applicant company.

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

or (b) I am authorized by

Pont-a-Mousson S.A.

the applicant for the patent to make this declaration on its/their behalf.

Cross out whichever of paragraphs 2(a) or 2(b) does not apply

2(a) relates to application made by inventor(s)
2(b) relates to application made by company(s) or person(s) who are not inventor(s); insert full name(s) and address(es) of inventors.

2. (a) I am/We are the actual inventor(s) of the invention

or (b)
1. Jacques Demoisson of
10 bis, due de l'Eglise, 54700 Loisy
2. Michel Hussard of 47 bis, rue Alfred
Songeur Maidieres, 54700 Pont-a-Mousson
3. Alain Percebois of 6, rue Salvador Allende,
54700 Blenod les Pont-a-Mousson

All of France

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

State manner in which applicant(s) derive title from inventor(s)

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

Cross out paragraphs 3 and 4 for non-convention applications. For convention applications, insert basic country(s) followed by date(s) and basic applicant(s).

3. The basic application as defined by Section 141 of the Act was/were made

in France on the 11 December 1989
by Pont-a-Mousson S.A.
in ... on the ...
by ...
in ... on the ...
by ...

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

Insert place and date of signature.

Declared at Nancy, France this 6th day of December 1990

Signature of declarant(s) (no attestation required)

PONT-A-MOUSSON S.A. 54000 NANCY 91, Avenue de la Liberation

Jean SUTTER
Directeur des Sces Techniques

Note: Initial all alterations.

DAVIES & COLLISON, MELBOURNE and CANBERRA.

(12) PATENT ABRIDGMENT (11) Document No. AU-B-67895/90
(19) AUSTRALIAN PATENT OFFICE (10) Acceptance No. 632190

(54) Title
COMPOSITE GASKET FOR THE LOCKED ASSEMBLY OF SPIGOT AND SOCKET PIPES

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(56) Prior Art Documents
AU 603707 23346/88 F16L 21/02 F16L 21/08 F16J 15/12
GB 1550624

(57) Claim

1. A composite gasket for telescopically securing a first pipe having a socket to a second pipe having a spigot, said gasket adapted to be positioned within said socket to receive said spigot, and comprising:

a body portion;

an annular heel made of elastic material; and

a plurality of inserts made of a material having a greater hardness than said heel and being embedded in the annular heel along the generatrices of a cone having the same axis as the gasket, each insert having a distal end projecting from the gasket towards the axis of the latter, each insert being equipped with a nose at said distal end for catching on said spigot of said second pipe and means for pivoting each of said inserts about two pivot points while simultaneously bearing on said body portion of the gasket, during the insertion of the spigot in said gasket such that said gasket can receive and lock spigots having various diameters.

8. A locked telescopic sealing assembly between two pipes, the first having a socket and the second having a spigot penetrating into the socket, at the same time radially compressing a composite gasket according to claim 1, the solid body of the gasket being compressed radially between a chamber of the

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first pipe and the spigot of the second pipe, and the annular heel bearing on an annular receiving groove at the entrance of the socket, and each insert bearing on the annular socket entrance groove with its head and on the spigot with its catching nose, each insert assuming an inclination relative to the axis of the gasket and of the coaxial pipes which depends on the diametral production tolerances of the spigot and therefore on the annular play between the spigot and the entrance groove of the socket.

632190

COMMONWEALTH OF AUSTRALIA

PATENTS ACT 1952

COMPLETE SPECIFICATION

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COMPLETE SPECIFICATION FOR THE INVENTION ENTITLED:

Composite gasket for the locked assembly of spigot and socket pipes

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

The present invention relates to a composite gasket for the locked assembly of coaxial spigot and socket pipes, the assembly being telescopic.

More particularly, it is concerned with a composite gasket, in the elastic body of which are embedded a particular number of inserts for locking the spigot of one pipe relative to the socket of another pipe, the gasket being compressed radially between the spigot and the socket.

The patent FR 1,490,680 discloses a composite gasket equipped with locking inserts and a telescopic locked assembly of the abovementioned type. According to this patent, each insert, at a fixed and low inclination relative to the axis of the gasket or at an inclination which is variable between narrow limits permitted by an orifice passing through the socket, catches on a circular groove which is made on the spigot of one pipe. According to one embodiment, each insert is produced in the form of a finger screwable into a nut embedded in the gasket, in order to modify the effective length of the locking finger in the event that pipes of large diameter are not strictly in alignment.

In view of the low inclination of the locking inserts which makes it necessary for them to bear on the spigot by means of a circular groove, and in view of the narrow limits of angular movement of the said inserts, the diametral tolerances of the spigots of the pipes lockable in this way are likewise narrow.

According to a first aspect of the present invention there is provided a composite gasket for telescopically securing a first pipe having a socket to a second pipe having a spigot, said gasket adapted to be positioned within said socket to receive said spigot, and comprising:

a body portion;

an annular heel made of elastic material; and

a plurality of inserts made of a material having a greater hardness than said heel and being embedded in the annular heel along the generatrices of a cone having the same axis as the gasket, each insert having a distal end projecting from the gasket towards the axis of the latter, each insert being

equipped with a nose at said distal end for catching on said spigot of said second pipe and means for pivoting each of said inserts about two pivot points while simultaneously bearing on said body portion of the gasket, during the insertion of the spigot in said gasket such that said gasket can receive and lock spigots having various diameters.

Due to its possibilities of angular movement in relation to the gasket in which it is embedded, each insert can adapt to variations in diameter of a spigot or of the socket of a pipe, also called diametral tolerances, that is to say to a variable annular play between spigot and socket, to obtain the optimum buttressing inclination. Thus, depending on the diametral tolerances encountered, a single optimum insert length is sufficient to obtain a good locking of the spigot of one pipe relative to the socket of the other pipe.

According to a second aspect of the present invention there is provided a locked telescopic sealing assembly between two pipes, the first having a socket and the second having a spigot penetrating into the socket, at the same time radially compressing a composite gasket according to a first aspect of the present invention the solid body of the gasket being compressed radially between a chamber of the first pipe and the spigot of the second pipe, and the annular heel bearing on an annular receiving groove at the entrance of the socket, and each insert bearing on the annular socket entrance groove with its head and on the spigot with its catching nose, each insert assuming an inclination relative to the axis of the gasket and of the coaxial pipes which depends on the diametral production tolerances of the spigot and therefore on the annular play between the spigot and the entrance groove of the socket.

Thus, with a small annular play between the assembled pipes, the insert behaves as though it had a small length, and with a large annular play the insert behaves as though it had a large length. This is obtained by means of an optimum inclination of the insert which rotates about a first theoretical rotational pivot in relation to the socket for a first tolerance range and about a second theoretical rotational pivot for a second tolerance range.

Embodiments of the invention will now be described by way of example only with reference to the accompanying drawings in which:-

Figure 1 is a partial mid-section through the composite gasket of an embodiment of the invention,

Figure 2 is a partial view of the gasket according to the line 2-2 of Figure 1,

Figure 3 is a front view of a single insert on a larger scale than Figures 1 and 2,

Figures 4A and 4B are mid-sectional views, on a smaller scale than Figures 1 and 2, of two pipes and of the composite gasket interposed between them, respectively before and after the locked assembly of an embodiment of the invention has been carried out,

Figures 5, 6 and 7 are partial mid-sectional views, on a large scale, illustrating different positions of the insert for different annular plays between the socket and the spigot of two pipes,

Figure 8 is a geometrical diagram, on a large scale, illustrating different inclinations of the reaction of the spigot on the insert for different annular plays, the trend curves of the contact points of the insert with spigots of different diameters, and tangents of the reaction angles for each inclination of the insert.

According to the exemplary embodiment in Figure 1, the embodiment is used with a gasket G of axis X-X. Its mid-section comprises an annular solid body 1 made of elastomer and an annular heel 2 likewise made of elastomer. The body 1 and the heel 2 are separated by a peripheral circular groove 3 and by an inner circular groove 4. The inner groove 4 is limited on the heel 2 side by an inner circular lip 5 which is oblique relative to the axis X-X. The elastomeric lip 5, which is thin and flexible, converges towards the axis X-X near to the minimum inside diameter of the solid body 1.

The gasket G comprises a particular number of inserts 7 made of extruded or sintered material of great hardness, for example of hard metal alloy or of ceramic. The inserts 7 are uniformly distributed over the entire circumference of the gasket G. Each insert 7 is a body of rectangular cross-section 8 and of bent profile and is

composed of an approximately rectangular wide head 9 and of an elongate body 10 forming two obtuse deflection angles a and a1 relative to the said head 9. Each head 9 and a large part of each body 10 are embedded in the annular heel 2 of the gasket G and are covered with the elastic material of the heel 2. The nose 11 and part of the body 10 project towards the axis X-X of the gasket G in relation to the inner circular groove 4 of the said gasket G.

The inner groove 4 comprises an oblique flank adjacent to the solid body 1 and an oblique flank consisting of the oblique lip 5. Two annular spaces 12 and 13 are formed between an insert 7 and each of these oblique flanks.

The composite gasket G with inserts is intended to be mounted between two pipes T1 and T2, for example made of nodular graphite iron. One of the pipes T1 with a socket 15 comprises successively, in the axial direction from the bottom towards the entrance of the said socket 15, an annular chamber 16 for the movement of the spigot of the other pipe, a circular stop 17 projecting internally relative to the chamber 16, a circular chamber 18 for receiving a heel 2 of a gasket G, and a circular entry flange 19 limiting the groove 18, of an inside diameter substantially smaller than that of the stop 17. The entry flange 19 is connected to the groove 18 by means of a rounded surface 14.

The other pipe T2 with a cylindrical spigot 20 is produced with diametral tolerances corresponding to a maximum outside diameter d2, a medium outside diameter d3 and a minimum outside diameter d4. The pipes of outside diameters d3 and d4 are designated respectively by T3 and T4 in Figure 4B.

For their assembly, the pipes T1 and T2 are brought close to one another and aligned according to their axis X-X (Figure 4A). The gasket G is introduced into the socket 15 of the pipe T1, the body 1 taking its place in the chamber 16 and the heel 2 fitting into the receiving groove 18, the axis X of the gasket G coinciding

with that of the pipes T1 and T2.

The spigot 20 of the pipe T2 is then introduced through the gasket G, first moving aside the lip 5 which is laid with some pressure on to the outer surface of the spigot 20. When the spigot 20 crosses the threshold of the inserts 7, these are inclined as a result of angular movement in the space 12 towards the body 1. The introduction of the spigot 1 is continued until its end edge comes near to the bottom of the chamber 16. The spigot 20 is then returned axially rearwards so as to cause the inserts 7 to be turned back. The inserts 7 change their inclination relative to the axis X-X as a result of an angular movement counter to the preceding one and of small extent in the space 13 towards the circular lip 5. During this turning back, the noses 11 of the inserts 7 catch on the outer surface of the spigot 20 and thus offer appreciable resistance to the continuation of the axial withdrawal movement of the spigot 20. The locking of the telescopic assembly of the pipes T1 and T2 is achieved.

The operation of the device according to an embodiment of the invention with respect to the particular diametral tolerances will now be described.

After the abovementioned angular movements during the assembly of the pipes T1 and T2, each insert 7 assumes different bearings and inclinations according to the diameter d2, d3 or d4, in the locking position.

In the case of a minimum diameter d4 providing a maximum annular play j4 between the spigot 20 and the groove 18 of the socket, the nose 11 is in contact with the spigot 20 at a point K. The head 9 bears on the groove 18 at a single point C. The median line of inclination of the insert 7 serving as a support for a reaction force F of the insert 7 against the spigot 20 then passes through a theoretical rotational pivot R2. In this case, the inclination of the insert 7 relative to the axis X-X is the highest, the locking still being good.

In the case of a maximum diameter d2 providing a

minimum annular play j2 between the spigot 20 and the groove 18 of the socket, the nose 11 is in contact with the spigot 20 at a catching point D, the head 9 bearing on the groove 18 at two points A and B.

The intersection of the perpendiculars to the two contact points A and B determines a new theoretical pivot R1 which is further from the face 19 than the pivot R2 and of which the straight-line segment joining it to the point D serves as a support for the reaction force F. In this case, the inclination of the insert 7 relative to the axis X-X is the lowest, a good locking of the spigot being ensured at the same time.

Between these two extremes there is a characteristic medium diameter d3 which provides a medium annular play j3 between the spigot 20 and the groove 18 of the socket, the nose 11 being in contact with the spigot 20 at a catching point H, and the head 9 bearing both on the rounded surface 14 extending the entry flange 19 and the groove 18. In this case, the inclination of the insert 7 is intermediate between those of the two preceding cases.

As shown in Figures 5 and 6, this transfer point is determined by the value of an angle a2 between a line joining the pivot R1 and the end of the nose 11 and an upper face of the head 9 opposite the groove 18 of the socket.

It emerges from these three cases that, to obtain the best possible locking, the reaction angle x, which is that of the abovementioned reaction force F with the perpendicular to the generatrix of the spigot 20 at the contact point D, H or K, must be between particular limits which depend on the desired locking force, on the material of the pipes T1 and T2 and on the surface state of these pipes.

So that there is a locking of the spigot 20 of the pipe T2 relative to the socket 15 of the pipe T1, the insert 7, which bears with its head 9 on the groove 18 of the socket, must exert a reaction force F towards the spigot 20. The force F is directed along a straight-line

segment joining the catching point of the nose 11 on the spigot 20 to the theoretical rotational pivot R1 or R2.

The reaction force F forms an angle x with the perpendicular to the generatrix of the spigot 20 at the contact point D, H or K.

If the reaction angle x is large, the component of the force F parallel to the axis X-X predominates over its component perpendicular to the axis X-X, thus theoretically being conducive to a good locking. Nevertheless, to allow an effective catching of the nose 11 against the outer surface of the spigot 20, it is expedient if the angle x of the reaction F does not exceed a particular maximum limit, beyond which the insert 7 no longer catches on the outer surface of the spigot 20 and simply slides against it.

Conversely, if the reaction angle x is small, the horizontal component of the reaction force F becomes negligible in relation to its component perpendicular to the axis of the spigot, and therefore, although the nose 11 actually penetrates the surface of the spigot 20 in this case, the force F cannot effectively oppose a push of the pipe T2 relative to the pipe T1 along the axis X-X and therefore cannot oppose a retraction movement.

In Figure 8, other contact points of the noses 11 with the outer surface of the spigots 20 are marked at M and L for diameters larger than d3 and smaller than d4 respectively. The theoretical pivots R1 (where there are two bearings A and B of the head 9 on the groove 18) and R2 (where there is a single bearing C of the head 9 on the groove 18) are the zones where the centres of rotation of an insert 7 are situated in the course of an angular movement during the locking withdrawal of the spigot 20. Radii of rotation joining R1 or R2 at different contact points of a nose 11 with the spigot 20 at D, H, K, M and L serve to support the reaction forces F on the insert 7.

A curve ε joins the various contact points D, H, K, M and L of a nose 11 with the outer surface of a spigot 20, the diameter of which varies according to the

production tolerances.

A curve y represents the variations of the tangent of the angle x, tg x, as a function of the diametral tolerance of the spigot, that is to say of the annular play j2, j3 and j4. The curve y has two abrupt changes of direction, or turnings back, at s1 and s2 located in the vicinity of the diameter d3. It is appropriate to note, in this respect, that tg x must not be considered similar to a coefficient of friction.

Thus, when the annular play decreases, that is to say when the diameter of the spigot increases, tg x, hence x, increases to the point s2. This is still true between a diameter passing through the point s1 and the diameter d2 corresponding to the minimum play j2. In contrast, between the points s2 and s1 there is a reversal in the trend of tg x which decreases. This reversal corresponds to an intermediate phase where the insert 7 no longer has a single contact point C against the inner surface of the socket and does not yet have a bearing point A against the entry flange 19 and a bearing point B against the groove 18. In this intermediate phase, the insert 7, which already has a bearing point B against the groove 18, still has a bearing point A against the rounded surface 14. In this case, the perpendicular to the contact point A is not parallel to the perpendiculars to the entry flange 19, thus shifting the position of the pivot and therefore the angle x of the reaction force. This is what is shown in Figure 6.

In Figure 8, a generatrix of the spigot 20 has been graduated according to tg x from 0.4 to 1. Projecting each point of the curve y on to the generatrix thus graduated results in the value of tg x, from which the value of x can be deduced for a diameter of the spigot 20 passing through the particular point of the curve y.

For example, for the points D, M and K, the curve y gives respective values of tg x higher than 1 ($x = 46°$), between 0.7 and 0.8 ($x = 37°$) and between 0.5 and 0.6 ($x = 29°$).

By way of comparison, broken lines illustrate the

radii of rotation of an insert of a type known from the patent FR 1,490,680 and the catching points N, Q and H of the said insert on spigots of different diameters.

The reaction forces V of the spigot on the insert are marked on the radii of rotation passing through a single pivot R2, since there is only a single contact point between the insert and the socket. A curve z1 joins the contact points N, Q and H. Likewise, a curve y1 represented by broken lines illustrates the values of tg x of this solution. It thus emerges that the possibilities of angular movement of an insert according to the patent FR 1,490,680 are more limited than those of the insert 7 of the invention, and the diametral tolerances acceptable with a known insert are lower than in the invention, this improvement arising from the transfer of the pivot R2 towards the pivot R1 in the vicinity of the diameter d3. The improvement in relation to the prior art can be summarized by the appearance of the contact point B against the groove 18 of the socket, this tending to lay the insert 7 on to the spigot, thus making it easier for it to catch, despite a small diametral play and therefore a small inclination of the insert 7 in relation to the axis X-X.

The inserts 7 reinforce the creep strength of the gasket G and prevent it from being expelled towards the outside of the socket 15 when the pipeline contains a fluid under high pressure. The inserts 7 improve the anchorage of the heel 2 of the gasket G in the socket groove 18.

Due to the angle a1, the face 9 of the insert 7 is virtually perpendicular to the axis X-X and parallel to the opposite face of the stop 17 of the socket.

By virtue of their inclination relative to the axis X-X in the free state (Figures 1 and 4A) and their flexibility of inclination or of angular movement, allowed by the non-compressed elastic mass of the body 1 and by the flexible lip 5, the inserts 7 offer only slight resistance to the penetration of the spigot and make easier the axial introduction of the spigot 20 of

the pipe T2 into the socket 15 of the pipe T1 (Figure 4A) and its slight axial withdrawal as far as the optimum locking inclination.

The anchoring zone of the noses 11 of the inserts 7 on the spigot 20 is protected against attacks from external fluids by the lip 5 of the gasket G (Figure 4B) which completely closes the entrance of the socket 15.

As a result of the variation of the bearing contacts of the insert 7 on the socket groove 18 (Figures 5 to 7), that is to say because of the possibility of passing from one bearing point C to two bearing points A and B and the resulting change of the rotational pivot R1, R2 as a function of the outside diameter d2, d3, d4 of the spigot 20 of the pipe T2 to be locked, the reaction angle x shifts about an optimum value, allowing an effective locking over a wide range of diametral tolerances of the spigot 20 between d2 and d4.

Owing to the variation of the bearings of the head 9 on the groove 18 (Figures 5 to 7) and the resulting shift of the theoretical pivot R1, R2, the insert 7 behaves, with small annular plays (j2), as though it had a small length and a high inclination, allowing an easy catching of the nose 11, whilst with large annular plays (j4) the insert 7 behaves as though it had a large length and a low inclination which likewise ensures an effective locking.

Finally, the diametral tolerances, that is to say the range of diameters (d2, d3, d4), of lockable pipes T2 is widened substantially.

If the range of diameters of lockable pipes, hence the diametral tolerances, is to be widened still further, instead of a single series of inserts 7 a second series of inserts of a length different from that of the inserts 7 and alternating with these is used.

~~The reference numerals in the following claims do not in any way limit the scope of the respective claims.~~

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A composite gasket for telescopically securing a first pipe having a socket to a second pipe having a spigot, said gasket adapted to be positioned within said socket to receive said spigot, and comprising:

a body portion;

an annular heel made of elastic material; and

a plurality of inserts made of a material having a greater hardness than said heel and being embedded in the annular heel along the generatrices of a cone having the same axis as the gasket, each insert having a distal end projecting from the gasket towards the axis of the latter, each insert being equipped with a nose at said distal end for catching on said spigot of said second pipe and means for pivoting each of said inserts about two pivot points while simultaneously bearing on said body portion of the gasket, during the insertion of the spigot in said gasket such that said gasket can receive and lock spigots having various diameters.

2. A composite gasket according to claim 1, wherein each insert has a transverse rectangular angled section.

3. A composite gasket according to claim 1, wherein each insert has a wide head seated in the annular heel of the gasket, an elongate body passing through said heel obliquely relative to the axis of the gasket and forming an obtuse deflection or bend angle relative to the head, and a nose-shaped end projecting from the gasket towards the axis of the latter.

4. A composite gasket according to claim 1, wherein the end or head of each insert embedded in the annular heel of the gasket is completely covered with the elastic material of the gasket.

5. A composite gasket according to claim 1, wherein it possesses in the extension of its annular heel, radially opposite the said heel, an oblique

annular lip converging towards the axis of the gasket at least as far as the minimum inside diameter of the solid body of the gasket, the said lip forming with the solid body an inner annular groove into which each insert protrudes or projects with its nose and part of its body.

6. A composite gasket according to claim 5, wherein the oblique annular lip and each insert have approximately the same inclination relative to the axis of the gasket.

7. A composite gasket according to claim 5, wherein the inner annular groove comprises an oblique flank adjacent to the solid body and an oblique flank consisting of the oblique lip, an annular space being formed between each insert and the oblique flank adjacent to the solid body, whilst another annular space is formed between each insert and the flank consisting of the oblique lip.

8. A locked telescopic sealing assembly between two pipes, the first having a socket and the second having a spigot penetrating into the socket, at the same time radially compressing a composite gasket according to claim 1, the solid body of the gasket being compressed radially between a chamber of the first pipe and the spigot of the second pipe, and the annular heel bearing on an annular receiving groove at the entrance of the socket, and each insert bearing on the annular socket entrance groove with its head and on the spigot with its catching nose, each insert assuming an inclination relative to the axis of the gasket and of the coaxial pipes which depends on the diametral production tolerances of the spigot and therefore on the annular play between the spigot and the entrance groove of the socket.

9. A locked telescopic sealing assembly according to claim 8, wherein each insert bears with its head on at least one point of the socket entrance groove, whilst at the same time being buttressed by means of its nose on the spigot, whatever the diametral tolerances of the spigot, assuming the optimum

inclination relative to the axis of the gasket and of the pipes as a result of rotation about one of two rotational pivots.

10. A locked telescopic sealing assembly according to claim 9, wherein each insert bears with its head on two points of the socket entrance groove, whilst at the same time being buttressed on the spigot by means of its catching nose.

11. A composite gasket substantially as hereinbefore described with reference to the accompanying drawings.

12. A locked telescopic sealing assembly substantially as hereinbefore described with reference to the accompanying drawings.

DATED this 1st day of October 1992
Pont-a-Mousson S.A.
By Its Patent Attorneys
DAVIES COLLISON CAVE

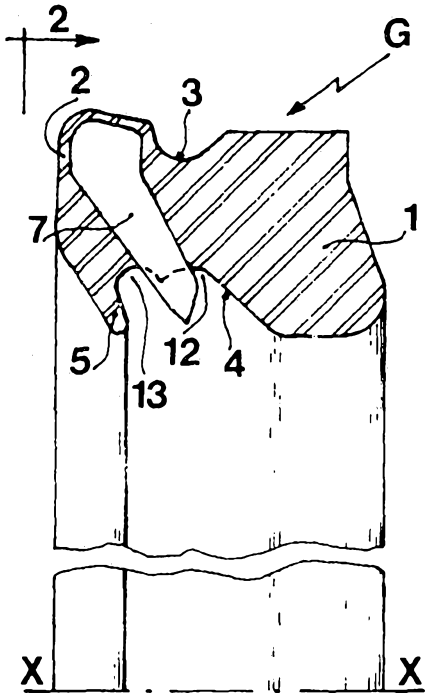

Fig. 1

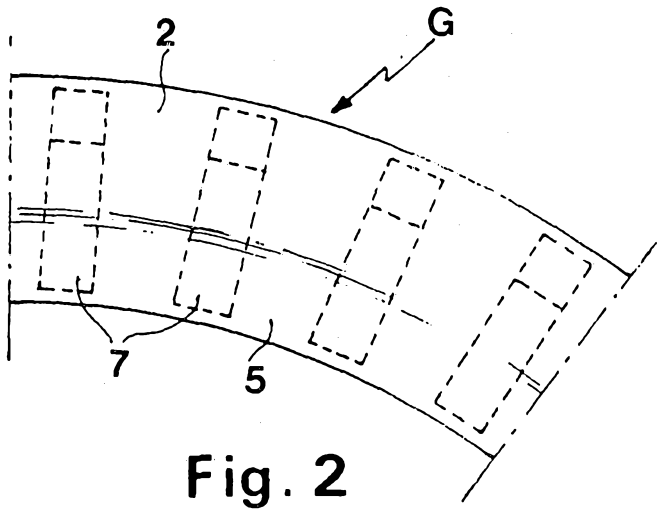

Fig. 2

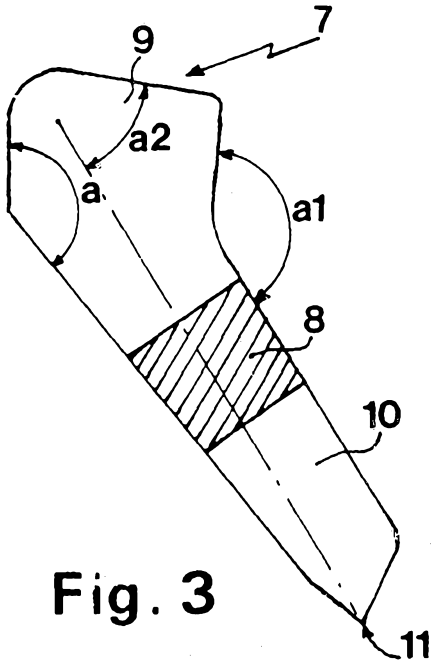

Fig. 3

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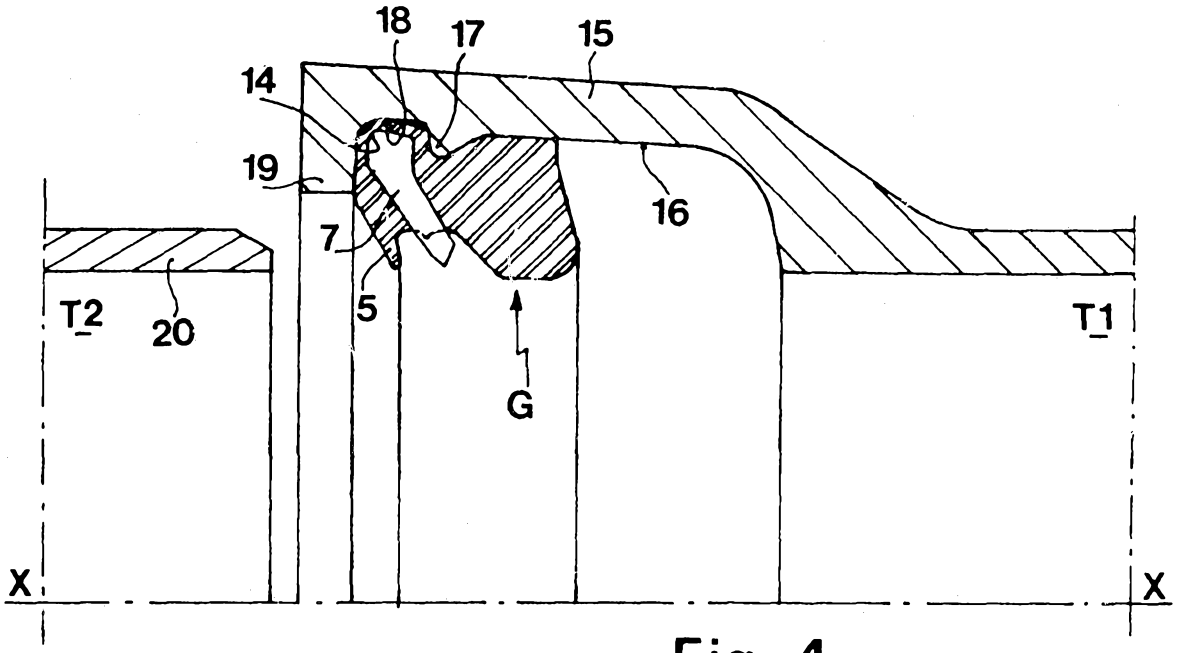


Fig. 4A

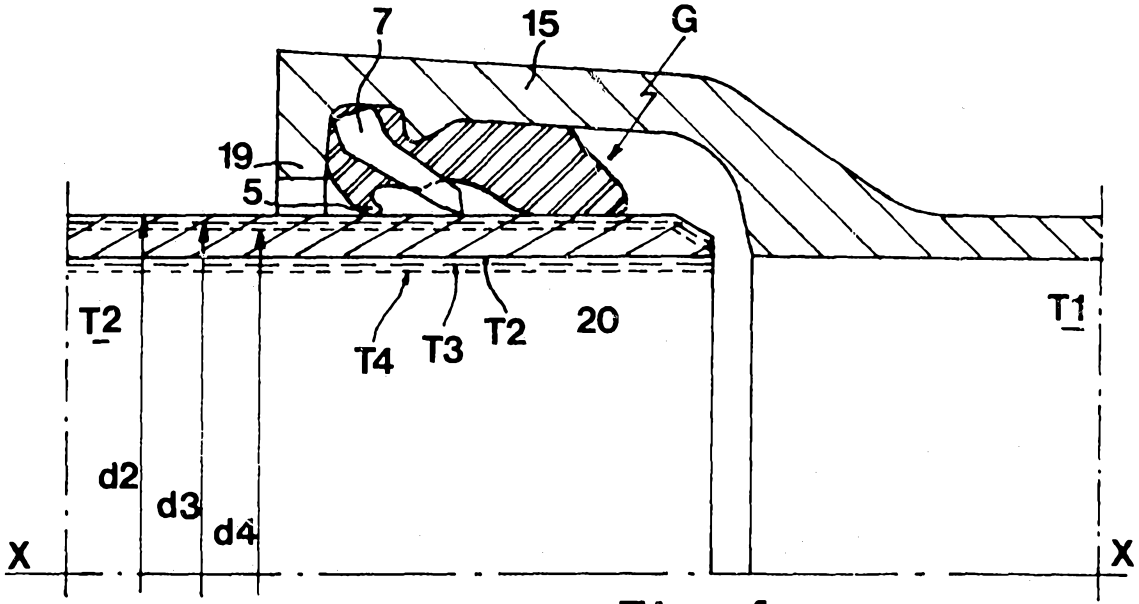


Fig. 4B

Fig. 5

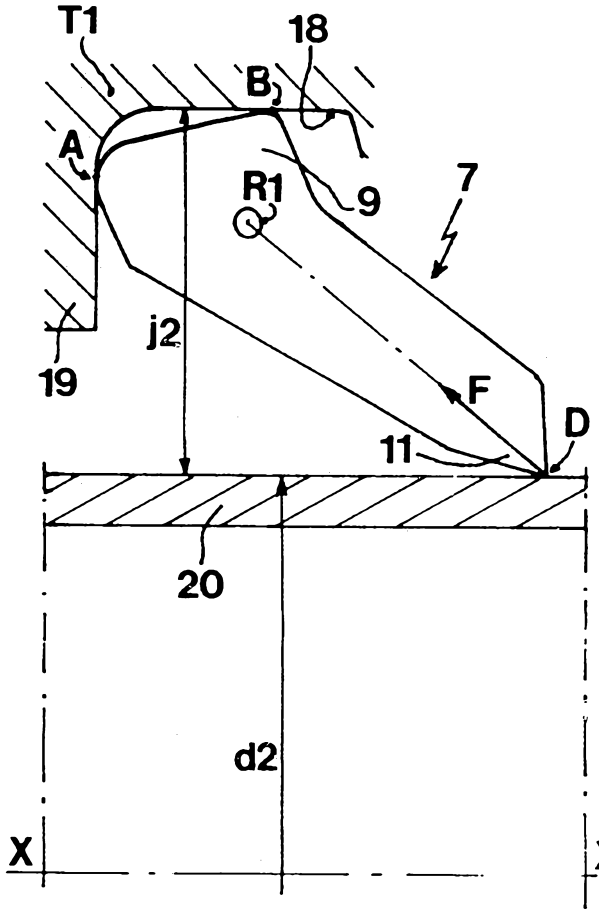


Fig. 6

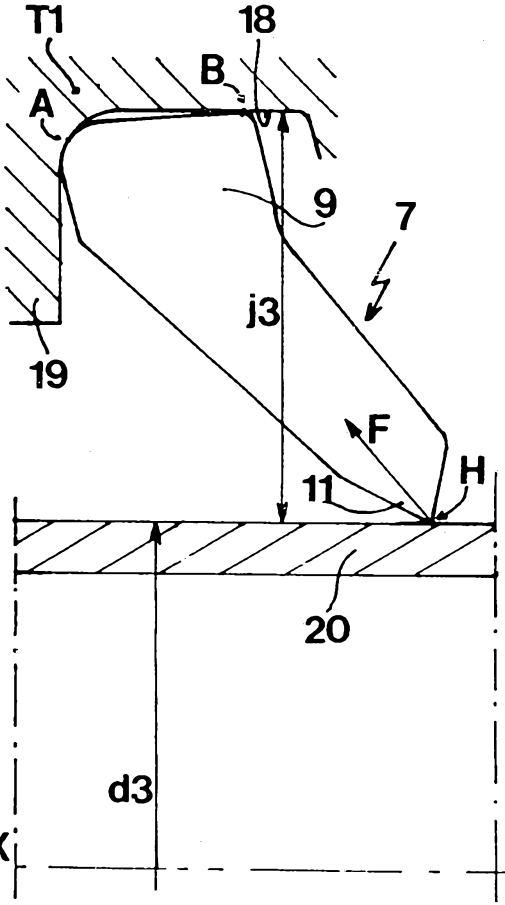
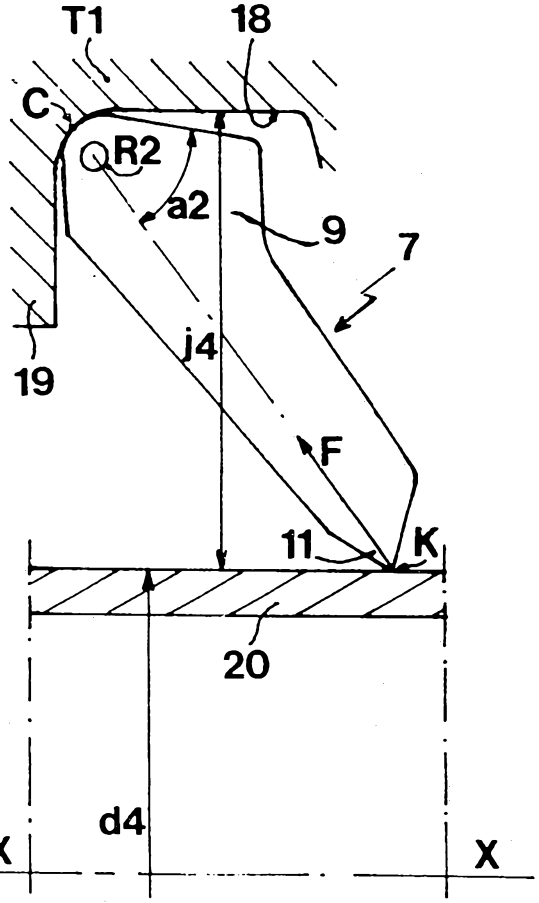


Fig. 7



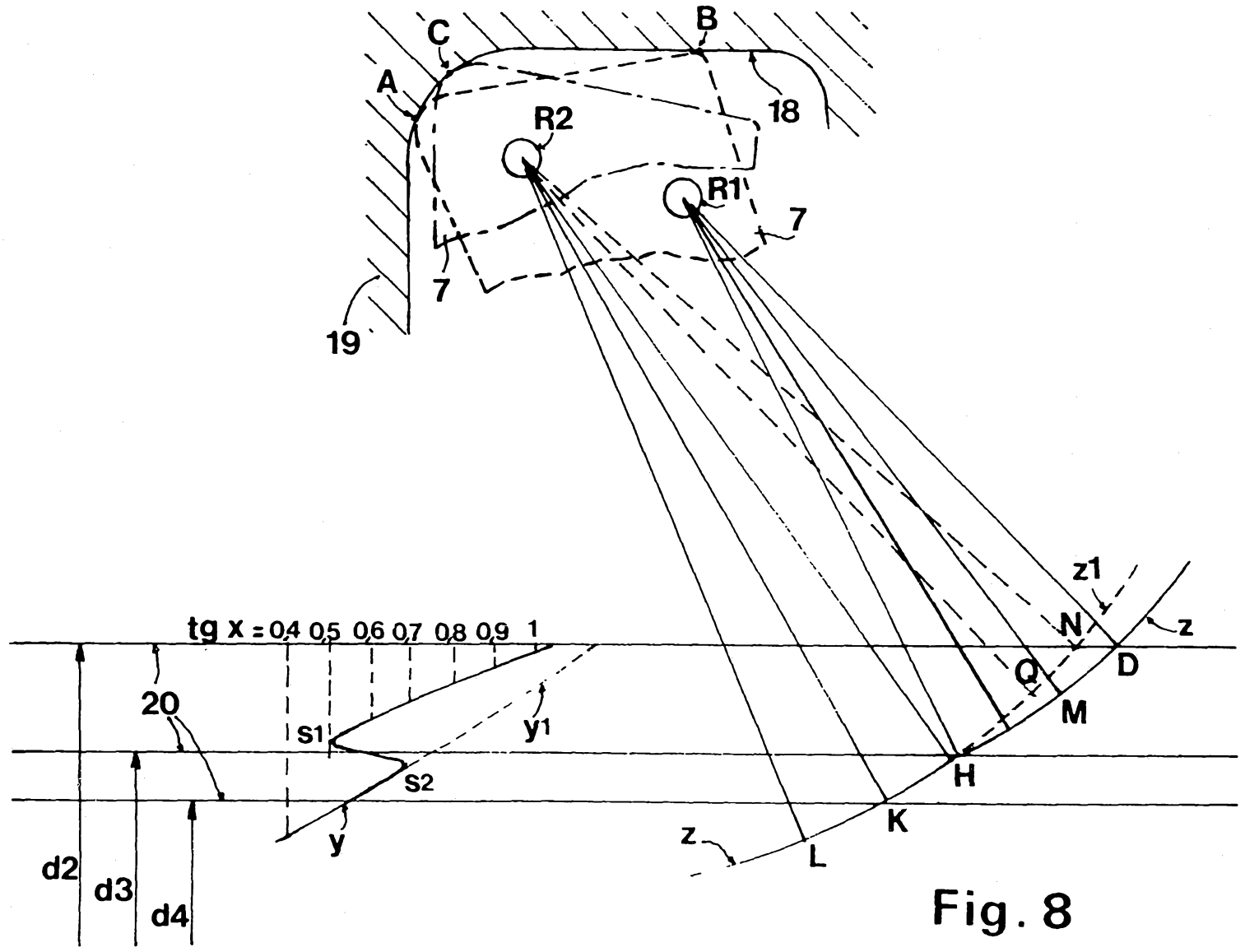

C
B
A
18
R2
R1
7
7
19
z1
N
z
D
Q
M
H
K
L
z
tg x = 0,4 0,5 0,6 0,7 0,8 0,9 1
20
S1
y1
S2
y
d2
d3
d4

Fig. 8