

This invention relates to a dry shaving apparatus having a movable lower cutter and an upper cutter which cooperates with the lower cutter and is mounted in an auxiliary frame provided with resilient detent means on its end walls.

From Japanese Utility Patent No. 53-40306, a cutting head frame is known having an auxiliary frame which is inserted into the cutting head frame from the housing side of the shaving apparatus and is held by means of resilient detent arms arranged in pairs in the end walls and engaging into registering recesses in the end cheeks of the cutting head frame. If it is desired to remove the auxiliary frame from the cutting head frame, it is necessary to reach into the narrow cutting head frame and exert considerable amounts of pull to unlock the auxiliary frame. In addition to being a complicated procedure, this also entails the risk of damaging the auxiliary frame, in particular its cutting foil.

From German Patent DE-PS 28 57 468 a cutting head frame is known having an auxiliary frame which is insertable from the housing side of the shaving apparatus and has a flange for seating engagement by the cutting head frame, with a resilient detent arm and a gripping plate associated with this arm being formed thereon in the area of either end wall of the auxiliary frame. In this arrangement, the auxiliary frame can be withdrawn from the cutting head frame by external action through the gripping plates. To overcome the lock, however, this arrangement requires a considerable amount of pull. Due to the seating engagement of the cutting head frame with the flange of the auxiliary frame, the size of the auxiliary frame is dictated by the size of the cutting head frame. In consequence of the mounting of the cutting head frame on the shaver housing, the extent of cutting head frame and auxiliary frame in relation to height and width becomes relatively large. The resulting expenditure of material for the auxiliary frame with cutting foil has an adverse effect on its manufacturing cost.

Based on this state of the art, it is an object of the present invention to provide a dry shaving apparatus of the type identified in the preamble of claim 1 in which the auxiliary frame is readily replaceable and removable, in which in particular the pull necessary for removing the auxiliary frame is largely reduced, in which the auxiliary frame is held in a defined position in the direction of removal when locked, and in which the size of the auxiliary frame is reduced to a minimum.

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These requirements are satisfied by the invention in that the auxiliary frame is slidably insertable intermediate the end cheeks of a cutting head frame or a shaver housing in the direction of the lower cutter, that resilient detent means having ascending ramps are provided on the end walls of the auxiliary frame, that resilient release buttons adapted to actuate the detent means via the ascending ramps are provided in the end cheeks, and that the end cheeks provide above the release buttons a recess each including an abutment stop for the detent means of the auxiliary frame.

The particular ease with which the auxiliary frame arranged intermediate the end cheeks of a cutting head frame or of a shaver housing can be removed is accomplished in that resiliently arranged release buttons are provided in the end cheeks, which buttons act during the unlocking process upon ascending ramps provided on the resilient detent means situated on the end walls of the auxiliary frame, with the inclination of the ascending ramps being chosen such that the pressure exerted on the release buttons pushes these and thus the auxiliary frame out of the locked zone.

The user then merely lifts the unlocked auxiliary frame from the end cheeks.

In the locked position of the auxiliary frame, the lower cutter bears under spring action against the upper cutter mounted in the auxiliary frame. Utilization of this spring tension acting in the direction of withdrawal, while adding to the easy removability of the auxiliary frame after unlocking, causes on the other hand, via the resilient detent means, the locked auxiliary frame to be in firm abutment with the groove walls of the recesses provided in the end cheeks in the direction of removal.

Because the auxiliary frame is insertable intermediate the end cheeks of a cutting head frame or a shaver housing in the direction of the lower cutter from outside, it is possible to substantially reduce the size of the auxiliary frame, this arrangement permitting the auxiliary frame carrying the upper cutter to be provided already at the level of the edge area of the lower cutter.

The recesses for the resilient detent means of the auxiliary frame are provided on the inside of the respective end cheek of a cutting head frame or a shaver housing of suitable configuration and consist of a longitudinally extending groove whose groove wall lying close to the end of the end cheek provides an abutment stop for the auxiliary frame via the respective detent means.

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Handling of the auxiliary frame during insertion and removal is further facilitated by longitudinally extending guide grooves embedded in the end cheeks.

Conveniently, the upper cutter is mounted in the auxiliary frame so as to be convex, with the end walls of the auxiliary frame with their respective detent means extending relatively far into the convex area of the upper cutter.

In accordance with a preferred embodiment, the resilient detent means are nose-shaped and project with their nose ends directed towards the upper cutter out of the end walls of the auxiliary frame.

The ascending ramps of the detent means are provided in a simple manner by the nose backs extending in a slope from the projecting nose ends to the set back end walls of the auxiliary frame.

Preferably, the end walls of the auxiliary frame include each two rigid guide rails engaging into registering guide grooves in the end cheeks.

In a preferred embodiment of the invention, the resilient detent means provided in either end wall of the auxiliary frame is situated intermediate the two rigid guide rails.

In a further embodiment of the invention, the extent of sliding motion of the auxiliary frame between the end walls is limited in the direction of removal by a step-like shoulder provided in the ascending ramps of the detent means.

Preferably, the transition between the slope of the ascending ramps of the detent means and the end walls of the auxiliary frame is formed by a step-like shoulder.

The step-like shoulder, whether formed as transition of the slope of the ascending ramps to the end walls of the auxiliary frame or as an interruption of the slope/inclination of the ascending ramps, abruptly terminates the sliding travel of the auxiliary frame in its direction of removal. The release buttons, while no longer in abutment with the ascending ramps yet still acted upon by operating pressure, move in accelerating fashion into the step-like shoulders to the end walls of the auxiliary frame or the set back shoulder walls, impacting these. The user can both feel and hear the acceleration and impact process of the release buttons of the auxiliary frame. In this unlocked position, the auxiliary frame is held ready for removal intermediate the end cheeks either by the release buttons engaging the step-like shoulders or, in the absence of operating pressure on the release

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buttons, by the detent means which, being not fully untensioned yet in this position, are accordingly in abutment with the end cheeks. By these means it is ensured that the auxiliary frame is not ejected from the end cheeks after it is unlocked.

Further advantages and details of the invention will become apparent from the subsequent description in conjunction with the drawings illustrating preferred embodiments. In the drawings,

FIG. 1 is a front view, partly sectioned, of the shaving area of a dry shaving apparatus;

FIG. 2 is an exploded perspective view of an auxiliary frame, cutting head frame and upper part of a shaver housing;

FIG. 3 is a longitudinal sectional view of one of the two identically constructed end cheeks of a shaver housing or cutting head frame, with a partial sectional view of one of the two identically constructed end walls of an auxiliary frame shown in locked position;

FIG. 4 is a longitudinal sectional view and partial sectional view of the arrangement of FIG. 3, showing a detent means acted upon by a release button;

FIG. 5 is a perspective view of the auxiliary frame, with the ascending ramp having a step-like shoulder;

FIG. 6 is a longitudinal sectional view of one of the two identically constructed end cheeks of a shaver housing or cutting head frame, with a partial sectional view of one of the two identically constructed end walls of an auxiliary frame shown in locked position, with the ascending ramp having a step-like shoulder;

FIG. 7 is a longitudinal sectional view and partial sectional view of the arrangement of FIG. 6, showing a detent means acted upon by a release button and with the ascending ramp having a step-like shoulder; and

FIG. 8 is a longitudinal sectional view and partial sectional view of the arrangement of FIG. 7, showing a step-like shoulder provided in the ascending ramp.

FIG. 1 shows the shaving area of a dry shaving apparatus having a movable lower cutter 1 and an upper cutter 2 which is in cooperative relation with the lower cutter and is mounted in an auxiliary frame 3 so that it

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is convex. The lower cutter 1 is caused to reciprocate via a rocking lever 5 by a motor, not shown, which is disposed in the housing 4 of the dry shaving apparatus. A helical spring 6 urges the lower cutter 1 against the upper cutter 2 in known fashion.

In the embodiment shown in FIG. 1, the end cheeks 9 and 10 are part of the housing 4. Providing extensions of the housing ends 11, 12, they are formed on the upper housing wall 13 of the housing 4 which wall lies below the lower cutter. The auxiliary frame 3 which is insertable in the direction of the housing 4 as well as the end cheek 10 are shown in partial sectional view, illustrating the auxiliary frame 3 situated intermediate the end cheeks 9 and 10 in locked position.

The partial section taken through the end cheek 10 shows a release button 15 which is secured to a cross member 14 in the end cheek 10 by means of a clip connection and has a projection 16 protruding from the end cheek contour as well as a lug 17 extending in the direction of the lower cutter 1. Further components and arrangements serving to unlock and lock the auxiliary frame 3 as well as their functions will be described in more detail with reference to FIGS. 2, 3 and 4.

Unlike FIG. 1, the embodiment of FIG. 2 provides a cutting head frame 18 adapted to be slipped on the housing 4, with the auxiliary frame 3 being insertable intermediate its end cheeks 9 and 10 in the direction of the housing.

Spring-loaded locking elements 20 provided at either end 19 serve to lock the cutting head frame 18 relative to the housing. For the purpose of adjusting the auxiliary frame 3 central with the housing 4, projections 7 are provided on the housing which engage into registering cutouts 8 in the auxiliary frame 3.

When the cutting head frame 18 is in locking engagement with the housing, the front wall 21 and the rear wall 22 of the cutting head frame terminate approximately at the level of the housing wall 13 of the housing 4. In this position, the end cheeks 9 and 10 receiving and holding the auxiliary frame 3 project beyond the housing wall 13 so that this condition is comparable with the one described and illustrated in FIG. 1. The two end walls 23 and 24 of the auxiliary frame 3 are of identical construction. The same applies to the two end cheeks 9 and 10.

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Provided in the end cheek 9 is a longitudinally extending opening 25 in which a cross member 14 extending transversely therethrough is formed. A resilient release button 15 is secured to the cross member 14 by means of a clip connection, for example. Formed on the end of the release button 15 close to the end of the end cheek is an inwardly extending lug 17. Above the lug 17, a groove 27 extending in longitudinal direction is embedded in the inner side 26 of the end cheek 9, with the groove wall 28 on the side close to the withdrawal direction of the auxiliary frame 3 serving as an abutment stop for the detent means when in the locked position.

To facilitate insertion and removal of the auxiliary frame 3, longitudinally extending guide rails 30, 31 are formed on the end walls 23, 24 of the auxiliary frame, the rails engaging into a guide groove 29 provided in the end cheek 9 and being guided by its side walls. In the posterior rear wall of this guide groove 29 are the opening 25 and the groove 27. The upper cutter 2 is mounted in the auxiliary frame 3 so as to be convex. The end walls 23 and 24 of the auxiliary frame are conformed to the convex contour, thus projecting a relatively large amount into the convex area of the upper cutter. Guide rails 30 and 31 are formed on the end wall 24. A resilient detent means 32 having an ascending ramp 33 is provided intermediate these two guide rails. The detent means 32 is of nose-shaped configuration, with the back of the nose, which acts as an ascending ramp 33, extending outwardly away from the end wall 24 and ascending in the direction of removal. The wall 34 through which the nose back is returned to the end wall 24 serves as abutment stop for the auxiliary frame 3 on the groove wall 28 in the groove 27 in the end cheek 10.

On placing the auxiliary frame 3 intermediate the end cheeks 9 and 10 of FIG. 1 or FIG. 2, the guide rails 30 and 31 engage the guide grooves 29 provided in the end cheeks. As the insertion process proceeds further, the ascending ramps 33 of the detent means 32 which protrude relative to the end walls 23 and 24 of the auxiliary frame come in abutment with the end cheeks 9 and 10. On account of the resilient property of the detent means 32, these are pushed via the ascending ramps 33 and in accordance with their slope inside the auxiliary frame 3. After the ends of the end cheeks are overtravelled, the rear wall of the guide groove 29 assumes the further guiding function until the detent means 32 spring into the grooves 27. Briefly before the detent means 32 spring into the grooves 27, the auxiliary frame 3 picks up the lower cutter 1 through the upper cutter 2 in the direction of insertion in opposition to the pressure of the helical

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spring 6 so that, after the detent means 32 have sprung into the grooves 27, the loaded helical spring 6 bears via the lower cutter 1 and the upper cutter 2 against the auxiliary frame 3, causing the walls 34 of the detent means 32 in the grooves 27 to engage the groove walls 28. In this position, the auxiliary frame 3 is held in a defined position intermediate the end cheeks 9 and 10 and securely interlocked therewith.

The removal of an auxiliary frame 3 which is interlocked with the end cheeks 9 and 10 of a shaver housing 4 or cutting head frame 18 will be explained in more detail with reference to FIGS. 3 and 4.

The sectional views of FIG. 3 and FIG. 4 show by way of example the interlocking area of the auxiliary frame 3 with the end cheek 9 of a cutting head frame 18 which is in locking engagement with the housing 4, the respective locking elements 20 and 35 thereof being irrelevant.

The resilient detent means 32 is shown as situated in the groove 27 in the end cheek 9, with the wall 34 resting against the groove wall 28. The descending ramp 33 extends out of the groove 27 in the direction of the housing wall 13 of the housing 4 to the set back end wall 23 of the auxiliary frame 3.

The end cheek 9 includes a longitudinally extending opening 25 with a cross member 14 therein to which a release button 15 made of a springy material is secured, for example, by means of a clip connection. The cross member 14 may also be rotatably mounted to allow the release button 15 to pivot. The release button 15 extends from the cross member 14 within the opening 25 towards the end of the end cheek, terminating in a lug 17 extending towards the auxiliary frame 3 in the upper area of the ascending ramp 33 of the detent means 32.

When the release button 15 is actuated via the projection 16, it comes to lie, or pivots about the cross member 14, inwardly, urging the resilient detent means 32 via the descending ramp 33 into the auxiliary frame 3 whereby, as shown in FIG. 4, the detent means 32 is disengaged from the groove 27 and thus unlocked. With the spring action of the release button 15 continuing, the unlocked detent means 32, and thus the auxiliary frame 3, slides with its descending ramp 33 along the lug, thereby lifting clear of the housing wall 13 or moving out of the end cheeks 9 and 10. The user then merely takes the unlocked auxiliary frame 3 out of the end cheeks 9 and 10. This process is initially aided and facilitated

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by the fact that in the locked condition of the auxiliary frame 3 the contact pressure of the lower cutter 1 bearing against the upper cutter 2 under the action of the helical spring 6 is utilized in addition. The end cheek 10 as well as the end wall 24 of the auxiliary frame 3 are configured by analogy with the above description.

In the auxiliary frame of FIGS. 5, 6 and 7, the transition from the ascending ramp 33 to the end wall 24 is configured as a step-like shoulder 36 limiting the sliding travel of the auxiliary frame 3 in the direction of removal.

The release button 15 urging the auxiliary frame via the ascending ramp 33 - which serves the function of a descending ramp in the withdrawal process - in the removal direction springs or pivots with its lug 17, after it has overtravelled the end of the ascending ramp, into the step-like shoulder 36, impacting the end wall 23. The user can feel the abrupt transition from the ascending ramp 33 to the end wall 23 while the impact of the release button 15 on the end wall 23 is easily heard.

The same sequence of functions occurs in the end cheek 10 and the end wall 24 which are configured analogously.

The abrupt transition from the ascending ramps 33 to the end walls 23 and 24 described in the foregoing completes the unlocking process of the auxiliary frame, terminating also its sliding travel intermediate the end cheeks 9 and 10. The release buttons 15 impacting the end walls 23 and 24 of the auxiliary frame 3 halt the sliding motion of the auxiliary frame 3, holding it intermediate the end cheeks 9 and 10 for further removal by the user.

The step-like shoulder 36 assumed and with the length and the inclination/slope of the ascending ramp 33 suitably coordinated, the unlocked auxiliary frame 3, on removal of the operating pressure acting on the release buttons, is held intermediate the end cheeks 9 and 10 by the detent means 32 abutting the end cheeks, the holding action being the result of the low spring tension still remaining therein.

FIG. 8 shows the interlocking area of the auxiliary frame 3 with the end cheek 9 as described and illustrated in FIGS. 6 and 7, with the difference, however, that the step-like shoulder 36 is provided in the slope or inclination of the ascending ramp 33.

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The length of the sliding travel of the auxiliary frame 3 intermediate the end cheeks 9 and 10 may be selected in accordance with the individual application by suitably positioning the step-like shoulders 36 in the ascending ramps 33 of the detent means 32, taking into consideration a minimum length of sliding travel which is necessary to bring the locked auxiliary frame 3 into an unlocked position.



Patent Claims

1. A dry shaving apparatus (4) having a movable lower cutter (1) and an upper cutter (2) which cooperates with the lower cutter (1) and is mounted in an auxiliary frame (3) provided with resilient detent means (32) on its end walls, characterized in that the auxiliary frame (3) is slidably insertable intermediate the end cheeks (9, 10) of a cutting head frame (18) or a shaver housing (4) in the direction of the lower cutter (1), that resilient detent means (32) having ascending ramps (33) are provided on the end walls (23, 24) of the auxiliary frame (3), that resilient release buttons (15) adapted to actuate the detent means (32) via the ascending ramps (33) are provided in the end cheeks (9, 10), and that the end cheeks (9, 10) provide above the release buttons (15) a recess (27) each including an abutment stop (28) for the detent means (32) of the auxiliary frame (3).

2. A dry shaving apparatus as claimed in claim 1, characterized in that the recess (27) is provided on the inner side (26) of the respective end cheek (9, 10) and consists of a longitudinally extending groove whose groove wall (29) lying close to the end of the end cheek provides an abutment stop for the auxiliary frame (3) via the respective detent means (32).

3. A dry shaving apparatus as claimed in claim 1 or claim 2, characterized in that a longitudinally extending guide groove (29) is provided in each end cheek (9, 10).

4. A dry shaving apparatus as claimed in claim 1, characterized in that the upper cutter (2) is mounted in the auxiliary frame (3) so as to be convex, with the end walls (23, 24) of the auxiliary frame (3) with their respective detent means (32) extending relatively far into the convex area of the upper cutter (2).

5. A dry shaving apparatus as claimed in claim 1 or claim 4, characterized in that the resilient detent means (32) are nose-shaped and project with their nose ends directed towards the upper cutter (2) out of the end walls (23, 24) of the auxiliary frame (3).

6. A dry shaving apparatus as claimed in one or several of the claims 1, 4 or 5, characterized in that the ascending ramps (33) of the detent means (32) are provided by the nose backs extending in a slope from the projecting nose ends to the set back end walls (23, 24) of the auxiliary frame (3).

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7. A dry shaving apparatus as claimed in claim 4, characterized in that the end walls (23, 24) of the auxiliary frame (3) include each two rigid guide rails (30, 31).

8. A dry shaving apparatus as claimed in any one of the claims 4 to 7, characterized in that the resilient detent means (32) provided in either end wall (23, 24) of the auxiliary frame (3) is situated intermediate the two rigid guide rails (30, 31).

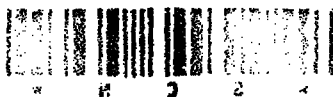
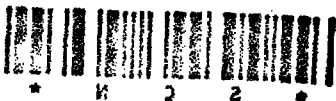
9. A dry shaving apparatus as claimed in any one of the preceding claims, characterized in that the extent of sliding motion of the auxiliary frame (3) between the end walls (23, 24) is limited in the direction of removal by a step-like shoulder (36) provided in the ascending ramps (33) of the detent means (32).

10. A dry shaving apparatus as claimed in claim 9, characterized in that the transition between the slope of the ascending ramps (33) of the detent means (32) and the end walls (23, 24) of the auxiliary frame (3) is formed by a step-like shoulder (36).



List of References

- 1 Lower Cutter
- 2 Upper Cutter
- 3 Auxiliary Frame
- 4 Housing
- 5 Rocking Lever
- 6 Helical Spring
- 7 Projections
- 8 Cutouts
- 9, 10 End Cheeks
- 11, 12 Ends of Housing
- 13 Housing Wall
- 14 Cross Member
- 15 Release Button
- 16 Projection
- 17 Lug
- 18 Cutting Head Frame
- 19 Ends
- 20 Locking Elements
- 21 Front Wall
- 22 Rear Wall
- 23, 24 End Walls
- 25 Opening
- 26 Inner Side
- 27 Groove
- 28 Groove Wall
- 29 Guide Groove
- 30, 31 Guide Rails
- 32 Detent Means
- 33 Ascending Ramp
- 34 Wall
- 35 Locking Elements
- 36 Step-like Shoulder



6 Nov 87/BH.

