THE JOINT EXAMINATION BOARD

AMENDMENT OF SPECIFICATIONS FOR UNITED KINGDOM PATENTS/APPLICATIONS IN PROSECUTION, REVOCATION PROCEEDINGS OR OTHERWISE

Wednesday 2nd November 2005

10.00 a.m. – 1.00 p.m.

Please read the following instructions carefully. ***Time Allowed – 3 HOURS***

1. Please note the following:

    a. Enter the Paper Number (P4) and your Examination number in the appropriate boxes at the top of each sheet of paper;
    b. The scripts are photocopied for marking purposes. Please write with a **dark inked pen** on one side of the paper only and within the printed margins, and do not use highlighters in your answer;
    c. Do not staple or join pages together in any way;
    d. Do not state your name anywhere in the answer;
    e. Write clearly: examiners cannot award marks to answers that cannot be read;

2. Under the Examination Regulations **you may be disqualified from the examination and have other disciplinary measures taken against you if**:

    a. you are found with unauthorised printed matter or other unauthorised material in the examination room;
    b. your mobile phone is found to be switched on;
    c. you copy the work of another candidate, use an electronic aid, or communicate with another candidate or with anyone outside the examination;
    d. you continue to write after being told to stop writing by the invigilator(s). **NO WRITING OF ANY KIND IS PERMITTED AFTER THE TIME ALLOTTED TO THIS PAPER HAS EXPIRED.**

3. **At the end of the examination assemble your answer sheets IN ORDER and put them in the WHITE envelope provided**. Any answer script taken out of the examination room will not be marked.

THE JOINT EXAMINATION BOARD

PAPER P4

QUESTION

A United Kingdom patent application comprising the attached specification (identified as GB 0325118.9) was filed at the UK Patent Office on December 18th, 2003 without any claim to priority. The UK Patent Office has issued the attached Official Letter.

You have received information from your client in the form of the attached letter.

Your task is to prepare the following.

1. A letter to the UK Patent Office in response to the Official Letter, accompanied by a set of amended claims if appropriate. (Please note that for the purpose of this examination you are **not** required to prepare any amendments to the description of the patent application.)

2. A memorandum consisting of notes (not a letter) explaining the actions you have taken and the reasons for those actions, and providing a basis for later advice and comment to your client. These notes should be restricted to patent matters; you are **not** required to consider any other matters such as copyright or design protection.

Please note the following.
(a) You should accept the facts given in the paper and base your answer on those facts. In particular you should **not** make use of any special knowledge that you may have of the subject-matter concerned, and you must assume that the prior art referred to is in fact exhaustive. Where only extracts of documents are presented, you should assume that those extracts contain all relevant material.

(b) If your advice to your client will include a suggestion that any divisional application(s) should be filed, you should draft the corresponding independent claim(s) and your memorandum should explain why divisional filing is advisable. You should **not** draft a description or any dependent claims for a divisional application.

(c) If you submit any amended claim set and/or divisional claim(s), please put these at the top of the papers when handing in your answer and number the pages accordingly.

Document List:
Client's letter - 1 page
Official letter - 1 page
Client's application GB 0325118.9 - 10 pages text, 3 pages drawings
GB 2 436 939 (Henry Inc.) - 3 pages text, 1 page drawings
EP 1 139 202 (Williams) - 3 pages text, 1 page drawings

LETTER FROM CLIENT

Mr W Mitchell
Chartered Patent Attorney

1 November 2005

Dear Mr Mitchell

RE: UK Patent Application no. 0325118.9

Thank you for your letter enclosing the Patent Office Examination Report.

I am sorry for replying so close to the extended deadline. I have been busy promoting our new range of seals covered by the patent. The seals are proving to be very popular, to the extent that we are unable to keep up with demand and are investing in a new factory to increase our production capacity ten fold. The new factory cannot come quickly enough. We have just heard that a competitor GenericSeals is trying to exploit our productivity limitations, offering almost identical copies of all our seal range to our customers all around the UK. We lost a member of our technical staff to them several months ago: judging from that and from the low prices they're offering we're pretty sure that they're copying our manufacturing process as in our patent. I wrote to them a few weeks ago sending a copy of our patent but I have heard nothing since.

When we last spoke with you in December we had just received our first big order, for ring seals of various diameters with outwardly-extending bristles. We now supply just as many seals with inwardly-extending bristles. The machine we use can easily be reconfigured to produce both, just as it can to produce different diameter seals and seals with different bristle angles. All of our seals use the angled bristles. A key aspect of the production process is its flexibility. We can make the whole range of seals using just one machine. We pre-assemble the bundles so that the same tube bundle assemblies can be used for all seals, it's just the automated lay up that is different.

The two earlier patents look interesting. GB 2,436,939 is obviously very different from ours. Lacing the bristles together would be very time consuming and uneconomic: a serious price factor. EP 1,139,202 is the closest but this "loose fill" method can't actually produce a seal having uniform and tightly packed bristles. The loose bristles are a nightmare to handle. We tried something similar and found also that the seals had leakage problems.

The main selling points of our seals are (i) excellent sealing characteristics because of good bristle packing, and (ii) good lifetime, due we think to the bristle compliance resulting from the angled bristle lay up that we use. Please deal with the objections as you see fit and do what you can to maintain our position, especially against Generic.

Yours sincerely

Robert Bristle

OFFICIAL LETTER

Application no. 0325118.9
Applicant: Sweeping Seals Limited
Examiner: Darren Scraper

Latest Date for reply: 3 September 2005

PATENTS ACT 1977
Examination Report under Section 18(3)

Novelty/Obviousness

(1) The invention is not new and/or is obvious in view of what has already been disclosed in the following documents:

(1) GB 2,436,939 (Henry Inc)
(2) EP 1,139,202 (Williams)

(2) Henry and Williams both disclose methods of manufacturing a brush seal element comprising the steps of Claim 1. Henry does not disclose using an assembly jig but this would be readily inferred by the person skilled in the art. Moreover Williams clearly shows a jig.

(3) The features of the dependent claims are disclosed in one or more of the cited documents or comprise subject matter which would be obvious to the skilled person.

Clarity and Support

(4) The last clause of claim 1 lacks clarity. The annular shape and radial bristles do not 'result' from the integral joining. Also the step of cutting the bristles necessary to complete the seal element has been omitted and correction should be made. See also claim 6.

(5) Claim 4 seems to be redundant in view of claim 1's reference to radial bristles.

Yours faithfully

Darren Scraper

Applicant: Sweeping Seals L
Application No. 0325118.9

Filed: 18 Dec 2003
Priority: None

BRUSH SEALS

This invention relates to brush seals and particularly to an improved method of manufacture of such seals.

Compliant brush seals for preventing gas leakage between a stationary housing and a rotating shaft passing therethrough are known. Such seals include a series of individual bristles, consisting of metallic wire or other fibre, extending from a backing member into contact with the rotating shaft. The ends of the bristles brush lightly against the rotating shaft.

The invention is applicable to the manufacture of brush seals for use in machines between two relatively moving parts, or a moving part and a static part, for example between a rotor and a stator of a gas turbine engine. In such an application, the seal will be of circular form. The invention relates particularly to the manufacture of wire brush seals for machine parts, and has been devised with the object of simplifying the manufacture of brush seals to a preselected width and

bristle length, and minimising finishing operations for the seal.

According to this invention, there is provided a method of manufacturing a brush seal element comprising the steps of: positioning a plurality of bundles of bristles on a carrier member such that the ends of the bristles project from the carrier member; clamping the bristles projecting from the carrier member between a pair of coaxial clamping rings located on a brush seal assembly jig (i.e. an alignment support), and integrally joining the clamping rings and the bristles, such that the resulting seal element is annular and has radially extending bristles.

Preferably, the bundles are located in respective guides disposed around the carrier for positioning the bundles around the clamping rings before clamping. The bristles may be slidable within the guides so that their radially inner ends can be made to abut an end face of the assembly jig thereby to similarly locate all the bristles with respect to the jig in the radial direction. The guides may extend along the radius of the carrier and clamping rings such that bristles are radially aligned in the resultant seal.

Preferably, the bristles and clamping rings are metallic and are integrally joined by welding or brazing.

Preferably, the free ends of the bristles are machined following removal of the carrier to ensure concentricity of the brush seal, by a grinding machine.

A specific manufacturing method of a brush seal according to an embodiment of the invention will now be described, by way of example, with reference to the accompanying drawings, in which;

Figure 1 illustrates the assembly of holding tubes each carrying a multiplicity of wire bristles formed from a bundle of wire strands;

Figure 2 is an enlarged detail of a holding tube with bristles projecting therefrom;

Figure 3 illustrates the assembly of a plurality of holding tubes mounted on a carrier with a pair of annular plates, during the formation of a seal element;

Figure 4 is a section through a finished ring seal, and

Figure 5 shows a series of brush elements assembled on a carrier.

Figures 1 to 5 show the series of steps of this invention for making an annular wire brush seal.

Figure 1 shows a machine in which a multi-wire strand 12, provided pre-wound on a spool 17, is drawn from the spool by a feed unit 18 which drives the multi-wire strand through a guide nozzle 19 held on a pillar 20 and to a filling point. A holding tube 21 is held temporarily at the filling point by a clamp (not shown) and the strand 12 is fed through it. The metal wires are then severed by a cutter 22 to a required length, to provide a brush element 23 comprising the holding tube 21 packed with multiple wire bristles 12 which fit slidably in the tube and project to the predetermined length as shown in Figure 2. The process is automated to produce multiple brush elements 23 by feeding further holding tubes 21 sequentially to the filling point in the machine.

The use of these discrete holders enables multiple bundles of packed bristles to be conveniently prepared and handled in manufacturing e.g. as below. Each contains a pre-determined number of bristles, giving an even distribution of bristles in the seal.

When manufacturing e.g. a circular brush seal with outwardly-directed bristles, the brush elements 23 (Figure 2) are affixed to an annular carrier, for example by bonding the holding tubes to the carrier with an

adhesive. The bristles 12 here project inwardly of the carrier. As shown in Figure 3, the carrier 24 with the brush elements 23 affixed thereto is then fitted to a jig 25, together with a pair of annular plates 26 which are disposed so that the radially inner end portions of the bristles 12 are positioned therebetween. The bristles may be then slid radially inwardly if necessary through their holding tubes 21 towards the jig 25, so that their radially inner ends all abut a cylindrical reference face 27 of the jig 25. The plates 26 are then clamped together firmly to hold the bristles, and all the bristles are severed part-way between the holding tubes 21 and the plates 26, as shown at 28. The carrier can now be removed, and, if of a suitable material, the holding tubes 21 can be detached and re-used.

The plates 26 carrying the bristles 12 cut at the required length are removed from the jig 25, and the plates and bristles are united by welding or brazing as shown at 29 in Figure 4. The brush seal thus produced may be usable in that form, or may be subjected to a finishing machining operation, as described below.

The chosen angle of the tubes, and hence of the radial bristles, with respect to the geometrical radius of the carrier may vary according to e.g. the seal

diameter, resiliency of the bristle material, intended speed of rotation of a shaft, etc.

Thus, in one version the tubes may be positioned such that the bristles extend exactly (i.e. only) in the radial direction of the carrier 24 and ring plates 26. In these embodiments leakage through the seal may tend to occur because of the difference in diameter. If bristles are tightly packed at the radially inner diameter, there will tend to be spaces between them at the radially outer diameter of the seal. This is advantageous however if a controlled leakage across the seal is desirable, for example to cool the bristles when heated by rubbing of the bristle tips in use, e.g. against a high speed shaft.

However some improved seal properties can be achieved by positioning the brush element tubes at an angle with respect to the true radius of the carrier, so that in the resultant seal the bristles 12 are all similarly angled with respect to the radial direction of the annular rings 26. We find that a brush seal with this arrangement is desirable because it can have bristles which are relatively more similarly tightly packed (closely spaced) for both the inner and outer diameters of the eventual seal, and this can significantly reduce leakage. Angled bristles are also

more readily deflected in use, resulting in a more compliant seal which is less liable to damage, for example when the bristles are initially fitted with an interference fit against a co-operating sealing surface such as a rotating shaft.

Figure 5 shows how the lay up will look for a seal of this type, with the array of brush elements 23 all arranged obliquely on the carrier 24; this is easily done because the tubes 21 lie stably against one another.

In order to facilitate this assembly of the brush elements 23 on the carrier 24 at the required angular disposition, automation is used e.g. a positioning arm (not shown) for the tubes 21 which has a reference abutment face at a suitable angle to push all of the tubes 21 of all the brush elements 23 to the required angle relative to the carrier 24. In this way, a plurality of brush elements can quickly be assembled on the carrier, to be then mounted in the jig 25 as described first above.

The seal shown in Figure 4 is an annular brush seal having outwardly-directed bristles, but of course other shapes of seals can be made in the same manner by providing suitably shaped carriers, assembly jigs and so on.

Though a seal as described above and as illustrated in Figure 4 may often be used without further finishing, it may at times be required to machine the seal more accurately to a finished size; e.g. using a grinding machine against the bristle tips.

CLAIMS

1. A method of manufacturing a brush seal element comprising the steps of:

positioning a plurality of bundles of bristles on a carrier member such that the ends of the bristles project from the carrier member;

clamping the bristles projecting from the carrier member between a pair of coaxial clamping rings located on a brush seal assembly jig, and

integrally joining the clamping rings and the bristles such that the resulting seal element is annular and has radially extending bristles.

2. A method as claimed in Claim 1 wherein the bundles are located in respective guides disposed around the carrier for positioning the bundles around the circumference of the clamping rings before clamping.

3. A method as claimed in Claim 2 wherein the bristles are slidable within the guides so that their radially inner ends are made to abut an end face of the assembly jig thereby to similarly locate all the bristles with respect to the jig in the radial direction.

4. A method as claimed in any preceding claim wherein the guides extend along the radius of the carrier and clamping rings such that bristles are radially aligned in the resultant seal.

5. A method as claimed in any preceding claim wherein the bristles and clamping rings are metallic and are integrally joined by welding or brazing.

6. A method as claimed in any preceding claim wherein the free ends of the bristles are machined following removal of the carrier to ensure concentricity of the brush seal.

7. A method as claimed in Claim 6 wherein the machining is performed by means of a grinding machine.

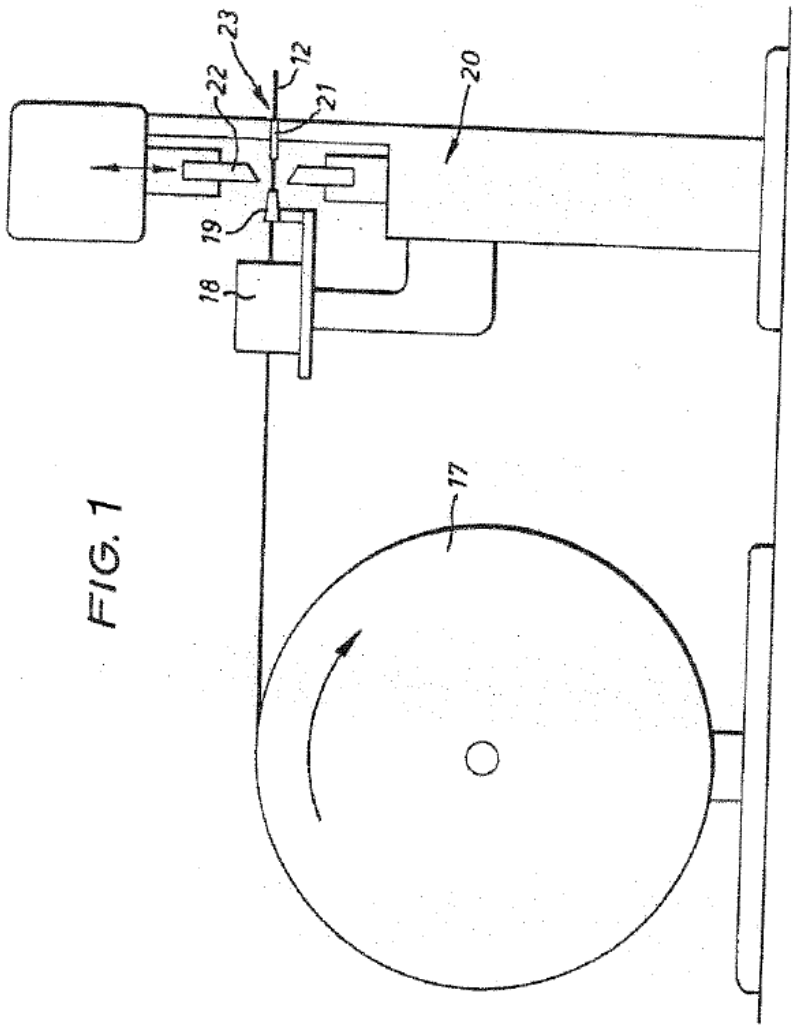
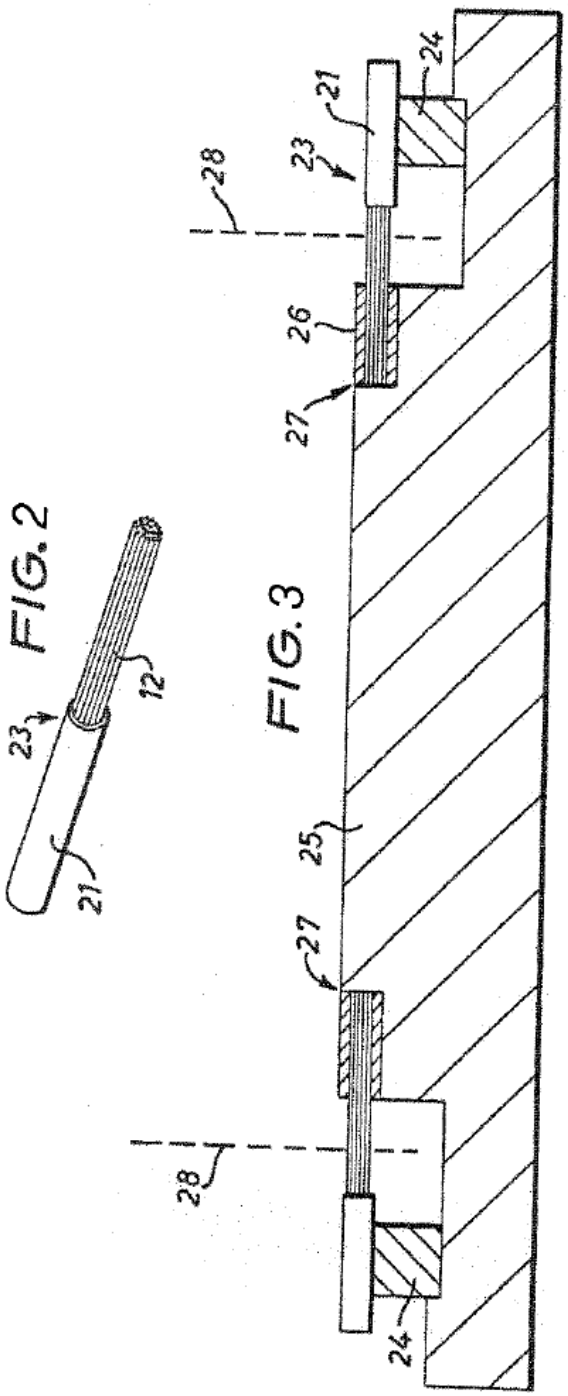


FIG. 1



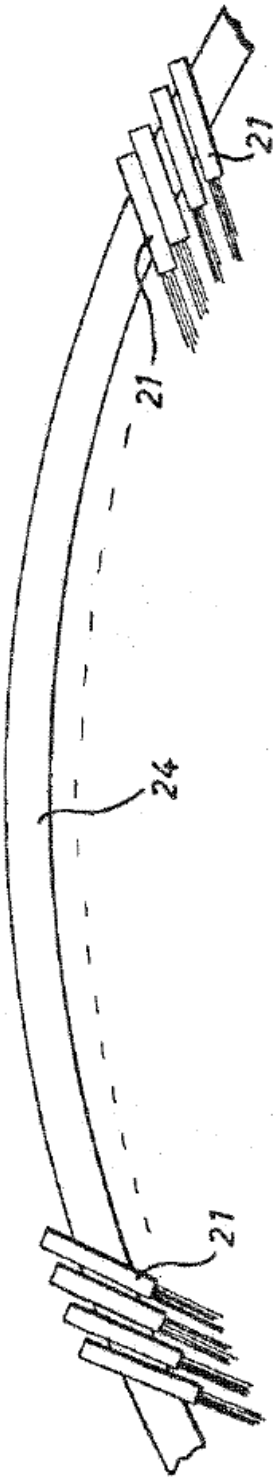


FIG. 5

Published: 21 Feb 2004
Filed: 8 Aug 2003
Priority: 20 Aug 2002 USA

SEALS AND METHOD OF MANUFACTURE THEREOF

This invention relates to seals, and relates in particular to a method of making seal elements and to seal elements made by the method.

According to the invention there is provided a method of manufacturing a brush seal element comprising the steps of: providing a brush having a plurality of bundles of bristles projecting from respective holes in an annular backing member, securing the respective bundles to the backing member, e.g. by threading a retaining wire through the holes from behind and around the central portion of each bundle so that all the bundles are wired together; clamping the free ends of the bristles between a pair of annular clamping members, joining the clamping members to the tips of the bristles; and subsequently cutting the bristles to remove the backing member and the ends of the bristles attached thereto.

In the drawings:

Figure 1 is a sectional detail showing securing of a bristle bundle;

Figure 2 is a sectional elevation of a brush formed in a first stage;

Figure 3 shows the brush of Figure 2 with clamping members,

Figure 4 is an end elevation of the brush of Figure 3.

Figure 2 shows a backing ring 1 with a plurality of radial holes 3 each having an internal step 5 adjacent its radially inner end.

The holes 3 are formed close together, and into each hole is pulled a bundle of metallic bristles 6. The bristles are straight pieces of small diameter wire i.e. less than 0.005 inch diameter. As many as possible are disposed in each hole.

The bristles are held in place by a wire lacing which consists of a small diameter copper wire 7 which passes up through the hole, over the central portion of each bent-up bundle of bristles 6, back down the same hole and up into the next hole, so that all the bundles of bristles are wired together and can be pulled down (folded double) into their respective holes to seat against the step 5. This pulling-in is shown for an individual bundle in Figure 1.

In one example 140 wires of 0.003 inch diameter were doubled over and pulled into each hole so that 280 bristles were formed.

The brush construction has groups of substantially parallel radial bristles emerging from the holes, but spaced by the wall thickness between holes. This would not be acceptable for a seal element, since the spaces provide a leakage path. However, at their free ends, the fibres, being not quite parallel, become intermixed and there is no spacing.

Two clamping rings 8 are arranged one on each side of the brush, and the radially outer ends of the bristles are welded to these rings to form an integral bond. The ring 1 and the wire laced ends of the bristles are then machined away, for example along the dotted line 10, to leave free bristle ends of the desired length protruding from the clamping rings 8.

The above described method produces a brush with radially inwardly extending bristles but clearly the method can be applied to the production of a brush having radially outwardly extending bristles, by reversing the radial disposition of elements.

The seal element formed need not be annular but can be straight, bent or other shape, by making the original brush straight, bent etc.

The method of joining the bristles to the clamping rings is preferably by welding e.g. with an electron beam 11 directed at the circumference of the bristles and rings to melt the metal and form a weld 12. Other methods of joining can be used to produce a similar integral joint, for example, brazing and diffusion bonding.

Fig.1

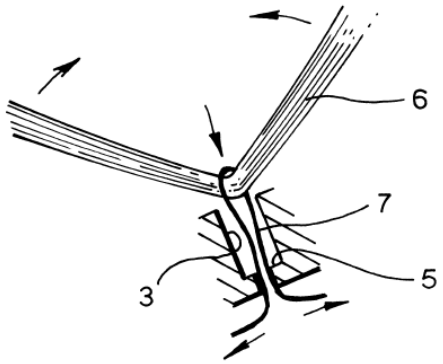


Fig.2

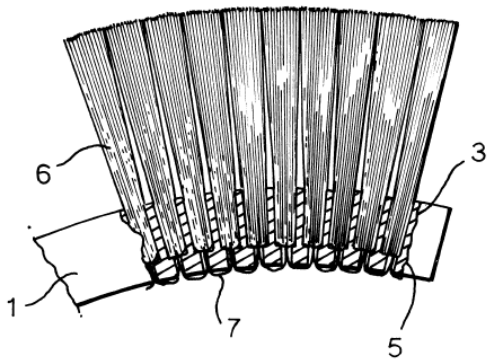


Fig.3.

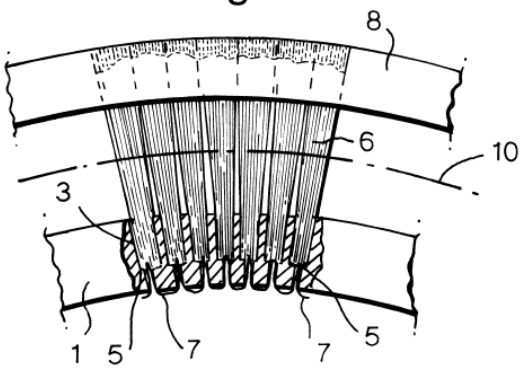
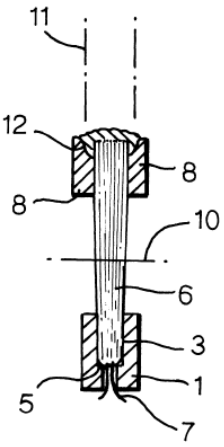


Fig.4



Published: 17 May 2003

METHOD AND APPARATUS FOR MANUFACTURING COMPLIANT BRUSH SEALS

The present invention relates to a method and an apparatus useful in assembling compliant brush seals.

The packed bristles of a brush seal discourage gas flow between relatively rotating components such as a stationary housing and a shaft rotating in the housing. Contact of the bristles with the shaft establishes a “zero clearance” between the seal and shaft further enhancing the seal effectiveness.

As has long been appreciated by those familiar with such sealing elements, it is necessary to pack the individual bristles uniformly about the circumference of an annular seal as well as to align each bristle element properly so as to achieve the desired advantages. This is difficult.

It is an object of the present invention to provide a better method and means for holding, aligning, and positioning a plurality of individual bristle elements preparatory to securing the bristle elements to a backing ring thereby forming a completed brush seal.

According to the present invention, an aligning member is provided which includes a surface having a plurality of grooves disposed therein. The bristle elements are received in and correctly aligned by the grooves.

In the drawings:

Figure 1 shows a cross section of the assembly apparatus;

Figure 2 shows a perspective detail of the aligning member;

Figure 3 shows a completed brush seal disposed about a rotating shaft; and

Figure 4 shows apparatus arranged for automatic manufacture.

Figure 1 shows an arrangement 10 according to the present invention. It includes an annular aligning member 12 having an annular support surface 14 which is adapted to align a plurality of separate bristle members 16.

The arrangement also includes a first removable holding member 24 disposed, in the preferred embodiment, within the annular aligning member 12. The holding member 24 supports a first backing ring 20 adjacent the portion of the bristle elements 16 extending beyond the surface 14. A second backing ring 22 is positioned opposite the first backing ring 20, sandwiching the bristle elements 16.

A second holding member 18 is provided behind the second backing ring 22. The holding members 18, 24 are forced together by urging means, such as a threaded bolt 29, securely but releasably clamping the backing rings 20, 22 and bristle elements 16.

The clamped subassembly 16, 20, 22, 18, 24, 29 is then removed from member 12 and the clamped bristles 16 and backing rings 20, 22 are then fused or otherwise permanently secured together forming a brush seal 30, as shown in Figure 3, to be used for sealing between a static housing (not shown) and a rotating shaft 32. The step of permanently securing the bristles 16 to the backing rings 20, 22 includes, for example, welding or fusing the bristles and backing rings together and subsequently trimming excess bristle material radially outward of the weld 34.

Figure 2 shows the grooves 26 and lands 28 on the support surface 14. The grooves are aligned in the radial direction of the annular aligning member 12 so that the bristles are radially aligned in the resultant brush seal.

Figure 4 shows one method of automating the assembly procedure. A bristle element dispenser 38 delivers a preselected number of individual bristles 16 to each groove 26 in the aligning member 12. The member 12 is indexed rotationally with respect to the bristle dispenser 38 until each groove 26 has been filled with a preselected quantity of loose bristle elements 16. If necessary the bristle elements may be pushed radially inwards in the grooves 26 until their radially inner ends contact the reduced diameter raised central portion of the first holding member 24.

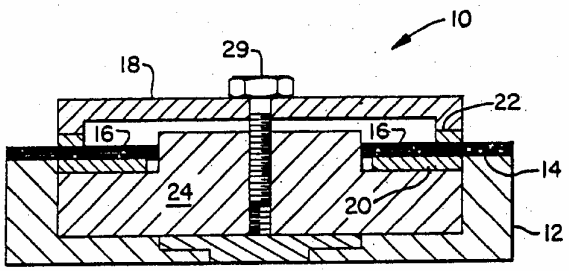


FIG. 1

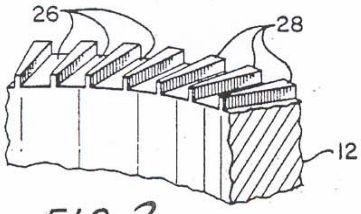


FIG. 2

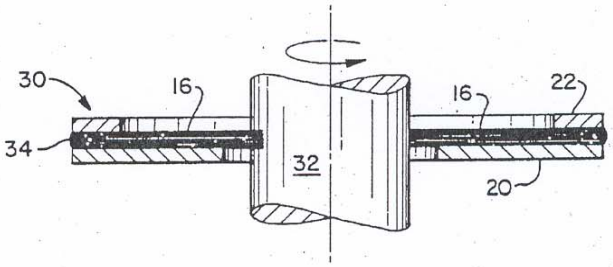


FIG. 3

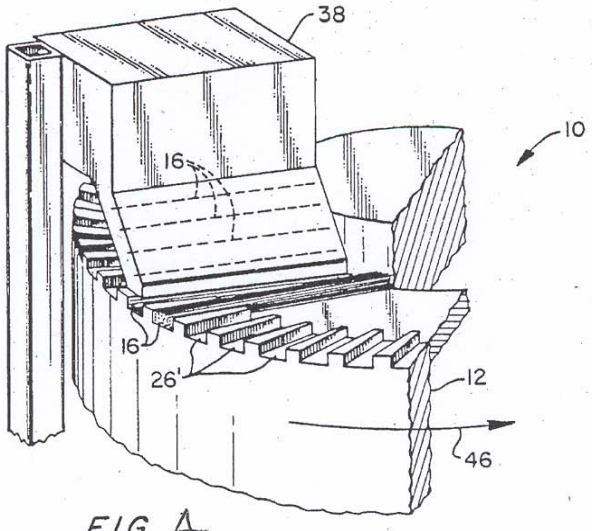


FIG. 4

EXAMINERS' COMMENTS

PAPER P4: GENERAL ISSUES

(1) GENERAL APPROACH

A P4 question is set up to require and enable preparation of a full response for filing at the Patent Office. The Examiners want to see that the candidate can

- understand a patent application written by somebody else, and interpret its claims;
- assess the relevance of cited documents to what is disclosed and claimed;
- see what amendments could be made to cure any invalidity - this will require skill in dealing with novelty and obviousness issues;
- understand and assess objections raised by the Patent Office or opponent;
- (crucially) identify, in the light of all the circumstances set out in the question, which among possible lines of response best furthers and protects the client's interests.

Candidates must then show understanding and control of language, logic and argument in preparing claim amendments and a letter replying to the objections. Candidates must show understanding of fundamental prosecution strategies and legal constraints affecting amendment and division, in particular the prohibition on extending the original disclosure (Section 72(1)(d)(e) and Section 76).

Because the Examiners are looking for strategic judgement in prosecution, the scenarios presented vary from year to year. However candidates should note that because the Examiners want to test the abilities listed above, a correct answer is very unlikely to involve simply deferring the apparent major issues while further enquiries are made of the client.

The instructions from the client give indications to the candidate about the kind and scope of protection that the client desires, in relation to market and likely competition. The proposed amendment should provide the proper protection to benefit the client's business, while meeting objections raised by the examiner. Candidates may be expected to counter weak or incorrect objections by argument alone.

Divisional filing can be an important strategy. The question routinely explains to candidates how they should deal in their answer with any proposed divisional filings. Candidates are reminded that divisional filing is not necessarily expected. In real practice divisional filing although important is an exception. The Examiners look with suspicion at answers that purport to "protect the client's position" or "maximise protection" by proposing divisional filings for each and every novel feature. In the exam, as in real practice, you must discriminate to succeed. Divisional filing proposals are of course almost always possible, but not always necessary or appropriate. The marks available in a given paper for any such proposals will vary accordingly.

(2) MARKING

The claims usually determine a large proportion of the available marks; typically about half. The remainder of the marks are divided, often about equally, between the letter to the Patent Office and the memorandum of points (or the client letter, if a letter is requested). To avoid hinting at acceptable answers, specific indication of the mark allocation is not given in the question.

In the 2005 paper the allocation was: claims 43 marks, response letter 29 marks, memorandum of notes 28 marks. By request, a copy of the marking schedule used by the Examiners is attached. This should be referred to with awareness that it cannot be more than a guide to the marking. P4 is not a list of questions with individual clearly-defined answers. It is a single question with a single complex answer. Equally good answers may differ widely. There is great scope for variation among answers with respect to elements which may significantly affect the marks awarded, but which cannot meaningfully be itemised. The available marks are grouped into categories and the numbers of marks available in respect of certain elements approximately predetermined, to assure general consistency of marking between the Examiners. Each script is marked by two Examiners.

The marks given also depend on how self-consistent the answer is. It cannot even always be said that, just by mentioning a certain point, marks will be gained. A candidate who accompanies a correct element or argument with another one entirely at odds with it risks getting few or none of the available marks. Also, the Examiners want to see that the candidate lit upon the chosen claims and arguments for genuine reasons. The memorandum of notes can be important in this respect.

The marking schedule gives a version of claim 1 thought by the Examiners to be good, but it must not be thought that only a claim closely similar to this one would get good or adequate marks. Where “negative” amounts are indicated, these are not for differences relative to the specific sample claim shown, but indicate a reduction in the maximum marks available for any claim deficient in the manner identified; the actual mark obtained out of that maximum will still depend on the overall drafting quality.

(3) PRESENTATION OF ANSWER

The best answers to P4 are often the shorter ones. Time is well spent reading and thinking, to ensure a good and thorough understanding of the client’s patent application and its relationship to the prior art, so that this can then comfortably be linked to the client’s aims. A sensible practical approach, accompanied by reasoned arguments and explanations as to why that approach was chosen, is what is wanted.

Candidates should take pains to record points for the requested “memorandum” or client letter as specified in the question. Claims do not usually explain themselves, and letters to the Patent Office naturally pass over many issues. So, the memorandum may require more detail than a real life file note, meeting note or letter. Candidates should use this as an opportunity to explain the decisions taken in other parts of the paper, i.e. to “show the working”. 28% of the total marks were available for this part, so it was a useful area for candidates to pick up marks. On the whole, candidates who failed to manage time effectively, and did not attempt this part or left it seriously incomplete, struggled to pass the paper overall. Brief note form is acceptable for a memorandum, provided that it can be understood. Complete sentences are advisable.

Thus, there might be notes indicating:

- assessment of the prior art, noting specifically why amendment is needed (rather than simply stating that claim 1 is not new over document A, candidates gain marks by noting what in document A anticipates);
- discussion of amendment options, their pros and cons in the light of the client’s comments, and any other surrounding factors, showing awareness of any problematic or arguable technical points e.g. in the prior art;

- justification for the choice of amendment made, and for any other strategic decision e.g. to make a divisional filing;
- indication of awareness of any significant questionable issues of basis, unity or clarity, whether or not raised by the Examiner;
- indication of potential fall-back positions should the amended independent claim not be accepted by the Examiner;
- discussion of tactics and or commercial aspects with regard to any competitors mentioned in the question or similar points arising in the question.

In real life, some of these explanations give a client the chance to see why you have chosen a particular approach or claim wording, and to expose any wrong assumptions.

Order of presentation is not crucial, but the Examiners prefer the response followed by the memorandum. In the response, most candidates put the claims before the letter which isn't realistic, but the Examiners like it because it puts the most important things first. There is a recent trend for sub-claims to be presented on a mass of pages, with one tiny claim on each. Presumably this is to leave room for subsequent insertions, but it is taken to unnecessary extremes.

The Examiners do their best, but find parts of some scripts very difficult to read. Candidates should have in mind that if parts of the answer are genuinely illegible, the Examiners cannot give marks for them. Candidates should also beware of submitting all of their written materials, including working notes and scribbles. Everything submitted is part of the answer. If the script apparently contains two conflicting approaches to the same issue, and the Examiners cannot tell which was finally intended, the candidate risks not getting marks for that issue. Like attorneys, candidates must take responsibility for deciding what the answer is.

P4: 2005 PAPER

(1) PRIOR ART

Candidates were expected to note that the GB document was prior art by virtue of Section 2(3) only. The EP prior art clearly anticipated claim 1 so that amendment was needed. In the Examiners' view the GB document also anticipated: see section (4) below.

(2) CHOICE OF AMENDMENT

There were two main lines of amendment giving a decent main claim, and almost all candidates went for one or the other of these two although the quality of drafting varied widely. The two main options were

- an angled lay-up of the bristles and
- the use of discrete holding members or holding tubes in the process.

The Examiners preferred the latter option, because being a true "process" invention it followed on more naturally from the invention and method claims as originally presented.

There is a clear indication in the client's letter that this feature is being used by the competitor and is important in practice.

However, it is clear from the client's letter that the "angled bristles" invention provides considerable advantages and is used in the competitor's products. These advantages are largely "product" advantages, so the feature lends itself to a product claim instead of or in addition to a method claim. A product claim to a seal with angled bristles, independent of the production method, was a valuable claim (which however few candidates proposed). For this reason the Examiners were prepared to give as many marks for the "angled bristles" option as for the "discrete holders" invention, if well presented with both product and process claims. The description in the application on pages 6 and 7 has basis for the product claim, and explanation of the relevant advantages. Presentation of this method-independent claim in the pending application might cause upheaval in the examination/search procedure, so it is probably more appropriate to a divisional filing.

It is clear from the client's letter that large quantities of money are being spent (on a new factory) so that the additional cost of a divisional filing should not be an obstacle.

Because in this particular paper the amendment presented a number of additional drafting issues - discussed below - the Examiners were prepared to give most of the available "claims" marks for a choice of either one of the main lines of amendment, since both covered the infringer's activities. It was not necessary to claim both, and propose a divisional, in order to get a pass.

A number of candidates proposed divisional applications to apparatus for making the filled tubes, and even to the filled tubes themselves, but these gained few marks.

(3) DRAFTING ISSUES

The paper presented a number of drafting issues which many candidates overlooked entirely, while those that did address them did not always do so convincingly. Probably for that reason, there were few very high marks despite the high pass rate.

(a) An issue which definitely should have been addressed, because the Patent Office raised it, was the reference to "radial" bristles in claims 1 and 4. The application's disclosure gives scope for dealing with this in various ways. It was important to present a coherent approach. One way is to say that even "angled" bristles project substantially or at least partly radially, and that this is how the term is used in the application on page 6. The term could then be left in claim 1, and claim 4 clarified using "true radius". Or, the options (truly radial, angled away from the true radius) could have been separately specified either in the main claim or in dependent claims. [But, see (b) below]. Most candidates did not deal with this satisfactorily.

(b) A separate issue, not raised by the Patent Office but hinted at in the client's letter and clear in the application itself, was that of whether the claim had to be or should be limited to circular seals. No situation with a non-circular seal was presented, but the feature was clearly not conferring patentability and the description clearly says it is not required. Marks were therefore available for broadening the claim to non-annular seals. Doing this required confidence in amendment and a self-consistent approach. Where the candidate had gone for the "angled bristles" claim, it was difficult because there is then no "radius" to define against. Numerous candidates tried to broaden by deleting the reference to "annular" at the end of claim 1, but left the "coaxial clamping rings" in the earlier stage so that the broadening

was ineffective. However a number of candidates saw that the clamping members could reasonably be renamed as “plates”. With relevance to point (a) above: candidates who removed the restriction to annular seals should realise that references to “radial” then became meaningless and should have been clarified or removed.

(c) The Patent Office had objected that the main method claim should include the step of cutting. A response is needed. Many candidates simply ignored the objection, which did not earn marks.

Others introduced the cutting step, and this was an acceptable response. However a surprising number introduced it into the claim after the step of fixing (welding), even though in the only example given it precedes it (page 5). This ordering would not seem completely impossible, but none of the candidates concerned gave any justification for their choice.

Some resisted the objection, and argued that the cutting step need not be included in the claim. Marks were awarded for reasonable argument, e.g. with reference to page 5 line 15 (although this passage does immediately follow a description of the cutting at line 13). It could be argued for example that the cutting, although practically essential per se, was not an essential feature of the newly-claimed concept involving the discrete holders. Or, that it was not actually essential because you could get a complete seal just by pulling the discrete holders off the bristles, without cutting. [The Examiners tended to the view that in practice cutting would be necessary: after simple removal of the holders the ends of the bristles would probably have to be extensively finished to make the circumference uniform.]

(d) Where candidates drafted claims to the “angled bristles” invention, the Examiners were looking for awareness that saying “at an angle to the radius” is vague and, depending on context, may not distinguish from truly radial. Then, the awareness should be followed up with appropriate and self-consistent claim drafting or interpretative comment. For example, candidates could have drafted an unambiguous distinction by referring to bristles angled away from the radius, or oblique with reference to the geometrical or true radius. There is plenty of basis for this in the description text. Or, candidates could have asserted in their response that when interpreted in the light of page 6, “at an angle to the radius” clearly means at a non-zero angle. Too often a weak definition was presented without comment, support or apparent awareness of the issue.

(e) Some candidates included the manufacture of the bristle bundles as a step in their method claims. This seems an undesirable limitation, and better left in a sub-claim. Claim 1 could just refer to “providing” the bundles.

Some described the discrete bundles in the claim by saying that their angle of inclination to the radius **could** be varied. This does not really make sense in a method claim.

(f) Product claims or product-by-process claims corresponding to the “discrete holders” method claim generally got no marks, since in general they lacked novelty and/or gave no protection beyond that of the process claim. The same applied to omnibus claims directed to a seal product, unless perhaps that of the claim 5 method, or of course a method including the angled bristles.

(g) Dependent claims should have been added where appropriate. Where the “angled bristles” option had been chosen for the main claim, there was little scope for additional dependent product claims, because the description contains little additional information. However whichever option was chosen for the main claim, the other option could have been included as a dependent method claim. The “discrete holder” option gave some options for

dependent claims, including reusable tubes and use of adhesive. See the marking schedule. Many candidates offered no additional dependent claims at all.

(4) PATENT OFFICE LETTER/ARGUMENTS

(a) The letter should explain the amendments made, and where appropriate reassure the Patent Office that they correspond to information in the original application made. On the whole, candidates did this well.

(b) The response was overdue, so that a two-month extension (obtainable as of right and retrospectively) should have been requested. Many candidates overlooked this, missing easy marks.

(c) In relation to the prior art, novelty and inventive step needed to be asserted properly. This is done by describing the difference clearly and saying why it is significant. Even for a pure novelty point it is worth saying why a difference is significant, because it shows that it is a real difference and not merely a matter of wording.

For example, many candidates with claims to the “discrete holder” invention elaborated at length on the fact that the prior art did not show such discrete holders, without saying anything about their significance i.e. that they make the bristles easier to handle, so that you can move them around and set them to any angle you want.

(d) Some candidates argued that claim 1 was novel over GB because GB did not disclose a “jig”. The Examiners were usually not convinced by this. Firstly, “jig” is such a general word that the distinction is intrinsically unconvincing, even though GB doesn’t describe how its clamping rings are “arranged”. Secondly, although we don’t have “file wrapper estoppel” here, it’s surely undesirable to suggest for posterity that the term “jig” means something narrower than “any support which provides sufficient alignment”. Almost all candidates had introduced another clearly novel limitation into their claims, such as the tubular holders, so that the argument was unnecessary.

(e) Not many marks were available for inventive step, since there was only one document to argue over. Arguments for inventive step must be linked to the features of the main claim presented. A number of candidates erred in this respect.

Arguments are not strengthened by using underlining or rhetorical phrases such as “in no way discloses…” and the Examiners suggest not doing this. Almost invariably, parts of candidates’ answers phrased in such a way were weak in content.

(f) As mentioned previously, candidates needed to deal with the “radial” clarity issue. Few did so.

(g) Finally, a large number of candidates went to lengths to explain how their amended claim covered both inwardly and outwardly extending bristles. Generally this did not gain marks. The paper did not seem to lay stress on this point, save that obviously one should not gratuitously exclude either possibility. Admittedly the client’s letter mentions both, but the claim always covered both so that there seemed little to discuss. Sub-claims specifying (while covering both of) inward and outward bristles were not awarded marks.

MEMORANDUM OF NOTES

Most relevant issues have been mentioned in the "General" section above. In the present paper, the Examiners were looking for some assessment of the patentability prospects of the chosen amendment, of the usefulness or otherwise of any proposed (or already filed) divisional, and of the level of confidence that these would cover the competitor's activities. Some comments on the value of process claims earned marks. The possible significance of the competitor having a former employee of the client, indicating likely infringement of method claims, was also relevant here.

Marking Schedule

Claims	**43**
Claim 1	**25**
Suitable claim 1: 1. A method of manufacturing a brush seal element comprising the steps of: preparing a plurality of bundles, each bundle comprising a discrete holder within which multiple bristles are held; positioning said plurality of bundles of bristles on a carrier member such that the ends of the bristles project from the carrier member; clamping the bristles projecting from the carrier member between a pair of clamping members located on a brush seal assembly jig; integrally joining the clamping members and the bristles such that the resulting seal element has radially extending bristles; and severing the bristles part way between the discrete bundles and the clamping plates. "tube" instead of "holder" is equally acceptable. removing all reference to clamping rings desirable as removes all reference to annular brush seals	25
Placing severing step before joining, or other examples of misrepresenting the method steps as being in a specific (wrong) order.	-4
Alternative answer: Removing "annular" and limiting to the angular lay-up This method claim is almost as good. The letter points to this answer too, so don't over-emphasise relative importance of first claim above. 25 marks awarded if this "angular" claim is accompanied by a valid product claim.	20
Defining the angular lay-up in a manner which does not exclude the radial direction	-3
Faults common to both paths	
Not removing annular	-3

Not adding the severing step and providing no justification for doing so.	
Other claims	**14**
Claim to brush seals not rewarded – no novelty in the product (unless angled, of course).	
Dependent claims:	
Angled bundles (if option 1 main claim)	2
Reintroducing the annular shape	1
Preassembly of bundles(if option 2 main claim)	2
Reusable tubes	2
Predetermined number of bristles	1
Reference abutment face	1
Amend claim 4 for consistency	2
Omnibus claim	1
Device for manufacturing a brush seal element	3
Divisional Claim	**4**
Divisional claim to “other” amendment option	4

Response	**29**
Extension of Time	**2**
Basis for amendment: if amendment is wrong then fewer marks available:	**9**
Amendment option 1	
- removal of ‘annular’ (p7 line 21)	2
- holding bristle bundles prior to assembly (p4 line 25)	2
- cutting to length (p5 line 13)	2
Or	
Amendment option 2	
- removal of “annular”	2
- angular alignment	2
Amendment of claim 4 (if required given amendment to claim 1 – mark awarded if candidate recognises no amendment to claim 4 required)	1
Basis for new sub claims	2
Novelty	**4**
[2 marks per document – generally comparative and dependent on a novel amendment. Good amendments will render all 4 marks available]	
Noting section 2(3) prior art	**2**

Inventive Step	**4**
Use appropriate arguments in support of IS – not credit if arguments do not relate to the claim submitted	
Clarity and support	**4**
Severing – adding feature removes problem	2
Addressing issue with claim 4	2
Other points	**4**
Request acceleration	2
Requesting opportunity to file divisional before grant	2

Notes for memo to client	**28**
Explain need for amendment	**2**
Explain amendment	**3**
- Avoided prior art by amending to…	2
- Noting only needed to distinguish from s2(3) prior art – IS not necessary	1
Explain impact of amendment:	**4**
- removed feature to ensure maximum protection	2
- inserted feature to distinguish from prior art but impacts on scope	2
Amended claim 4 to clarify scope – or note the absence of a need to do so	**1**
Added claim to jig to enhance protection	**2**
Discuss other options for amendment	**5**
- recognise that sub claims don't provide good options for amendment and that new sub claims provide suitable fall back positions should this be required	2
- identify other option for claim 1 (angled lay up/pre-bundling as the case may be)	3
Showing we cover preferred embodiments	**2**
Extension of Time – note that no loss of rights has taken place	**1**
Other advice	**8**
Suggest divisionals –need to decide quickly as acceleration requested	2
Options for dealing with Generic – early grant, warning with copy of granted patent (not pending application)	3
Practicality of method claims (product of process theoretically covered, but…)	2
Note possible impact on provisional protection by amending claims	1