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(54) **TRANSITION PIECE SIDE SEALING ELEMENT AND TURBINE ASSEMBLY CONTAINING SUCH SEAL**

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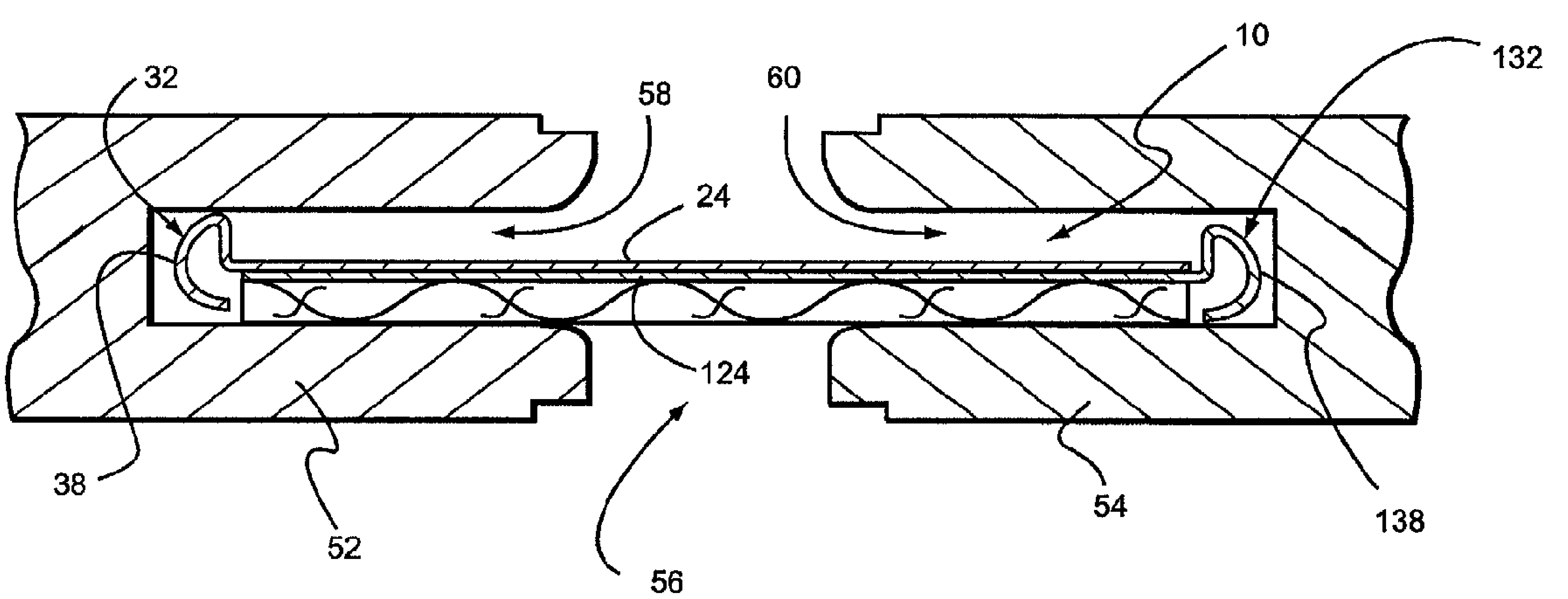
(57) **ABSTRACT**

The gas-path leakage seal is provided for generally sealing a gas-path leakage-gap between spaced-apart first and second members of a turbine. The seal includes an elongated seal member having an elongated, imperforate, and flexible first portion and a rigid second portion that defines a mounting bracket. The first portion has first and second surfaces and raised longitudinal edges that extend a generally identical distance above the first surface and generally the aforesaid identical distance below the second surface. A cloth layer having a thickness generally equal to or slightly greater than the aforesaid identical distance is superimposed on the second surface between the raised edges.



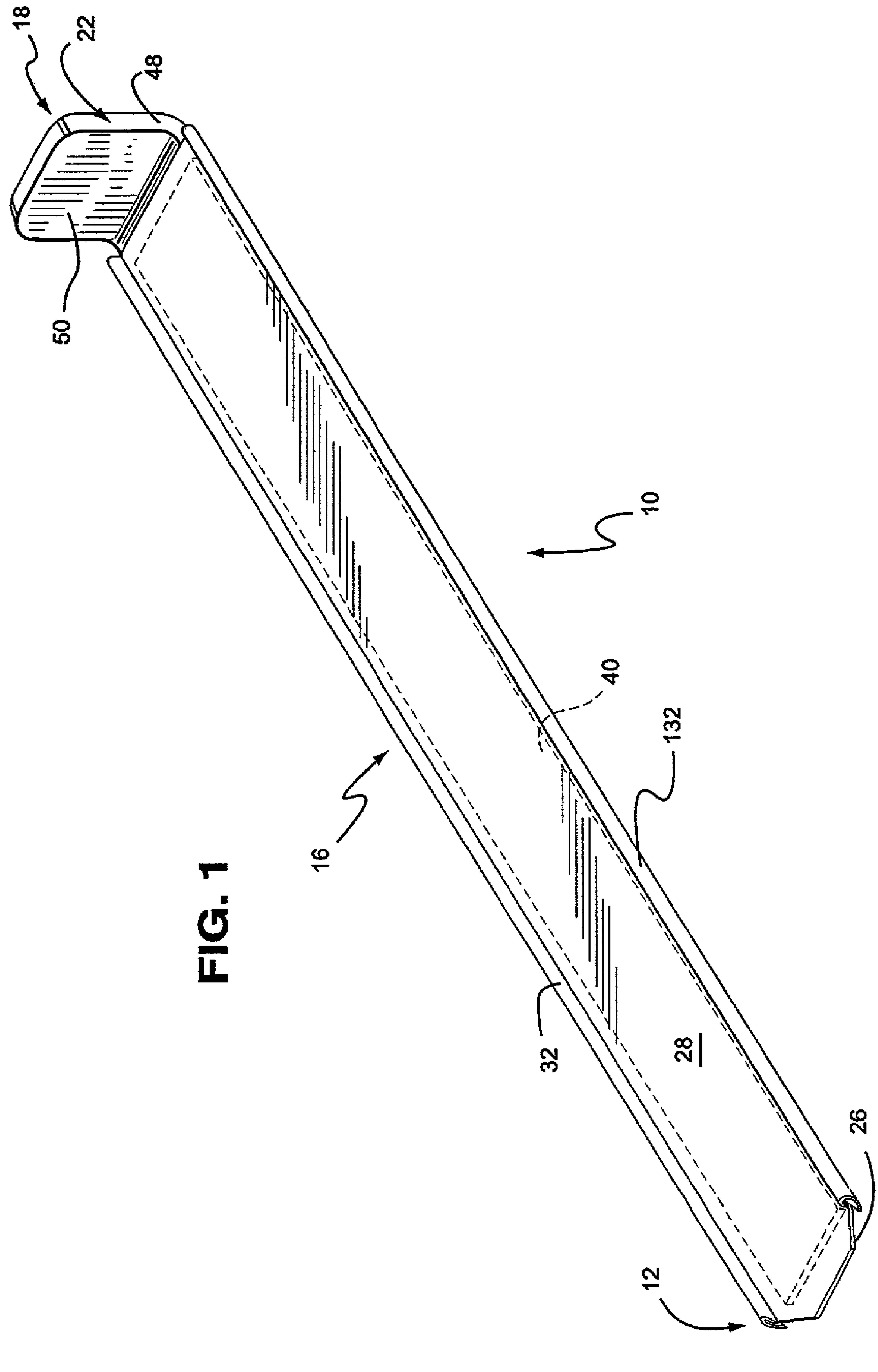


FIG. 1

FIG. 2

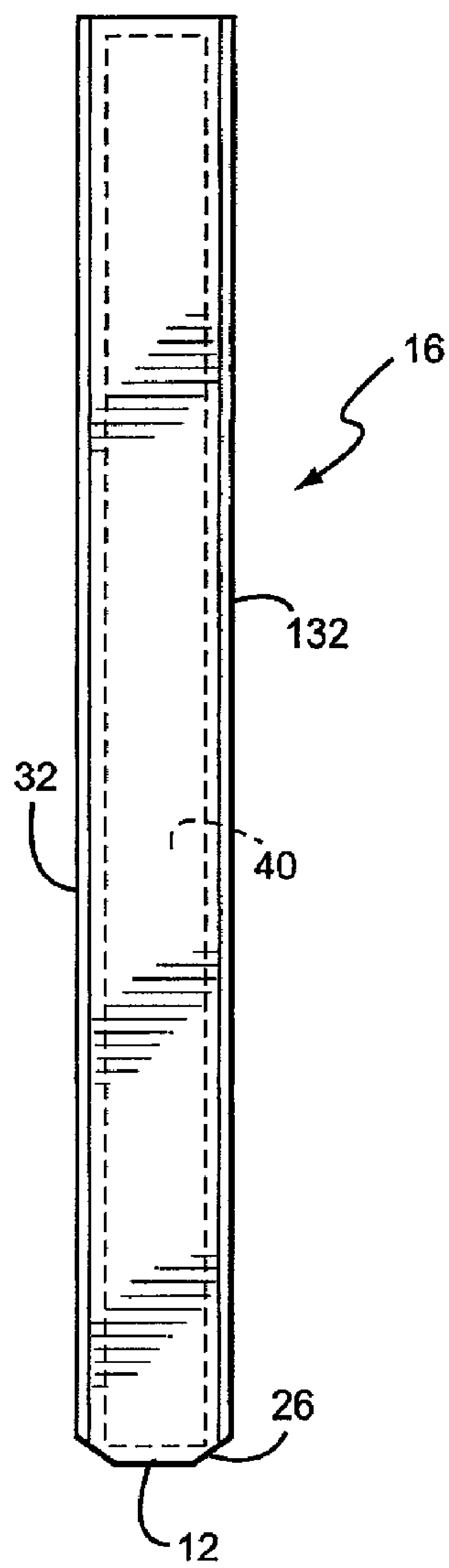
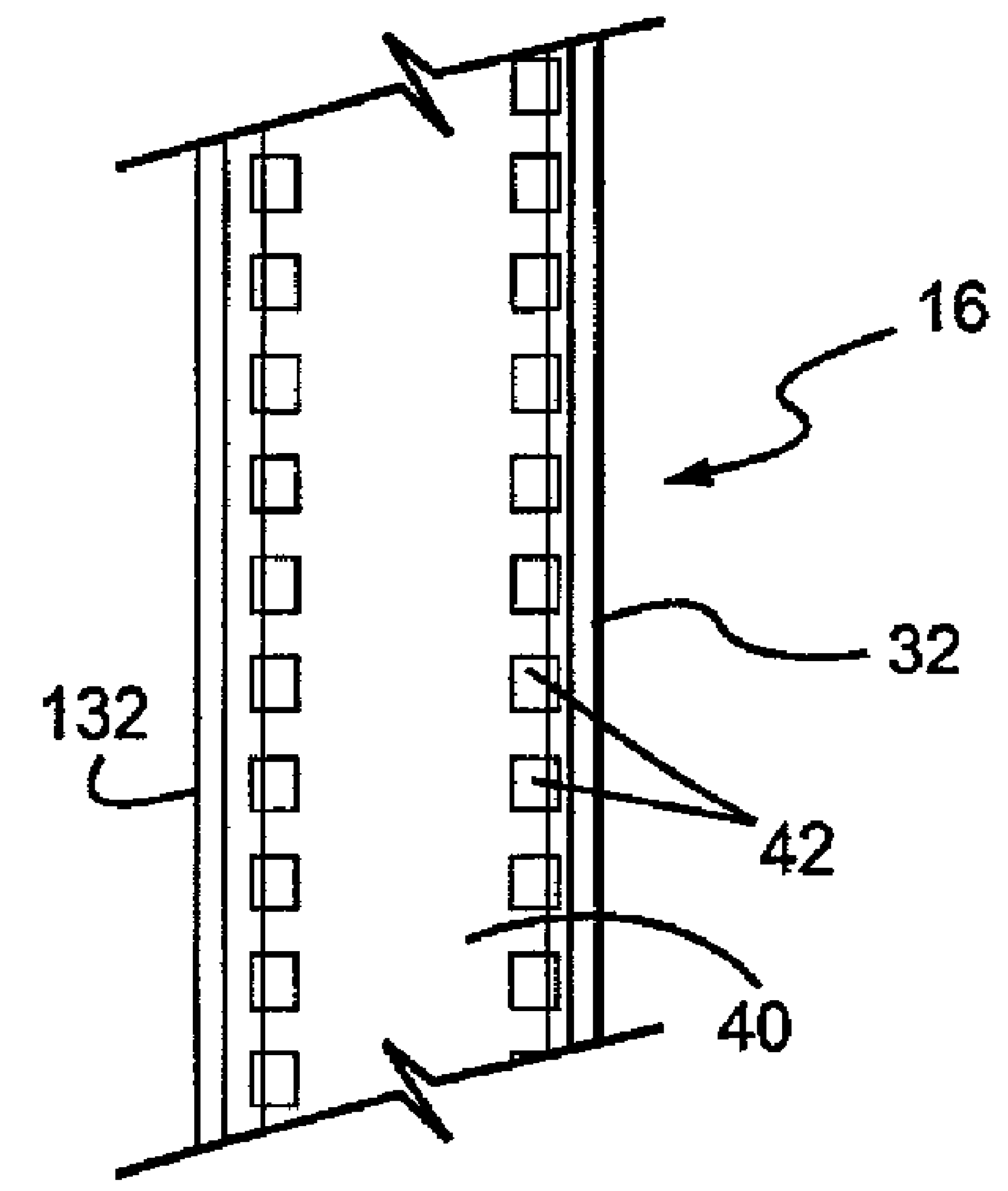


FIG. 4



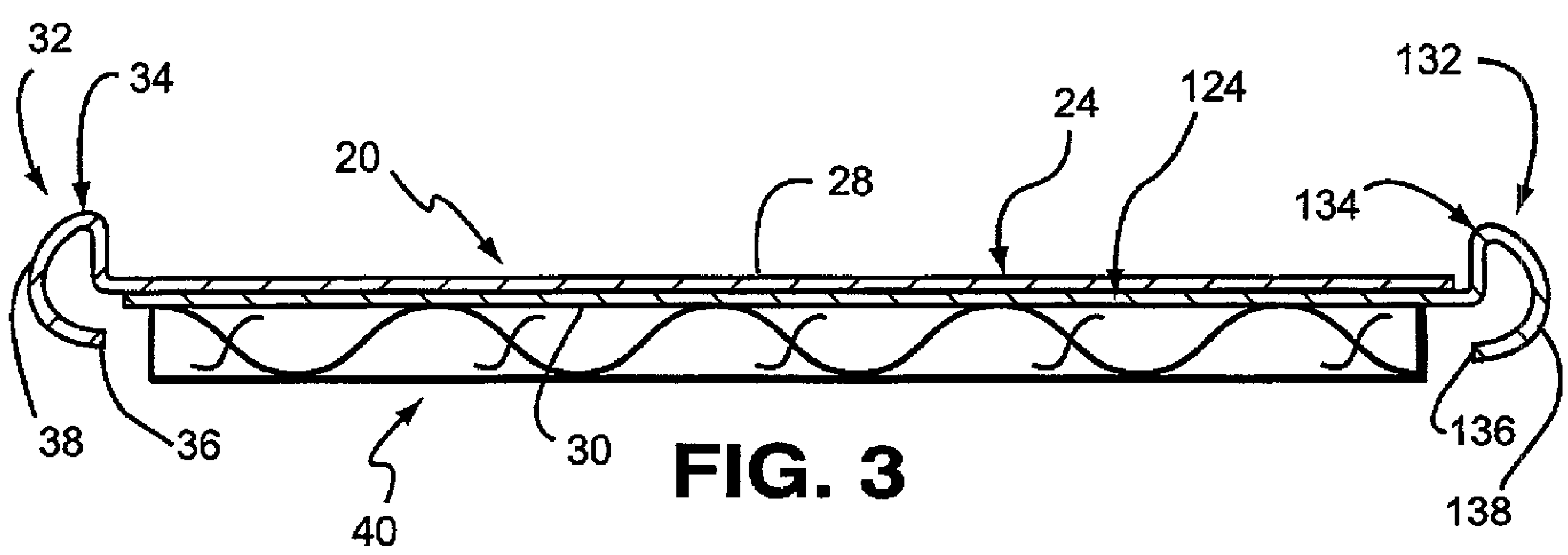


FIG. 3

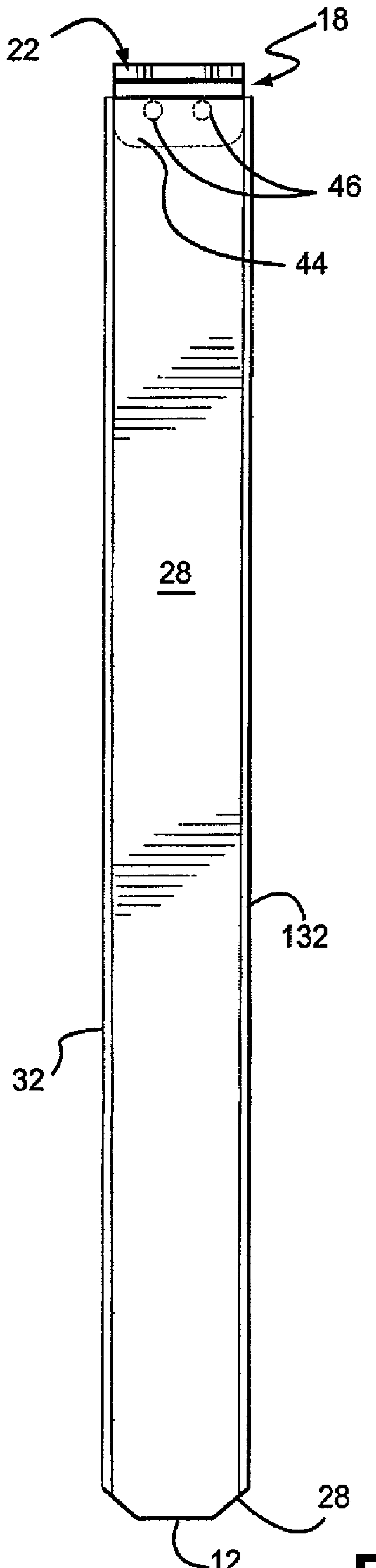


FIG. 5

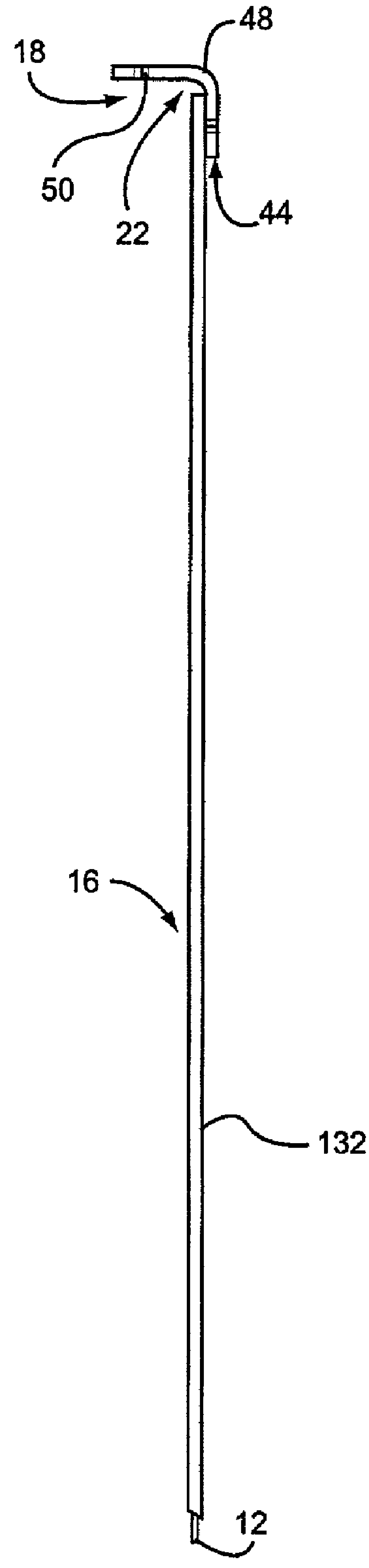


FIG. 6

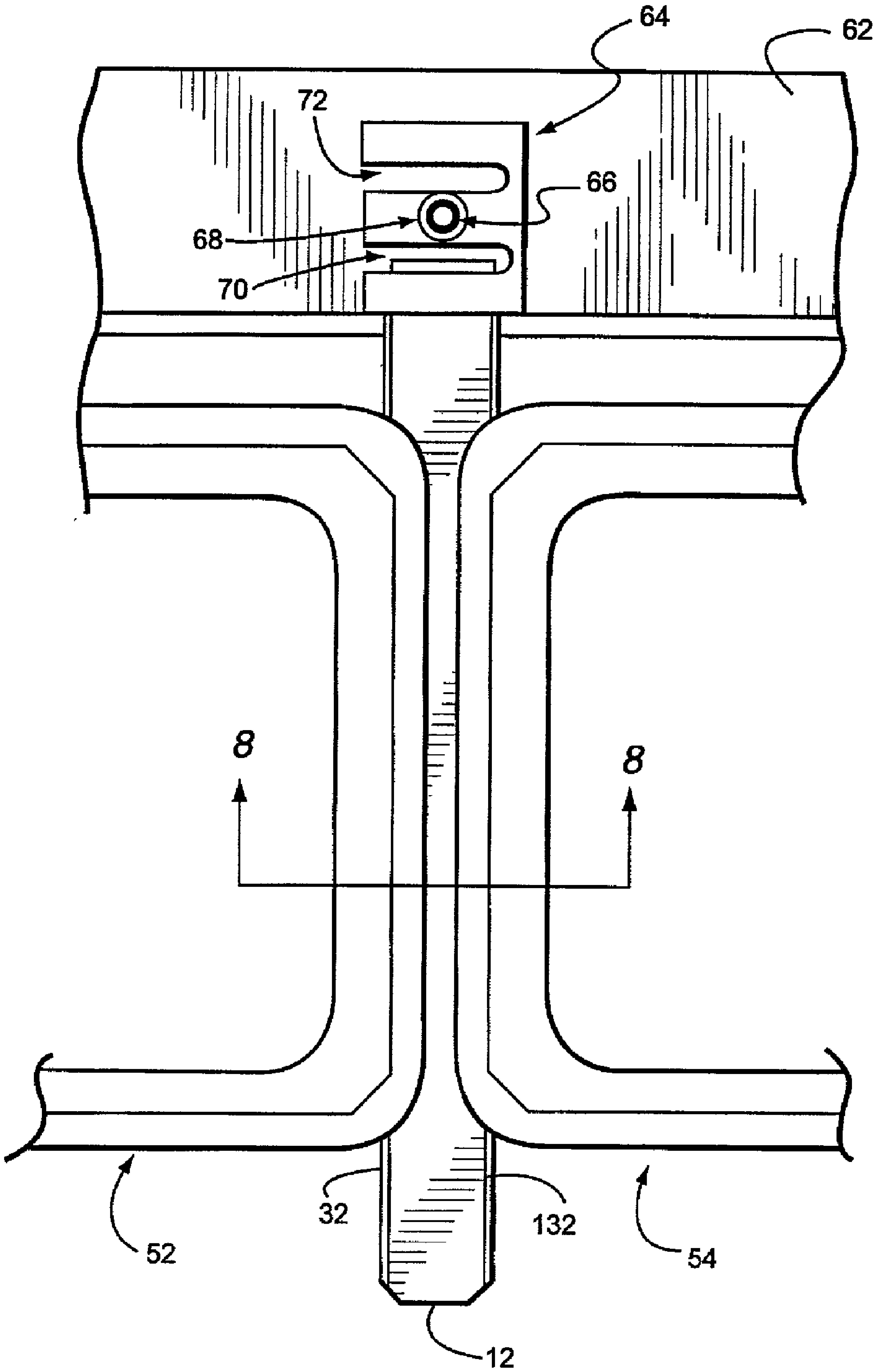


FIG. 7

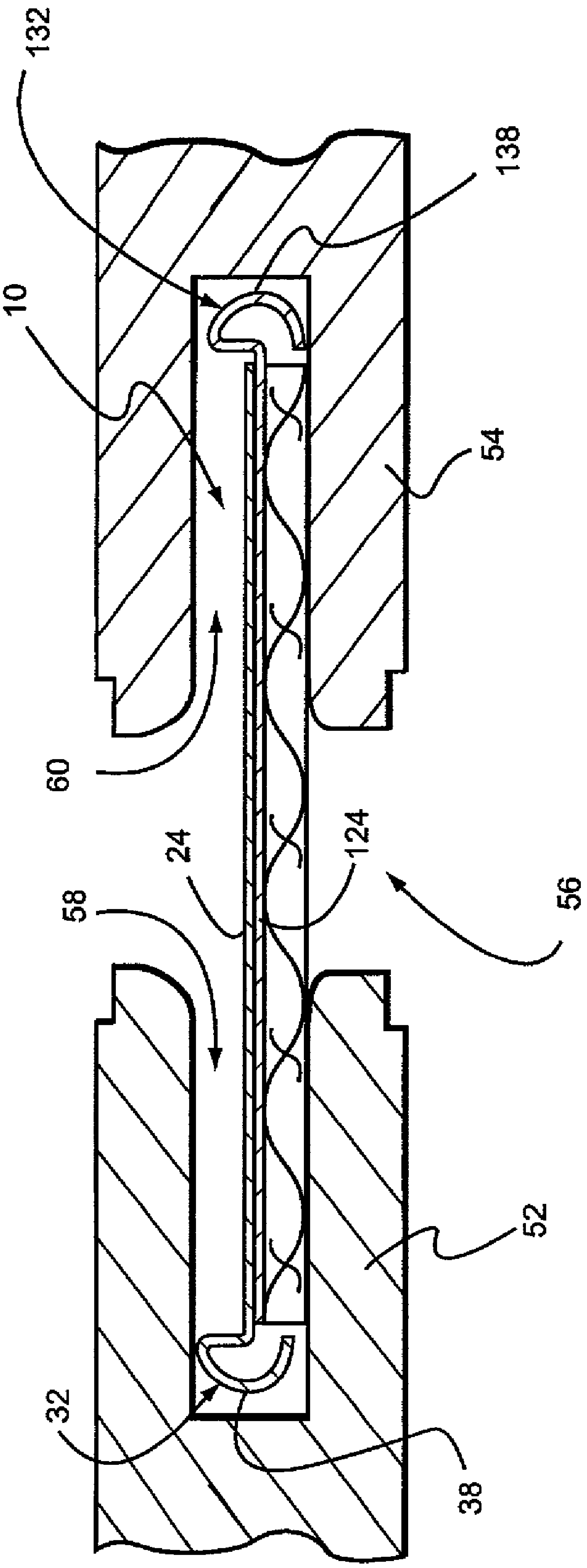


FIG. 8

TRANSITION PIECE SIDE SEALING ELEMENT AND TURBINE ASSEMBLY CONTAINING SUCH SEAL

BACKGROUND OF INVENTION

[0001] The present invention relates generally to seals, and more particularly to a spline seal for a turbine.

[0002] Turbines include gas and steam turbines. Gas turbines include, but are not limited to, gas turbine power generation equipment and gas turbine aircraft engines.

[0003] A gas turbine has a gas path which typically includes, in serial-flow relationship, an air intake (or inlet), a compressor, a combustor, a turbine, and a gas outlet (or exhaust nozzle). Gas-path leakage occurs through gaps between gas turbine subassemblies such as through gaps between the combustor and the turbine, and gas-path leakage occurs through gaps between the components that make up a gas turbine subassembly, such as through gaps between combustor casing segments. Such components and subassemblies have surfaces of different shapes, suffer from assembly misalignment, and undergo vibration. Hot-section components thermally experience hot gas flow and typically undergo different thermal growths.

[0004] Gas leakage, either out of the gas path or into the gas path, from an area of higher pressure to an area of lower pressure, is generally undesirable. For example, gas-path leakage in the turbine or compressor area of a gas turbine, between the rotor of the turbine or compressor and the circumferentially surrounding turbine or compressor casing, will lower the efficiency of the gas turbine leading to increased fuel costs. Additionally, gas-path leakage in the combustor area of a gas turbine will require an increase in burn temperature to maintain power level, such increased burn temperature leading to increased pollution, such as increased NOx and CO production.

[0005] Steam turbines (which can be considered a special type of gas turbine) include, but are not limited to, steam turbine power generation equipment. A steam turbine includes a steam inlet, a turbine, and a steam outlet, wherein steam is the gas which turns the turbine rotor. The turbine of a steam turbine is similar to the turbine of a gas turbine and suffers from steam-path leakage the way the turbine of a gas turbine suffers from gas-path leakage.

[0006] Seals are used to minimize leakage of fluids. A known fluid-path leakage seal is a cloth seal having a generally impervious and uniformly-thick shim assemblage and a cloth assemblage generally surrounding the shim assemblage. Cloth seals may be used in many applications including, but not limited to, seal assemblies for steam turbines and gas turbines used for power generation and seal assemblies for gas turbines used for aircraft and marine propulsion.

[0007] Commonly owned U.S. Pat. No. 5,934,687 relates to a cloth seal that incorporates a metal sheet having raised edges that are pushed against the associated turbine members to provide improved sealing. However, no provision is made for facilitating the quick assembly of the seal to the turbine members, and thus the metal sheet component design limits functional, manufacturing, and assembly options.

[0008] Another fluid-path leakage seal for sealing the gap between two circumferentially-adjacent (and non-rotating) transition pieces of a power-system gas turbine is disclosed in commonly owned U.S. Pat. No. 6,162,014. This seal is a manually-flexible metal seal that has a uniform thickness in the general shape of an elongated rectangular metal sheet, and has a fiber-fabric cloth layer wrapped around the metal sheet. One elongated edge of the metal bar is engaged in a surface groove of one transition piece. The other elongated edge of the metal bar is engaged in a matching and aligned surface groove of the other transition piece. One end of the metal bar serves as a mounting bracket, having a right-angle bend, which is used to secure the seal to a (non-rotating) first-stage nozzle. The grooves of transition pieces are not perfectly machined, and the grooves of transition pieces installed in power-system gas turbines are not perfectly aligned. As a result, in spite of the flexibility of the metal seal an effective seal may not be achieved between the transition pieces. In addition, the metal sheet component design limits functional, manufacturing and assembly options.

[0009] What is needed is an leakage seal for a turbine that improves upon the seals of the '687 and '014 seal configurations so as to be easy to assemble and install, and so as to provide a more effective seal between components that are not perfectly aligned, and that increases functional, manufacturing and assembly options.

SUMMARY OF INVENTION

[0010] The gas-path leakage seal according to an embodiment of the invention is for generally sealing a gas-path leakage-gap between spaced-apart first and second members of a turbine.

[0011] In one aspect, the turbine seal of the present invention includes an elongated seal member having a length and having opposing first and second ends bounding said length, an elongated, imperforate, and flexible first portion, and a rigid second portion lengthwise adjoining said first portion, wherein said first portion is lengthwise disposed between said first end and said second portion, wherein said second portion is lengthwise disposed between said first portion and said second end, wherein said flexible first portion includes a shim-layer assemblage having opposing first and second surfaces and having two longitudinally extending raised edge regions, wherein each of said raised edge regions extends a generally identical distance above said first surface and each of said raised edge regions extends generally said identical distance below said second surface; and wherein said flexible first portion further includes a cloth layer assemblage having a thickness generally equal to or slightly greater than said identical distance and superimposed on said second surface between said raised edge regions, and wherein said second portion defines a mounting bracket.

[0012] In an exemplary embodiment, the cloth layer assemblage and the shim-layer assemblage are attached together by spot welds, and the raised edges have curved portions.

[0013] In another aspect of the invention, a turbine assembly is provided that includes a) a first turbine member having a first surface groove; b) a second turbine member proximate and spaced apart from said first turbine member so as to define a fluid-path leakage gap therebetween, said second turbine member having a second surface groove facing and generally aligned with said first surface groove; and c) a turbine seal including an elongated turbine seal member having a length and having opposing first and second ends bounding said length, an elongated, imperforate, and flexible first portion, and a rigid second portion lengthwise adjoining said first portion, wherein said first portion is lengthwise disposed between said first end and said second portion, wherein said second portion is lengthwise disposed between said first portion and said second end, wherein said flexible first portion includes a shim-layer assemblage having opposing first and second surfaces and having two longitudinally extending raised edge regions, wherein each of said raised edge regions extends a generally identical distance above said first surface and each of said raised edge regions extends generally said identical distance below said second surface; and wherein said flexible first portion further includes a cloth layer assemblage having a thickness generally equal to or slightly greater than said identical distance and superimposed on said second surface between said raised edge regions, wherein said second portion defines a mounting bracket, and wherein said turbine seal member is disposed in said gap with said first edge engaged in said first surface groove and with said second edge engaged in said second surface groove.

[0014] Advantageously, in one embodiment, the turbine seal is vibrationally excited within a range of vibrational frequencies by motion of generally only the first and second turbine members during operation of the turbine, and the turbine seal is devoid of any resonant frequency within the range of vibrational frequencies.

[0015] In an exemplary application, the turbine assembly is a power-system gas turbine assembly, the first and second turbine members are circumferentially-adjacent transition pieces, and the mounting bracket is secured to a third turbine member comprising a first stage nozzle.

[0016] Several benefits and advantages are derived from the invention. The manually-flexible main body of the turbine seal member allows all transition-piece turbine spline seals in a standard power-system gas turbine to be replaced in generally half a day instead of the several days required for prior-art seals. Furthermore, manually flexible main body, which may be a metal sheet, provides good sealing of gas flow as the raised edges are pushed against the first and second turbine members by gas from the higher-pressure side of the seal. The first cloth layer provides some sealing and good wear resistance. The flexible metal sheet and the inherent flexibility of the cloth layer provides good seal flexibility which means the seal is very compliant and can accommodate surfaces of different shapes, assembly misalignment, vibration, and differential thermal growth. The spot welds make it easier to assemble the seal, and the curved portions make it easier to install the seal.

BRIEF DESCRIPTION OF DRAWINGS

[0017] **FIG. 1** is a perspective view of a first embodiment of the turbine seal of the present invention;

[0018] **FIG. 2** is a top plan view of a seal strip embodying the invention;

[0019] **FIG. 3** is a cross-sectional view taken along line **3-3** of **FIG. 2**;

[0020] **FIG. 4** is a fragmentary view of the seal assembly of **FIG. 1** illustrating an exemplary welding pattern;

[0021] **FIG. 5** is a top plan view of the seal assembly of **FIG. 1**;

[0022] **FIG. 6** is a side elevational view of the assembly of **FIG. 5**;

[0023] **FIG. 7** is a view of a section of a turbine including a seal assembly embodying the invention; and

[0024] **FIG. 8** is a cross-sectional view taken along line **8-8** of **FIG. 7** showing the edges of the seal assembly engaged in the surface groove of first and second turbine members in an embodiment of the invention.

DETAILED DESCRIPTION

[0025] Referring now to the drawings, wherein like numerals represent like elements throughout, **FIG. 1** shows a first embodiment of the turbine seal of the present invention. The turbine seal is defined by an elongated turbine seal member **10** that has having a length and first and second ends **12** and **14**. The turbine seal member includes an elongated, imperforate first portion **16** and also includes a second portion **18** lengthwise adjoining the first portion. In an exemplary embodiment, the first portion **16** defines the main body of the seal member and is manually-flexible. The second portion **18** defines a mounting bracket of the seal member and is manually-rigid. By "manually-flexible" it is meant that the first portion **16** can be flexed by hand by an adult person of average strength. By "manually-rigid" it is meant that the second portion **18** cannot be flexed by hand by an adult person of average strength. The first portion is lengthwise disposed between the first end and the second portion, the second portion is lengthwise disposed between the first portion and the second end.

[0026] In a first embodiment, as seen in **FIGS. 3, 5** and **6**, the first portion **16** is comprised of an imperforate shim-layer assemblage **20** that has a first thickness and the second portion **18** is defined from a bent strip or plate **22** that has a second thickness. In an exemplary embodiment, the second thickness is on the order of at least about five times greater than the first thickness.

[0027] The shim-layer assemblage comprises at least one shim layer or plate of uniform thickness, and may comprise at least two superimposed, generally identical shim layers or plates. In this exemplary embodiment, the assemblage has no more than four layers. Each shim layer is impervious to gas and comprises a metal, ceramic, and/or polymer sheet. The choice of materials for the shim and the choice of the thickness for a shim layer are made by the artisan to meet the sealing, flexibility, and resilience requirements of a particular seal application. Usually, the shim-layer has a thickness of generally between about five and twenty thousandths of an inch, for example, about ten thousandths of an inch where two shim layers are provided. In one embodiment, each shim layer comprises a high-temperature, cobalt-based superalloy, such as HS-188. It is noted that the shim layers can comprise different materials and/or have different thicknesses depending on the particular seal application.

[0028] In the illustrated embodiment, the first portion of the seal member is comprised of two superimposed and identical shim layers **24**, **124**, formed from metal. To integrate the assembly, the first end **12** of the seal member is edge-welded. Further, to facilitate placement of the seal member, the first end **12** is chamfered as shown at **26**.

[0029] Thus, a flexible and generally imperforate shim-layer assemblage **20** is provided having opposing first and second surfaces, defined in the illustrated embodiment by the top surface **28** of shim plate **24** and the bottom surface **30** of shim plate **124**, respectively. The shim-layer assemblage further includes to raised edges **32**, **132**. In the illustrated embodiment, one raised edge **32** is formed entirely from one of the edges of one metal shim sheet **24**, and the other raised edge **132** is formed entirely from one of the edges of another metal shim sheet **124**. Each of the raised edges extends a generally identical distance above the first surface **28**, and each of the raised edges extends generally that same identical distance below the second surface **30**. It is noted that the directions "above" and "below" are relative directions applying to the seal as viewed in **FIGS. 1 and 3**. In the illustrated embodiment, the raised edges **32**, **132** are generally mirror images of each other.

[0030] As will be understood from the discussion above, in a first exemplary embodiment, the shim-layer assemblage is an elongated metal strip assemblage having a centerline running midway between the raised edges and having a cross section (shown in **FIG. 3**) generally perpendicular to the centerline. Here, each of the raised edges has a first portion **34**, **134** disposed at the previously-defined generally identical distance above the first surface **28** of the metal sheet assemblage, each of the raised edges has a second portion **36**, **136** disposed at the previously-defined generally identical distance below the second surface **30**. In the previously-defined cross section the first portion has a curved shape. Also, in the previously-defined cross-section the raised edges each terminate proximate the second portion **36**, **136**. Furthermore, each of the raised edges has a connecting portion **38**, **138** joining together the first and second portions. The connecting portions **38**, **138** have a curved shape, more specifically a generally bowed shape, pointing away from each other as illustrated in **FIG. 3**. Such curved bowed shape facilitates seal installation in many seal applications, as described in greater detail below. In an exemplary mode of making the seal, each sheet metal member is stamped or rolled to form the curved raised edges. It is noted that seal can be made by pressing seal between two pressing plates (not shown).

[0031] The seal member further includes a cloth layer assemblage **40**. In the illustrated embodiment, the cloth layer assemblage **40** has a thickness generally the same as or slightly greater than (e.g. by the thickness of one of the metal sheets or shims comprising the shim-layer assemblage) the previously defined identical distance (i.e., the identical distance the first and second raised edges extend above the first surface). The cloth layer assemblage **40** is superimposed on the second surface between the raised edges. The cloth layer assemblage comprises at least one cloth layer, only one of which is shown in **FIG. 3**. Each cloth layer comprises metal, ceramic, and/or polymer fibers that have been woven, knitted, or pressed into a layer of fabric. The choice of layer construction (i.e., woven, knitted, or pressed), the choice of materials for the cloth, and the choice of the thickness for a layer are made by the artisan to meet the wear resistance, flexibility, and sealing requirements of a particular seal application. It is noted that such multiple cloth layers can comprise different materials, different layer construction (i.e., woven, knitted, or pressed) and/or have different thicknesses depending on the particular seal application. In this exemplary embodiment, the cloth layer assemblage has no more than two cloth layers. In one embodiment, each cloth layer is a woven cloth layer comprising L605 or Haynes-25. An exemplary cloth layer is a twilled metal cloth layer. By "twilled" is meant a cloth having a twill weave (such as a twill weave which floats weft threads over two warp threads and which staggers these floats regularly). In an exemplary construction, the cloth layer has 30 warp wires per inch and 250 weft wires per inch with each warp and weft wire having a thickness of 7-10 mils and with the cloth layer having an overall thickness of about 0.052 inch. An exemplary cloth-layer assemblage is a Dutch Twill weave cloth assemblage comprising a high-temperature, cobalt-based super-alloy, such as L-605. It is noted that a Dutch Twill weave will allow a small controlled leakage which provides cooling, as can be appreciated by the artisan.

[0032] In an exemplary embodiment, the cloth layer assemblage **40** is superimposed on generally the entire second surface **30**. In the illustrated construction, the cloth layer assemblage **40** and the metal shim-layer assemblage **20** are attached together by a plurality of spot welds **42** (as shown in **FIG. 4**). In another examplary construction, seam welds (not shown) are used in place of spot welds.

[0033] Thus, the first portion **16** of the turbine seal member is defined by its corresponding sections of the shim-layer and cloth-layer assemblages. The second portion **18** of the turbine seal member **10** includes a base portion **44** lengthwise overlapping the corresponding section of the cloth-layer assemblage **40** of the first portion and attached (such as by spot welding **46**) to the corresponding sections of the cloth-layer and shim-layer assemblages. The second portion **18** of the turbine seal member **10**, which may be made of stainless steel, includes a generally right-angle bend **48** to define mounting bracket **22** having a support portion **50** adjoining the base portion **44**.

[0034] **FIGS. 7 and 8** schematically show a first embodiment of the gas-path leakage seal of the present invention. Although the invention is described in terms of a gas turbine, it is understood to be equally applicable to a steam turbine, which can be considered a special type of gas turbine. The gas-path leakage seal is for generally sealing a gas-path leakage-gap between spaced-apart first and second members of a gas turbine (only a small portion of which is shown in **FIG. 7**). The turbine assembly includes a first turbine member **52**, a second turbine member **54** which is proximate and circumferentially spaced apart from the first turbine member so as to define a fluid-path leakage gap **56** therebetween, and a turbine seal **10** embodying the invention. The first turbine member **52** has a first surface groove or slot **58**, and the second turbine member has a second surface groove or slot **60** facing and generally aligned with the first surface groove **58**. A fluid-path leakage gap as used herein includes, without limitation, a steam-path leakage gap of a turbine of a steam turbine, a compressed-air leakage gap of a compressor of a gas turbine, and a combustion-gas leakage gap in or downstream of a combustor of a gas turbine. In a power-system gas turbine, downstream of the combustor includes the transition pieces, first-stage nozzle and turbine sections.

[0035] The turbine seal **10** is identical to the previously-described turbine seal shown in FIGS. **1-6**. The gas-path leakage seal member is disposed in the gap to extend partially in the first groove and partially in the second groove with one of the raised edges disposed entirely within the first groove and the other of the raised edges disposed entirely within the second groove. The gas-path leakage-gap has a higher-pressure end and a lower-pressure end. This pressure differential seats the seal such that the raised edges can resiliently and unattachedly contact the first and second members respectively along the lower pressure side of the respective first and second slots and such that the second cloth layer assemblage can also unattachedly contact the first and second members and along the lower pressure side of the first and second slots. The resilient contact of the metal sheet assemblage maintains sealing in the "plane" of the seal while allowing for different surface shapes, assembly misalignment, vibration, and/or thermally-induced relative movement between the first and second members. In an embodiment of the invention, the way in which the seal assembly is inserted with respect to the turbine members is controlled so that the cloth layer **40** may only be provided on one side of the seal strip, as illustrated. Specifically, the cloth is provided on the downstream, pressure side of the junction. Thus, the cloth layer assemblage is pushed by the differential pressure into contact with the first and second members (as shown in **FIG. 8**). The cloth layer assemblage protects the metal sheet assemblage **20** against wear. The installed seal is not welded or otherwise attached to the first and/or second members allowing for ease of installation.

[**0036**] During operation of the turbine, the turbine spline seal is vibrationally excited within a range of vibrational frequencies by motion of generally only the first and second turbine members **52**, **54**. The turbine spline seal is devoid of any resonant frequency within the range of vibrational frequencies, as is within the skill of the artisan to design by choosing, for example, an appropriate thickness and length of the mounting bracket **22**.

[**0037**] The turbine assembly also includes a third turbine member **62**, and the mounting bracket **22** is secured to the third turbine member **62**. In one application of the present invention, the turbine assembly is a power-system gas turbine assembly, the first and second turbine members **52**, **54** are circumferentially-adjacent transition pieces of the gas turbine assembly, and the third turbine member **62** is a first stage nozzle of the gas turbine assembly. Here, the installed turbine seal member **10** is radially aligned, with the mounting bracket **22** located at its radially-outer end, and a mounting block **64** is used to secure the mounting bracket **35** to the third turbine member **62**. The mounting block has a bolt hole **66** and the third turbine member has a threaded bolt hole (not shown). A bolt **68** passes through the bolt hole in the mounting block and threadably-engages the threaded bolt hole of the third turbine member.

[**0038**] Mounting block **64** also has a first slot **70** and a second slot **72**. In the illustrated embodiment, the right-angle bend **48** of the second portion **18** engages the lower of the two slots. It is pointed out that the first slot **70** is the lower slot in **FIG. 7**. It is noted that the mounting block **64** may be rotated one half turn about bolt **66**. As rotated, the second slot **72** will become the lower slot for engagement with the right-angle bend **48** of the second portion **18** of the turbine seal member **10**.

[**0039**] As previously mentioned, the manually-flexible first portion **16** of the turbine seal member **10** allows all transition-piece turbine spline seals in a standard power-system gas turbine to be replaced in generally half a day instead of the several days required for prior-art seals. It has been found that some prior-art seals had a dominant resonant frequency which was excited by the vibration (including twisting) motion of the transition pieces leading to early seal failure. The manually-rigid second portion **18** of the turbine seal member of the turbine seal **10** has its length and thickness chosen, as can be appreciated by those skilled in the art, to avoid the installed turbine seal from having any resonant frequencies which can be excited by the vibrational motion (typically between 80 and 200 Hertz) of the transition pieces during operation of the turbine.

[**0040**] While the invention has been described in connection with what is presently considered to be the most practical and preferred embodiment, it is to be understood that the invention is not to be limited to the disclosed embodiment, but on the contrary, is intended to cover various modifications and equivalent arrangements included within the spirit and scope of the appended claims.

1. A turbine seal comprising an elongated seal member having a length and having opposing first and second ends bounding said length, an elongated, imperforate, and flexible first portion, and a rigid second portion lengthwise adjoining said first portion, wherein said first portion is lengthwise disposed between said first end and said second portion, wherein said second portion is lengthwise disposed between said first portion and said second end, wherein said flexible first portion includes a shim-layer assemblage having opposing first and second surfaces and having two longitudinally extending raised edge regions, wherein each of said raised edge regions extends a generally identical distance above said first surface and each of said raised edge regions extends generally said identical distance below said second surface; and wherein said flexible first portion further includes a cloth layer assemblage having a thickness generally equal to or slightly greater than said identical distance and superimposed on said second surface between said raised edge regions, and wherein said second portion defines a mounting bracket.

2. The turbine seal of claim 1, wherein said shim-layer assemblage has a first thickness and includes at least first and second metal strips, wherein said second portion has a second thickness and comprises a metal plate, and wherein said second thickness is at least five times greater than said first thickness.

3. The turbine seal of claim 1, wherein said second portion includes a generally right-angle bend, and wherein said mounting bracket is an angled mounting bracket.

4. The turbine seal of claim 1, wherein said cloth layer assemblage is mechanically secured to said shim-layer assemblage.

5. The turbine seal of claim 4, wherein said cloth layer assemblage is spot welded to said shim-layer assemblage.

6. The turbine seal of claim 4, wherein said second portion is mechanically secured to corresponding sections of said shim-layer and cloth layer assemblages of said first portion.

7. The turbine seal of claim 1, wherein said raised edge regions are generally mirror images of each other.

8. The turbine seal of claim 1, wherein each of said raised edge regions has a first portion disposed at said identical distance above said first surface, wherein each of said raised edge regions has a second portion disposed at said identical distance below said second surface, and wherein each of said raised edge regions has a connecting portion joining together said first and second portions, and wherein in said cross section said connecting portion has a curved shape.

9. A turbine assembly comprising:

a) a first turbine member having a first surface groove;

b) a second turbine member proximate and spaced apart from said first turbine member so as to define a fluid-path leakage gap therebetween, said second turbine member having a second surface groove facing and generally aligned with said first surface groove; and

c) a turbine seal including an elongated turbine seal member having a length and having opposing first and second ends bounding said length, an elongated, imperforate, and flexible first portion, and a rigid second portion lengthwise adjoining said first portion, wherein said first portion is lengthwise disposed between said first end and said second portion, wherein said second portion is lengthwise disposed between said first portion and said second end,

wherein said flexible first portion includes a shim-layer assemblage having opposing first and second surfaces and having two longitudinally extending raised edge regions, wherein each of said raised edge regions extends a generally identical distance above said first surface and each of said raised edge regions extends generally said identical distance below said second surface; and

wherein said flexible first portion further includes a cloth layer assemblage having a thickness generally equal to or slightly greater than said identical distance and superimposed on said second surface between said raised edge regions,

wherein said second portion defines a mounting bracket, and

wherein said turbine seal member is disposed in said gap with said first edge engaged in said first surface groove and with said second edge engaged in said second surface groove.

10. The turbine assembly of claim 9, wherein said shim-layer assemblage has a first thickness and includes at least first and second metal strips, wherein said second portion has a second thickness and comprises a metal plate, and wherein said second thickness is at least five times greater than said first thickness.

11. The turbine assembly of claim 9, wherein said second portion includes a generally right-angle bend, and wherein said mounting bracket is an angled mounting bracket.

12. The turbine assembly of claim 9, wherein said cloth layer assemblage is mechanically secured to said shim-layer assemblage.

13. The turbine assembly of claim 12, wherein said cloth layer assemblage is spot welded to said shim-layer assemblage.

14. The turbine assembly of claim 12, wherein said second portion is mechanically secured to corresponding sections of said shim-layer and cloth layer assemblages of said first portion.

15. The turbine assembly of claim 9, also including a third turbine member, and wherein said mounting bracket defined by said second portion is secured to said third turbine member.

16. The turbine assembly of claim 15, wherein said second portion includes a generally right-angle bend, and wherein said mounting bracket is an angled mounting bracket.

17. The turbine assembly of claim 16, wherein said turbine assembly is a power-system gas turbine assembly, wherein said first and second turbine members are circumferentially-adjacent transition pieces of said gas turbine assembly, and wherein said third turbine member is a first stage nozzle of said gas turbine assembly.

18. The turbine assembly of claim 16, further comprising a mounting block for securing the mounting bracket to the third turbine member, the mounting block having a bolt hole and the third turbine member having a threaded bolt hole for receiving a common bolt to secure the mounting block to the third turbine member.

19. The turbine assembly of claim 18, wherein the mounting block includes first and second slots, the right-angle bend of the second portion engaging one of said slots to secure the seal member to the third turbine member.

20. The turbine assembly of claim 9, wherein each of said raised edge regions has a first portion disposed at said identical distance above said first surface, wherein each of said raised edge regions has a second portion disposed at said identical distance below said second surface, and wherein each of said raised edge regions has a connecting portion joining together said first and second portions, and wherein in said cross section said connecting portion has a curved shape.

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