United States Patent [19]

Limberg

Best Available Copy

[11] 3,911,573

[45] Oct. 14, 1975

[54] **DRY SHAVER**

[75] Inventor: **Klaus Limberg,** Solingen, Germany

[73] Assignee: **Robert Krups,** Solingen-Wald, Germany

[22] Filed: **Sept. 25, 1973**

[21] Appl. No.: **400,519**

[30] **Foreign Application Priority Data**

Sept. 30, 1972 Germany 2248103

[52] **U.S. Cl.** **30/43.92**

[51] **Int. Cl.²** **B26B 19/02**

[58] **Field of Search** 30/43.92, 43.91, 42

[56] **References Cited**

UNITED STATES PATENTS

1,902,988	3/1933	Bott	30/43.92 X
2,049,574	8/1936	Stein	30/43.92 X
2,281,434	4/1942	Gur Arye	30/43.92
2,287,686	6/1942	Jones	30/43.92
2,841,867	7/1958	Padgett	30/43.92 X
3,332,146	7/1967	Kratz	30/43.92
3,389,467	6/1968	Baumann	30/43.92
3,447,241	6/1969	Moeckl	30/43.92 X
3,783,508	1/1974	Brown et al.	30/43.92

FOREIGN PATENTS OR APPLICATIONS

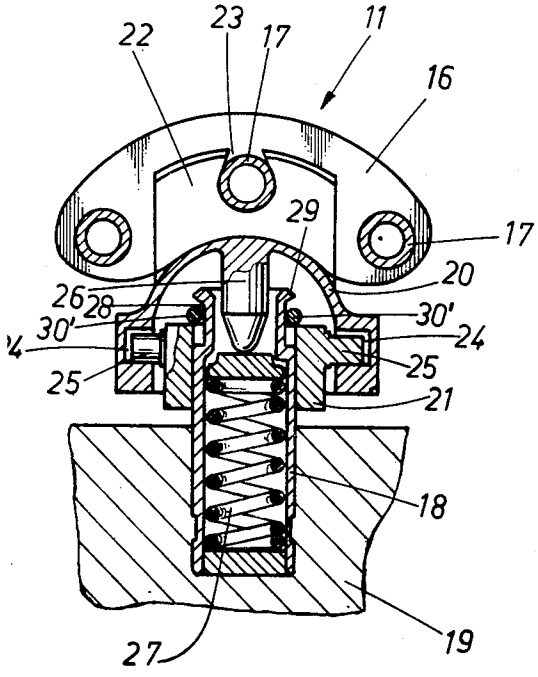
224,014	10/1942	Switzerland	30/43.92
1,035,597	7/1966	United Kingdom	30/43.92
512,518	9/1939	United Kingdom	30/43.92

Primary Examiner—Al Lawrence Smith
Assistant Examiner—J. T. Zatarga
Attorney, Agent, or Firm—Michael S. Striker

[57] **ABSTRACT**

A dry shaver casing is provided with a shearhead which includes a set of cutter blades and a carrier for the same. An oscillatable projection extends from the casing and is provided with an outer recess in its periphery, and a sleeve mounted on the carrier surrounds the projection and has at least one springy portion extending inwardly of the interior cross-section of the sleeve and received with a snap action in the recess of the projection.

4 Claims, 4 Drawing Figures



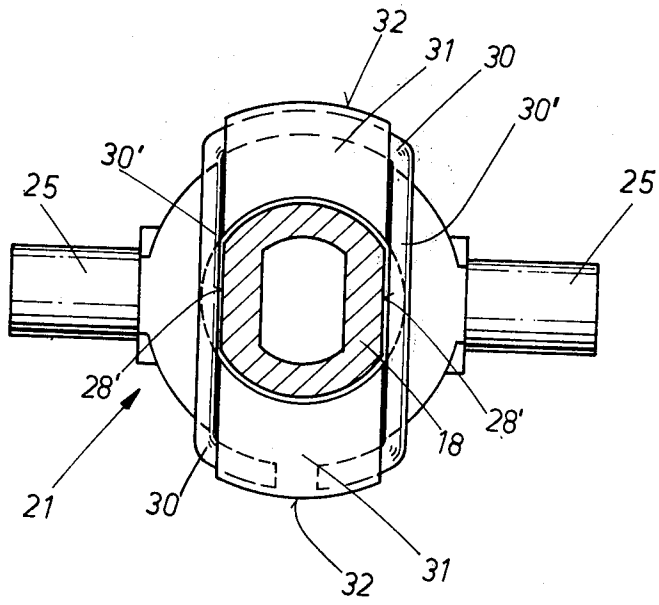


FIG. 1

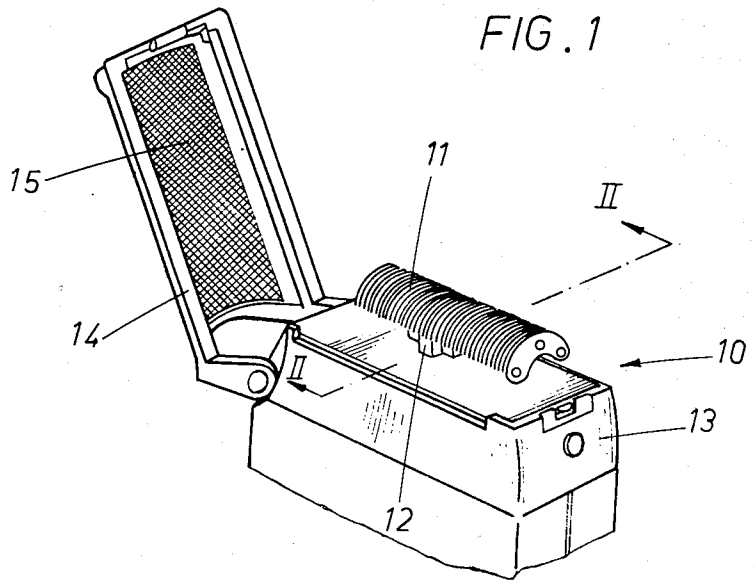

15
11
II
14
II
10
13
12

FIG. 2

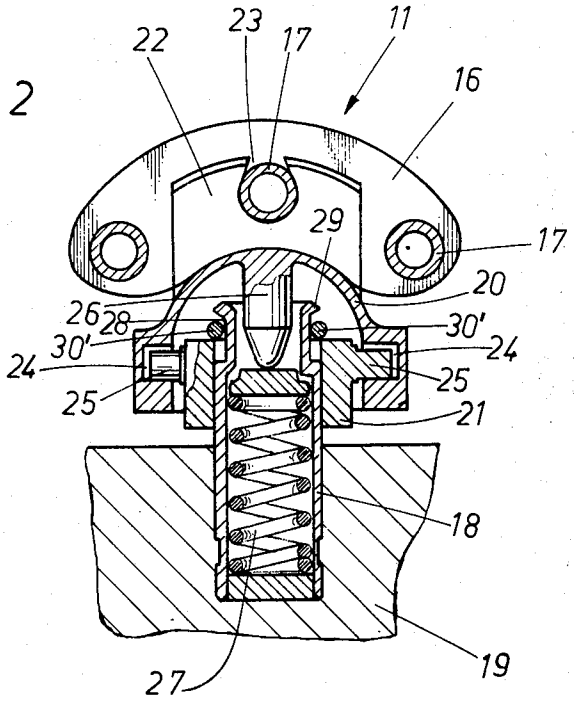

22
23
17
11
16
29
17
20
26
28
30'
24
30'
24
25
25
21
18
19
27

FIG. 3

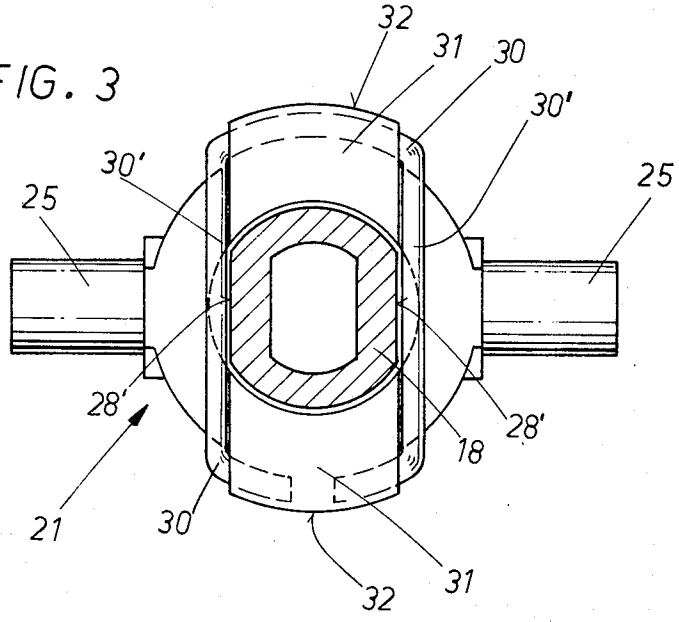
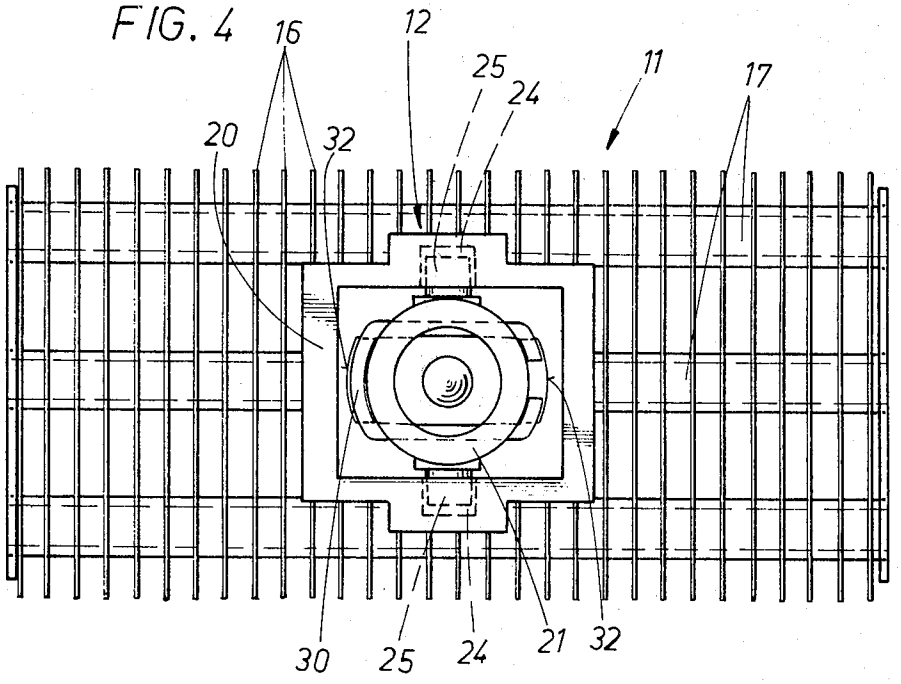

32
31
30
30'
30'
25
25
28'
28'
18
21
30
31
32

FIG. 4


16
12
25
24
11
17
20
32
30
25
24
21
32

DRY SHAVER

BACKGROUND OF THE INVENTION

The present invention relates generally to a dry shaver, and more particularly to a dry shaver having a casing and a shearhead provided on the same.

Many different types of dry shavers are well known in the art. One of these, and this is the type with which the present invention is particularly concerned, has a casing which houses the drive components, and a shearhead which is releasably mounted on the casing. The shearhead usually is in form of a frame having a cutout across which a thin flexible apertured shear foil extends. Located within this frame, and connected with a motion-transmitting component of the drive unit which extends out of the casing, is a set of cutter blades all of which are connected together to form a unit and which are provided on a carrier. The carrier is connected with the drive component which, when the drive is energized, performs oscillatory movements and thus moves the set of cutter blades in a similar manner. The edges of the cutter blades, that is the cutting edges which sever hair and beard stubble, engage and slide over the inner side of the shear foil, and in some prior-art constructions a spring is provided which urges the set of cutter blades into such engagements.

This is a highly efficient and reliable construction. However, aside from the efficiency of operation it is of course also necessary that the dry shaver be capable of being readily cleaned, since cut off hair and beard stubble will accumulate in the interior of the shearhead, and in particular around and between the blades. It is therefore desired that the unit having the cutter blades and the carrier be readily detachable from the oscillatable drive component or projection, so that it can be removed and cleaned in a suitable manner, for instance by holding it under running water which obviously would not be possible if it were to remain connected with the dry shaver casing which contains sensitive electrical components.

The problem with these two requirements, namely that on the one hand the unit having the cutter blades be reliably connected with the oscillatable drive component, and that on the other hand it be readily releasable, has heretofore not been satisfactorily solved. A prior-art construction which has attempted such a solution proposes to permit removal of the cutter blade unit from the oscillatable drive component by turning the cutter blade unit out of its normal operating position, and then withdrawing it, and of course to re-connect it this procedure would be reversed. This, however, is not satisfactory because the connection between the two components cannot be visually inspected during disengagement and re-engagement, so that these manipulations are rather difficult for the average user. In particular, there is the danger that the components might become damaged by improper connection, or rather by an attempt to establish a connection which is not really possible due to inaccurate alignment of the components.

SUMMARY OF THE INVENTION

Accordingly, it is a general object of the present invention to overcome the disadvantages of the prior art.

More particularly, it is an object of the present invention to provide an improved dry shaver construction which avoids the aforementioned disadvantages.

Still more specifically, the invention has as one of its important objects to provide an improved dry shaver construction which has a coupling capable of providing a reliable connection between the cutter blade unit and the drive component of the dry shaver, but which coupling can be readily disengaged and re-engaged at the requirements of a user.

In keeping with the above objects, and with others which will become apparent hereinafter, one feature of the invention resides, in a dry shaver, in a combination which comprises a casing and a shearhead on the casing. The shearhead includes a set of cutting blades and a carrier for the same. An oscillatable projection extends from the casing and has an exterior inwardly extending recess, and a sleeve is mounted on the carrier and surrounds the projection. The sleeve has at least one springy portion extending inwardly of its interior cross-section and being lodged in the recess of the projection, but being adapted to snap out of the recess when a predetermined axial pull is exerted on the sleeve.

This permits a reliable snap action connection of the sleeve with the projection, and a similarly reliable and simple disengagement of these components. Moreover, the novel arrangement requires of the user no manipulative operations other than a straight-line withdrawal of the sleeve from the projection, or a straight-line pushing of the sleeve onto the projection. Of course, the force required to overcome the spring action of the springy portion, that is to push the sleeve onto the projection or withdraw it from the same, can be readily so selected that its exertion will not cause any damage to any of the various components involved.

A particularly simple construction utilizes a spring annulus which is mounted on the sleeve, having portions which are located inside the inner circumferential surface bounding the passage in the sleeve, and which annulus is connected with the sleeve. This arrangement has the advantage that the sleeve itself can be produced in a very simple manner and, on the other hand, that the annulus can be connected with the sleeve using the springy characteristic of the annulus itself without requiring special components for the connection. It is advantageous if the annulus is arranged in the region of an axial end of the sleeve and embraces axially projecting wall portions of the same. A particular advantage of this construction is the fact that it is unnecessary to form the sleeve with cutouts through which portions of the annulus could extend into the interior of the sleeve, because the sleeve can extend inwardly of the interior cross-section of the sleeve outwardly adjacent one axial end of the sleeve. The wall portion or portions of the sleeve which are embraced by the annulus may advantageously be provided with a radial bead or flange to prevent slipping-off of the annulus.

I currently prefer to provide the recess which cooperates on the oscillatable projection with the springy portion of the sleeve, by depressing parts of the circumferential surface of the projection in inward direction. This assures that the projection is not materially weakened by the provision of the recess, and moreover it provides a positive protection against undesirable turning of the sleeve relative to the projection, and thus eliminates undesired displacements of the set of cutter blades. The inward depressions may be formed as diametrally opposite facets or surface portions which extend in parallel with one another and are planar. Of

course, it should be understood that it is equally well possible to provide a differently configurated recess, for instance in form of an outer circumferentially extending groove which is provided in the circumferential surface of the projection.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a perspective view of the upper part of a dry shaver casing with the shearhead provided on the same;

FIG. 2 is a section taken on line II—II of FIG. 1;

FIG. 3 is a partly sectioned top-plan view of the sleeve used in the embodiment of FIG. 2, mounted on the oscillatable drive projection; and

FIG. 4 is a bottom-plan view of the coupling according to the present invention which is used in FIG. 2, together with the set of cutter blades.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to the exemplary embodiment illustrated in FIGS. 1–4 it will be seen that in FIG. 1 I have shown for purposes of orientation the shearhead **10** of a dry shaver. This shearhead **10** has a set of cutter blades **11** which are connected with one another to form a unit. The set of cutter blades is connected via a coupling **12** with the oscillatable drive projection **18** (see FIGS. **2** and **4**) of a drive located in the interior of the dry shaver casing **13.** The drive itself, and the manner in which it imparts oscillatory movements to the drive projection **18,** is well known in the art and requires no detailed discussion.

The shearhead **10** further comprises a frame **14** which may be entirely removable from the casing **13,** or which may be tiltable to and from the open position shown in FIG. **1.** In conventional manner, the frame **14** which has a convex exterior configuration, mounts a shear foil **15** of flexible thin metal or the like provided with a plurality of apertures so that the frame **14** with the shear foil **14** form a perforated cover through which beard stubble can extend to the interior of the frame **14** to be cut off by the cutting edges of the blades of the set **11.** In normal operation, the frame **14** will be tilted down towards the right to overlie the set **11** and to define a shearhead chamber with the casing **13,** but for purposes of inspection or cleaning it will be moved to the position shown in FIG. **1,** if it cannot be removed in its entirety.

Referring now in particular to FIGS. **2** and **4** it will be seen that in known manner the set **11** is composed of a plurality of individual cutter blades **16** which are mounted in parallelism and with some spacing on mounting members **17.** A carrier **20** is provided for the set **11.** The carrier **20** is provided with wall portions **22** which are provided with recesses **23** and extend between two successive ones of the cutter blades **16** so that they can be placed onto the center mounting member **17.** The lower side of the carrier **20,** that is the side facing away from the set **11,** is open in a frame-like manner, and a sleeve **21** is inserted into it and connected with the carrier **20** in such a manner that the sleeve can tilt about an axis extending transversely to the direction of oscillation of the set **11** and the projection **18,** which means that the axis extends from left to right in FIG. **2** whereas the direction of oscillation extends normal to the plane of FIG. **2.**

In particular, and now referring especially to FIG. **2,** it will be seen that the carrier **20** is provided with two transversely spaced recesses **24** and that the sleeve **21** has two diametrally opposite projections **25** each of which is received in one of the recesses **24.** The carrier **20** may be of synthetic plastic material and the insertion of the projections **25** into the recesses **24** is accomplished by temporarily deforming the material of the carrier **20** in transverse direction so that the projections **25** can snap into the recesses **24.** The carrier **20** is further provided with a downwardly extending projection or pin **26** which in known manner extends into the upper open end of the tubular oscillatable drive projection **18** which is mounted in a motion-transmitting arm **19** (shown only fragmentarily). A spring **27** acts upon the inner free end of the projection **26** to urge the same and via it the carrier **20** and the set **11** in upward direction, that is in such a direction that the cutting edges of the blades **16** will engage the inner surface of the shear foil **15.**

The inner cross-section of the sleeve **21** is so dimensioned with reference to the outer cross-section of the projection **18** that the sleeve **21** can slide axially on the projection **18.** This assures that in all operating conditions the set **11** will be reliably pressed against the inner side of the shear foil **15** by the action of the spring **27,** whereby optimum shear results are obtained.

As shown particularly clearly in FIGS. **2** and **3,** the projection **18** is provided with a portion **28** having a reduced cross-section. It is further provided at the free end of the projection **18** with a portion **29** whose cross-section corresponds to the remainder of the projection **18,** rather than to the reduced cross-section of the portion **28.** The reduced cross-section in the illustrated embodiment is obtained by recessing diametrally opposite sides of the portion **28** in the illustrated manner, and the inner surfaces **28'** at these sides extend in planes which are parallel with one another and with the longitudinal axis of the projection **18.** They are also planar, so that a fixation of the sleeve **21** against turning movement is assured when the snap action coupling is established. Of course, the recess could be formed in a different manner, for instance by providing a circumferentially extending groove in the outer circumferential surface of the projection **18,** or by providing even differently shaped recesses.

The edge bounding the portion **29** is beveled to facilitate slipping of a springy portion of the sleeve **21** onto it when the coupling is to be connected.

The sleeve **21** is provided at its axial end which is uppermost in FIG. **2,** with diametrally opposite deflectable springy portions **30'** each of which is partially closer to the axis of the sleeve **2** which coincides with the axis of the projection **18,** than the inner circumference of the sleeve **21;** these portions **30'** are part of a spring annulus **30** (see FIG. **3**) which is mounted on the sleeve **21** by embracing at wall portions **31** which are spaced in the axial direction of the sleeve **21** and extend transversely to the axis thereof. These wall portions **31** are so constructed that between them they leave openings in which the portions **30'** of the annulus

30 can extend. The wall portions 31 are provided with axially extending flange portions 32 which prevent undesired withdrawal of the annulus 30 from the sleeve 21. The annulus 30 is of course such as to be interrupted at one side, as shown in FIG. 3, and can therefore be outwardly deflected without any hindrance.

It is now merely necessary, when the coupling is to be disengaged from the position shown in FIG. 2, to exert a pull on the set 11 and carrier 20 in one direction (upwardly in FIG. 2) and on the casing 13 in the opposite direction (downwardly in FIG. 2) until the force of the pull is strong enough to overcome the resistance offered by the annulus 30, so that the same becomes outwardly deflected by the portion 29 and can slide over the same. Once it has slipped past the portion 29, it will of course snap back to its original condition, but the coupling is now disengaged and the sleeve 21 can be withdrawn from the projection 18. To reconnect the components, the just-described is merely reversed.

Evidently, various modifications may be made without departing in any way from the intent of the invention. The set 11, the frame 14 and the shearhead 10 could be constructed differently from what has been illustrated. The spring 27 could be omitted or could be located elsewhere than shown in FIG. 2; it could also be a differently configurated spring. The member 30 need not be of annular configuration, nor need it be located at the axial end of the sleeve 21 as shown in FIG. 2.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of constructions differing from the types described above.

While the invention has been illustrated and described as embodied in a dry shaver, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be protected by Letters Patent is set forth in the appended claims:

1. In a dry shaver, a combination comprising a casing; a shearhead including a set of cutter blades and a carrier therefor; an oscillatable drive projection extending from said casing and having a free end and an outer circumferential surface provided at diametrally opposite sides with two recesses, each of said recesses having a planar surface portion which is substantially parallel to the other planar surface portion, said planar surface portions being spaced from said free end of said drive projection and inwardly recessed from the rest of said circumferential surface; a sleeve mounted on said carrier and having an axial end and a wall portion extending axially from said axial end and having a radially projecting portion, said sleeve being provided with a central passage partially bounded by said wall portion and adapted to accommodate said drive projection; and an annular spring element mounted on said sleeve and having a section which is located under said radially projecting portion, and a pair of additional sections which extend into said central passage of said sleeve adjacent said axial end thereof and which resiliently yieldably abut against said two planar surface portions when said drive projection is accommodated in said passage so as to connect said sleeve to said drive projection but which are adapted to disengage said planar surface portions and to snap out of said recesses when a predetermined axial pull is exerted on said sleeve.

2. A combination as defined in claim 1, wherein said drive projection is tubular and has an open end facing said carrier; and further comprising a stud projecting from said carrier within the confines of said sleeve and into said open end.

3. A combination as defined in claim 2, and further comprising biasing means accommodated in said tubular drive projection and acting on said stud so as to urge said carrier axially away from said drive projection.

4. A combination as defined in claim 1, wherein said circumferential surface of said drive projection is formed in the region of said free end with two pairs of chamfered surfaces, one of the two surfaces of each pair partially bounding the respective recess, and the other being located at said free end, said chamfered surfaces being adapted to engage said additional sections of said spring element so as to snap the same in and out of said recesses.

* * * * *