Jan. 23, 1934. F. J. KALTEYER 1,944,793

STROPPING DEVICE

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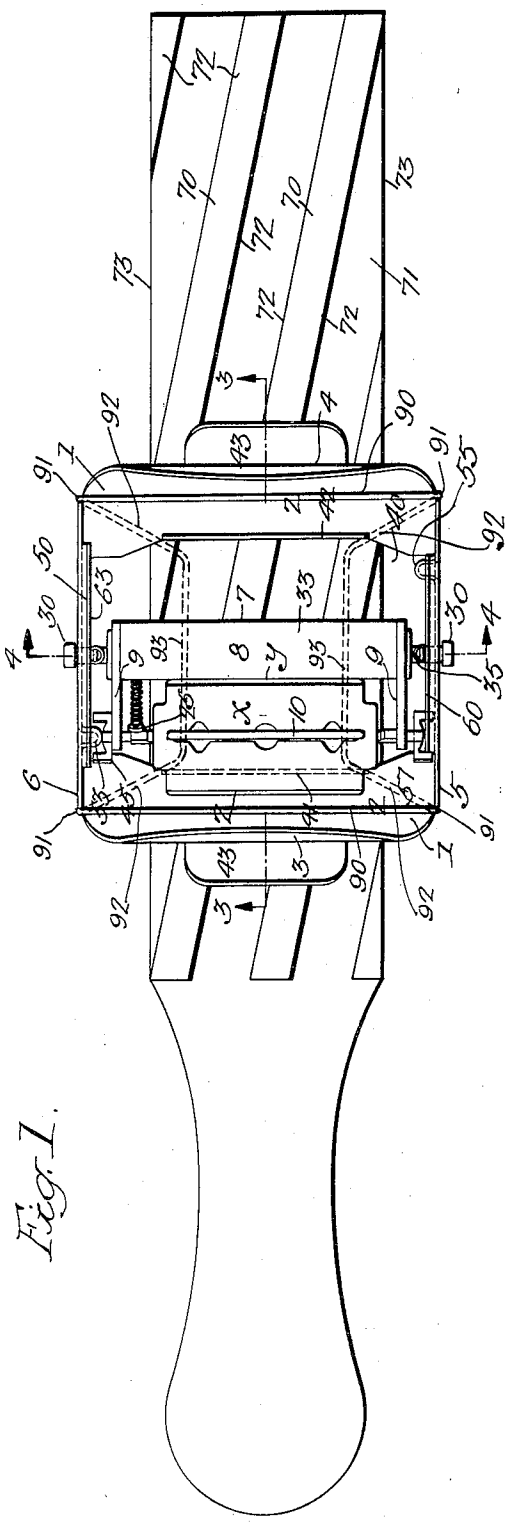


Fig. 1.

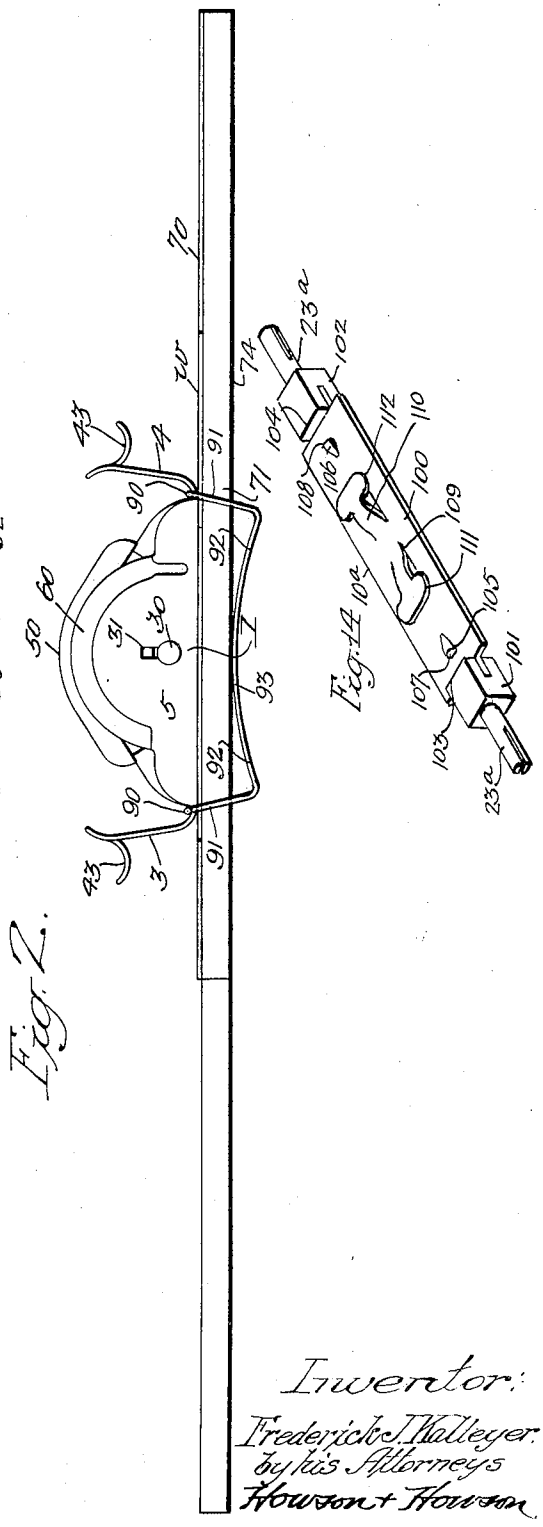


Fig. 2.

Fig. 14.

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Fig. 3.

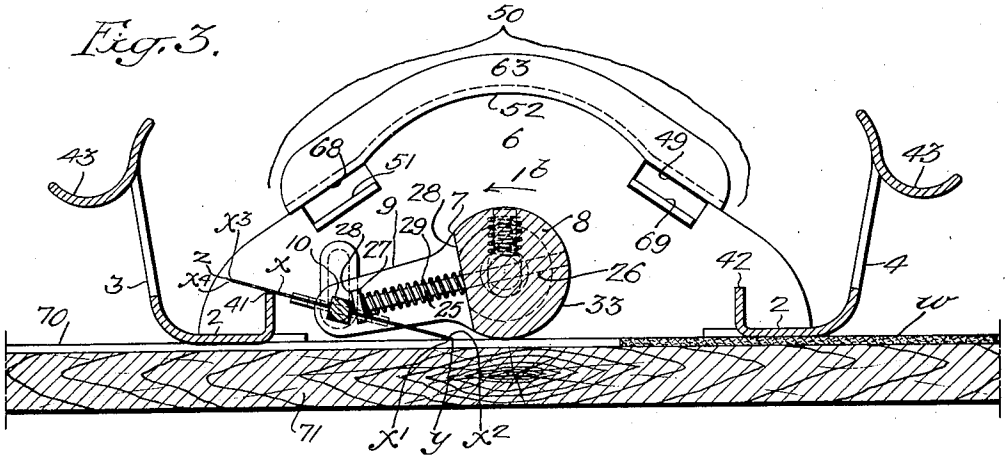


Fig. 4.

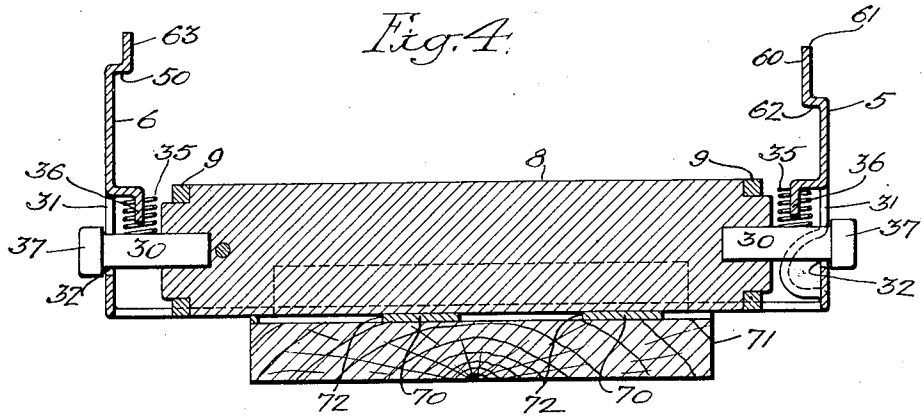


Fig. 10.

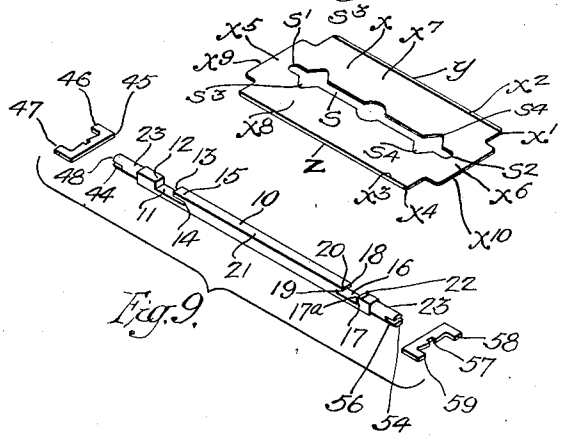


Fig. 9.

Fig. 11.

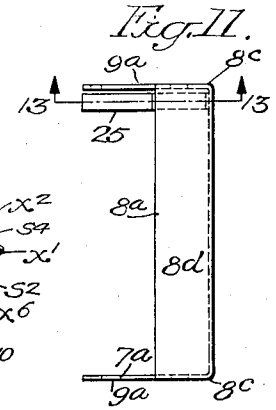


Fig. 12.

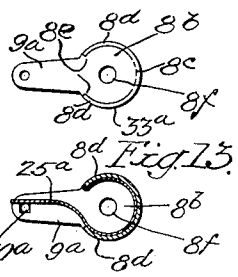


Fig. 13.

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Fig. 5.

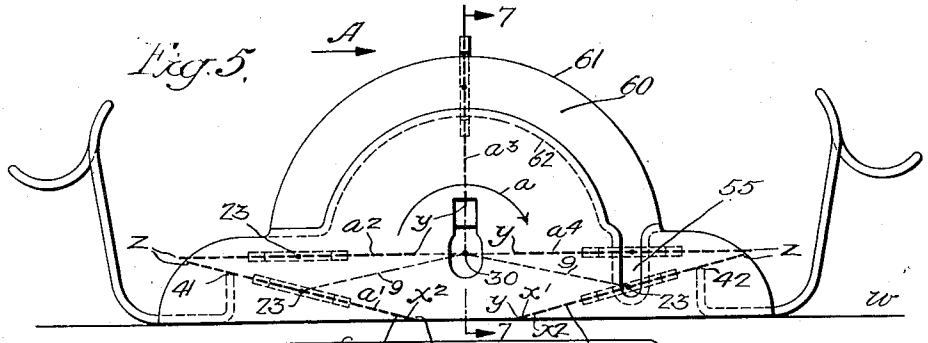


Fig. 7.

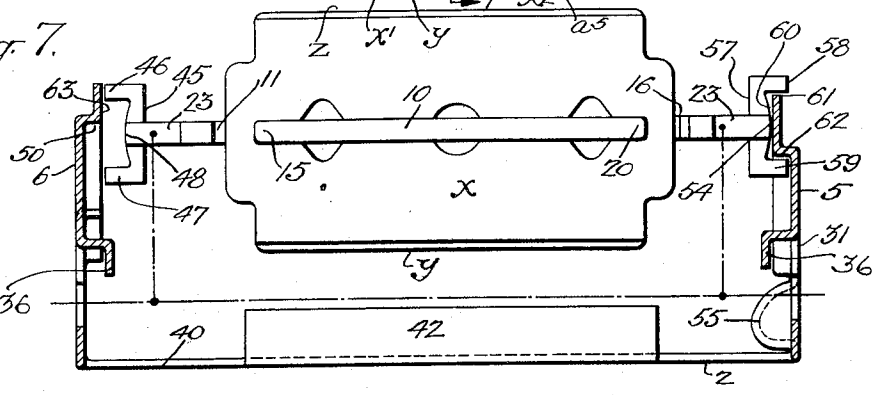


Fig. 6.

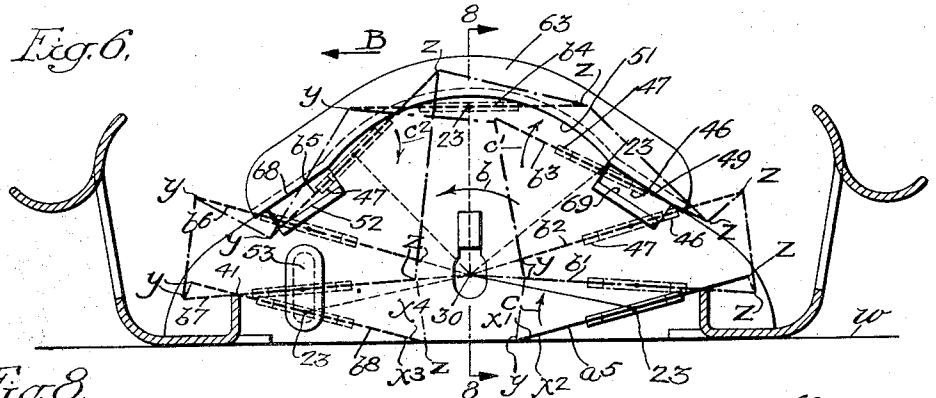
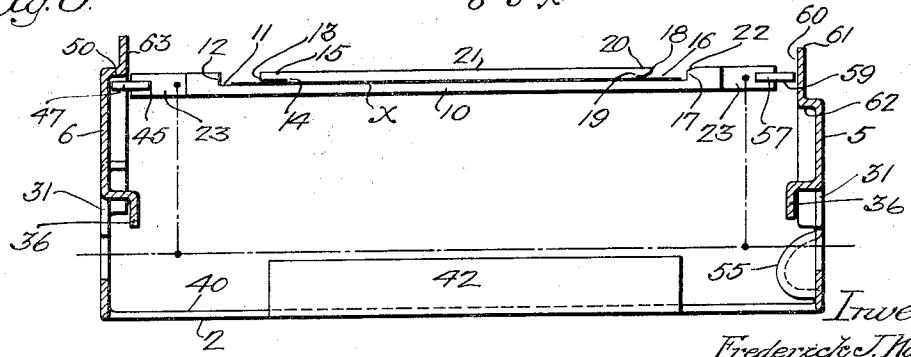


Fig. 8.



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UNITED STATES PATENT OFFICE

1,944,793

STROPPING DEVICE

Frederick J. Kalteyer, Philadelphia, Pa.

Application July 1, 1931. Serial No. 548,225

20 Claims. (Cl. 51—153)

This invention relates to a device for stropping double-edged razor blades of the "Gillette" and similar types.

One object of the invention is to provide means for automatically turning the blade edge for edge, in the device and relative to the stropping surface, during the stropping operation, in order that the four beveled faces which constitute the two oppositely disposed, parallel cutting edges of the blade will be presented to the stropping surface in successive order, to provide for equal stropping of both of said cutting edges, for effecting complete and uniform stropping of the blade.

Another object of the invention is to provide a manually operable stropping device with means whereby a uniform pressure of the blade against the stropping surface will be produced and maintained throughout the stropping operation, regardless of the degree of pressure manually exerted upon the device in, and for the purpose of, effecting a reciprocatory stropping movement of the device on, and relative to, the stropping surface.

Another object of the invention is to construct the co-operating elements of the device in such a manner that the edge of the blade that is to be stropped during a movement of the device in either direction over the stropping surface will, at the beginning of the stroke, remain above the stropping surface, to be brought into contact with the stropping surface after the movement of the device in the intended direction has progressed to some extent, thereby avoiding the rounding of the edge of the blade by premature contact of the blade with the stropping surface.

Another object of the invention is to construct and arrange the elements of the device in such a manner that the edge of the blade which has been in contact with the stropping surface during a movement of the device in one direction over the stropping surface will be raised from, and clear of, the stropping surface immediately upon the start of reverse movement of the device relative to the stropping surface, the said edge of the blade moving away from the stropping surface in a direction opposite to that of the reverse movement of the device, thereby preventing the said edge of the blade from catching in, or cutting, the said stropping surface.

Another object of the invention is to construct the device in such a manner that the edge of the blade in contact with the stropping surface will be automatically raised from the stropping surface immediately upon the release of, or a material reduction in, the pressure manually applied to the device during the operation thereof.

Another object of the invention is to provide the stropping device with a carriage which is adapted to be slid along the stropping surface; to mount in the carriage an oscillating blade-carrying frame, adapted to swing about an axis centrally located in the carriage and extending substantially at right angles to the direction of movement of the carriage; and to provide the oscillating frame with traction means for contacting with the stropping surface during the movements of the device along the stropping surface whereby the oscillating frame will be caused to swing about its axis in the direction in which the device is being moved, to swing the oscillating frame and the blade carried thereby into a position forward of the axis of the oscillating frame in the direction in which the carriage is being moved, in order that the blade will occupy a position adjacent the forward end of the advancing carriage, wherein the blade may be considered as being pushed by said carriage over the stropping surface to effect positive stropping contact between the blade and the stropping surface at all times.

Another object of the invention is to construct the elements of the device in such a manner that the blade will be uniformly maintained at a predetermined angle relative to the stropping surface during the stropping operation as effected during both strokes of the reciprocatory movement of the device over the stropping surface.

Another object of the invention is to provide a unique and highly efficient form of blade holder which will permit of the blade being readily inserted or removed therefrom, but which will positively and firmly hold the blade against the stropping surface during the stropping operation.

Another object of the invention is to provide stabilizing means for the blade holder in order that the blade will at all times be maintained under perfect control, thereby preventing improper or injurious contacting of the blade with the stropping surface; and providing for ready removal of the blade from its holder at any time, regardless of the position of the oscillating frame, in which the blade holder is mounted, with respect to the main frame or carriage of the device.

Another object of the invention is to provide the device with a stropping surface having blade-engaging edges extending at an angle to the line of reciprocating movement of the device to simulate diagonal movement of a razor blade over

a razor strop as practiced in hand stropping of straight razors.

The construction and operation of the device will be fully disclosed hereinafter, reference being had to the accompanying drawings, of which:

Fig. 1 is a plan view of the device in operative position on a suitable stropping surface;

Fig. 2 is a side elevation of the device as shown in Fig. 1;

Fig. 3 is a longitudinal sectional elevation, drawn to an enlarged scale, taken on the line 3—3, Fig. 1;

Fig. 4 is a transverse sectional elevation taken on the line 4—4, Fig. 1;

Fig. 5 is a side elevation of the device, similar to that shown in Fig. 2, with certain of the elements eliminated and showing different positions assumed by the blade during a movement of the device in one direction over the stropping surface, to effect stropping of the opposite beveled faces constituting one cutting edge of the blade;

Fig. 6 is a longitudinal sectional elevation, similar to Fig. 3, with certain of the elements removed and showing the various positions assumed by the blade in the turning of the blade to the extent of 180° relative to the blade-carrying frame during a movement of the device in a direction opposite to that illustrated in Fig. 5, to bring one of the two beveled faces constituting the second cutting edge of the blade into operative relation with respect to the stropping surface;

Fig. 7 is a transverse sectional elevation taken on the line 7—7, Fig. 5, and illustrating the relative position of the blade and balde holder with respect to the stabilizing means during the movement of the device in the direction indicated in Fig. 5;

Fig. 8 is a transverse sectional elevation taken on the line 8—8, Fig. 6, and illustrating the relative position of the blade holder with respect to the stabilizing means during the movement of the device in the direction indicated in Fig. 6;

Fig. 9 is a detached perspective view of the blade holder;

Fig. 10 is a perspective view of a blade of the type adapted to be stropped in the device forming the subject of this invention;

Fig. 11 is a plan view of a modified form of oscillating frame;

Fig. 12 is an end elevation of the frame shown in Fig. 11;

Fig. 13 is a sectional elevation taken on the line 13—13, Fig. 11; and

Fig. 14 is a perspective view of a modified form of blade holder.

The stropping device made in accordance with this invention comprises a main frame or carriage 1, which consists of a bottom 2, end walls 3 and 4 respectively and side walls 5 and 6 respectively.

Extending transversely of the carriage 1 and pivotally mounted in the side walls 5 and 6 thereof is an oscillating frame 7, which comprises a body portion in the form of a cylinder or drum 8 provided at its opposite ends with laterally extending arms 9, 9 respectively, and pivotally mounted in the outer ends of the arms 9, 9 is a blade holder 10.

The type of blade adapted to be stropped in the device and which is illustrated in Fig. 10, consists of a relatively thin flat flexible strip x provided with oppositely disposed parallel cutting edges y and z respectively, the edge y being formed by the intersection of beveled faces x^1 and x^2 and the edge z being formed by the intersection of beveled edges x^3 and x^4.

Extending longitudinally of the blade x, through the center thereof and parallel to the edges y, z, is a slot s, the ends s^1, s^2 of the slot s being spaced inwardly from the opposite end edges of the blade, providing relatively narrow end parts x^5, x^6, which connect the oppositely disposed body parts x^7, x^8 of the blade, which lie respectively at opposite sides of the slot s.

The blade holder 10, as shown in Fig. 9, is rectangular in cross section and of a width adapted to fit snugly within the slot s of the blade x.

Adjacent one of its ends the blade holder 10 is provided with a vertically disposed transversely extending groove 11 having an outer side wall 12 and an inner side wall 13. Extending inwardly, toward the middle of the holder 10, from the inner side wall 13 of the vertically disposed transversely extending groove 11 and coincident with the base surface thereof is a horizontally disposed transversely extending groove 14, providing a longitudinally extending overhanging lip 15 adjacent one end of the holder 10, for purposes hereinafter set forth.

Adjacent its opposite end, the blade holder 10 is provided with a second vertically disposed transversely extending groove 16, having an outer side wall 17 and an inner side wall 18, and extending inwardly from the inner side wall 18 and coincident with the base of the vertically disposed transversely extending groove 16 is a horizontally disposed transversely extending groove 19 which, as illustrated in Fig. 9, is relatively shallower than the horizontally disposed groove 14 at the opposite end of the blade holder. The undercutting of the groove 19 provides an overhanging lip 20, corresponding to the overhanging lip 15 and extending horizontally of the holder 10 in an opposite direction to the lip 15 located at the opposite end of the holder.

To insert the blade x in the blade holder 10 the end portion x^5 of the blade, for example, is first placed in the vertically disposed transverse groove 11 while the middle portion of the holder 10, lying intermediate the grooves 11 and 16, is permitted to project through the slot s in the blade. The length of the slot s between the ends s^1 and s^2 thereof is less than the length of the upper face 21 of the blade holder, between the inner walls 13 and 18 of the transverse grooves 11 and 16 respectively. Consequently with the end portion x^5 of the blade pressed down in the groove 11 and resting on the base surface thereof, and with the body of the blade holder 10 extending through the slot s, the blade will be flexed longitudinally, with the opposite end portion x^6 of the blade resting on top of the lip 20.

In order to insert the end x^6 of the blade in the transversely extending slot 16 of the holder the blade must be moved longitudinally of the holder, to bring the end s^1 of the slot s and the end portion x^5 of the blade under the overhanging lip 15 and within the undercut groove 14 at the one end of the holder, whereupon the opposite end portion x^6 of the blade will enter the vertical transverse groove 16, the end s^2 of the slot s and the end portion x^6 of the blade x being guided into the undercut groove 19 and under the overhanging lip 20 by the outer edge x^{10} of the end portion x^6 sliding downwardly on a beveled face 22 formed on the upper part of the outer wall 17 of the transverse slot 16, which moves the blade in a reverse direction relative to the holder 10 until

the said outer edge x^{10} of the end portion x^6 of the blade snaps into position behind a shoulder 17*a* formed by the wall 17 of the transverse groove 16. During this reverse movement of the blade the edge x^9 of the end portion x^5 of the blade is moving toward the wall 12 of the transverse slot 11.

Further longitudinal movement of the blade x relative to the holder 10 will be prevented by the end s^2 of the slot s bearing against a shoulder 19*a* formed by the base of the undercut groove 19, while the outer edge x^{10} of the end portion x^6 bears against the shoulder 17*a*. The inherent tendency of the blade to assume and maintain its flat condition at all times keeps the blade flat and prevents the blade from being accidently dislodged from the shoulder 17*a*.

Removal of the blade from the holder is effected by raising the end edge x^{10} of the blade from behind the shoulder 17*a* and moving the blade longitudinally until the end s^2 of the slot s comes from under the overhanging lip 20, whereupon the blade is moved longitudinally in the opposite direction until the end s^1 of the slot s at the opposite end of the blade comes from under the overhanging lip 15, whereupon the blade may be lifted out of the holder.

The holder 10 is provided at its opposite ends with cylindrical trunnion portions 23, 23, which are journaled in the outer ends of the arms 9, 9, respectively, of the oscillating frame 7.

The construction of the holder 10 is such that the blade is supported therein in a plane passing directly through the axes of the trunnions 23, 23.

The blade holder 10 is adapted to be rotated in the frame 7 to bring the blade x into a position wherein the plane of the blade extends radially from and through the axis of the drum 8 or in a position wherein the plane of the blade is disposed at right angles to a plane extending through the axis of rotation of the holder 10 and the axis of oscillation of the drum 8, as will be hereinafter described.

The means for moving the blade to either of these positions and for resiliently holding the blade in such positions in the preferred form of the invention comprises a radially extending spring-loaded plunger comprising a shank 25 slidably mounted in a radially extending bearing 26 formed in the drum 8. The shank 25 is provided with a head 27 having a flat surface 28 adapted to bear against one or the other of the flat sides of the rectangular blade holder 10. A spring 29, encircling the shank 25 and extending between the underside of the head 27 and a flattened surface 28 formed on the drum 8, exerts a force radially outward upon the plunger which is sufficient, when the flat face 28 is in any other but coincident relation of one of the flat sides of the holder 10 to turn the blade holder in its bearings until the flat face 28 of the plunger 25 bears flatly against one of the flat surfaces of the holder 10.

The drum 8 is provided with trunnions 30, 30 which pass through slots 31, 31 formed in the oppositely disposed side walls 5 and 6, respectively, of the carriage 1, the slots 31 extending at right angles to the plane of the bottom 2 of the carriage and permitting a relative vertical movement of the drum 8 with respect to the carriage, the lower ends 32 of the slots 31 limiting the movement of the drum outwardly with respect to the carriage, so that when the device is not in use the peripheral traction surface 33 of the drum 8 will extend slightly below the underside of the bottom 2 of the carriage, the trunnions 30, 30 being forced downwardly into the ends 32 of the slots 31 by springs 35, 35 which bear against the upper sides of said trunnions and are held in place by ears 36, 36 which are pressed out of the side walls 5 and 6 in forming the slots 31, 31 in said side walls.

Axial movement of the drum 8 relative to the carriage 1 is prevented by means of annular shoulders or heads 37, 37 formed on the trunnions 30, 30 outside the said side frames of the carriage, as illustrated in Fig. 4. In the present instance these trunnions 30 are composed of pins having a driving fit in suitable axially aligned openings formed in the opposite ends of the drum 8, but obviously the trunnions may be composed of screws having their ends threaded into correspondingly threaded openings in the opposite ends of the drum 8.

The bottom 2 of the carriage 1 is provided with a suitable opening 40 permitting the said outward movement of peripheral traction surface 33 of the drum 8 with respect to the carriage 1 and permitting contact of the blade x with the stropping surface w, over which the carriage 1 is adapted to be moved. The opposite ends of the opening 40 in the bottom 2 of the carriage 1 are provided with vertically extending walls or flanges 41 and 42 respectively for purposes hereinafter set forth.

The end walls 3 and 4 of the carriage 1 are provided with finger rests 43, 43 providing means whereby the carriage may be held between the thumb and middle finger, for example, of one hand for the purpose of exerting pressure on the carriage 1, for effecting reciprocation of the carriage longitudinally of the stropping surface w.

Assuming that a blade has been placed in the holder 10 and the carriage 1 placed on the stropping surface w, as illustrated in Figs. 1, 2 and 3, pressure applied to the carriage 1 will cause the bottom of the carriage to be moved down into full flat contact with the stropping surface w, consequently moving the drum 8 vertically with respect to the carriage against the pressure exerted by the springs 35, 35 which will cause the peripheral surface 33 of the drum 8 to exert a tractive force against the stropping surface w.

If the carriage 1 is then moved, for example, in the direction to the left, as shown in Fig. 1, the tractive force of the traction surface 33 of the drum 8 will cause the drum 8 and the blade-carrying frame 7 to rotate in the same direction, i. e. to the left, until the portion of the body of the blade x, farthest removed from the axis of the drum and lying beyond the ends of the arms 9, 9, contacts with the upper edge of the upstanding flange 41 of the carriage 1, which acts as a stop for the blade.

Continued movement of the frame 1 to the left will cause a continued rotation of the frame 7, but the blade being in contact with the stop 41 will cause the holder 10 to rotate in the arms 9, 9 of the frame 7 until the cutting edge of the blade nearest the axis of the frame 7, is brought into contact with the stropping surface w, thereby arresting the blade, the blade holder, and the blade-carrying frame 7 against further relative rotation. Thus, the blade x is moved to and maintained in a predetermined angle with respect to a plane passing through the axis of the holder 10 and the axis of the drum 8.

In moving into this angular position the one corner of the rectangular holder 10 is brought

to bear against the flat face 28 of the plunger 25 moving the said plunger inwardly against the force of the spring 29.

The blade x will be maintained in this position with respect to the stropping surface w throughout the stroke of the carriage 1 in the direction to the left, as viewed in Fig. 1, and as soon as the manually applied pressure is released from the carriage, or materially reduced, the flat face 28 of the plunger 25 will, by acting against the engaged corner of the holder 10 under the force exerted by the spring 29, cause the holder 10 to be rotated in the arms 9, 9, until the flat face 28 of the head 27 of the plunger again bears flatly against the flat side of the holder 10.

Such action will cause a slight rotation of the drum 8 until the blade x is in a plane extending radially from and through the axis of the drum 8. The peripheral surface 33 of the drum 8 will remain in contact with the stropping surface w and the springs 35, 35 will, by exerting an upward force on the carriage 1, raise the one side of the carriage clear of the stropping surface w. Thus, it will be seen that as soon as pressure is released from the carriage the edge of the blade, which has been in contact with the stropping surface w, will be raised immediately from said stropping surface.

Application of pressure to the carriage and movement of the carriage further in the direction to the left will again cause the innermost edge of the blade to be brought into stropping position, as illustrated in Fig. 3, wherein for the purpose of further description it will be assumed that the beveled face x^1 of the blade adjacent the cutting edge y of the blade is in contact with the stropping surface w.

Reversal of the carriage 1 into a movement in the direction to the right, as indicated by the arrow A, Fig. 5, will cause the edge y of the blade to be lifted upwardly from the stropping surface and at the same time causing the edge y to be moved backwardly, in a direction opposite to the new movement of the carriage, by rotation of the drum 8, and the arc described by the outer ends of the arms 9 moving in the direction of the arrow a, Fig. 5, from a position below the horizontal plane of the axis of the drum to a position substantially in the horizontal plane of said axis, the blade moving from the position a^1 to the position illustrated at a^2 in Fig. 5, the backward drawing away of the edge of the blade from the stropping surface being due to the greater distance of the axis 23 of the holder 10 from the vertical plane of the axis of the drum 7 when the blade is in the position a^2 than the distance between the axis 23 of the holder 10 and the vertical plane of the axis of the drum 8 when the blade is in the position a^1.

Continued movement of the carriage in the direction of the arrow A, Fig. 5, due to the traction of the surface 33 of the drum 8 on the stropping surface w, will cause the drum 8 and the arms 9 of the oscillating frame 7 to swing in the direction of the arrow a from position a^2 through the position a^3 to a position a^4 at the opposite side of the axis of the frame 7, the blade being held by the plunger 25 in a plane extending radially from and through the axis of the drum 8 throughout this swinging movement of the frame 7.

Further movement of the carriage in the direction of the arrow A will cause the body portion x^8 of the blade to engage the upper edge of the upstanding flange 42 on the carriage, which acts as a stop for the blade, and which, as the swinging of the frame 7 continues, causes a rotation of the holder 10 about its axis 23 in the arms 9 until the beveled face x^2 adjacent the cutting edge y contacts with the stropping surface w, bringing the blade x into position a^5, as illustrated in Fig. 5.

Thus, it will be seen that the movement of the carriage in the direction of the arrow A has progressed to some extent before the edge of the blade to be stropped is brought into contact with the stropping surface w.

In the manner above noted both of the beveled faces x^1 and x^2 constituting the cutting edge y of the blade x are passed through the stropping operation in successive order while the opposite cutting edge z of the blade is held in a position away from the stropping surface w.

In order to bring the cutting edge z into contact with the stropping surface w the blade must be given a turn of 180° in and with respect to the oscillating frame 7. This is accomplished on the next stroke of the carriage 1 in the direction illustrated by the arrow B in Fig. 6 which corresponds to the direction of movement of the carriage to the left, as above described.

From the position a^5, which the blade had attained as a result of the stroke of carriage movement indicated by the arrow A in Fig. 5, and as soon as direction of movement of the carriage is changed into the stroke indicated by the arrow B in Fig. 6, the blade will again move into a position where the plane of the blade is disposed radially with respect to and passes through the axis 30 of the drum 8, as indicated at b^1 in Fig. 6, the blade x and blade holder 10 turning in the direction of the arrow c about the axis 23 of the holder 10.

As the movement of the carriage in the direction of the arrow B, Fig. 6, continues the blade x will be moved from the position b^1 to the position illustrated at b^2 in Fig. 6. Continued movement of the carriage in the direction of the arrow B causes a continued rotation of the drum 8 and the arms 9 thereof in the direction of the arrow b, the blade x turning about the axis 23 of the blade holder and relative to the arms 9 in the direction indicated by the arrow c^1, the blade passing through the position shown at b^3 to a position indicated at b^4 where the plane of the blade is at right angles to a plane extending through the axis 30 of the drum 8 and the axis 23 of the holder 10.

Continued movement of the carriage in the direction of the arrow B and continued rotation of the drum 8 in the direction of the arrow b causes a continued rotation of the blade x in the direction of the arrow c^2 through the position illustrated at b^5 to a position illustrated at b^6, where the 180° movement of the blade with respect to the frame 7 is completed, the previously stropped edge y of the blade being now in the outer position formerly occupied by the edge z and the edge z being in the inner position formerly occupied by the edge y.

Continued movement of the carriage in the direction of the arrow B and a corresponding rotation of the drum in the direction of the arrow b causes the blade to be moved from the position b^6 to the position illustrated at b^7 where the body portion x^7 of the blade is resting on the upper surface of the upstanding flange 41 of the carriage 1.

As the stroke of the carriage 1 continues in the direction of the arrow B, the frame 7 continues to rotate in the direction of the arrow b and the

flange 41 acting as a stop for the blade x causes the blade holder to rotate about its axis 23 in the arms 9, 9 of the frame 7, causing a corresponding rotation of the blade x from the position shown at b^7 to the position shown at b^8 and wherein the beveled surface x^3 of the blade adjacent the second cutting edge z is brought into contact with the stropping surface w.

Reversal of the carriage into a movement in the direction of the arrow A will cause a swinging of the frame 7 about its axis 30 without changing the position of the blade with respect to the frame 7 as above described in the movement of the blade through positions a^1 to a^5, Fig. 5. Thus, the second beveled surface x^4 of the blade adjacent the cutting edge z will be brought into contact with the stropping surface w.

In this manner each of the four beveled surfaces x^1, x^2, x^3 and x^4 constituting the oppositely disposed cutting edges y and z are brought successively into contact with the stropping surface w, thereby insuring complete and uniform stropping of both cutting edges of the blade by successive reciprocatory movements of the carriage 1 with respect to the stropping surface w.

In order to effect the above described turning of the blade through an arc of 180° in and relative to the oscillating frame 7, one end of the blade holder 10 beyond the trunnion 23 is slitted in a plane coincident with the undercuts 14 and 19 in the blade holder, as illustrated at 44, Fig. 9, for the reception of a doubled ended lever 45 which extends laterally from the opposite sides of the blade holder and which is provided at its outer ends with projections 46 and 47 respectively, which extend parallel to the axis of the blade holder 10 and beyond the end surface 48 of said blade holder 10.

As the frame 7 moves in the direction of the arrow b, Fig. 6, to bring the blade into the position illustrated at b^2 the projection 46, for example, on the end of the blade holder, is brought into contact with a cam surface 49 which forms one section of a cam or cam path 50 extending longitudinally of the carriage 1 adjacent the end 48 of the holder 10. The cam path 50 is formed by displacing parts of the end wall of the carriage 1 inwardly. The angle of the cam surface 49 is so arranged with respect to the arc followed by the axis 23 of the holder 10 and the projection 46 thereon that, as the frame 7 continues to rotate in the direction of the arrow b the projection 46 will engage said cam surface 49, causing the holder 10 to be rotated in the direction of the arrow c^1, one corner of the rectangular blade holder 10 forcing the plunger 25 inwardly during such rotation. As the engaged corner of the holder 10 passes the center of the plunger 25 the spring 29 again becomes effective to continue the rotation of the holder 10 until the flat face 28 of the plunger 25 contacts with the next successively presented flat surface of the holder 10. This causes rotation of the holder from the position shown at b^3 to a position b^4 at right angles to the plane extending through the axis 30 of the drum 8 and the axis 23 of the holder 10, whereupon the opposite projection 47 of the lever 45 on the end of the holder 10 will contact with a second cam surface 51, of the cam path 50, which is disposed concentric with the axis 30 of the drum 8.

As the rotation of the frame 7 in the direction of the arrow b continues the two projections 48 and 47 on the end of the blade holder 10 will ride under and substantially in contact with the concentric cam surface 51 as the blade is moved through the position b^4 to the position illustrated at b^5, whereupon the projection 47 will contact with the cam surface 52 of the cam path 50, which is so disposed with respect to the arc followed by the axis 23 and the projection 47 of the holder 10 that the said holder will be turned in the direction of the arrow c^2 as the blade moves into the position illustrated at b^6 in Fig. 6.

The righting of the blade into a plane coincident with a plane extending through the axis 30 of the drum 8 and the axis 23 of the holder 10 is completed by the flat face 28 of the plunger 25 acting on one of the corners of the rectangular blade holder 10 in the manner above noted.

As the frame 7 continues its rotation in the direction of the arrow b, the end 48 of the blade holder 10 is brought into contact with a laterally extending cam surface 53, pressed inwardly from the side wall 6 of the carriage 1, which slides the blade holder 10 axially in and with respect to the arms 9, 9 of the frame 7, this axial movement of the blade holder 10 moving the outer ends of the projections 46 and 47 on the blade holder inwardly beyond the inner vertical plane of the cam surfaces 49, 51 and 52 of the cam path 50, so that as the direction of movement of the carriage is changed from the direction indicated by the arrow B in Fig. 6 to the direction indicated by the arrow A in Fig. 5 and the carriage follows through the stroke in the direction of the arrow A, Fig. 5, the projections 46 and 47 will not contact with the said cam surfaces, consequently the blade holder and the blade carried thereby will not be turned in the frame 7 upon this stroke of the carriage.

As the last portion of the stroke in the direction of the arrow A, which carries the blade from the position a^1 to the position a^5 is being completed, the opposite end 54 of the blade holder 10 is brought into contact with a laterally extending cam surface 55, which is pressed inwardly from the side wall 5 of the carriage 1, and the blade holder is thereby shifted axially in an opposite direction within the frame 7 to again bring the projections 46 and 47 into position to engage the cam surfaces 49, 51 and 52 of the cam path 50 upon a reversal of the stroke of the carriage into a direction indicated by the arrow B in Fig. 6.

The end 54 of the blade carrier 10 is slotted as indicated at 56, in the same manner as the opposite end 48 of the blade holder 10, and in this slot 56 is positioned a double-ended lever or yoke 57 having projections 58 and 59 spaced laterally of and extending parallel to the axis of the holder and beyond the end 54 of the blade holder.

During the movement of the carriage 1 in the direction of the arrow A, Fig. 5, which carries the blade x from position a^1 to position a^5, the end 54 of the blade holder contacts with or lies adjacent to a stablizing means comprising a surface 60 displaced inwardly from the side wall 5, and defined by concentric arcuate edges 61 and 62, the projections 58 and 59 extending over the edges 61 and 62 throughout the swinging movement of the frame in the direction of the arrow a, Fig. 5, to prevent any rocking movement of the carrier 10 with respect to the oscillating frame 7, as the said frame swings from left to right through the positions a^2, a^3 and a^4.

During this swinging movement the outer end of the projection 46, for example, on the opposite end of the blade holder 10, see Fig. 7, contacts with or lies adjacent an inwardly offset stabilizing

surface 63 of the end wall 5, to prevent axial movement of the blade holder away from the stabilizing segment 60 in the side wall 6, and thereby maintain the projections 58 and 59 in operative stabilizing relation to the edges 61 and 62 of the segment 60 on the side wall 5.

As the frame 7 swings in the opposite direction in the direction of the arrow *b*, Fig. 6, through the positions b^1 to b^7, the ends of the projections 58 and 59 will contact with the inwardly offset surface 60 of the end wall 5 to keep the projections 46 and 47 at the opposite end of the blade holder in position to engage the cam surfaces 49, 51 and 52 of the cam path 50, as illustrated in Fig. 8.

In this manner the blade is maintained under perfect control at all times and cannot be presented to the stropping surface in any but a correct position for stropping, thus avoiding injury to the stropping surface *w* or the blade *x*.

Due to this perfect control and stabilization of the blade at all positions of the frame 7 with respect to the carriage 1 the blade *x* may be readily removed from the blade holder or inserted in the blade holder.

The cam path 50 at a position opposite to the cam surface 49 is provided with a guard surface 60, so that, if the movement of the carriers should be reversed when moving in the direction of the arrow B in Fig. 6, and while the blade is in the position b^4 at right angles to the center lines of the arms 9, 9, the projection 46, for example, will engage the guard surface 60 and turn the blade into the position indicated at b^2, to present the blade flatly to the stropping surface.

A similar guard surface 61 is provided in the cam path opposite to the cam surface 52, to prevent accidental rotation of the blade holder or to turn the blade holder and the blade from the position b^6 to the position b^5, should the direction of the carriage be reversed after the blade had passed through position b^6 and before the end 48 of the blade holder engaged the lateral cam surface 53.

The modified form of oscillating frame 7^a, shown in Figs. 11, 12 and 13 is adapted to be stamped out of a sheet of suitable metal and comprises a hollow drum $8a$ composed of end disc-like members 8^b from which the arm 9^a extends. The ends 8^b are integrally connected at 8^c to the cylindrical wall 8^d, the ends of which fit snugly in shouldered recesses 8^c formed in the edge of the end members 8^b, said end members being apertured as at 8^b to receive a suitable supporting shaft or trunnions to be journaled in the side walls of the carriage 1.

A flat spring 25^a in the present case, see Figs. 11 and 13, is adapted to bear against the flat faces of the blade holder 10^a to maintain the blade holder in predetermined relation to the frame 7^a.

The peripheral surface 33^a of the drum 8^a is adapted to ride the stropping surface *w* to provide the necessary traction for oscillating the frame 7^a upon reciprocatory movement of the carriage.

The stropping surface, as shown in Figs. 1, 3 and 4, comprises in the present instance a series of diagonally extending strips 70 of stropping material, such as prepared leather, mounted rigidly on a suitable base 71 and presenting diagonal upstanding edges 72, 72 adapted, as the carriage 1 is reciprocated substantially parallel to the side edges 73, 73 of the strop, to engage the face bent over portions along the edge of the blade being stropped to move these small displaced particles along the cutting edge back into alignment with each other, which is the sharpening effect obtained by stropping. The upstanding edges 72 tend to realign the fine displaced portions of the blade edge more rapidly than stropping on a full uninterrupted stropping surface.

If desired, means may be provided for maintaining operative contact between the stropping surface 70 and the surface of the drum 8 of the oscillating frame 7, such means in one form, as shown in Figs. 1 and 2 of the drawing, comprising merely a spring wire having portions 90, 90 which extend transversely across the base 2 of the main frame 1 between the ends of the end walls 5—6 and the finger grips 3—4, the spring also including depending portions 91, 91 which pass downwardly beyond the side edges 73, 73 of the strop which connect at their lower ends with inwardly extending portions 92, 92 which in turn are connected at their inner ends to longitudinally extending portions 93, 93, such portions bearing against the underside 74 of the base 71 and exerting a downward pressure of the main frame 1 and drum 8 against the stropping surface *w*.

The modified blade holder 10^a, as illustrated in Fig. 14, consists of a plate 100 which is integrally mounted at its opposite ends respectively in blocks 101 and 102, said blocks being substantially square in cross section for cooperation with the head 27 of the spring-loaded plunger which is carried by the oscillating frame 7 and as for the purposes described above.

Extending outwardly in opposite directions from the blocks 101 and 102 respectively are trunnions 23^a, 23^a which are adapted to be mounted in the arms 9, 9 of the frame 7. The trunnions 23^a are grooved for the reception of the levers 45 and 57 as noted above in regard to the form of blade holder shown in Fig. 9.

Projecting upwardly from the plate 100 at points spaced inwardly from the inner ends 103 and 104 of the blocks 101 and 102 respectively are projections 105 and 106 which constitute shoulders 107 and 108 which are adapted to extend into the slot *s* of the blades *x* and to be engaged by the ends s^1 and s^2 of the slot *s* for preventing longitudinal movement of the blade *x* with respect to the blade holder 10^a.

Transverse displacement of the blade *x* with respect to the holder 10^a is prevented by tongues 109 and 110 which project upwardly from the plate 100 and fit snugly into the slot *s* in the blade *x*.

Perpendicular displacement of the blade *x* relative to the holder 10^a is prevented by lips 111 and 112 which extend laterally from the ends of the tongues 109 and 110 respectively. The lips 111 and 112 extend beyond the side edges of the slot *s* and the blade *x* and are adapted to bear on the upper surface of the blade to hold the under surface thereof flatly against the upper surface of the plate 100.

For simplicity of construction, the tongues 109 and 110, the lips 111 and 112 and the projections 105 and 106 are struck up from the plate 100 by any suitable stamping process.

In order to apply the blade to the holder 10^a the blade is flexed longitudinally and introduced to the holder in such a manner that the lips 111—111 will pass through openings s^3, s^3 which extend laterally from the slot *s* in the manner illustrated in Fig. 10. The end x^5 of the blade will then rest on top of the projection 105 and

tongue 109 will project into the slot s. The blade is then moved longitudinally, bringing the end s^1 of the slot s under the free end of the tongue 109. When in this position the transversely extending openings s^4, s^4 of the blade x are in a position to receive the lips 112, 112 of the tongue 110. The blade is then pressed down until these lips 112 pass through the openings s^4, whereupon the blade is moved in an opposite direction until the end s^1 of the slot s snaps over the projection 105 into engagement with the shoulder 107. The opposite end of the blade will then snap down into position with the end s^2 of the slot s bearing against the shoulder 108 on the projection 106. When in this position the lips 111 and 112 are disposed inwardly from the openings s^3 and s^4 respectively and overlie the portions of the blade immediately adjacent the slot s, whereupon the said lips will prevent perpendicular displacement of the blade, the tongues 109 and 110 will prevent lateral displacement of the blade and the shoulders 107 and 108 will prevent longitudinal displacement of the blade with respect to the holder 10^a.

If desired, the projections 105 and 106 may be dispensed with and the blocks 101 and 102 may be extended inwardly until the ends 103 and 104 thereof are spaced apart a distance substantially equal to the length of the blade x, whereupon longitudinal displacement of the blade would be prevented by the ends x^9 and x^{10} of the blade bearing against the shoulders formed by the ends 103 and 104 of the blocks 101 and 102 respectively.

I claim:

1. A stropping device for double-edged razor blades, comprising a carriage adapted for reciprocatory movement relative to a stropping surface, a frame pivotally mounted in said carriage, a blade holder rotatably mounted in said frame, friction means carried by the frame and riding the stropping surface for rocking the frame relative to the carriage, resilient means operatively connecting the frame to the carriage for maintaining constant predetermined uniform pressure of the friction means on the stropping surface during reciprocation of the carriage, and a stop adapted to engage the blade at one side of the pivot of the blade holder during rocking of the frame to turn the blade and blade holder in the frame to apply one edge of the blade to the stropping surface under constant uniform pressure.

2. A stropping device for double-edged razor blades, comprising a carriage adapted for reciprocatory movement relative to a stropping surface, a frame pivotally mounted in said carriage, a blade holder rotatably mounted in said frame, friction means riding the stropping surface to rock the frame in the carriage, and a stop on said carriage for engaging the blade at one side of the pivot of the blade holder to turn the blade holder in the frame and apply and maintain the edge of the blade at the opposite side of the blade holder pivot at a constant predetermined angle to the stropping surface.

3. A stropping device, for double-edged razor blades, comprising a carriage adapted for reciprocatory movement relative to a stropping surface, a frame pivotally mounted in said carriage, a blade holder rotatably mounted in said frame, means for resiliently maintaining the blade holder and a blade carried thereby in a predetermined position with respect to said frame, a stop on said carriage adapted to engage said blade to support the blade with one edge thereof in operative relation to said stropping surface, and traction means riding said stropping surface and operatively connected with said frame for effecting relative rotation between the carriage and the frame and between the blade and said frame to press said blade edge into contact with said stropping surface.

4. A stropping device, for double-edged razor blades, comprising a carriage adapted for reciprocatory movement relative to a stropping surface, a frame pivotally mounted in said carriage, a blade holder rotatably mounted in said frame, means for resiliently maintaining the blade holder and a blade carried thereby in a predetermined position with respect to said frame, a stop on said carriage adapted to engage said blade to support the blade with one edge thereof in operative relation to said stropping surface, traction means riding said stropping surface and operatively connected with said frame for effecting relative rotation between the carriage and the frame and between the blade and said frame to press said blade edge into contact with said stropping surface, and means for resiliently pressing said traction means into contact with the stropping surface to effect uniform pressure of the blade edge against the stropping surface.

5. A stropping device, for double-edged razor blades, comprising a carriage adapted for reciprocatory movement relative to a stropping surface, a frame pivotally mounted in said carriage and having a cylindrical traction surface adapted to ride said stropping surface to effect rotation of the frame relative to the carriage, a blade holder rotatably mounted in said frame, means for resiliently maintaining the blade holder and a blade carried thereby in a fixed predetermined position relative to the frame, and a stop on said carriage adapted to engage the blade at one side of the blade holder pivot to turn the blade holder relative to the frame upon rotation of the frame relative to the carriage to press one edge of said blade into contact with the stropping surface.

6. A stropping device, for double-edged razor blades, comprising a carriage adapted for reciprocatory movement relative to a stropping surface, a frame pivotally mounted in said carriage and having a cylindrical traction surface adapted to ride said stropping surface to effect rotation of the frame relative to the carriage, a blade holder rotatably mounted in said frame, means for resiliently maintaining the blade holder and a blade carried thereby in a fixed predetermined position relative to the frame, a stop on said carriage adapted to engage the blade at one side of the blade holder pivot to turn the blade holder relative to the frame upon rotation of the frame relative to the carriage to press one edge of said blade into contact with the stropping surface, and resilient means operatively connecting the frame to the carriage for effecting resilient contact under substantially uniform pressure of the said traction surface of the frame with the stropping surface.

7. A stropping device, for double-edged razor blades, comprising a carriage adapted for reciprocatory movement relative to a stropping surface, a frame pivotally mounted in said carriage and having a cylindrical traction surface adapted to ride said stropping surface, a blade holder rotatably mounted in said frame, means carried by said frame for resiliently maintaining

the blade holder and the blade carried thereby in a predetermined position relative to the axis of the frame, and a stop at each side of said frame axis beyond the path of movement of the blade holder and adapted to engage the blade respectively upon relative rotation between the frame and the carriage in opposite directions to turn the blade holder relative to the frame to press one edge of the blade into contact with the stropping surface.

8. A stropping device, for double-edged razor blades, comprising a carriage adapted for reciprocatory movement relative to a stropping surface, a frame pivotally mounted in and adapted for oscillatory movement with respect to said carriage upon relative movement between the carriage and the stropping surface, a blade holder rotatably mounted in said frame, a cam follower carried by the blade holder, a cam carried by the carriage and extending through substantially the full angle of pivotal movement of the frame and including a follower actuating portion engaged by the said cam follower for turning the blade holder and the blade to a fixed predetermined position relative to the frame during one portion of a relative pivotal movement between the frame and the carriage, and a dwell portion engaged by the follower for maintaining the blade and blade holder in said fixed relation to the frame during another portion of the pivotal movement between the frame and the carriage.

9. A stropping device, for double-edged razor blades, comprising a carriage adapted for reciprocatory movement relative to a stropping surface, a frame pivotally mounted in and adapted for oscillatory movement with respect to said carriage upon relative movement between the carriage and the stropping surface, a blade holder rotatably mounted in said frame, a cam follower carried by the blade holder, a cam carried by the carriage and adapted to be engaged by the said cam follower for turning the blade holder and the blade relative to the frame upon relative pivotal movement in one direction between the frame and the carriage, and means for disengaging the cam follower from the cam for permitting relative pivotal movement of the frame in an opposite direction with respect to the carriage without effecting rotation of the blade holder with respect to the frame.

10. A stropping device, for double-edged razor blades, comprising a carriage adapted for reciprocatory movement relative to a stropping surface, a frame pivotally mounted in and adapted for oscillatory movement with respect to said carriage upon relative movement between the carriage and the stropping surface, a blade holder rotatably mounted in said frame, a cam follower carried by the blade holder, a cam carried by the carriage and adapted to include a follower actuating portion engaged by the said cam follower for turning the blade holder and the blade to a fixed predetermined position relative to the frame upon relative pivotal movement in one direction between the frame and the carriage, and a dwell portion engaged by the follower for maintaining the blade and blade holder in said fixed relation to the frame during another portion of the pivotal movement between the frame and the carriage, and means for maintaining positive operative engagement between the cam follower and the cam during substantially the whole of the said pivotal movement of the frame in said direction relative to the carriage.

11. A stropping device, for double-edged razor blades, comprising a carriage adapted for reciprocatory movement relative to a stropping surface, a frame pivotally mounted in and adapted for oscillatory movement with respect to said carriage upon relative movement between the carriage and the stropping surface, a blade holder rotatably mounted in said frame, a cam follower carried by the blade holder, a cam carried by the carriage and adapted to be engaged by the said cam follower for turning the blade holder and the blade relative to the frame upon relative pivotal movement in one direction between the frame and the carriage, means for disengaging the cam follower from the cam for permitting relative pivotal movement of the frame in an opposite direction with respect to the carriage without effecting rotation of the blade holder with respect to the frame, and means for positively maintaining said non-rotatable relation between the blade holder and the oscillating frame during the last said movement of the frame relative to the carriage.

12. A stropping device, for double-edged razor blades, comprising a carriage adapted for reciprocatory movement relative to a stropping surface, a frame pivotally mounted in and adapted for oscillatory movement with respect to said carriage upon relative movement between the carriage and the stropping surface, a blade holder rotatably mounted in said frame, a cam follower carried by the blade holder, a cam carried by the carriage and adapted to be engaged by the said cam follower for turning the blade holder and the blade relative to the frame upon relative pivotal movement in one direction between the frame and the carriage, means for disengaging the cam follower from the cam for permitting relative pivotal movement of the frame in an opposite direction with respect to the carriage without effecting rotation of the blade holder with respect to the frame, means for positively maintaining said non-rotatable relation between the blade holder and the oscillating frame during the last said movement of the frame relative to the carriage, and means for effecting re-engagement of the cam follower and the cam at the end of the last said relative movement between the frame and the carriage.

13. A stropping device, for double-edged razor blades, comprising a carriage adapted for reciprocatory movement with respect to a stropping surface, said carriage comprising a bottom, the underside of which is adapted to ride on said stropping surface, said bottom having an opening therein, side walls extending upwardly from said bottom at opposite sides of said opening respectively, a blade-carrying frame having trunnions mounted for pivotal movement in upwardly extending bearing slots formed in said side walls respectively, an arcuate traction surface on said frame normally extending through said opening beyond the said under surface of the carriage for engagement with the stropping surface, and resilient means between the frame and the carriage for applying a uniform pressure of the traction surface of the frame on the stropping surface when said carriage is pressed downwardly on said stropping surface causing the said traction surface of the frame to recede to the plane of the said under surface of the carriage bottom.

14. A stropping device, for a double-edged razor blade, comprising a carriage, a frame pivoted in

the carriage, a blade holder rotatably and slidably mounted in the frame, a cam extending longitudinally of the carriage adjacent one end of the blade holder, a cam follower on the blade holder adapted to engage the cam for turning the blade holder relative to the frame, a laterally extending cam on the carriage adapted to shift the blade holder laterally of the frame for releasing the cam follower from the cam surface, a lever on the opposite end of the blade holder, a guide for said lever extending longitudinally of the carriage adjacent the last said end of the blade holder to prevent turning of the blade holder, and a second laterally extending cam on said carriage to shift the blade holder in an opposite direction to release the said lever from said guide.

15. A stropping device, for a double-edged razor blade, comprising a carriage, a frame pivoted in the carriage, a blade holder rotatably and slidably mounted in the frame, a cam extending longitudinally of the carriage adjacent one end of the blade holder, a cam follower on the blade holder adapted to engage the cam for turning the blade holder relative to the frame, means for holding said cam follower in operative relation to the said cam surface, a laterally extending cam on the carriage adapted to shift the blade holder laterally of the frame for releasing the cam follower from the cam surface, a lever on the opposite end of the blade holder, a guide for said lever extending longitudinally of the carriage adjacent the last said end of the blade holder to prevent turning of the blade holder, means for maintaining the said lever in operative relation to the guide, and a second laterally extending cam on said carriage to shift the blade holder in an opposite direction to release the said lever from said guide.

16. A stropping device, for a double-edged razor blade, comprising a carriage, a frame pivoted in said carriage, a blade holder rotatably mounted in said frame, means resiliently holding the blade holder in a position with the blade in substantially radial relation to the axis of the frame at each end of an oscillatory movement of the frame relative to the carriage, a cam surface adjacent one end of the blade holder and extending longitudinally of the carriage, a cam follower on said end of said blade holder and adapted to engage said cam surface and turn the blade holder substantially ninety degrees from its said position in said frame, and a second cam surface extending longitudinally of the carriage and adapted to be engaged by the said cam follower for continuing the turning of the said blade holder a second ninety degrees to move said blade holder to its first said position with the blade turned edge for edge relative to the frame, as the frame swings longitudinally of the carriage.

17. A stropping device, for a double-edged razor blade, comprising a carriage, a frame pivoted in said carriage, a blade holder rotatably and slidably mounted in said frame, a cam surface adjacent one end of the blade holder and extending longitudinally of the carriage, a cam follower on said end of said blade holder and adapted to engage said cam surface and turn the blade holder substantially ninety degrees in said frame, and a second cam surface extending longitudinally of the carriage and adapted to be engaged by the said cam follower for continuing the turning of the said blade holder a second ninety degrees relative to the frame, a guide adjacent the opposite end of the blade holder and extending longitudinally of the carriage and adapted to hold the blade holder against lateral sliding movement relative to the frame, as the frame swings longitudinally of the carriage.

18. A stropping device, for a double-edged razor blade, comprising a carriage, a frame pivoted in said carriage, a blade holder rotatably mounted in said frame, a cam surface adjacent one end of the blade holder and extending longitudinally of the carriage, a cam follower on said end of said blade holder and adapted to engage said cam surface and turn the blade holder substantially ninety degrees in said frame, a second cam surface extending longitudinally of the carriage and adapted to be engaged by the said cam follower for continuing the turning of the said blade holder a second ninety degrees relative to the frame, as the frame swings longitudinally of the carriage, and a laterally extending cam on the carriage adapted to shift the blade holder laterally of the frame to move the cam follower out of co-operative relation with respect to said longitudinally extending cam surfaces.

19. A stropping device, for a double-edged razor blade, comprising a carriage, a frame pivoted in said carriage, a blade holder rotatably mounted in said frame, a cam surface adjacent one end of the blade holder and extending longitudinally of the carriage, a cam follower on said end of said blade holder and adapted to engage said cam surface and turn the blade holder substantially ninety degrees in said frame, a second cam surface extending longitudinally of the carriage and adapted to be engaged by the said cam follower for continuing the turning of the said blade holder a second ninety degrees relative to the frame, and a guiding surface intermediate and connecting said longitudinally extending cam surfaces and adapted to be engaged by said cam follower to maintain control of the blade holder, as the frame swings longitudinally of the carriage.

20. In a stropping device for a double-edged razor blade, a blade holder having flat faces substantially angularly arranged with respect to each other cross-sectionally of the holder, a frame in which the blade holder is rotatably mounted, and a resilient element adapted to bear against any one of said flat faces to maintain the blade holder resiliently in a fixed predetermined position with respect to the frame.

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