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Crosby

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[54] **SEAT BASE RAIL CONNECTOR AND ASSEMBLY**

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[73] Assignee: **Morley Furniture Spring Corp.,** Lake Bluff, Ill.

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Related U.S. Patent Documents

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Appl. No.: **865,966**
Filed: **Dec. 30, 1977**

[51] **Int. Cl.**[3] **F16F 3/02**
[52] **U.S. Cl.** **267/110**
[58] **Field of Search** 267/97, 101, 110–112

[56] **References Cited**

U.S. PATENT DOCUMENTS

3,334,887 8/1967 Slominski 267/110

Primary Examiner—Duane A. Reger
Attorney, Agent, or Firm—Richard G. Lione

[57] **ABSTRACT**

A rail connector and improvement in seat base support assembly. The connector takes two basic forms. In the first a pre-stressed, close wound coil, disposed either transversely or longitudinally of the connector, is effective to continuously bias the seat base support means upwardly. In the second a cantilevered, curved spring arm serves the same purpose. The connector may be configured to reach into the body of a sinuous spring band, for example, and define a torque arm in the band, at the back rail. All forms are applicable to wire mesh, chord rubber webbing, flat steel bands and sinuous, both arced and dearced.

4 Claims, 9 Drawing Figures

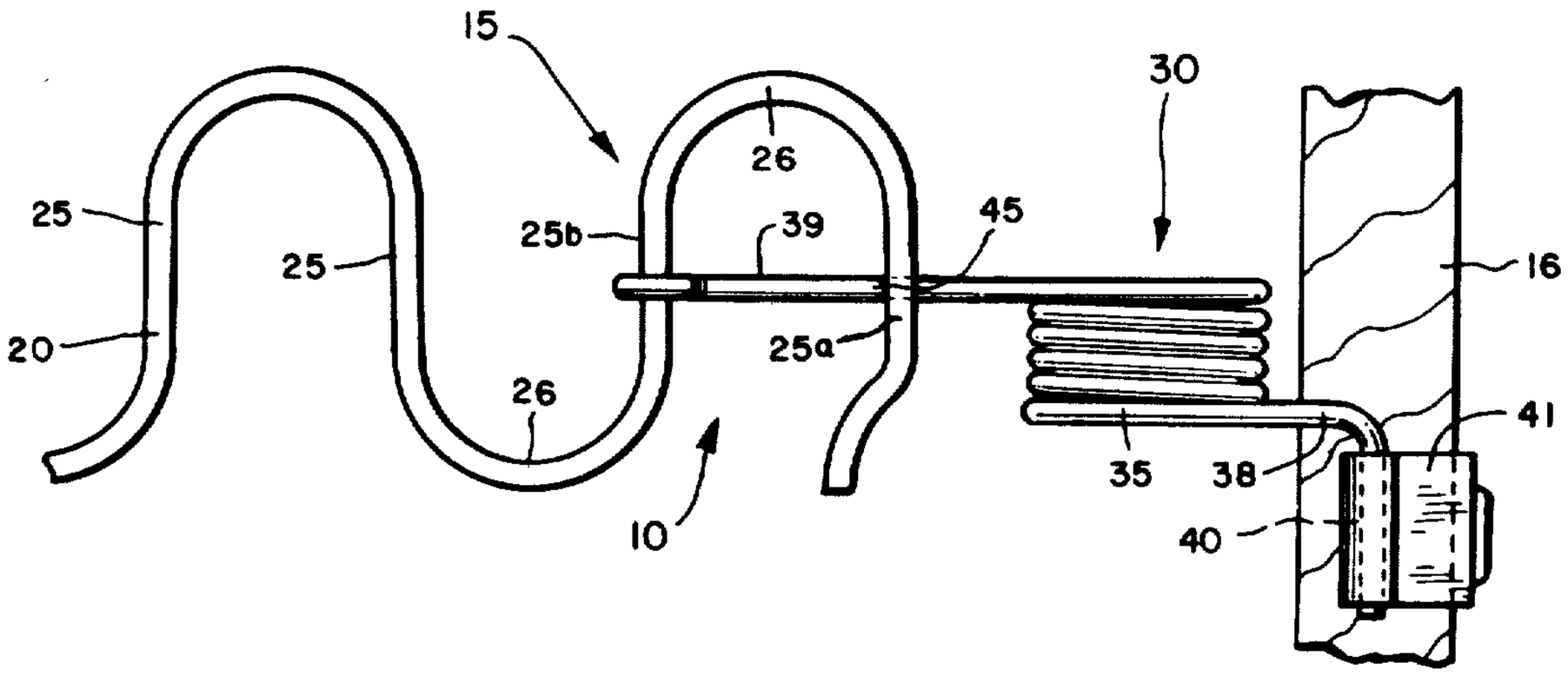


FIG. 1

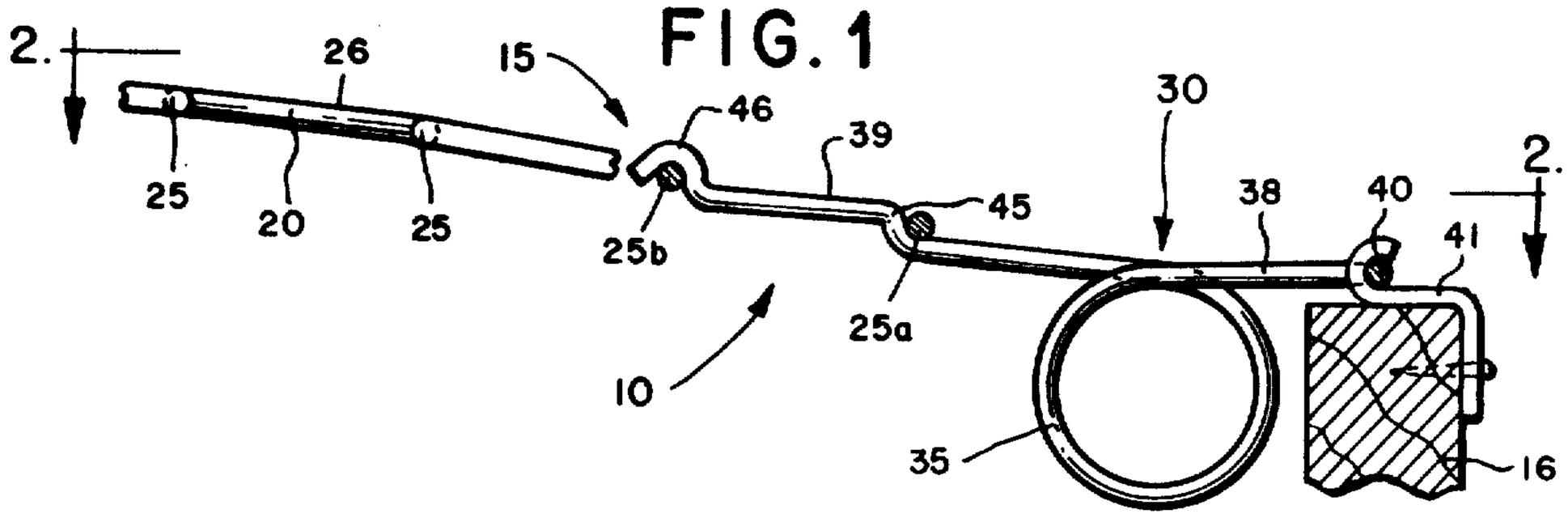


FIG. 2

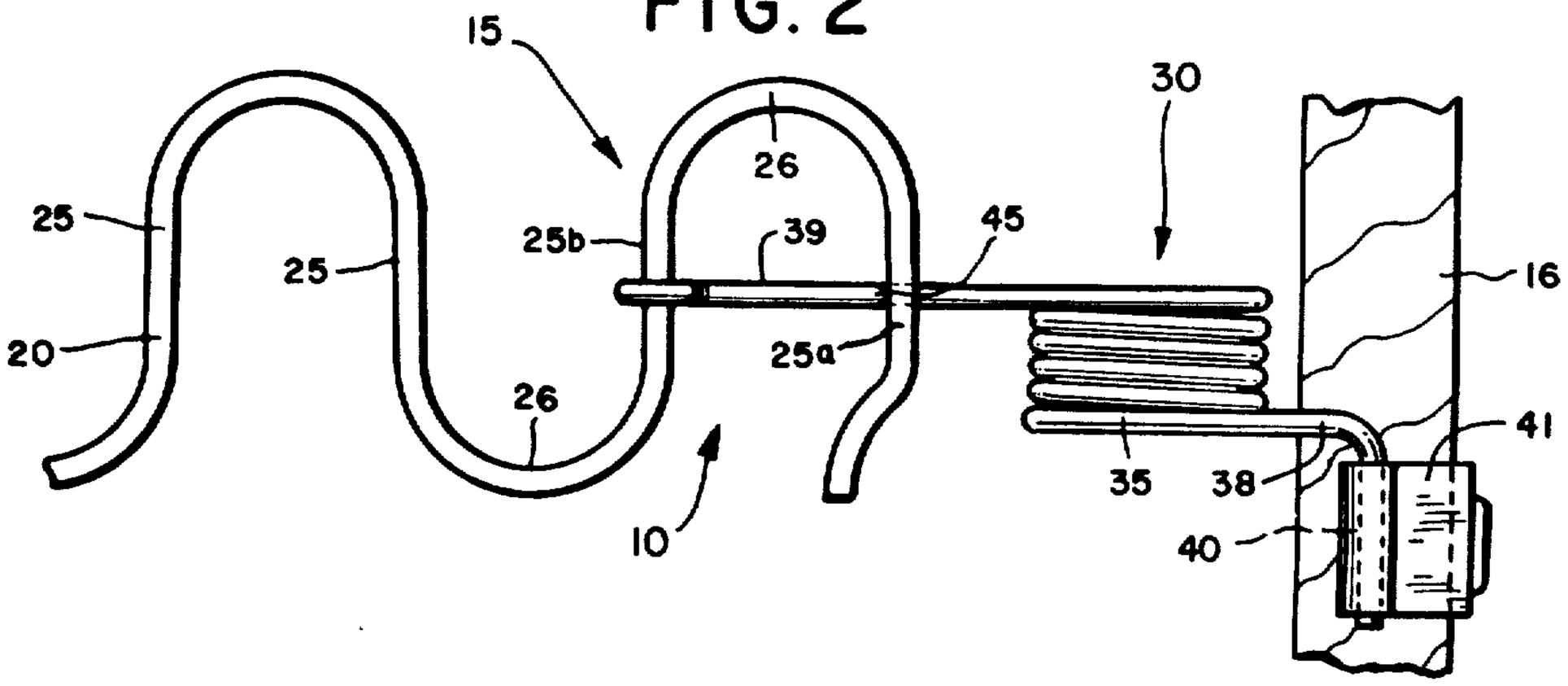


FIG. 3

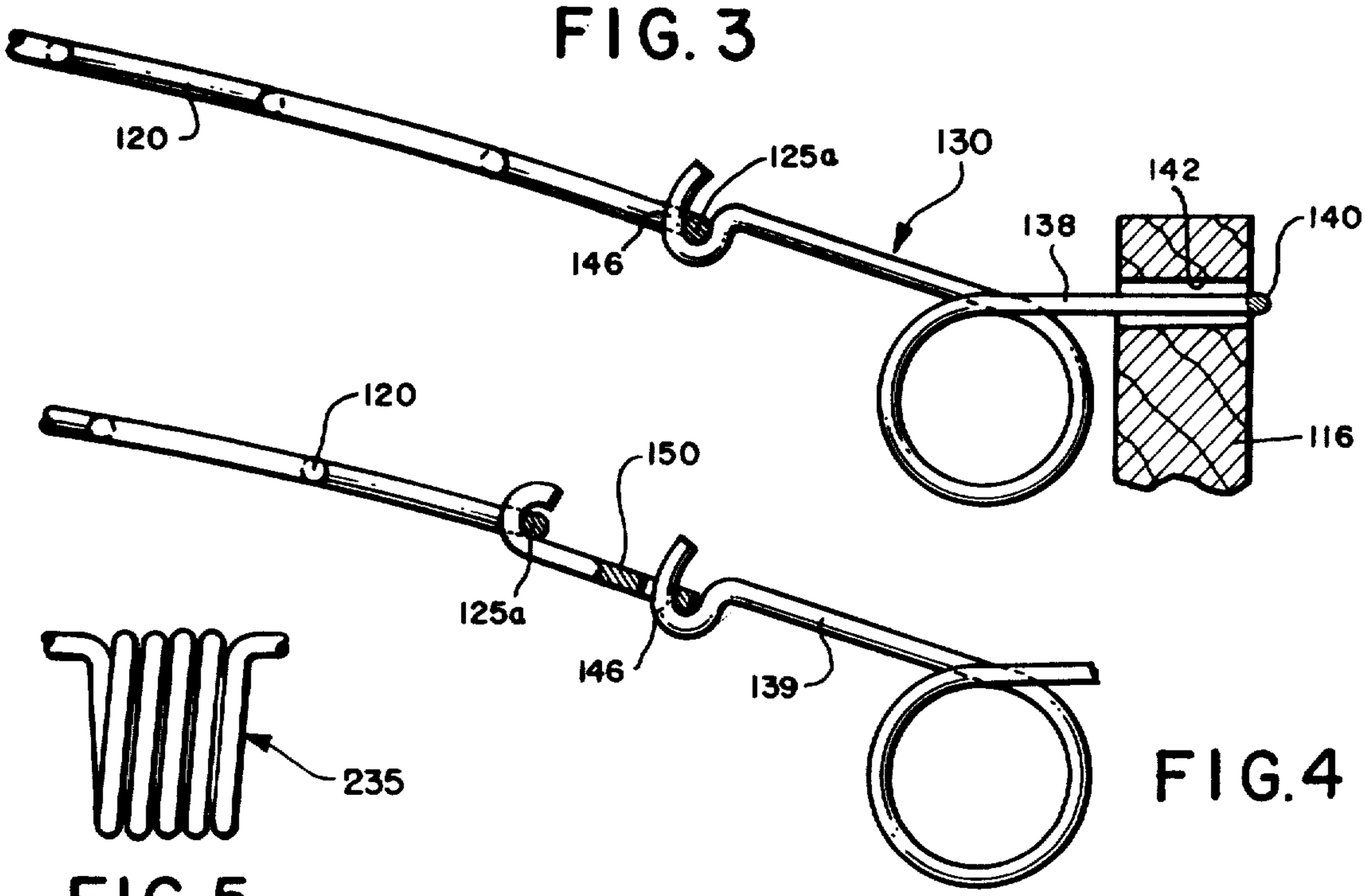


FIG. 4

FIG. 5

FIG. 6

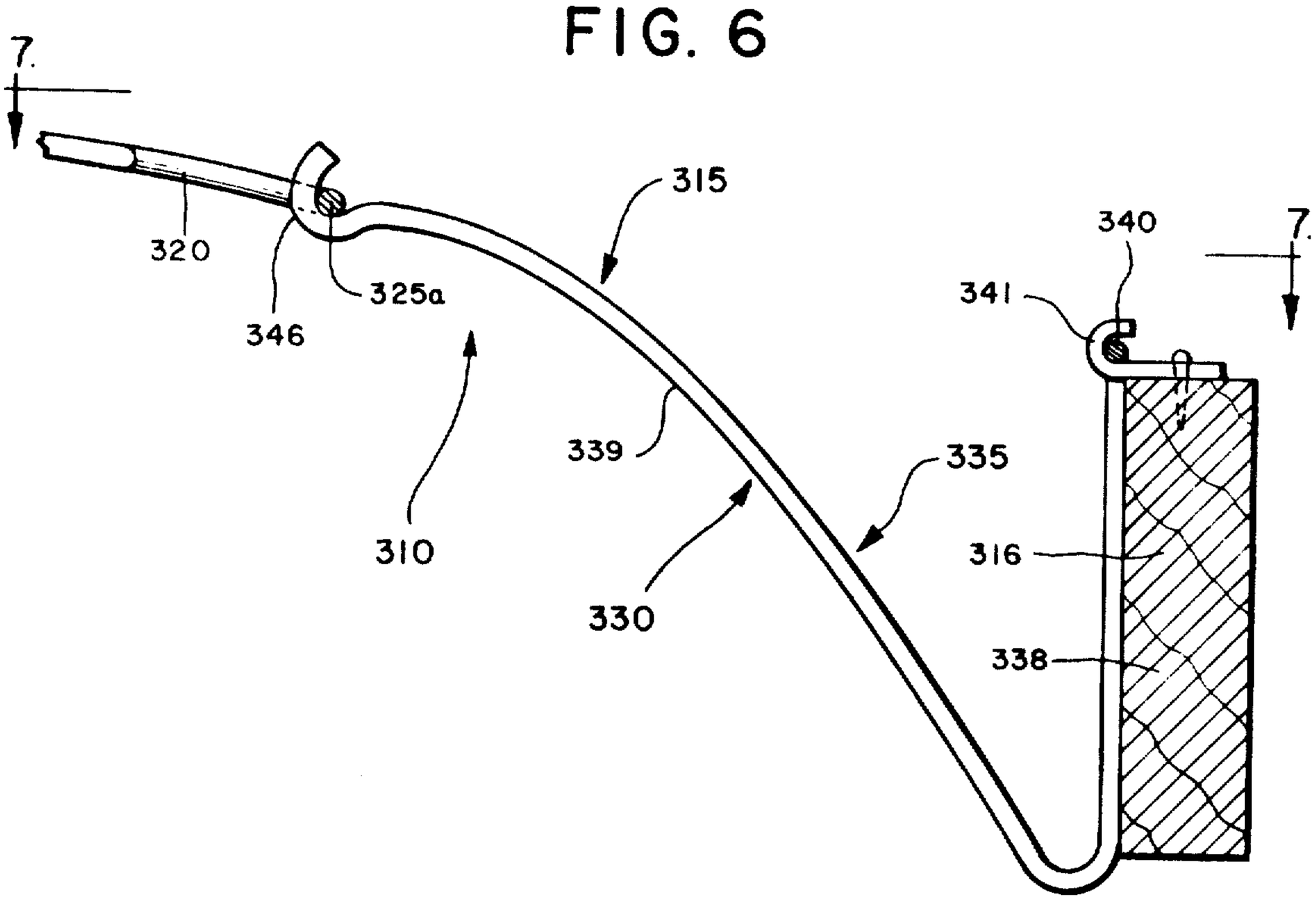

7.
320
346
325a
315
310
339
330
335
340
341
316
338

FIG. 7

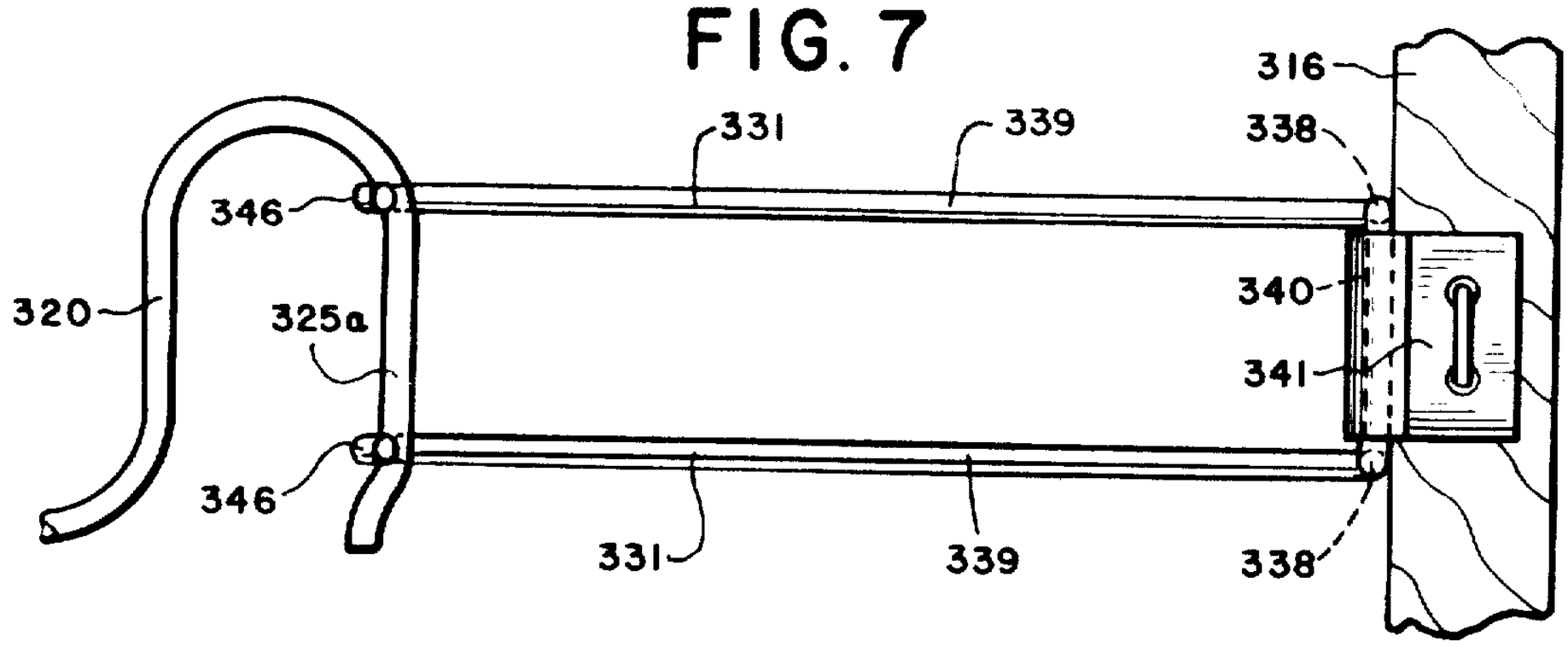

316
338
331
339
346
340
320
325a
341
346
331
339
338

FIG. 8

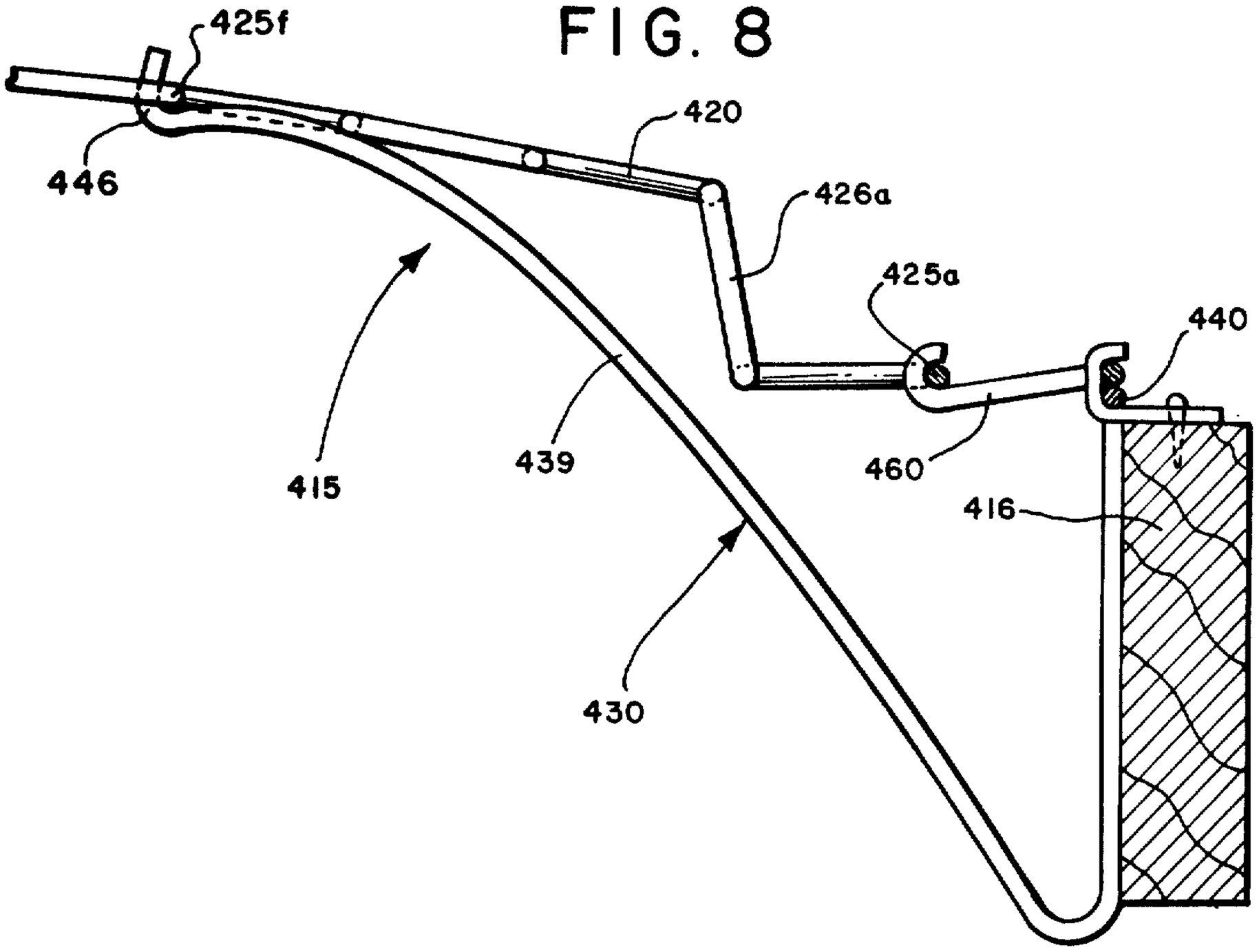
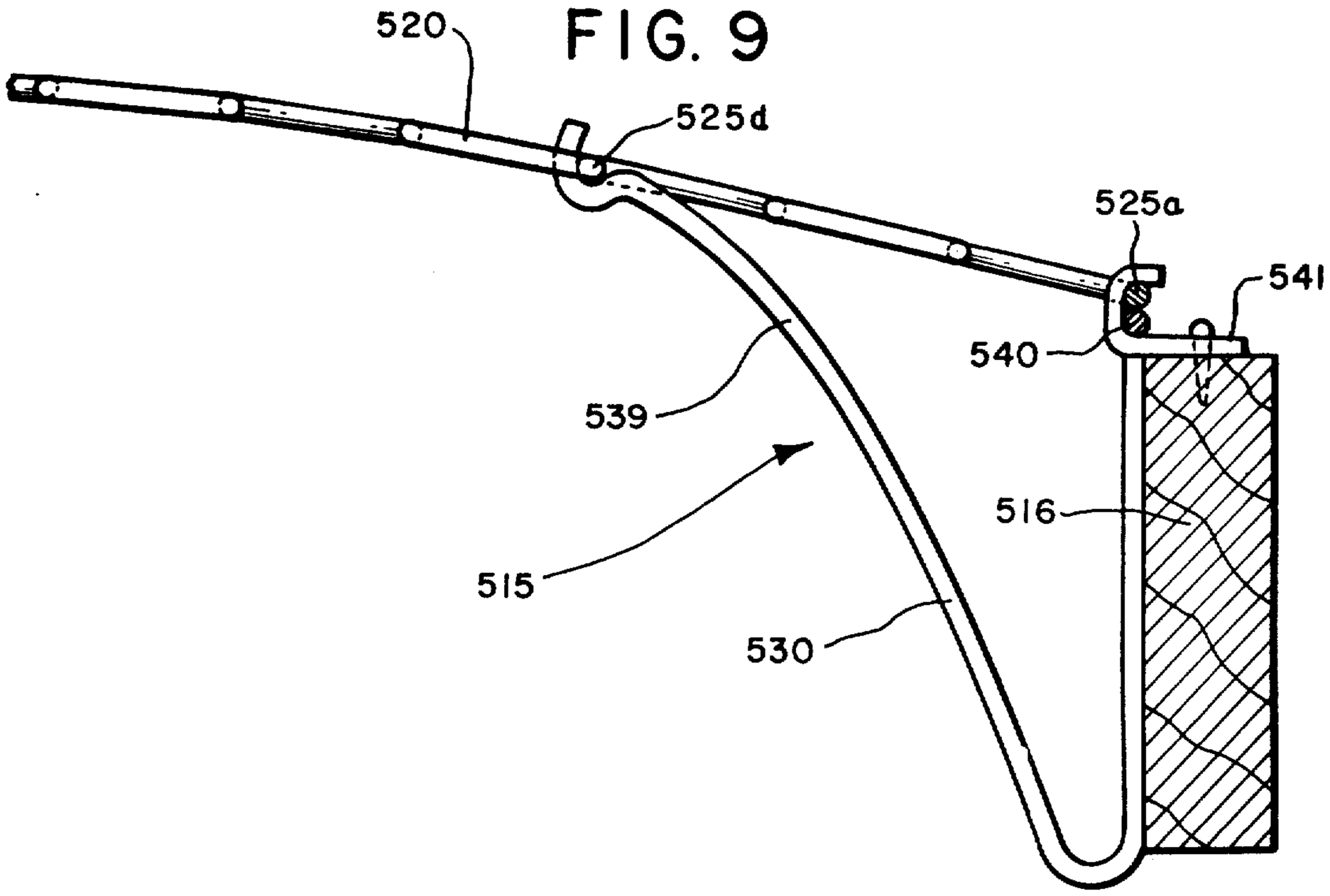

425f
420
446
426a
425a
440
460
439
415
416
430

FIG. 9


520
525d
525a
541
540
539
516
515
530

SEAT BASE RAIL CONNECTOR AND ASSEMBLY

Matter enclosed in heavy brackets [ ] appears in the original patent but forms no part of this reissue specification; matter printed in italics indicates the additions made by reissue.

FIELD OF THE INVENTION

This invention is in the field of seat base support assemblies. It relates to seat base support assemblies for furniture or the like wherein the support assemblies employed are of the non-coil spring type; i.e., they comprise sinuous spring bands, wire grids or chord-rubber webbing, or are made up of flexible steel bands. The invention finds particularly advantageous application to sinuous band seat spring assemblies, however, and is discussed initially in that context.

BACKGROUND OF THE INVENTION

Over the past ten to twelve years furniture seat spring torsioning devices such as disclosed in U.S. Pat. No. 3,210,064, No. 3,388,904, and No. 3,525,514, met the industry's long sought need for deep-drop uplift at the back rail and also contributed in other ways to the luxury seat which evolved during that time frame. As eleven (11) gauge helical spring connectors became disproportionally more expensive during this period these devices have been used almost exclusively with SWING ANCHOR connecting links and radius links such as disclosed in U.S. Pat. No. 3,790,149, and depended upon kinetic energy stored in the arced sinuous spring itself to produce all upward resilience. The upholstered furniture styles most widely sold at the time developed all the back rail uplift considered desirable using such connecting links.

During the past three to four years, however, there has been a move toward the use of thicker and thicker cushions. Attractive new and thicker cushion materials, including foam rubber laminates, have necessitated the lowering of seat frame heights dramatically. As a result, an urgent need was created in such constructions for more upward resilience of a strong dynamic nature in the spring base.

SUMMARY OF THE INVENTION

An object of the present invention is to provide a new and improved rail connector for sinuous spring bands, wire grids, chord-rubber webbing, and flexible steel bands.

Another object is to provide a rail connector which embodies the salutary features of conventional helical spring connectors while retaining essentially none of the undesirable features thereof.

Still another object is to provide a rail connector which produces spring torsioning and dynamic uplift at the back rail through kinetic energy which it itself stores, and which then cooperates with any spring action in the seat base support assembly, which might be sinuous, arced, or de-arced, a wire grid, chord-rubber webbing, or flexible steel bands.

Yet another object is to provide such rail connectors which give varying degrees of dynamic uplift resilience obtained by offering alternative spring action modes within themselves.

The foregoing and other objects are realized in accord with the present invention by producing two related forms of rail connector. A first form uses pre-

stressed, close wound coil spring with attachment arms. In one alternative the coil spring is wound on an axis transverse to the axis of spring expansion and contraction while in another alternative the coil spring is wound on an axis longitudinally arranged relative thereto. In either alternative the connector may selectively have a leverage-amplified torsioning capability.

A second form uses a pre-stressed, cantilever spring configuration. This connector may selectively be used with a sinuous spring band having leverage-amplified torsioning incorporated therein.

The invention for the first time provides seat spring-enhancing connectors that in themselves combine the four essential seat-force-generators; i.e., (1) torsioning; (2) dynamic uplift; (3) expansion-contraction; and (4) leverage-amplification. These, in turn, produce to the greatest degree the four most desired seat-performance characteristics; i.e., (1) initial-drop; (2) deep-drop; (3) softness without "oil canning", "bucketing", "jack-knifing", or "bottoming"; and (4) resilient uplift proportionate to load.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention, including its construction and modes of operation, together with additional objects and advantages thereof, is illustrated more or less diagrammatically in the drawings, in which:

FIG. **1** is a vertical sectional view through a portion of the back end of a furniture seat spring base, illustrating a spring band assembly including a first form of rail connector embodying features of the present invention;

FIG. **2** is a view taken along line **2—2** of FIG. **1**;

FIG. **3** is a view similar to FIG. **1** illustrating one modification of the first form of rail connector embodying features of the invention;

FIG. **4** is a view similar to FIG. **1** illustrating another modification of the first form of rail connector embodying features of the invention;

FIG. **5** is an enlarged view of a portion of an alternative first form of rail connector embodying features of the invention;

FIG. **6** is a view similar to FIG. **1** illustrating a second form of rail connector in a spring band assembly embodying features of the invention;

FIG. **7** is a view taken along line **7—7** of FIG. **6**;

FIG. **8** is a view similar to FIG. **7** illustrating the second form of rail connector in a sinuous spring band assembly embodying features of the invention; and

FIG. **9** is a view similar to FIG. **7** illustrating the second form of rail connector in another sinuous spring band assembly.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawings, and particularly to FIGS. **1** and **2**, a portion of the back end of a furniture seat base is illustrated generally at **10**. The seat base **10** comprises spring band assemblies **15**, only one of which is shown, extending in parallel relationship between the front rail (not shown) and back rail **16** of the base frame. Each assembly **15** includes a normally arced sinuous spring band **20** of standard loop size; i.e., a seven-eighths ($\frac{7}{8}$) inch interval between linear segments **25** and semi-circular segments **26** ofthe band. Each band **20** is connected to the back frame rail **16** by a first form of rail connector **30** embodying features of the invention.

The rail connector **30** is fabricated of eleven (11) gauge wire, similar to standard helicals. It comprises a section **35** of three coils tightly wound on an axis transverse to that of the band **20** and the axis of expansion and contraction of the connector **30**.

Extending from the coil section **35**, at their uppermost extremity, tangent to the arc of the coils and in opposite directions, are a rail-attachment leg **38** and a spring-attachment leg **39**. The rail-attachment leg **38** terminates in a transversely disposed anchor section **40** which seats in a conventional "G" clip **41**, while the spring-attachment leg **39** seats on and grips the spring band **20**.

The spring attachment leg **39** is inclined slightly upwardly from the horizontal, in contrast to the rail-attachment leg **38**, and includes an upwardly formed shoulder **45** and a terminal hook **46**. The shoulder is formed approximately mid-way between the hook **46** and tangency with the coil **35**, seven-eighths ($\frac{7}{8}$) inches each way in the case where the band **20** is regular sinuous.

As seen best in FIG. **1**, the downwardly opening hook **46** is designed to seat over the penultimate linear segment **25b** in the spring band **20**, while the ultimate linear segment **25a** seats against the shoulder **45**. The result is to lock the end of the band **20** and the connector **30** together.

In operation, the attachment-arm **39** reaching up into the band **20** sets up a torsioning effect in the back of the band. The arm **39** is spring loaded upwardly by the strength of the coil section **35** and produces dynamic uplift. At the same time the coil section **35** permits of longitudinal expansion-contraction of the connector **30**. The coil section **35** and rail-attachment leg **38** extending outwardly of the band **20** end amplify the leverage induced torque.

In an alternative construction of the first form of the invention, as seen in FIG. **3**, the rail connector **130** is attached to the rail **116** through a gang bore **142**. The rail-attachment leg **138** of the connector has a shorter anchor section **140** which can pass through the bore **142** from front to back of the rail **116** and then seats against the back of the rail to lock the connector **130** to the rail.

The spring-attachment leg **139** in this form of the connector is much shorter and has an upwardly formed hook **146** at its inner end. The hook **146** is so formed that when it seats upwardly, onto the ultimate linear segment **125a** of the spring band **120**, it cannot slip off during seat base operation.

The connector **130** provides both dynamic uplift and resilient expansion-contraction at the band end. It does not induce torsion or leverage amplification.

The connector **130** can also be connected to the ultimate linear segment **125a** of the band **120** by a conventional VLE clip, as seen at **150** in FIG. **4**. As such, the single spring attachment leg **139** obtains a wider purchase area on the band **120** end. The effect is to enhance lateral stability of the spring band assembly.

Turning now to FIG. **5**, a modified coil section for a connector otherwise identical to that hereinbefore discussed is illustrated at **235**. As illustrated, the coil section **235** is tightly wound in five (5) coils on an axis longitudinally aligned with the sinuous spring band span (not shown). This form of the connector **130** produces the same salutary effects, the dynamic uplift being produced by a torquing expansion-contraction of the coil section **235** in contrast to the loop compression-expansion of the coil section **35**, however.

FIGS. **6** and **7** illustrate a portion of a furniture seat base **310** comprising spring band assemblies **315** (only one shown) in which a second form of spring band **320** connector is illustrated at **330**. The connector **330** uses a cantilever principle to provide dynamic uplift to the band **320** at the back rail **316**.

The rail connector **330** is fabricated of spring steel wire of relatively heavy gauge; i.e., eight (8) gauge or heavier. As best illustrated in FIG. **7**, it includes a pair of identical connector arms **331** extending parallel to each other between the rail **316** and the band **320**.

As seen once again in FIG. **6**, each connector arm **331** includes a generally V-shaped body **335** made up of a rail-attachment leg **338** and a spring-attachment leg **339**. The legs **338** are vertically oriented and preferably four (4) inches long. The legs **338** are joined at their upper ends by a base leg **340** which seats in a conventional EKS clip **341** stapled to the top of the rail **316**.

Curving upwardly and inwardly from the lower end of each rail-attachment leg **338** is a corresponding spring-attachment leg **339**. The spring-attachment legs **339** are approximately eight (8) inches long.

Formed on the free ends of the legs **339** are attachment hooks **346** identical to the hooks **146** hereinbefore discussed. The connector **330** is a variation of the second form of the invention wherein the hooks **346** receive and seat on the ultimate linear segment **325a** of the spring band **320**.

In operation the legs **338** are braced against the rail **316** with the spring-attachment legs **339** extending inwardly and upwardly therefrom to the hooks **346**. In unloaded position the hooks are disposed approximately one (1) inch above the level of the EKS clip **341**. The connector **330** thus is effective to dynamically urge the spring band **320** end upwardly when a subject is seated. At the same time longitudinal resilient expansion-contraction can and does take place in the connector **330**, enhancing seat base softness.

FIG. **8** illustrates a sinuous spring band assembly **415** which incorporates a connector **430** identical to the connector **330** hereinbefore discussed.

In the spring band assembly **415** the connector hooks **446** are seated on a linear segment **425f** of the band **420** which is sixth from the end of the band; i.e., the ultimate linear segment **425a**. The linear segment **425a** is connected to the rail by a SWING ANCHOR connector clip **460** such as illustrated in FIG. **1** of the aforementioned U.S. Pat. No. 3,790,149. The base of the clip **460** is seated, together with the base leg **440** of the connector **430**, in the conventional EKS clip stapled to the top of the rail **416**.

The spring band **420** immediately inwardly of its ultimate linear segment **425a**, at the penultimate linear segment, is bent upwardly for the length of one semi-circular band segment **426a** and then bent back into the normal arc of the band. This creates a torsion inducing moment arm configuration in the end of the band as illustrated at FIG. **12** in the aforementioned U.S. Pat. No. 3,525,514.

In operation of this spring band assembly **415** the connector **430** performs the same functions as previously ascribed to the connector **330**. Further, however, its dynamic uplift is effected inwardly of the band end. This uplift, coupled with the torsion inducing band **420** configuration and the articulate connection provided by the clip **460** produces a highly sophisticated and luxurious seat base.

FIG. **9** illustrates a sinuous spring band assembly **515** which also incorporates a connector **530** identical to the connector **330** hereinbefore discussed. In the assembly **515** the sinuous band **520** is a de-arced band, however; i.e., it *has a considerably flatter arc than "normally arced" sinuous and thus* has very little inherent upward resilience. In this assembly the connector **530** pre-loads the band **520** upwardly at the fourth linear segment **525**d from the ultimate linear segment **525**a.

The ultimate linear segment **525**a is seated in the EKS clip **540** on the rail **516**, together with the base leg **540** of the connector **530**. The connector leg **539** thus pre-loads the band **520** upwardly with the seat base **10** in its relaxed state as a subject is seated and rises, the connector provides a dynamic uplift which would otherwise not be present.

All of the connectors hereinbefore discussed are also used to connect other forms of seat base support means to the frame rails. As will readily be understood, wire grids such as manufactured under the trademark PERMA-MESH by Flexolators, Inc., chord-rubber webbing such as manufactured by the Pirelli, s.p.a., of Italy, and flat steel bands, for example, do not have stored upward resilience in the sense that arced sinuous spring bands do. When connected to the back frame rail by connectors embodying the inventions disclosed herein, however, they are provided with a dynamic uplift adjacent the back rail. In this sense they are similar to a [de-arced] *non-arced* sinuous spring band.

It should be noted here that normally arced, de-arced and non-arced sinuous have been referred to. Each of the first two has an arc to it; de-arced merely have a substantially lesser degree of arc. Non-arced sinuous, on the other hand, has no arc inherently built into it at all, as illustrated by the Slominski U.S. Pat. No. 3,334,887, for example.

While several embodiments described herein are at present considered to be preferred, it is understood that various modifications and improvements may be made therein, and it is intended to cover in the appended claims all such modification and improvements as fall within the true spirit and scope of the invention.

What is desired to be claimed and secured by Letters Patent of the United States is:

1. In a [furniture] seat base including a frame having afront rail and a back rail and a plurality of sinuous spring band assemblies disposed between said rails, the improvement in a sinuous spring band assembly, comprising:

a. [a normally] *an* arced sinuous spring band comprising a plurality of generally linear wire segments interconnected by a plurality of generally semi-circular wire segments connected to the front rail and extending into close proximity with the back rail, and

b. a rail connector connecting said band to the back rail,

c. said rail connector including coil spring means for storing energy and having a rail attachment leg extending from one end thereof and a spring attachment leg extending from the other end thereof,

d. said coil spring means being effective to resiliently oppose downward movement of said spring attachment leg relative to said rail attachment leg,

e. said rail attachment leg being connected to the back rail with said coil spring means spaced from said back rail whereby the coil spring means will not come into engagement with the rail during vertical travel of the seat spring assembly under load *or, at least, will not come into engagement with the rail until a substantial amount of vertical travel has taken place,*

f. said spring attachment leg being connected to said band.

2. The improvement in a sinuous spring band assembly of claim 1 further characterized in that:

a. said rail attachment leg is connected to said back rail by pivot means which permit vertical pivoting of said connector about a horizontal axis on the rail.

3. The improvement in a sinuous spring band assembly of claim **2** further characterized in that:

a. said spring attachment leg underlies the linear wire segment at the back end of said band and overlies a linear wire segment inwardly of the back end of said band so as to exert a torque effect ending to flatten the arc of said normally arced band.

4. In a furniture seat base including a frame having a front rail and a back rail and a seat base support means disposed between said rails, the improvement in a seat base support assembly,comprising:

(a) a seat base member connected to the front rail and extending into close proximity with the back rail,

(b) a rail connector connecting said member to the back rail,

(c) said rail connector including coil spring means for storing energy and having a rail attachment leg extending from one end thereof and a spring attachment leg extending from the other end thereof,

(d) said coil spring means being effective to resiliently oppose downward movement of said spring attachment leg relative to said rail attachment leg,

(e) said spring attachment leg being connected to said member,

(f) said rail attachment leg being connected to the back rail with said coilspring means spaced from said back rail whereby the coil spring means will not come into engagement with the rail during vertical travel of the seat base support assembly under load or, at least, will not come into engagement with the rail until a substantial amount of vertical travel has taken place.

* * * * *