July 26, 1966 W. I. NISSEN 3,262,198

MAGAZINE FOR A RIBBON-LIKE SHAVING BLADE

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FIG. 1.

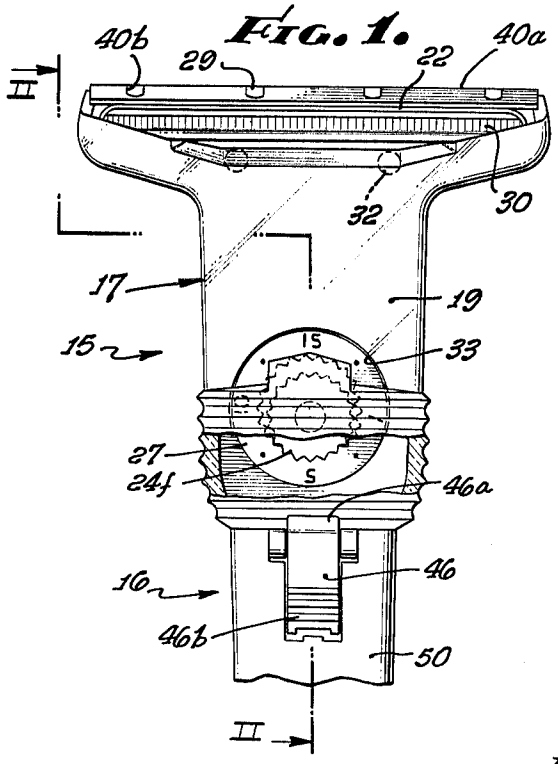


FIG. 2.

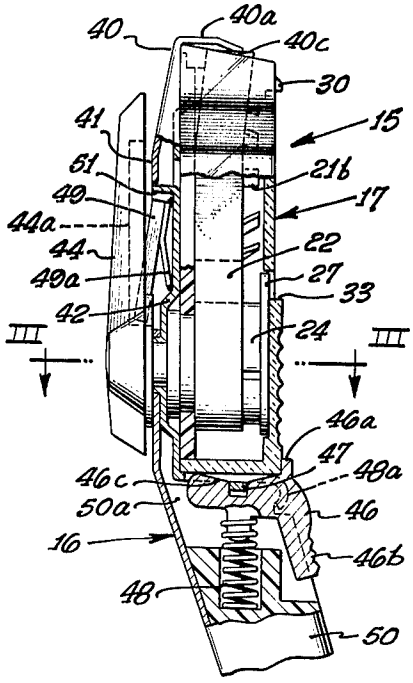


FIG. 3.

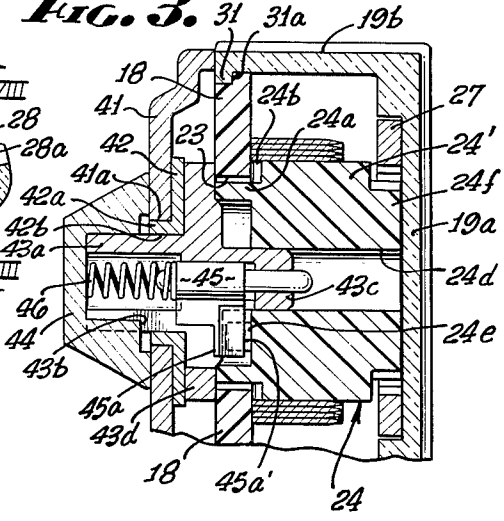
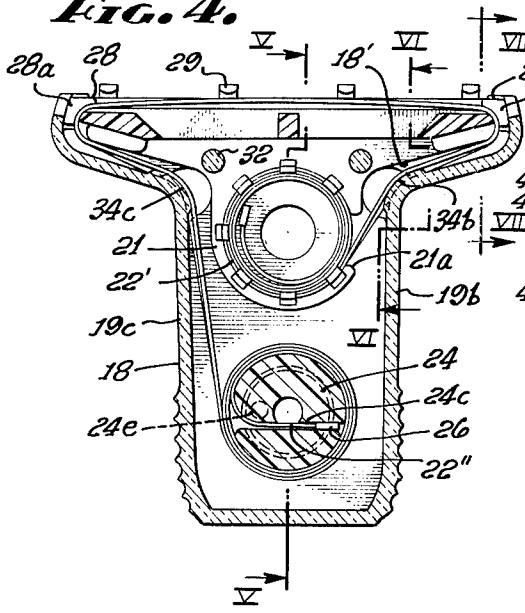


FIG. 4.



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FIG. 5.

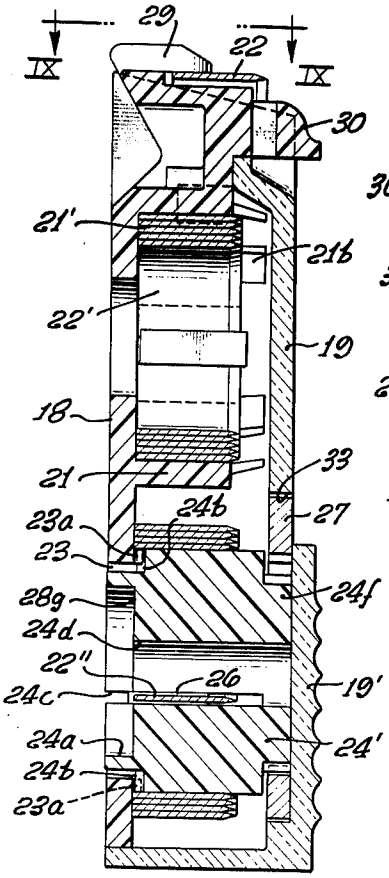


FIG. 6.

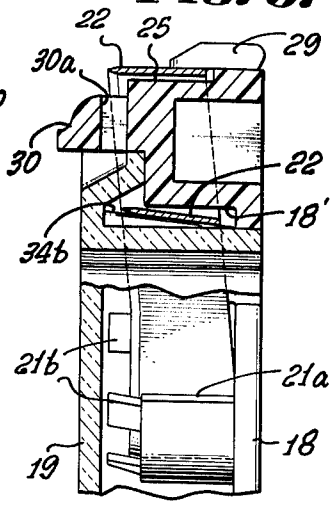


FIG. 7.

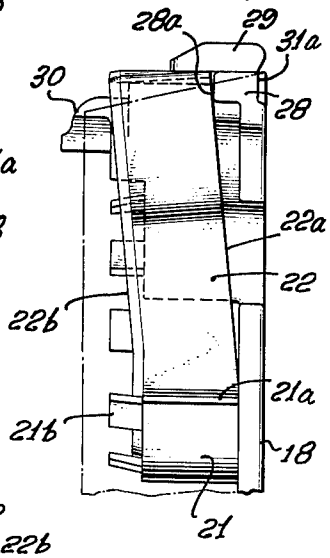


FIG. 8.

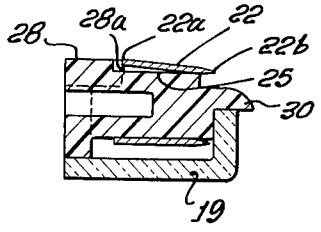


FIG. 9.

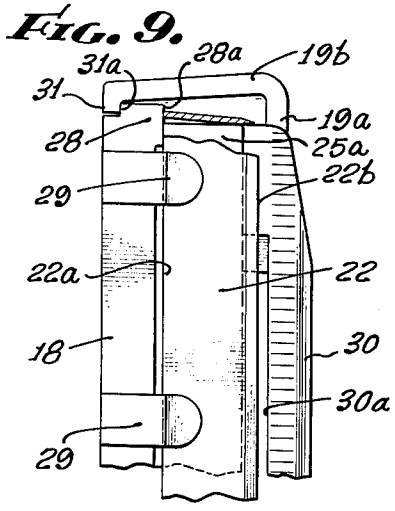
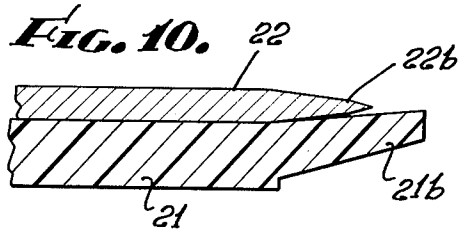


FIG. 10.



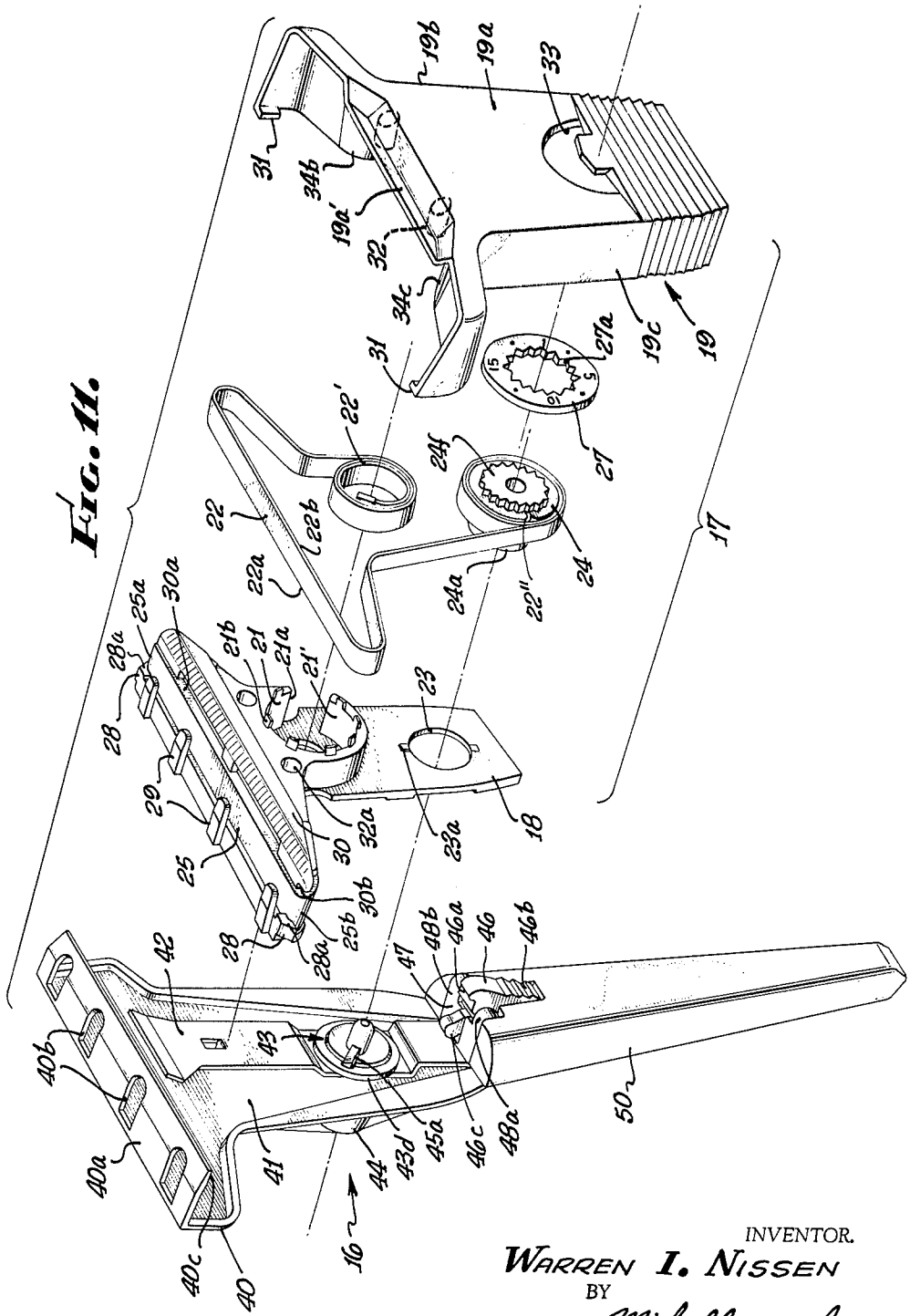
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FIG. 11.



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FIG. 12.

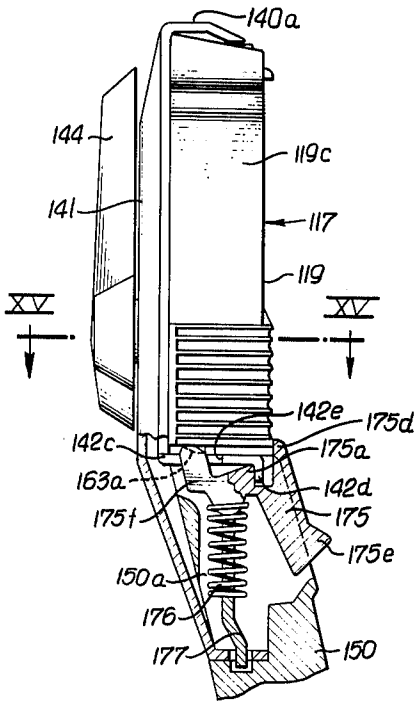


FIG. 13.

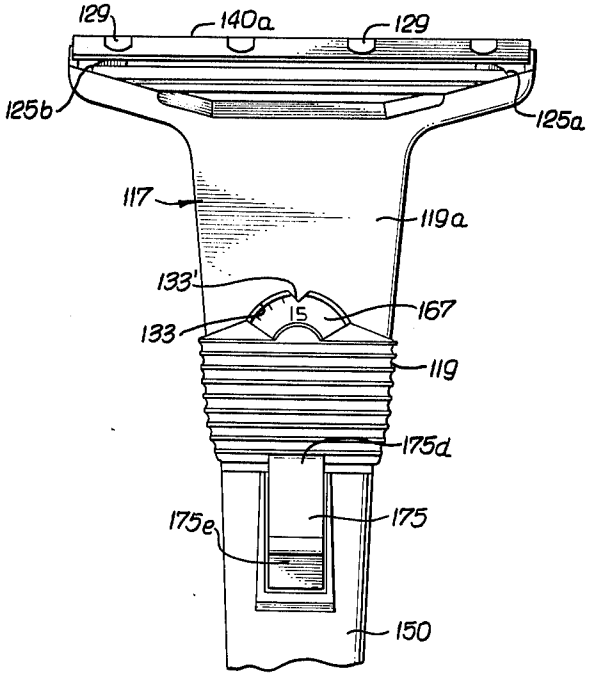


FIG. 14.

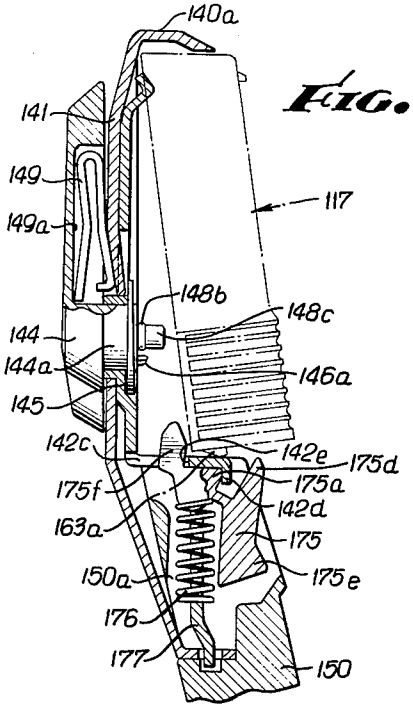
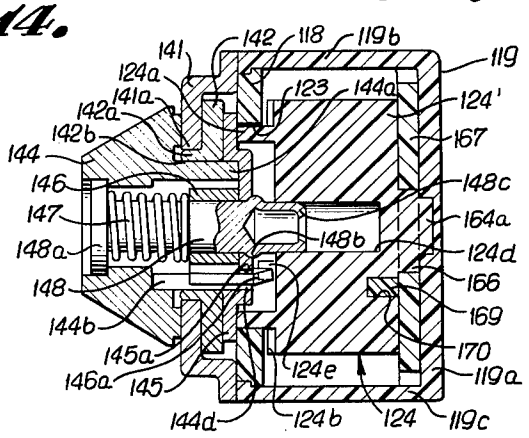


FIG. 15.



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FIG. 16.

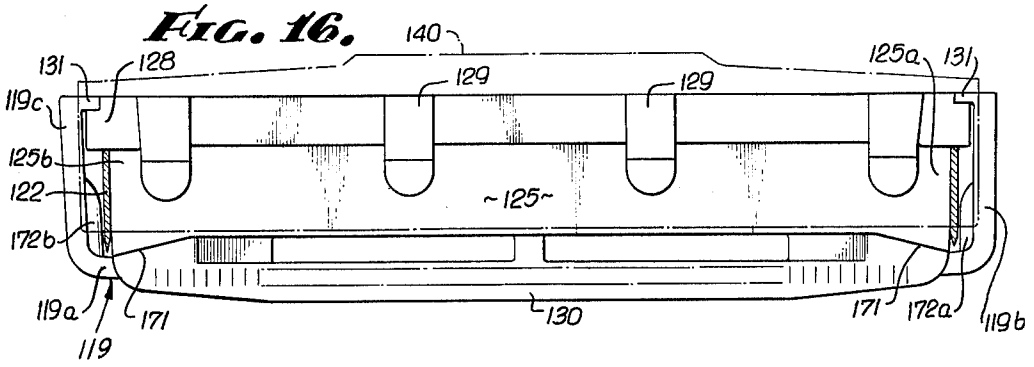


FIG. 17.

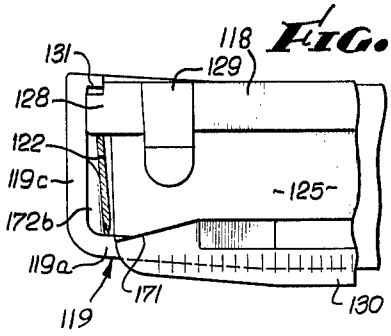


FIG. 18.

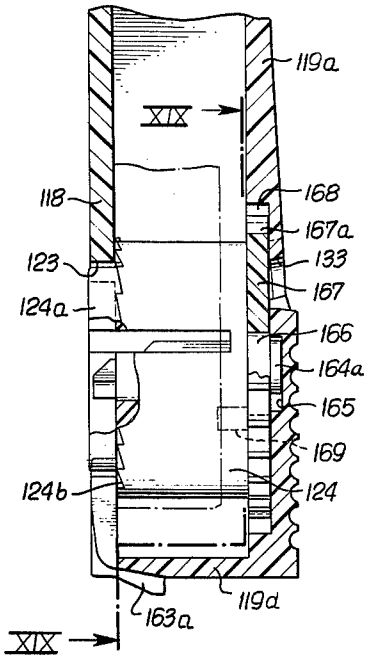
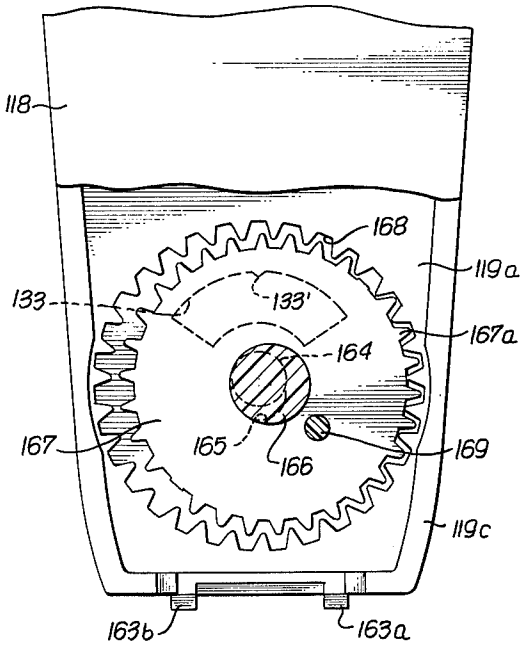


FIG. 19.



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FIG. 20.

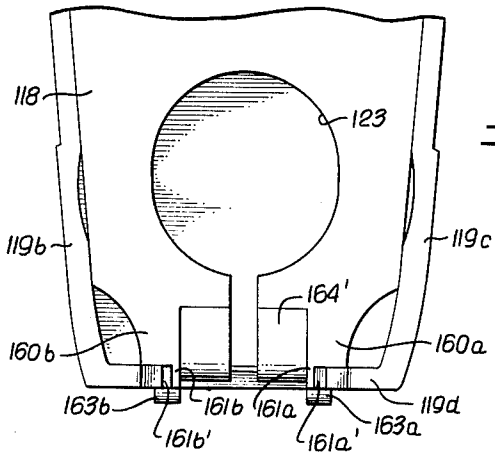


FIG. 23.

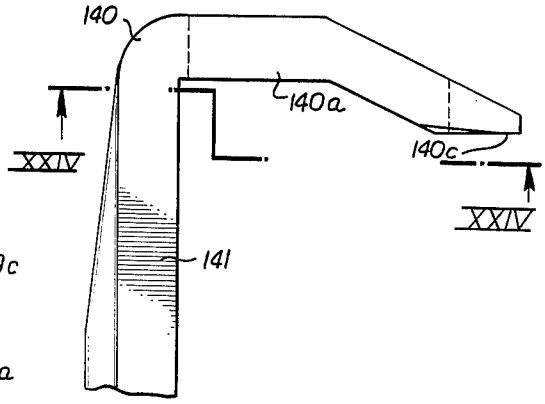


FIG. 21.

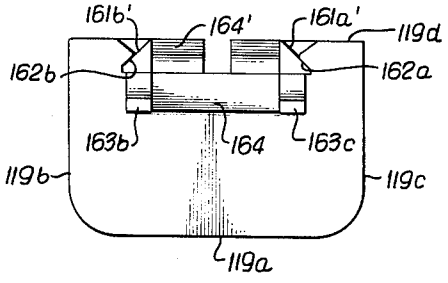


FIG. 24.

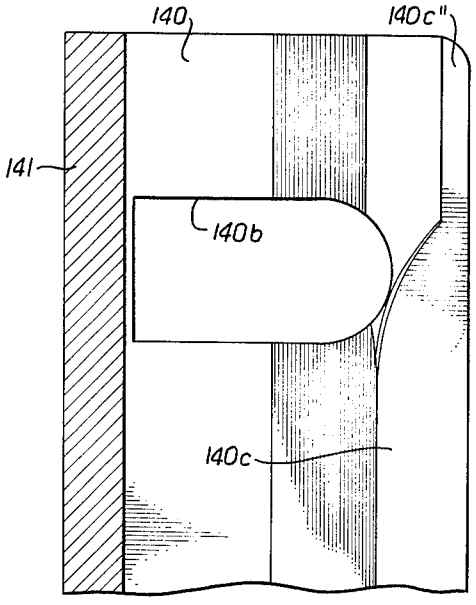
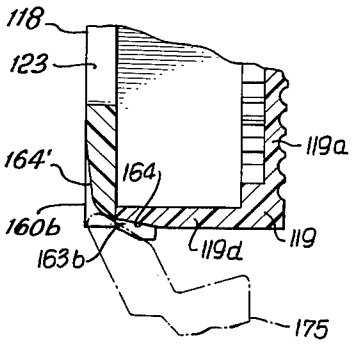


FIG. 22.



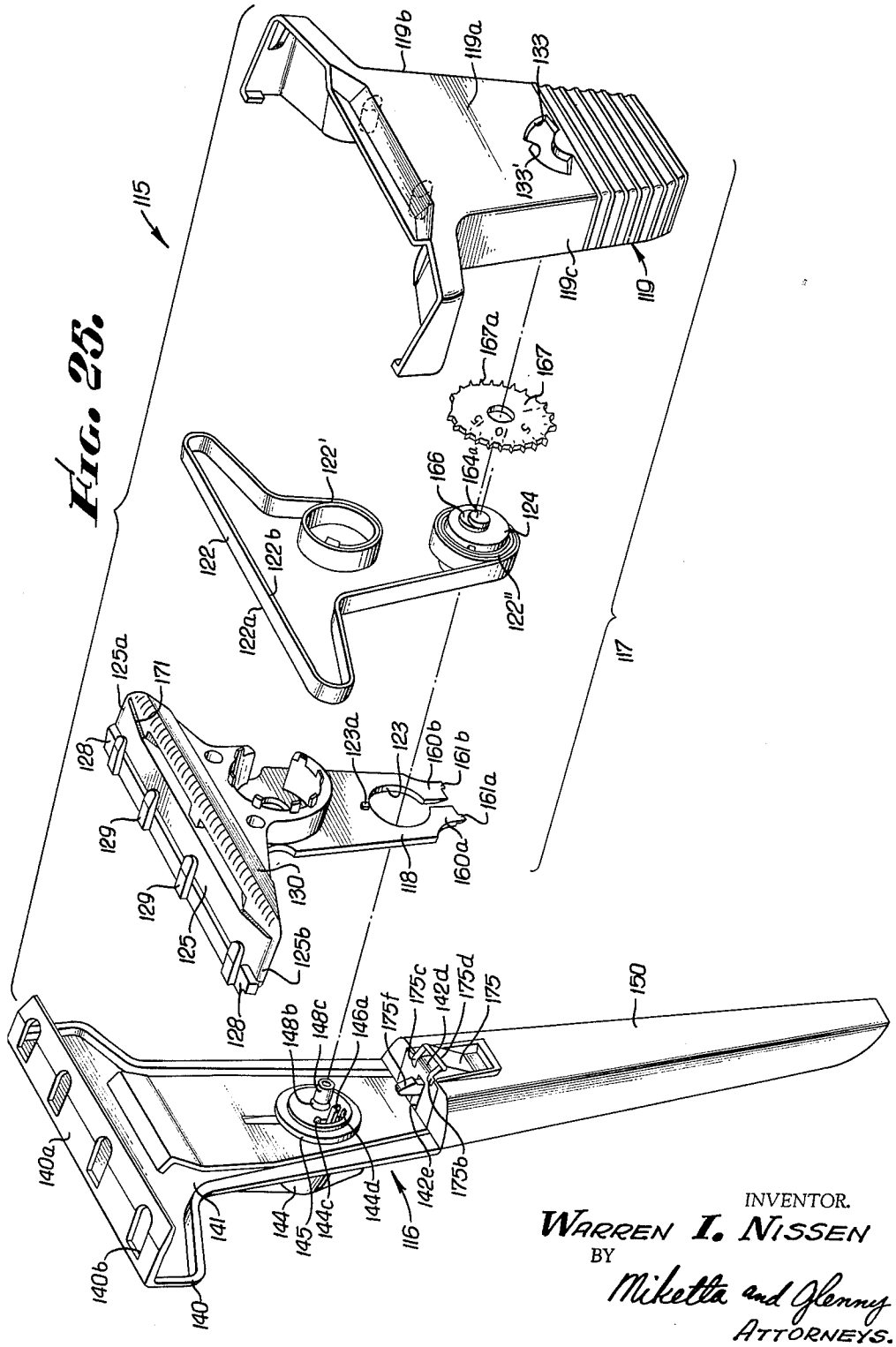
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Fig. 25.



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United States Patent Office 3,262,198 Patented July 26, 1966

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MAGAZINE FOR A RIBBON-LIKE SHAVING BLADE

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Continuation of application Ser. No. 305,734, July 1, 1963. This application Feb. 9, 1966, Ser. No. 529,911
11 Claims. (Cl. 30—40.1)

This is a continuation of applicant's prior copending application Serial No. 305,734 filed July 1, 1963, which in turn is a continuation-in-part of applicant's application Serial No. 211,073 filed July 19, 1962, now abandoned.

The present invention relates to a magazine for a ribbon-like shaving blade wherein successive lengths of such blade may be rendered available for shaving. The magazine is adapted to be removably carried in a holder to provide a safety razor.

Attempts have been made heretofore directed to the development of safety razors utilizing a ribbon-like or strip shaving blade, such a blade having an unsharpened rear edge and a parallel sharpened edge. Such safety razors included a magazine having a supply of ribbon like blade, generally coiled, a rotatable blade take-up means, and a blade supporting surface for receiving and supporting a length of such blade for shaving. However, because of the many problems involved, there have been no commercially successful razors provided with removable magazines having a continuous ribbon-like blade which is adapted to have successive lengths thereof rendered available for shaving.

Generally, the problems involved in developing such a commercially acceptable safety razor were associated with the magazine containing the ribbon-like shaving blade. There was difficulty in preventing the blade from moving laterally during advancement of the blade. The location and position of that portion of the blade exposed for use in shaving was not effective and often unsatisfactory. Although a razor should be small and compact, it should present a relatively long shaving edge in order to expedite shaving. The ends of that portion of the ribbon-like blade in the shaving zone of prior magazines had a large radius of curvature, and since these curved sections were not effective in shaving, the intermediate shaving portion was spaced from the sides of the magazine and hence from the sides of a holder receiving such magazine to an undesirable extent. The prior magazines of this type were not capable of presenting shaving blade sections so as to permit shaving in normally inaccessible or recessed areas, such as in clefts, around nostrils, ears, etc.

It was recognized that the supply of ribbon-like blade in the magazine should be provided in a coiled condition for ease of handling and most effective use. However, there were problems in providing effective and operable means for receiving such a coiled supply of a ribbon-like blade in the magazine and preventing the coiled blade from moving laterally within the magazine when a length of blade was advanced from the coiled supply to the shaving zone of the magazine. Such uncontrolled lateral movement, in prior magazines, either tended to move the sharpened blade against a dulling surface or produced undesirable variations in blade exposure and shaving effectiveness.

The mazagine for a ribbon-like shaving blade of the present invention completely obviates the problems encountered heretofore in developing a commercially acceptable safety razor having ribbon-like blade and is arranged to product new and desirable effects and results. The present magazine is adapted to be removably carried by a holder to provide a safety razor having a

continuous ribbon-like shaving blade wherein successive lengths of such blade may be rendered available for shaving. Such magazine includes means for imparting when clamped in the holder a frusto-conical form to a portion of a ribbon-like blade at each end of such blade length of the shaving zone wherein the apex of each such frusto-conical portion is lying forwardly of the sharpened edge of such blade. Such frusto-conical end portions are of small radius, thus making it possible to shave those shielded or recessed areas which were normally inaccessible to ribbon type safety razors attempted to be developed heretofore.

Moreover, the magazine of the present invention includes a portion defining a shaving zone for a length of the blade and spaced, supporting pads for continuously engaging the rear unsharpened edge of the blade to provide a positive backstop for the blade in the shaving zone. This together with the operation of the frusto-conical forms insures positive and desired blade edge exposure and location.

A further improvement characterizing the present invention is the provision of self-adjusting blade take-up means which is rotatably and loosely mounted within the magazine and which is adapted to reduce the clamping pressure on the ribbon-like blade as the blade is advanced when the magazine is removably carried in a holder of a safety razor.

Accordingly, it is a general object of the present invention to provide a magazine for a ribbon-like blade that avoids all of the foregoing disadvantages of such magazines heretofore proposed by others.

An object of the present invention is to provide a magazine for a ribbon-like blade adapted to be removably carried in a holder to form a safety razor capable of rendering successive lengths of such blade available for shaving.

An object is to provide a magazine for a ribbon-like blade capable of imparting frusto-conical forms to sections of such blade to permit a construction effective in shaving normally inaccessible and recessed areas.

Another object is to provide a magazine for a ribbon-like blade capable of imparting a frusto-conical form to the blade when clamped in a suitable holder, which frusto-conical form is effective in positioning such blade in a shaving zone in the magazine.

A further object is to provide a magazine for a ribbon-like blade adapted to prevent that length of such blade in the shaving zone of the magazine from exhibiting undesired lateral movement.

An object is to provide a magazine for a ribbon-like blade which has a minimum number of elements, is economical to manufacture, provides means for maintaining blade sections in most effective positions, and can be easily installed and used in a safety razor.

An object is to provide a magazine for a ribbon-like blade in which the blade is assured of immediately being located in the proper shaving position with the correct blade exposure when the magazine is assembled in a holder device and is positively prevented from unwinding when the magazine is disassembled from a holder.

Another object is to provide a magazine for a ribbon-like blade which is easily and quickly disassembled or ejected from a holder and which will effectively prevent debris from accumulating beneath the ribbon-like blade when the blade is moved to present an unused length of blade for shaving.

An object is to provide a magazine for a ribbon-like blade having a novel indicia or counting means which is particularly suitable for easy positioning during assembly of the magazine device.

Other objects and advantages of this invention will be readily apparent from the following description which is

primarily directed to exemplary forms illustrated in the appended drawings.

In the drawings:

FIG. 1 is a front elevation of an exemplary magazine device of the present invention removably carried by a holder to form a safety razor of unusual attributes. A portion of the cover is broken away.

FIG. 2 is a side elevation, partly in vertical section, of the device, the section and view being taken along plane II—II of FIG. 1.

FIG. 3 is an enlarged transverse section of the device taken along plane III—III of FIG. 2.

FIG. 4 is a front elevation of the magazine of FIG. 1, with the front wall of the cover removed and other parts broken away or removed for clarity.

FIG. 5 is an enlarged vertical section of the device taken along plane V—V of FIG. 4.

FIG. 6 is an enlarged vertical section of the upper portion of the device, taken along plane VI—VI of FIG. 4.

FIG. 7 is an enlarged fragmentary side elevation of the upper portion of the device shown in FIG. 4, the cover being removed.

FIG. 8 is an enlarged vertical section taken along plane VIII—VIII of FIG. 4, illustrating the form and position of the blade at the end portion of the shaving zone.

FIG. 9 is an enlarged fragmentary top plane view of the device, taken from plane IX—IX of FIG. 5, with a portion of the ribbon blade broken away.

FIG. 10 is an enlarged section showing the relationship of the hollow supply element to the outer coil of the ribbon-like blade adapted to be received therein.

FIG. 11 is an exploded isometric view of a magazine device, as shown in FIGS. 1 to 10, a ribbon-like blade adapted to be carried and selectively positioned therein, and an exemplary holder in which such magazine may be mounted.

FIG. 12 is a side elevation, partly in vertical section, of another embodiment of the device of the present invention, with the magazine assembled in a holder.

FIG. 13 is a front elevation of the assembled magazine device and holder of FIG. 12.

FIG. 14 is a vertical section of the holder of FIGS. 12 and 13 with the latch in the ejected or unassembled magazine position, a magazine in phantom lines being shown in the unassembled position.

FIG. 15 is a transverse section of the device taken along plane XV—XV of FIG. 12.

FIG. 16 is an enlarged top plan view, partly in section, of the magazine device of FIGS. 12 and 13 in the assembled position when secured within a holder, a holder being shown in phantom lines.

FIG. 17 is an enlarged fragmentary top plan view, partly in section, of the magazine device of FIG. 16, except the device is in a slightly bowed and unassembled position with respect to a holder.

FIG. 18 is an enlarged fragmentary, vertical section of the magazine device of FIGS. 12 and 13 and particularly shows a modified counting or indicia means for indicating the number of unused shaving lengths of the blade that remain.

FIG. 19 is a transverse section of the device taken along plane XIX—XIX of FIG. 18.

FIG. 20 is an enlarged fragmentary, rear elevation of the lower end portion of the magazine device of FIGS. 12 to 19.

FIG. 21 is a bottom plan view of the magazine device of FIG. 20.

FIG. 22 is a fragmentary vertical section of the lower end of the magazine device of FIGS. 20 and 21, the latch element of a holder being shown in phantom lines and illustrating its cooperation with the camming surface on the bottom of the magazine device.

FIG. 23 is an enlarged, fragmentary, end elevation of the upper portion or lip of the holder device of FIGS. 12, 13 and 14 with the magazine removed or unassembled.

FIG. 24 is a transverse section of the underside of the lip of the holder device taken along plane XXIV—XXIV of FIG. 23.

FIG. 25 is an exploded isometric view of the magazine device, as shown in FIGS. 12 to 24, a ribbon-like blade adapted to be carried and selectively positioned therein, and an exemplary holder, as shown in FIGS. 12, 13 and 14, in which such magazine may be assembled or mounted.

Referring now to the drawings, wherein like reference characters designate like or corresponding parts throughout the several views, there is shown in FIGS. 1, 2 and 3 a safety razor **15** including a holder **16** and an exemplary magazine **17** of the present invention removably carried by the holder **16**.

As best seen in FIG. 11, the exemplary magazine **17** of the present invention includes a base or back element **18** adapted to receive and support various elements and a cover element **19** which is adapted to be firmly secured to the base **18** as by means of snap-type connections, to enclose and retain such elements.

The base **18** includes a substantially cylindrical, hollow element **21** adapted to receive a coiled supply of a ribbon-like shaving blade (such as shown generally at **22**), an opening **23** for rotatably and loosely receiving and mounting a take-up means **24** adapted to receive an end of the blade **22**, and an elongated, flat, transversely extending portion **25** defining a shaving zone for a portion of the blade **22** which blade passes over portion **25** in following a path of travel between supply element **21** and take-up means **24**, as hereinafter described in greater detail.

The blade strip comprises a blade **22** adapted to be used in the magazine **17** which is of uniform width, with a longitudinally extending unsharpened rear edge **22***a*, a parallel sharpened front edge **22***b*, a coiled supply end **22'**, and a take-up end **22''**.

The hollow supply element **21** comprises a cylindrical inner wall **21'** interrupted by an opening **21***a* at one side thereof through which the blade **22** extends from its supply end **22'** which is adapted to be inserted within supply element **21** and a plurality of fingers **21***b*. The hollow supply element **21** has a total depth greater than the width of the blade **22** to insure that the sharpened edge **22***b* is protected from damage by contact with the cover **19**, and to prevent the blade **22** from binding. The plurality of forwardly extending, spaced blade-retaining fingers **21***b* are provided on the outer portion and margin of the hollow supply element **21**, the inner surfaces of the retaining fingers **21***b* being inclined toward the axis of the cylindrical supply element **21**, as seen in FIG. 10. The angle of inclination of the inner surfaces of the fingers **21***b* is less than the angle of the bevel at the sharpened edge **22***b* of the blade **22**, so that the retaining fingers **21***b* only contact the shoulder or bevel portion of the blade when the blade tends to ride outwardly. This avoids any contact with and possible damage to the ultimate shaving edge of the blade. The fingers **21***b* thus insure that the supply portion of blade **22** will be retained within the hollow supply element **21**, since the tendency of the coil to expand causes it to readjust itself continuously to the size of the hollow supply element as the blade strip is fed out. The bottom of the hollow supply element **21** is planar and is adapted to contact the rear edge **22***a* of the coiled supply blade.

Blade take-up means **24** (FIGS. 3, 4, 5, and 11) comprises a rotatable arbor element **24'** shown in cross section in FIG. 4 having a smaller diameter journal end **24***a* rotatably and loosely received in opening **23** formed in the base **18**. The diameter of the opening **23** is greater than the diameter of journal end **24***a* of arbor **24'** as best seen in FIG. 5 to allow the take-up means **24** to be self-adjustable on the base **18** when the blade **22** is subjected to tension. The rearwardly facing shoulder between the journal end **24***a* and the main portion of the arbor **24'**

is provided with a plurality of teeth 24*b* forming a continuous rack which is adapted to cooperate with and rotatably contact two or more fixed teeth 23*a* (FIG. 11) provided on the base 18 adjacent opening 23. Each of the teeth 24*b* and fixed teeth 23*a* (FIG. 3) has complementary inclined sliding surfaces terminating in mating stop surfaces to allow the arbor element 24' to only rotate in one direction (counterclockwise in FIG. 4) and thus keeping the blade 22 in continuous tension when it is wound on the take-up means 24. The cover element 19 is sufficiently flexible to permit the teeth 24*b* to pass over the fixed teeth 23*a*.

It is important that the take-up end 22'' be free to seek its own natural position on the arbor 24' since any restraint on its freedom to move laterally could very easily negate the effect produced by the combination of the inclined surface 34*c* and the frusto-conical form at the take-up end of the shaving zone keeping the blade strip moving along the desired path described. The angle of the inclined surface and height of the pad 28 at the take-up end are selected so that the blade end 22'' is free to coil up on the arbor 24' anywhere between the front surface of the base 18 and the indicia ring 27.

Various means may be provided for securing the blade take-up end 22'' to the arbor 24'. For example, as best seen in FIGS. 4 and 5, the take-up end 22'' of the continuous ribbon-like blade 22 may be provided with an enlarged end 26 (of substantially greater thickness than the blade itself). The arbor 24' may be provided with a transverse slot 24*c* facing toward the journal end 24*a*, such slot 24*c* having an enlarged end portion adapted to receive the enlarged end 26. When blade take-up end 22'' is placed in slot 24*c* with the enlarged end 26 in the enlarged portion of the slot, the blade is anchored to the arbor 24' and cannot be withdrawn by a longitudinal pull on the blade. The enlarged end 26 at each end of the blade strip may conveniently be formed by spot welding a U-shaped clip thereto.

Means are provided whereby rotation may be imparted to arbor 24' by any desired driving means. The arbor may be provided with a rearwardly opening axial bore 24*d*, adapted to receive a driving element. Bore 24*d* provides a convenient means for mounting the arbor 24' on the driving element of a suitable holder. As illustrated, bore 24*d* may be cylindrical. The recessed end face 24*g* of arbor 24' may be provided with a drive pin 24*e* adapted to engage an arm of a rotatable pin carried by a holder, whereby rotation of the pin results in rotation of the take-up means 24 to wind the blade up on the arbor 24'.

The other forward end of the arbor 24' may be provided with a small pinion gear 24*f* adapted to engage and rotate an indicator ring 27 having indicia on the forward side thereof for indicating the number of shaving blade lengths remaining in the supply coil 22'. The inner surface of ring 27 is provided with gear teeth 27*a*, but the pitch diameter thereof is greater than that of pinion gear 24*f*. As best seen in FIGS. 1 and 5, the number of teeth 27*a* in ring 27 may be one or two more than the number of teeth on pinion 24*f*, so that the teeth mesh only along a portion of the periphery. Rotation of the arbor 24' will cause the pinion 24*f* to drive the ring 27, but since the ring has more teeth than the pinion, it will be rotated a fraction less than one revolution each time pinion 24*f* is turned one revolution. Ring 27 is rotatably held within a suitable recess 33 formed in the rear face of the cover 19.

The rotatable arbor take-up means is therefore self-adjustably mounted on the base 18 within the magazine 17, and is adapted to move relative to the portion 25 (defining the shaving zone) when the blade take-up end 22'' is connected thereto, the arbor 24' is rotated and the blade 22 is subjected to tension.

The magazine 17 includes path-defining means for a path of travel for the blade 22 between the supply element 21 and the take-up means 24. In general, the path-defining means (described in greater detail hereinafter) include means which properly position and maintain a portion of a long, ribbon-like blade in a shaving zone; means which provide a path of travel of reverse curvature; and means which so curve the blade and shift it laterally forward of a plane occupied by a collection of sharp edges in either the supply or the take-up or both elements by the application of take-up tension along the sharpened edge of the blade when the latter is clamped in the holder along such edge.

The aforesaid path-defining means includes an elongated flat portion defining a shaving zone portion 25 for a length of the blade 22 to be used for normal shaving. The shaving zone portion 25 has a substantially flat surface long enough to provide a support for a suitable length of the blade 22 for use in shaving and has a blade supply end 25*a* and blade take-up end 25*b*. Each of the ends 25*a* and 25*b* of the shaving zone 25 has a cylindrical surface of small radius the axis of which is substantially parallel with the axes of the supply element 21 and take-up means 24 (and in the illustrated embodiment perpendicular to the frontal surface of base 18). The ends 25*a* and 25*b* define a virtually semi-circular path of travel at ends of the shaving zone 25 for the blade 22. The radius of curvature of each end 25*a* and 25*b* may be on the order of about 0.06 inch about which the blade 22 is bent as it passes to and from the shaving zone 25. A path of travel of small radius, at the ends of the shaving zone, permits contouring the blade and magazine for effective shaving.

A pad 28 is provided at the supply end 25*a* and at the take-up end 25*b* of the shaving zone 25, the pads 28 being spaced from each other and having vertical frontal surfaces 28*a* in a plane substantially parallel to and spaced forwardly of the planes of the bottom surfaces of the supply element 21 and take-up element 24, which spacing may be in the order of 0.05 inch. The vertical pad surfaces 28*a* contact the unsharpened rear edge 22*a* at each end of the portion of the blade 22 within the shaving zone 25 to displace the sharpened blade edge 22*b* forwardly in such shaving zone. In the shaving zone 25 the area between the pads 28 is recessed so as to avoid undesirable contact with the rear edge 22*a* of the blade 22. This prevents any possible unevenness on the rear blade edge 22*a* from pushing or variably displacing the blade 22 forwardly. Due to the higher tension at the take-up end 25*b* during blade-advancing movements, there would be an undesirable tendency to rock or pivot the flat blade 22 about any protrusion thus causing the blade 22 to move forwardly and present an edge which is not in a desired shaving plane, or to be displaced at the supply end 22'.

The width of the shaving zone portion 25 from the pad-surfaces 28*a* to the front longitudinal edge of portion 25 is less than the width of the blade 22. Therefore, the sharpened forward edge 22*b* of a blade fitted to the magazine is adapted to extend beyond the front edge of the portion 25 in the shaving zone into an effective shaving position.

A plurality of spaced blade hold-down elements 29 may be provided on the upper end of the base element 18, such elements 29 projecting forwardly and over the shaving zone portion 25 and spaced from it to permit the blade 22 to slidingly extend between elements 29 and portion 25. The elements 29 maintain blade 22 in a generally flat condition above the portion 25 when the magazine 17 is not mounted in the holder 16.

A guard 30 of conventional grooved or denoted configuration may be provided on the base element 18 slightly below and projecting forwardly of the shaving zone portion 25. The guard 30 is adapted to extend beneath the sharpened edge 22*b* of a length of the blade 22 positioned in the shaving zone. Debris removal slots 30*a* may be provided in the guard 30 and forwardly of the front edge of the shaving zone portion 25 to accommodate the

removal of hair and debris accumulated during the shaving operation. An additional debris removal slot **30***b* may also be provided in the guard **30** adjacent and forwardly of the take-up end **25***b* of the shaving zone portion **25** to allow removal of any debris which may be accumulated at the take-up end of the shaving zone from the blade **22** being moved over such take-up end **25***b*.

Although all of the path-defining means could be integral with the base **18**, the exemplary form of magazine illustrated here shows some of the path-defining means as a part of the cover **19**. The cover **19** has the same general shape as the base element **18** and is adapted to be firmly secured thereto and cooperate therewith to enclose and/or retain the supply element **21**, blade **22**, take-up means **24**, and indicator ring **27** to form the complete magazine **17**. The cover may have a front wall **19***a* and rearwardly extending side walls **19***b* and **19***c*. Inwardly extending locking lugs **31** are provided on the rear edges of the side walls **19***b* and **19***c* and are adapted to be lockingly received in complementary recessed areas **31***a* provided in the rear surface of the base element **18**. Similar locking lugs may be provided at different locations between base and cover. Resiliency of materials of construction permit the locking lugs **31** to snap into locking engagement with the recessed areas **31***a* to firmly secure the cover **19** on the base element **18**. (See FIGS. 3 and 9.)

Dowel pins **32** extend rearwardly from the inside surface of the front wall **19***a* of the cover and are received in holes **32***a* provided in the base element **18**. The cooperation of dowel pins **32** in the holes **32***a* insures proper registration and position of the cover element **19** on the base element **18** and aids in firmly securing these elements together to form a complete magazine **17**.

The upper part of the recess **33** extends through the front wall **19***a* of the cover to allow the indicia on indicator ring **27** to be visible to the user of the magazine. There is therefore a visible indication of the number of shaving blade lengths remaining in the supply coil **22'** enclosed within the magazine. The upper portion **19***a'* of the cover front wall **19***a* may be provided with an inwardly and upwardly inclined drainage surface adapted to extend below the debris removal slots **30***a* in the guard **30** when the cover **19** is firmly secured on the base element **18**.

The cover element **19** of the magazine **17** includes means having surfaces inclined out of normal to the bottom surfaces of the supply elements **21** and take-up means **24**, and positioned along the path of travel of the blade **22** between the supply element **21** and the supply end **25***a* of the shaving zone and its associated pad **28**, and between the take-up means **24** and the take-up end **25***b* of the shaving zone and its associated pad **28**. These means may be provided in the magazine on the inner surface of each of the side walls **19***b* and **19***c* of the cover and are shown at **34***b* and **34***c*, respectively.

The inclined surfaces **34***b* and **34***c* in the magazine **17** lead and guide the blade **22** from the coiled blade supply **22'** to the supply end **25***a* of the shaving zone, and from the take-up end **25***b* of the shaving zone to the take-up means **24**. Each of the surfaces **34***b* and **34***c* is curved and inclined inwardly and rearwardly toward the base element **18**, and both are adapted to provide a path of travel of reverse curvature for the blade **22** on either end of the shaving zone portion **25**, as best seen in FIGS. 4 and 6. In the illustrated embodiment each of the inclined surfaces **34***b* and **34***c* may be at an angle of between 83° and 87° with the plane of the base element **18**, but if the pads **28** are made higher, this angle may have to be made even smaller.

It can now be understood that means are provided in the magazine **17** which cooperate with the holder to impart a frusto-conical form to a portion of the blade **22** at each end of the blade length in the shaving zone **25**. Such frusto-conical portions of the blade **22** are the resultant obtained by the relationship between the inclined surfaces **34***b* and **34***c*, the small, curved supply and take-up ends **25***a* and **25***b* of the shaving zone, and the forwardly spaced pads **28** adjacent the ends of the shaving zone when the blade is clamped along the sharpened edge by the holder. The frusto-conical form is indicated, in part, in FIGS. 7, 8 and 9.

When a ribbon-like blade **22** is properly assembled in the magazine **17** with the take-up end **22''** connected to the take-up means **24**, and the coiled supply end **22'** positioned in the hollow supply element **21**, and an intermediate length of the blade **22** properly tensioned over the shaving zone portion **25** and clamped thereto along the front edge of the blade, the blade **22** is twisted, bent and laterally displaced to form the frusto-conical shaving portions at the ends of the shaving zone. This can be understood by a detailed description of the positions adapted to be assumed by the blade **22** from its supply end **22'** to its take-up end **22''**.

As best seen in FIGS. 4, 6 and 7, the blade **22** extends through opening **21***a* of the supply element **21** and slidingly contacts the inclined surface **34***b* which imparts a twist to that portion of the blade **22**. When rotation of arbor **24'** places the blade under tension, the inclined surface **34***b* imparts increased tension to the sharpened forward edge **22***b* of the blade **22** and to also guide the rear edge **22***a* of the blade **22** onto the forwardly spaced, vertical surfaces **28***a* of the pads **28** in the shaving zone.

That portion of the blade **22** extending between the inclined surface **34***b* and the supply end **25***a* of the shaving zone is therefore inclined until it contacts the under surface of the curved supply end **25***a* at which point it has a tendency to conform to such contacting surface (see FIG. 8). Due to the tension on the blade **22** from the take-up means **24**, the blade is bent around the small radius of curvature of the supply end **25***a* of the shaving zone and tends to assume a substantially flat position between the flat surface of the shaving zone portion **25** and the blade hold-down elements **29**. Due to the forwardly spaced surfaces **28***a* on the pad **28**, the blade **22** in the shaving zone **25** is pushed forwardly so that the sharpened forward edge **22***b* is in a plane spaced forwardly of the leading edge areas **22***b* of those portions of the blade in the coiled supply end **22'** and immediately preceding the supply end **25***a* of the shaving zone.

However, as can be seen in FIGS. 7, 8 and 9, that portion of the blade **22** bent around the supply end **25***a* of the shaving zone has its rear edge **22***a* in contact with the pad surface **28***a* and is spaced from the upper rounded part of the supply end **25***a* and the adjacent portion of the shaving zone **25**. That portion of the blade adjacent the sharpened forward edge **22***b*, due to the increased tension imparted thereto by the inclined surface **34***b*, tends to contact the forward edge of the supply end **25***a*. Therefore, the twists, curves and forward displacement imparted by the elements of the magazine to that portion of the blade at the supply end **25***a* of the shaving zone **25** produces in cooperation with the holder a frusto-conical form with the apex of the frusto-conical portion lying forwardly of the sharpened edge **22***b* of the blade **22**, in effective shaving position. The frusto-conical form partly caused by the clamping force applied along the forward edge thereof by the holder will tend to cause the blade to back away into engagement with the pads **28**.

When the magazine **17** is not removably mounted in the holder **16**, the length of blade **22** extending over the shaving zone portion **25** may be slightly spaced therefrom but is retained in a substantially parallel position thereto by the blade hold-down elements **29**.

That portion of the blade **22** extending from and around the take-up end **25***b* of the shaving zone also assumes a frusto-conical form similar to that portion of the blade **22** passing around the supply end **25***a* of the shaving zone, but the blade **22** tends to be bent and

twisted in the reverse order to finally assume a coiled condition 22'' around the take-up means 24.

As the blade 22 passes around the take-up end 25*b* of the shaving zone, the rear edge 22*a* is in contact with the pad surface 28*a*, and slightly spaced from the upper rounded part of the take-up end 25*b*. The portion of the blade adjacent the sharpened edge 22*b* of the blade tends to contact the forward edge of the take-up end portion 25*b* due to the increased tension imparted thereto by the inclined surface 34*e*. When the blade 22 is bent around and passes from the take-up end 25*b*, the blade is given a reverse twist by the inclined surface 34*c*. The rear edge 22*a* of that portion of the blade adjacent the inclined surface 34*c* is moved rearwardly toward the base element 18 and therefore tends to urge the rear edge 22*a* of the blade in contact with the pad surfaces 28*a*.

The magazine 17 is therefore provided to house a ribbon-like blade 22 of uniform width having a longitudinally straight rear edge and a parallel sharpened edge wherein successive portions of such blade 22 may be rendered available for shaving by rotating the take-up means 24. The base and cover of the magazine may be made of any desired metal or composition. Moldable organic plastic compositions of sufficient rigidity are preferred since the path-defining means, hollow supply container and interlocking connectors may be readily formed as integral parts of the base 18 and cover 19.

The blade 22 adapted to be used in the magazine 17 may be prepared by slitting from a sheet of suitable steel a ribbon-like strip which may be about 3/16 inch wide, and about 0.0015 inch thick. The strip, which preferably has a very smooth surface finish, is thoroughly cleaned and degreased, then plated with nickel by a conventional process, the plating having a thickness of about 0.0001 inch. The plated strip, after washing and drying, is hardened by heating above the critical temperature of the steel, then quenched and tempered to produce a strip having a Vickers hardness number of about 830. One longitudinal edge is sharpened to a razor edge whereupon the sharpened strip is cut into sections of a length depending on the number of shaving lengths desired. Anchor tips 26 are welded to both ends 22' and 22''.

Upon assembly of the blade 22 in the magazine 17, with the end 22'' anchored in the slot 24*e* of the take-up arbor 24' and the other end 22' inserted in coiled form in the supply element 21, it is found that the blade can readily pass around both curved ends 25*a* and 25*b* of the shaving zone without fracturing or breaking despite the high hardness of the blade. When the blade is used up, the enlarged tip 26 on the supply end 22' will jam between the inclined surface 34*b* and the opposite surface 18' of the base 18 thus indicating to the user that the last shaving portion is in the razor.

Various forms of holders may be used to facilitate handling of the magazine during shaving. An exemplary holder 16 is shown in FIGS. 1, 2, 3 and 11 in which the magazine 17 of the present invention is adapted to be removably mounted so as to form a safety razor. The holder 16 may include at its upper end a head 40 having a forwardly projecting elongated lip 40*a* and a downwardly extending supporting web 41 rigidly connected at its lower end to a handle 50.

The lip 40*a* on the head 40 is provided with slots 40*b* adapted to receive, in mating relationship, hold-down elements 29 on the magazine 17 for positioning and insuring proper registration of the magazine 17 in the holder 16. The lip 40*a* extends continuously from one side of the head to the other side and has a substantially flat blade-engaging land surface 40*c* on the under side of the forward edge of the lip 40*a*.

As shown in FIG. 2, the land surface 40*c* on the lip 40*a* is adapted to engage and clamp the blade 22 downwardly into contact with the blade supporting surface portion 25 of the shaving zone of the magazine 17 so as to firmly clamp that portion of the blade 22 against the supporting surface in a flat shaving position. In addition, this clamping action on the blade in the shaving zone by land 40*c* of the lip 40*a* further develops and secures the frusto-conical end portions of the blade. That portion of the under surface of the lip 40*a* between the land surface 40*c* and the web 41 is recessed to allow sufficient space for the generation of the frusto-conical end portions of the blade.

An elongated magazine-guiding element 42 may be provided on the holder 16 and rigidly secured thereto by means of an extruded annular projection 42*a* extending through an aperture 41*a* in the web 41 and flared outwardly around the edges of the aperture 41*a*, as best seen in FIG. 3. An opening 42*b* within the annular projection 42*a* is therefore provided in the magazine-guiding element 42 for rotatably receiving a blade-advancing mechanism.

Such blade-advancing mechanism includes a drive-pin carrier 43 journaled in opening 42*b* and having a shank end 43*a* extending through and rearwardly of the web 41. A crank arm or turnable lever 44 is firmly secured to the shank end 43*a* of the carrier 43, preferably by a press or friction-fit, to rotate the drive-pin carrier 43 and to secure such carrier on the head 40.

Drive-pin carrier 43, as best seen in FIG. 3, has a drive-pin 45 mounted for axial movement within a bore in the carrier 43, such drive-pin 45 has a laterally extending pawl 45*a* which projects outwardly through a slot 43*b* in the forward end 43*c* and flange 43*d* of the carrier 43. Drive-pin 45 is urged forwardly toward the carrier forward end 43*c* by a compression spring 46 which seats against the inner face of crank arm 44. The carrier forward end 43*c* is frictionally and securely received in bore 24*d* of the take-up means 24 and, when rotated by the crank arm 44, turns the arbor 24' to take up the used portions of the blade 22. The arbor 24' is therefore journaled on the holder 16 when the magazine 17 is mounted in the holder.

Pawl 45*a* drivingly engages the lug or pin 24*e* of the arbor 24' when the magazine 17 is mounted in the holder 16, and thereby provides an operative connection between the crank arm 44 and arbor 24' which may readily be engaged and disengaged when the magazine is mounted in or removed from the holder 16. The face 45*a'* of the pawl 45*a* is inclined so that if the crank arm 44 is turned in the wrong direction, the spring-loaded pawl 45*a* will simply ride up and over the rigid lug or pin 24*e* without rotating the arbor 24'. The slot 43*b* extends into shank end 43*a* to provide movement clearance for the pawl 45*a*. This prevents that portion of the blade 22 on arbor 24' from being forceably unwound. It is preferred that lug or pin 24*e* on the arbor 24' be weaker than pawl 45*a* so that when the blade tip 26 of the supply end jams in the magazine when the blade is used up as previously described, the lug or pin 24*e*, which is part of the replaceable magazine 17, will be broken rather than the blade strip 22 or the pawl 45 which is part of the holder 16.

In order to maintain the magazine securely in place when mounted in the holder 16, a snap-action latch 46 may be provided in the recessed area 50*a* in upper portion of the handle 50. The latch 46 is pivotally mounted about a shaft 47 bridging the hook members 48*a* and 48*b* (FIGS. 2 and 11) and received in a transverse recess 46*d* in the latch. The hook members 48*a* and 48*b* are integral with the lower end of the element 42 and are hooked over shoulders in the front of the handle to securely clamp the head 40 thereo. A compression spring 48 is seated in a socket provided in the handle recessed area 50*a* and bears against the bottom of latch 46 (FIG. 2) so as to maintain the latch 46 in the unlatched position as shown in FIG. 11 when the magazine 17 is removed from the holder 16. In the latched position shown in FIG. 2, the spring urges the latch upwardly and conformingly against the bottom portion of the magazine.

The latch 46 includes an upstanding locking ear 46*a* which engages the lower front portion of the magazine cover 19 when the magazine is mounted in the holder 16 and the latch is in the position shown in FIG. 2. Latch 46 also includes a thumbpiece 46*b* and a flat, rearwardly projecting cam 46*c* which bears against and engages the bottom wall of the magazine cover 19. The spring 48 bears against the latch 46 intermediate the locking ear 46*a* and the latch cam 46*c*. When the thumbpiece 46*b* is pressed inwardly, the cam 46*c* of the latch rocks against the contacting surface of the bottom of the magazine to move the locking ear 46*a* downwardly out of the path of the magazine 17 to permit the latter to be removed from the holder 16.

When the magazine 17 is mounted within the holder 16, the spring-pressed latch 46 biases the magazine upwardly toward lip 40*a* of the holder to clamp that length of the blade 22 in the shaving zone against the blade supporting portion 25.

A retaining or click element 49 may be mounted in a slot 51 of the holder web 41 (FIG. 2) and is adapted to be urged rearwardly and into engagement with a slot 44*a* in the crank arm 44 by integral laterally extending leaf springs 49*a* which bear against the rear surface of element 42. The retaining element 49 is held in a stationary position and cooperates with slot 44*a* to releasably hold the crank arm in a desired position and to indicate when the crank arm has rotated one complete revolution.

It will be apparent that additional magazines 17 may be provided, each identical in construction to the others and containing a fresh supply of ribbon-like blade 22 as replacements for the first magazine when the blade has been used up.

When the magazine 17 is mounted in the holder 16 a complete safety razor is provided wherein successive portions of the blade 22 may be rendered available for shaving by merely turning the crank arm 44. When the take-up means 24 is rotated to advance the blade 22, added tension is applied to the blade 22, thus causing a force to be applied from the take-up arbor 24', which is journaled to the holder 16, which force will tend to move the shaving zone portion 25 and the magazine 17 downwardly within the holder 16 to reduce the clamping pressure of the lip 40*a* against the blade 22. The unclamping action on the blade 22 in the shaving zone reduces the friction on the blade to permit it to be advanced freely.

A different embodiment of the present invention is shown in FIGS. 12 to 25, but it should be understood that any changes or improvements in the exemplary device in FIGS. 12 to 25 may be used in the device in FIGS. 1 to 11 and vice versa, whether used separately or in combination with all such changes or improvements.

For the clarity and brevity, the elements in FIGS. 12 to 25 which are the same as the elements in FIGS. 1 to 11 will be identified with the same reference number plus 100. For example, the blade 22 in FIGS. 1 to 11 is the same as the blade in FIGS. 12 to 25, thus the blade in FIGS. 12 to 25 will be identified as 122 and has the same function as blade 22. New elements will be identified with a new reference number.

As seen in FIG. 25, there is shown a safety razor 115 in an exploded, unassembled condition for clarity and understanding including a holder 116 and an exemplary, different embodiment of a magazine 117 of the present invention removably carried by the holder 116.

The exemplary magazine 117 includes a base or rack element 118 adapted to receive and support various elements and a cover element 119 which is adapted to be firmly secured to the base 118 by various connections, to enclose and retain such elements. The lower portion of base 118 may be longitudinally split from opening 123 to the lower end base 118 to provide a pair of flexible arm portions 160*a* and 160*b*, each of which has a downwardly extending, connecting finger element 161*a* and 161*b*, respectively. The finger elements 161*a* and 161*b* are spaced apart and are provided with outwardly inclined surfaces 161*a*' and 161*b*' on the rear surfaces thereof (FIGS. 20 and 21) for mating with complementary inclined surfaces 162*a* and 162*b* provided in the rearwardly extending lower wall 119*d* of cover 119 to provide a dovetail connection between the base 118 and cover 119.

This dovetail connection (160, 161 and 162) together with locking lugs 131 (FIGS. 16 and 17) provided at different locations between the base and cover firmly secure cover 119 on the base 118. It should be understood that only one fixed tooth 123*a* is provided on the base 118 as distinguished from the two teeth 23*a* on base 18. In either embodiment, one tooth is sufficient to perform the function and cooperation with the arbor element 24' or 124'.

The outer surface of the lower wall 119*d* of cover 119 may be provided with downwardly extending, spaced lugs 163*a* and 163*b*, preferably rounded, which are adapted to coperate with the snap-action latch 146 to aid in ejecting a used magazine 117 from the holder 116, as will be described in greater detail hereinafter.

A rearwardly and upwardly inclined camming surface 164 (FIGS. 20, 21 and 22) may be provided on the outer surface of lower wall 119*d* of cover 119, such camming surface 164 may be continued and provided on the lower end of base 118 as camming surface 164'. When base 118 and cover 119 are assembled, camming surfaces 164 and 164' cooperate together with the latch 146 to also aid in ejecting a used magazine 117 from holder 116 in accordance with the description that follows.

Blade take-up means 124 (FIGS. 15, 18 and 25) comprises a rotatable arbor element 124' shown in cross section in FIG. 15 having a smaller diameter journal end 124*a* rotatably and loosely received in opening 123 in base 118. The loose and rotatable connection between arbor 124' and base 118 allows the take-up means 124 to be self-adjustable on base 118 when the blade 122 is subjected to tension. The continuous rack of teeth 124*b* on the shoulder between the arbor journal end 124*a* and arbor 124' is adapted to cooperate with fixed tooth 123*a* on base 118 to only allow arbor element 124' to rotate in one direction and therefore maintain blade 122 under continuous tension when wound on take-up means 124.

A drive pin 124*e* may also be provided on arbor 124' and is adapted to engage an arm of a rotatable pin carried by holder 116, whereby rotation of the pin results in rotation of take-up means 124 to wind blade 122 on arbor 124'.

The other forward end of the arbor 124' may be provided with a smaller diameter, forwardly extending pin 164*a* centrally located along the horizontal axis of arbor 124'. Pin 164*a* is journaled and received in a recess 165 (FIGS. 15 and 18) provided in the inner surface of the front wall 119*a* of cover 119. The recess 165 is elongated in the vertical direction (FIG. 18) to permit the arbor 124' to move a limited distance vertically.

An eccentric 166 is provided on the forward portion of arbor 124' just rearwardly of pin 164*a*. An indicator ring or dial 167 having indicia indicating the number of shaving blade lengths remaining in supply coil 122' is rotatably mounted on the eccentric 166. The indicator ring or dial 167 may include outer gear teeth 167*a* which are adapted to engage and function with a stationary ring gear having teeth 168 (FIGS. 18 and 19) on the inner surface of the front wall 119*a* of cover 119, such ring gear surrounding the recess 165 and window 133 in the front cover wall 119*a*. The outer, stationary ring gear 168 includes more teeth than the ring or dial gear teeth 167*a*, for example 31 teeth may be provided in the stationary ring gear 168 and 30 teeth in the ring gear 167*a*.

As the arbor 124' is rotated, the eccentric 166 drives the indicator ring or dial 167. Since the outer gear teeth 168 are stationary and have at least one more tooth than

are in the inner ring **167**, the indicator ring **167** will be eccentrically moved and will rotate only one tooth for each complete revolution or rotation of arbor **124'**. As best seen in FIG. 25, a division or number of the indicia on the face of indicator ring **167**, may be located at each tooth. Therefore, one complete revolution of arbor **124'** will result in a movement of one number or division of the indicia on indicator ring **167**.

This modified counting mechanism for the number of unused blade shaving lengths only requires a smaller viewing window **133** in cover **119** than is shown in FIG. 11. A pointer **133'** may be provided on window **133** to indicate the actual number or division of the indicia on ring **167** that corresponds to the number of unused blade shaving lengths.

The indicator ring or dial **167** may also be provided with a locating stud or pin **169** extending rearwardly and received in a hole **170** in the front face of arbor **124'**. During assembly, the ring **167** is held in position on the arbor eccentric **166** by pin **169** in hole **170**. When assembly of the entire magazine **117** is completed, the blade take-up means **124** is moved a quarter of a turn to tighten the blade **122** and the pin **169** is sheared off along the plane of the rear surface of indicator ring **167** due to the engagement of gear teeth **167***a* and **168**. After pin **169** has been sheared off of ring **167**, the arbor **124'** and indicator ring **167** cooperate together in the manner described hereinabove.

Means may be provided adjacent the take-up end **125***b* of the shaving zone portion **125** and below the shaving zone portion **125** for preventing debris from accumulating between the blade **122** and the curved take-up end **125***b* when the blade **122** is moved across the shaving zone. Such means may include a vertical face **171** extending at an angle with the horizontal and the shaving zone **125** and extending outwardly from the curved take-up end **125***b*.

When the magazine **117** is disassembled from holder **116** and the blade **122** is untensioned, it is desirable to limit the outward bowing of the blade **122** in the magazine **117**. Means may be provided adjacent to and spaced from each curved end surface **125***a* and **125***b* of the shaving zone to limit such blade bowing. Such means may include internal shoulders **172***a* and **172***b* provided on the inner surface of cover **119**, such shoulders **172***a* and **172***b* extending inwardly toward but spaced from each of the ends **125***a* and **125***b* of the shaving zone **125**.

When the magazine **117** is disassembled from the holder **116**, and is in a non-shaving position, the front wall **119***a* of cover **119** may be bowed rearwardly (FIG. 17) so as to extend behind the back surface of the base **118**. In this position, the forward sharpened edge **122***b* of blade **122** engages the inner surface of front cover wall **119***a* to force the blade **122** against the pads **128** at each end of the shaving zone **125** when the magazine **117** is separated from holder **116**. When the magazine **117** is clamped in or assembled with the holder **116** (FIG. 16), the rearwardly extending side portions of the cover **119** will engage the holder **116** and will be pushed forwardly into the same plane as the rear surface of the base **118**. The cover **119** will therefore release the blade **122** as soon as magazine **117** is snapped into the holder **116** and before the blade is ready to be advanced.

The rearward bowing of the cover **119** always assures that the initial length of blade **122** in the shaving zone **125** will be disposed against the pads **128** and will have the correct blade exposure. There will be no spacing between the rear edge **122***a* of the blade **122** and pads **128** at any time. It is understood that as soon as tension is applied to the blade **122** by the take-up means **124**, the blade will continuously be urged into contact with pads **128**.

Another embodiment of an exemplary holder that may be used with the magazines of the present invention is indicated as **116** and also includes at its upper end a head **140** having a forwardly projecting elongated lip **140***a* and a downwardly extending supporting web **141** rigidly connected at its lower end to a handle **150**.

The lip **140***a* includes a blade engaging land surface **140***c* (FIGS. 23 and 24) on the under surface of the forward edge thereof, such surface **140***c* adapted to engage and clamp the blade **122** downwardly into contact with the blade supporting surface **125** of the shaving zone.

The under surface **140***c* of holder lip **140***a* may include a wider center clamping surface **140***c'* for contacting the blade **122** and a narrower surface **140***c''* adjacent each end of lip **140***a* (FIG. 24). The wider clamping surface **140***c'* serves to hold the blade **122** more rigidly against the blade supporting surface **125** and the narrower under surface **140***c''* at each end of lip **140***a* does not interfere with the bowing of the blade **122** around the curved ends **125***a* and **125***b* of shaving zone **125**.

An elongated magazine-guiding element **142** may be provided on holder **116** and rigidly secured thereto by means of an extruded annular projection **142***a* extending through an aperature **141***a* in the web **141** and flared outwardly around the edges of the aperture **141***a*, as best seen in FIG. 15. An opening **142***b* within the annular projection **142***a* is therefore provided in the element **142** for rotatably receiving a blade-advancing mechanism.

Such blade-advancing mechanism may include a crank arm or turnable lever **144** having a hollow forwardly extending hub portion **144***a* rotatably and snugly received in opening **142***b*. Hub portion **144***a* extends slightly beyond and forwardly of magazine-guiding element **142** to provide a seat for a retaining disc **145**. An elongated axially extending slot **144***b* is provided in hub portion **144***a* and axial, spaced locating projections **144***c* and **144***d* (FIGS. 15 and 25) are also provided on the forward end of hub portion **144***a* on either side of the axial slot **144***b*.

The retaining disc **145** includes an arcuate groove **145***a* which receives the projections **144***c* and **144***d* at the ends of such arcuate groove **145***a* to locate the retaining disc **145** on the holder.

An axially movable pawl **146** is positioned within the hollow hub portion **144***a* and is biased forwardly against the retaining disc **145** by a coiled spring **147**. A forwardly extending drive element **146***a* on the pawl **146** is adapted to project through the arcuate groove **145***a* in retaining disc **145** and is adapted to engage drive pin **124***e* affixed to the arbor **124'**. The drive element **146***a* on pawl **146** has a sloping camming surface whose lower end terminates at or slightly below the surface of retaining disc **145** when the pawl **146** is biased forwardly against disc **145** as shown in FIG. 15 to allow the drive pin **124***e* on arbor **124'** to ride smoothly over pawl **146** when lever **144** is turned in a reverse direction. A center pin **148** passes through lever **144**, pawl **146**, retaining disc **145** to retain all of the blade-advancing elements in an assembled position on holder **116**. The outer end of pin **148** is provided with a head **148***a* which is received in a recess in lever **144** and which retains the outer end of the spring **147** that biases pawl **146** forwardly. The pin **148** is provided with an intermediate upset collar **148***b* that engages the inner surface of retaining disc **145** and serves to retain all of the blade-advancing elements in assembled and operative position in holder **116**.

The forward end **148***c* of pin **148** is adapted to be received in the central recess **124***d* in arbor **124'** and serves as a journal or center for the arbor **124'**.

A U-shaped click spring **149** may be carried by a recess **149***a* in the lever **144** (FIG. 14) and is adapted to continuously bear against and ride over the back of the web **141** of holder head **140**. The spring **149** therefore moves with lever **144** upon each revolution of lever **144** when a new blade length is provided in shaving zone **125**.

A slightly modified snap-action latch **175** may be used on holder **116** to securely maintain the magazine **117** in assembled position on holder **116**. A recessed area **150***a* (FIG. 14) in the upper portion of handle **150** receives latch **175** which is pivotally mounted about a horizontally

extending shaft portion **175***a* projecting between upstanding shoulders **175***b* and **175***c*, all of which may be integral with latch **175**. The lower, horizontal portion **142***c* of element **142** extends forwardly over recessed area **150***a* and includes a downwardly projecting bearing hook member **142***d* which loosely and rotatably receives shaft portion **175***a*.

The latch **175** includes an upstanding locking ear **175***d* which engages the lower front portion of magazine cover **119** when the magazine is mounted in the holder **116** (FIG. 12). Latch **175** also includes a thumb-piece **175***e* and rearwardly projecting cam element **175***f* which extends upwardly and is adapted to move through opening **142***e* in lower portion **142***c* of element **142**.

A vertical compression spring **176** may be provided in recess area **150***a* for urging the shaft portion **175***a* of latch **175** upwardly into operative pivotal engagement with hook member **142***d*. The lower end of spring **176** may be carried by a vertical spring guide and retainer **177** secured to the handle **150** within recessed area **150***a*. The upper end of spring **176** is urged upwardly into continuous contact against the bottom of latch **175** (FIG. 14) intermediate the locking ear **175***d* and cam element **175***f*. The spring **176** is adapted to be moved between a latched position (FIG. 12) and an unlatched position (FIG. 14) and in each position is adapted to maintain latch **175** in an over-center position with respect to the vertical spring **176** and guide element **177**.

To assemble the magazine **117** on the holder **116**, the upper end of magazine **117** is positioned beneath lip **140***a* and the lower end of the magazine is pushed inwardly causing the latch **175** to pivot into the latched position of FIG. 12.

When it is desired to remove magazine **117** from holder **116**, the thumbpiece **175***e* is pressed inwardly, the cam **175***f* of the latch engages the camming surfaces **164** and **164'** on magazine **117** causing the magazine to cam forwardly and be ejected into the unlatched position of FIG. 14. In this position, the upstanding latch shoulders **175***b* and **175***c* engage the spaced lugs **163***a* and **163***b* which extend downwardly from magazine **117** to hold the magazine **117** in this ejected position until manually removed.

The upper end of magazine-guiding element **142** may be rolled over to present a smooth surface for engaging the rear surface of magazine **117** (FIG. 25) to prevent interference with the magazine when being removed from the holder **116**.

It is understood that the modification or different embodiments of the elements or parts in the magazine **117** and holder **116** may be used or incorporated, separately or in combinations, in the magazine **17** and holder **16**, or vice versa, without deviating from the present invention.

Obviously, many modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

I claim:

1. For use in a razor, a magazine for a ribbon-like blade of uniform width having a longitudinally extending rear edge and a parallel sharpened edge, said magazine comprising

means for receiving a supply of ribbon-like blade;

take-up means for receiving an end of a blade;

path-defining means for a path of travel for a blade between said supply means and take-up means,

said path-defining means including a portion defining a shaving zone for a length of such blade,

and means adapted to impart a frusto-conical form to a portion of a blade at each end of such blade length in the shaving zone, the apex of each such frusto-conical portion lying forwardly of a sharpened edge of such blade thereby increasing the stress of the blade adjacent the sharpened edge of such frusto-conical portions.

2. For use in a razor, a magazine as stated in claim **1**, wherein said supply means has a central axis, and wherein said frusto-conical imparting means includes surfaces angularly inclined to the axis of said supply means and positioned along said path of travel between said supply means and the adjacent end of said shaving zone, and between said take-up means and the other end of said shaving zone.

3. For use in a razor, a magazine as stated in claim **1**, wherein said last-named means includes curved, substantially cylindrical surfaces of small radius at each end of said shaving zone and defining a virtually semi-circular path of travel at the ends of said shaving zone, and an angularly inclined surface adapted to provide a path of travel of reverse curvature for a blade between each of said surfaces of small radius and its associated take-up and supply means, respectively.

4. For use in a razor, a magazine as stated in claim **1**, wherein said means for providing frusto-conical portions for such blade includes,

pad means adjacent the shaving zone, and having a surface in a plane substantially parallel to and spaced forwardly of the plane of the unsharpened rear edge of the blade supply, said pad surface being adapted to contact the unsharpened rear edge of the blade adjacent said shaving zone to displace a sharpened edge of such blade forwardly of the plane of the sharpened blade edge in the supply.

5. For use in a razor, a magazine as stated in claim **4**, wherein said pad means includes a pad adjacent each end of the shaving zone, said pads being spaced from each other,

means adjacent each pad and defining the end of said shaving zone,

said end-defining means presenting curved surfaces of small radius toward a side of a ribbon-like blade,

said curved surfaces being substantially perpendicular to said plane of the unsharpened rear edge of the blade supply,

and means having surfaces angularly inclined to said plane of the unsharpened rear edge of the blade supply and positioned along said path of travel between said supply means and the adjacent end of the shaving zone and its associated pad, and said take-up means and the other end of the shaving zone and its associated pad adapted to guide a rear edge of such blade onto and from said forwardly displaced surfaces of said pads.

6. For use in a razor, a magazine as stated in claim **1**, wherein said take-up means includes a self-adjusting rotatable arbor rotatably and loosely mounted within the magazine to enable the arbor to move relative to said portion defining a shaving zone when a blade end is connected thereto and the arbor is rotated and such blade subjected to tension.

7. For use in a razor, a magazine for a ribbon-like blade of uniform width having a longitudinally extending rear edge and a parallel sharpened edge wherein successive portions of such blade may be rendered available for shaving, said magazine comprising:

a substantially cylindrical, hollow element for receiving a coiled supply of ribbon-like blade,

take-up means for receiving an end of such coiled blade;

substantially planar, bottom surface for said supply element, said surface being adapted to contact the rear edge of a ribbon-like blade, said blade extending between said supply element and take-up means,

path-defining means for a path of travel for the blade between said supply element and take-up means, said path having a portion defining a shaving zone,

a pad adjacent each end of the shaving zone, said pads being spaced from each other and having surfaces in a plane substantially parallel to and spaced forwardly of the plane of said bottom surface, said pad surfaces being adapted to contact the rear edge of a blade adjacent said shaving zone to urge the sharpened edge forwardly in such zone,

means adjacent each pad and defining the ends of said shaving zone,

said means presenting curved surfaces of small radius, said curved surfaces being substantially perpendicular to said bottom surface and adapted to contact the side of a ribbon-like blade;

and means having a surface angularly inclined to said bottom surface and positioned along said path of travel between said supply element and one end of the shaving zone and its associated pad, and said take-up means and the other other end of the shaving zone and its associated pad adapted to guide a rear edge of a blade onto and from said forwardly displaced surfaces of said pads,

whereby each of the end portions of the length of the blade adapted to be in said shaving zone is adapted to have a frusto-conical form, the apex of such frusto-conical portion being forwardly of the sharpened edge of such blade.

8. For use in a razor, a magazine as stated in claim **7**, wherein said take-up means includes a self-adjusting rotatable arbor rotatably and loosely mounted within the magazine to enable the arbor to move relative to said shaving zone when a blade is connected thereto and the arbor is rotated and such blade subjected to tension.

9. For use in a razor, a magazine for a ribbon-like blade of uniform width having a longitudinally extending rear edge and a parallel sharpened edge, said magazine comprising:

a substantially cylindrical, hollow element for receiving a coiled supply of ribbon-like blade,

said element having a planar, bottom surface adapted to engage a rear edge of such coiled supply blade,

an elongated blade-supporting portion defining a shaving zone and having a blade supply end and blade take-up end,

a pad adjacent the blade supply end of said blade-supporting portion, said pad having a surface in a plane spaced forwardly of the plane of said bottom surface and adapted to contact a rear edge of a length of blade adjacent the shaving zone and to maintain that portion of the blade in the shaving zone with its sharpened edge parallel to but spaced forwardly

of the plane of sharpened blade edges in said supply element;

means adjacent said pad and defining the supply end of said shaving zone,

said latter means presenting a curved surface of small radius adapted to contact the side of the blade;

and means between said supply element and said supply end of said shaving zone, including an inclined surface adapted to confine tension to the sharpened edge areas of a blade passing thereover to guide a rear edge of a blade onto the surface of said pad,

said pad and curved inclined surface cooperating to impart a frusto-conical form to a portion of a blade at the supply end of a blade length in said shaving zone, the apex of such frusto-conical portion lying forwardly of the sharpened edge of such blade.

10. In a magazine, adapted to be inserted in a holder, for a ribbon-like blade of uniform width having a longitudinally extending rear edge and a parallel sharpened edge, the provision of:

a shaving zone for a length of a ribbon-like blade,

a front wall of the magazine being bowed rearwardly when the magazine is not in the holder and adapted to be flattened and unbowed when the magazine is in the holder,

pad means at each end of said shaving zone and adapted to contact the rear edge of a blade in said shaving zone to displace a sharpened edge forwardly in such zone and toward said front wall,

whereby when the magazine is not in the holder the sharpened edge of a blade contacts the bowed front wall at the ends of the shaving zone opposite said pad means to insure engagement between the rear edge of a blade and said pad means and thus provide correct exposure of the initial length of the blade in the shaving zone when the magazine is in the holder.

11. For use in a razor, a magazine for a ribbon-like blade as stated in claim **1**, said magazine comprising:

blade supply indicating means including a rotatable arbor element having a forward end portion,

an indicator ring journaled on said forward arbor end portion and having a shear pin extending toward said arbor element,

said shear pin being received in a slot in said arbor element and being adapted to be sheared off from said indicator ring when the arbor element is initially rotated and said indicator ring remains stationary.

No references cited.

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