

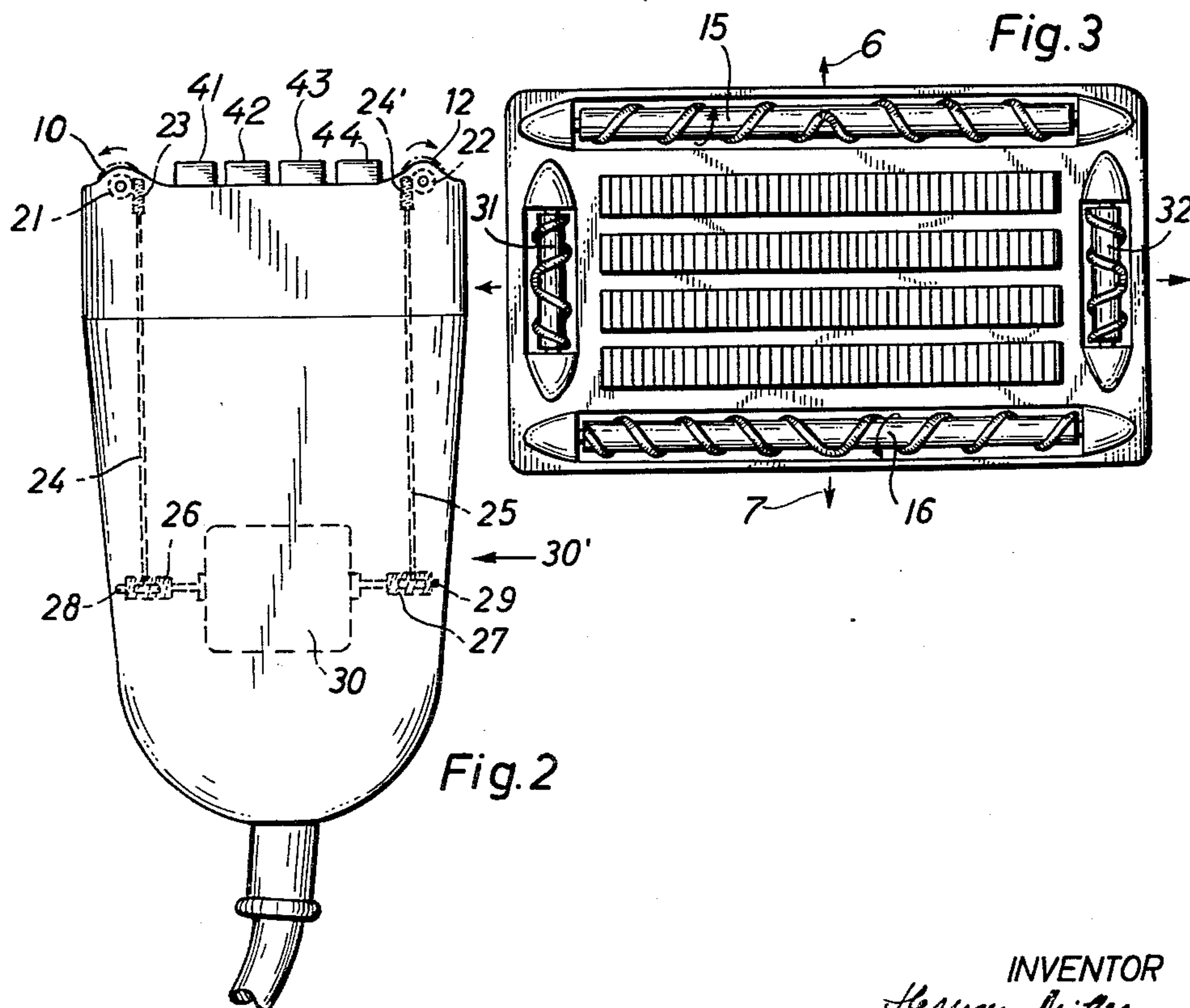
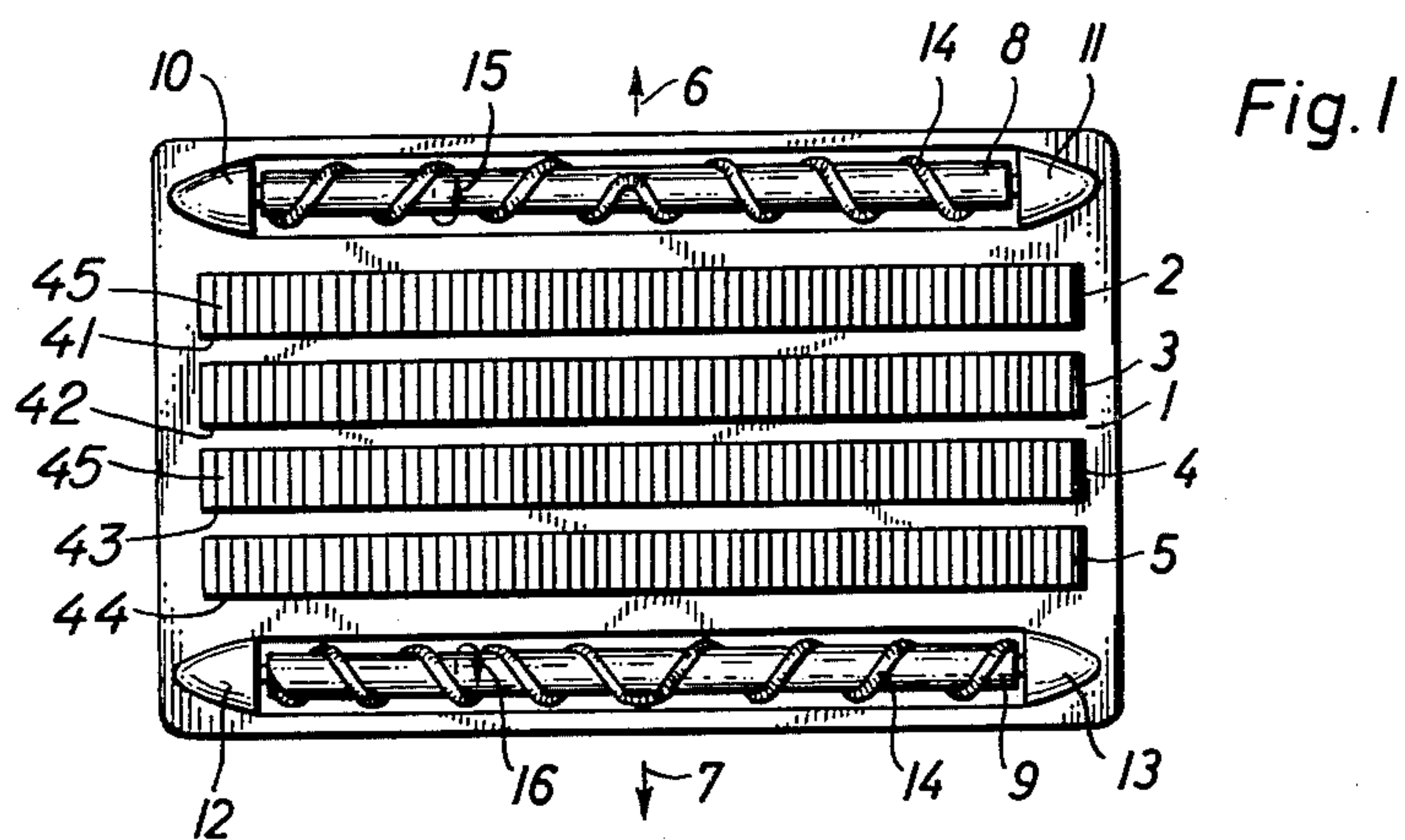
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SHIVERS

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SHAVERS

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The present invention relates to shavers such as electric shavers used for shaving the beard, and more particularly to a device for tensioning the skin of the shaving person.

Conventional shavers of this type usually have a roller which engages the skin and which turns by frictional engagement with the skin during movement of the shaver along the skin. The purpose of such a roller is to tension the skin so that the whiskers may be cut easily by the shaver, but the tensioning provided by this conventional construction is not very great and as a result the shaving is not carried out as effectively as desired.

One of the objects of the present invention is to provide a shaver of the above type with a structure which will tension the skin to the desired degree so as to improve the shaving action.

Another object of the present invention is to provide a shaver capable of tensioning the skin, during shaving thereof, in two mutually perpendicular directions.

A further object of the present invention is to provide a skin-tensioning structure capable of being incorporated into a conventional shaver with a minimum of reconstruction of the latter.

An additional object of the present invention is to provide a shaver capable of accomplishing all of the above objects and at the same time composed of simple rugged elements which are very reliable in operation.

With the above objects in view the present invention includes in a shaver a shaving head having an end face which is adapted to be directed toward the skin during use of the shaver. A skin tensioning means is carried by the shaver head at its end face for tensioning the skin during the shaving thereof, and this skin tensioning means includes a pair of opposed skin-engaging rollers and a drive means cooperating with these rollers for rotating the same in opposite directions which will tension a portion of the skin located between and engaged by the rollers.

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 drawings, in which:

Fig. 1 is a plan view showing that end face of a shaver head of the present invention which is directed toward the skin during use of the shaver; and

Fig. 2 is a schematic side elevational view of the shaver of the invention.

Fig. 3 is a modified plan view of a shaver head with four tension rollers.

Referring now to Fig. 1, the end face of the shaver head illustrated therein includes an end plate 1 formed with four parallel elongated slots 2-5 in projecting members 41 to 44, and suitable cutting blades 45 are mov-

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ably mounted behind these slots. Members 41 to 45 constitute cutter means.

In accordance with the present invention there are arranged, adjacent to and extending along the opposed side edges of end plate 1 which form the leading or trailing edges in the preferred direction of movement 6, 7 of the shaver, a pair of rollers 8 and 9 which form a skin tensioning means. The plate 1 carries hollow bosses 10-13 which respectively serve as bearings for the ends of the parallel rollers 8 and 9 which are supported for respective rotation about their axes by the shaver. Part of the driving structure for the rollers is located within a pair of the hollow bosses such as the bosses 10 and 12. Thus, referring to Fig. 2, it will be seen that within the bosses

10 and 12 a pair of worm wheels 21 and 22 are respectively fixed coaxially with the rollers 8 and 9 and respectively mesh with worms 23 and 24' fixedly carried by a pair of parallel shafts 24 and 25, respectively, which are supported by any suitable bearing structure within the shaver casing 30' for turning movement about their axes, respectively, while being prevented from moving axially. The shafts 24 and 25 respectively carry worm wheels 26 and 27 at their bottom ends, as viewed in Fig. 2, and these worm wheels respectively mesh with worms 28 and 29 driven by a common motor 30 located between the worms 28 and 29 and having the opposite ends of its drive shaft connected with these worms 28 and 29 which are coaxial. The motor 30 is supported on any suitable bracket or the like within the shaver casing and is connected in a known way with a source of current. This motor 30 may be the same motor which drives the rest of the shaver structure or it may be an entirely independent motor, so that in the latter case the drive means for the rollers is independent of and separate from the drive means for the rest of the shaver structure. If desired the worms 28 and 29 may be driven through a suitable gear reduction.

In accordance with a further feature of the present invention, the outer surfaces of the rollers 8 and 9 are irregular. Thus, these surfaces may be knurled, for example, but it is preferred to provide them with helically wound skin-engaging ribs 14 as shown in Fig. 1. It will be noted from Fig. 1 that the rib 14 of roller 8 is wound oppositely from the rib 14 of roller 9, and furthermore on each of these rollers the rib 14 along one half thereof is wound oppositely from the rib portion on the other half thereof. As best seen in Fig. 2 the outermost peripheral portion of rollers 8 and 9 are located in the same plane in which the cutter blades 45 operate.

The above-described drive means shown in Fig. 2 rotates the rollers 8 and 9 in the opposite directions 15 and 16, respectively, indicated in Fig. 1, so that the rollers will stretch skin located there between and engaged by the cutter means 41 to 45 and by rollers 8 and 9 since the skin-engaging peripheral portions of rollers 8 and 9 move in opposite directions away from cutter means 41 to 45. It is normal for the operator to move the shaver in the directions 6 or 7 at a speed within a given range, and the peripheral speeds of the rollers 8 and 9 are greater than the speeds within this range, so that the desired tensioning of the skin is produced independently of the direction of movement of the shaver.

The oppositely wound rib portions on each roller are wound in a direction, depending upon the direction of rotation of each roller, which will cause the two rib portions on each roller to tension the skin in the axial or longitudinal direction of each roller when rollers 8, 9 turn in the directions of arrows 15, 16. The helically wound rib portion 14 on the left as viewed in Fig. 1 corresponds to left-hand thread, and the rib portion on the right corresponds to right-hand thread. Therefore, the peripheral rib portions engaging the skin travel towards



the ends of the rollers, and thus the structure of the invention is capable of tensioning the skin in mutually perpendicular directions during the shaving thereof.

It will be noted from Fig. 3 that it is also possible to arrange a pair of additional driven rollers 31 and 32 along the sides of the end plate 1 shown at the right and left in Fig. 1 and driven in opposite directions of rotation to give the skin a tension which is directed perpendicularly to the direction of skin tension provided by the rollers 8 and 9. Rollers 31 and 32 may be driven in any suitable manner, for example by a transmission driven by the motor of the cutter means as described and illustrated in the U.S. Patent 2,119,248. The construction shown in Fig. 1 is preferred since the same effect is achieved with only one pair of rollers because of the oppositely wound portions of each rib 14 on each roller.

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 shavers differing from the types described above.

While the invention has been illustrated and described as embodied in skin-tensioning device for electric shavers, 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 secured by Letters Patent is:

1. In an electric razor, in combination, a casing; a shaving head on said casing and having an end face adapted to be directed toward the skin during use of the razor, said end face having a pair of opposed substantially parallel edges; a pair of tensioning rollers respectively supported for rotation about parallel axes on said shaving head, said rollers being respectively located adjacent and respectively extending along said edges, and projecting from said end face the same distance so that the outermost peripheral surface portions of said rollers are located in the same plane; cutter means located intermediate said rollers on said shaving head and projecting from said end face to said plane so that said cutter means and said rollers simultaneously engage the skin; and drive means located in said casing and operatively connected with said rollers for simultaneously rotating said rollers in opposite directions so that said peripheral surface portions in said plane move in opposite directions away from said cutter means so as to tension skin located between said rollers and engaged by said cutter means, each roller having at its outer surface a pair of oppositely wound helical skin-engaging ribs, each rib being wound along the respective roller from the center of the same toward one end of the same, the directions of winding of said helical ribs of each roller causing portions of said ribs passing through said plane to travel from the center towards the ends of the respective roller when said

rollers rotate in said opposite directions of rotation so that said travelling rib portions tension the skin between said rollers in axial direction of the respective roller.

2. In an electric razor, in combination, a shaving head having a substantially rectangular end face adapted to be directed toward the skin during use of the razor; four tensioning rollers supported for rotation about their respective axes on said shaving head at said end face thereof, one pair of said rollers extending along and adjacent the two longitudinal edges, and the other pair of said rollers extending adjacent to and along the transverse edges of said rectangular end face, said rollers projecting from said end face the same distance so that the outermost peripheral surface portions of said rollers are located in the same plane; cutter means located on said shaving head intermediate said rollers of said two pairs of rollers, said cutter means projecting from said end face to said plane so that said cutter means and said rollers simultaneously engage the skin; the rollers of each pair of rollers being driven to rotate in opposite directions with said outermost peripheral surface portions moving in opposite directions away from said cutter means so as to tension the skin engaged by said cutter means in two mutually perpendicular directions.

3. In an electric razor, in combination, a shaving head having a substantially rectangular end face adapted to be directed toward the skin during use of the razor; four tensioning rollers supported for rotation about their respective axes on said shaving head at said end face thereof, one pair of said rollers extending along and adjacent the two longitudinal edges, and the other pair of said rollers extending adjacent to and along the transverse edges of said rectangular end face, said rollers projecting from said end face the same distance so that the outermost peripheral surface portions of said rollers are located in the same plane; cutter means located on said shaving head intermediate said rollers of said two pairs of rollers, said cutter means projecting from said end face to said plane so that said cutter means and said rollers simultaneously engage the skin; the rollers of each pair of rollers being driven to rotate in opposite directions with said outermost peripheral surface portions moving in opposite directions away from said cutter means so as to tension the skin engaged by said cutter means in two mutually perpendicular directions, each roller having at its outer surface a pair of oppositely wound helical skin-engaging ribs, each rib being helically wound along the respective roller from the center of the same toward one end of the same, the directions of winding of said helical ribs of each roller causing portions of said ribs passing through said plane to travel from the center toward the ends of the respective roller when said rollers rotate in said opposite directions of rotation so that said travelling rib portions tension the skin in axial direction of the respective roller.

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