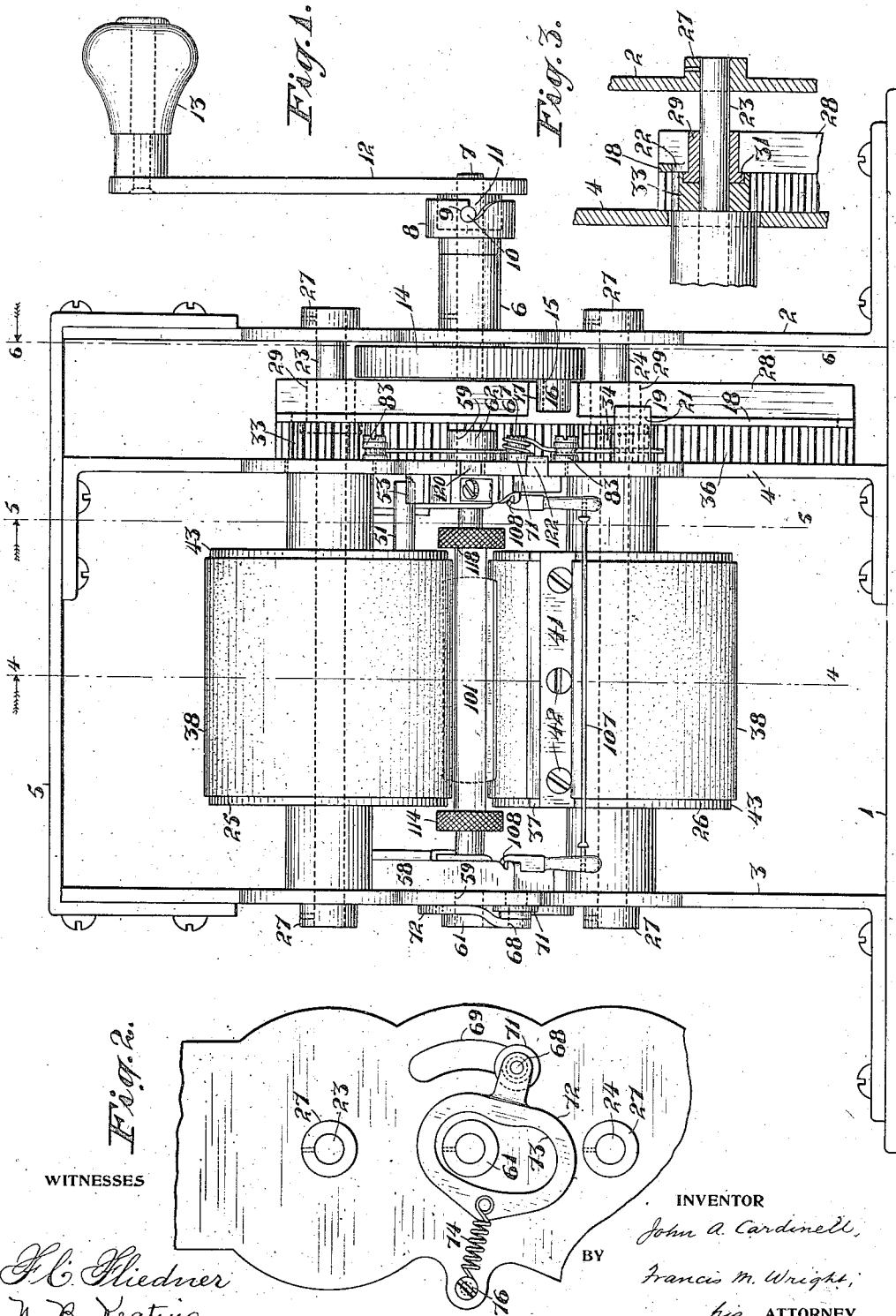


J. A. CARDINELL.
MACHINE FOR SHARPENING RAZOR BLADES.
APPLICATION FILED NOV. 4, 1912.

1,064,885.

Patented June 17, 1913.

4 SHEETS—SHEET 1.



WITNESSES

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4 SHEETS—SHEET 2.

Fig. 6.

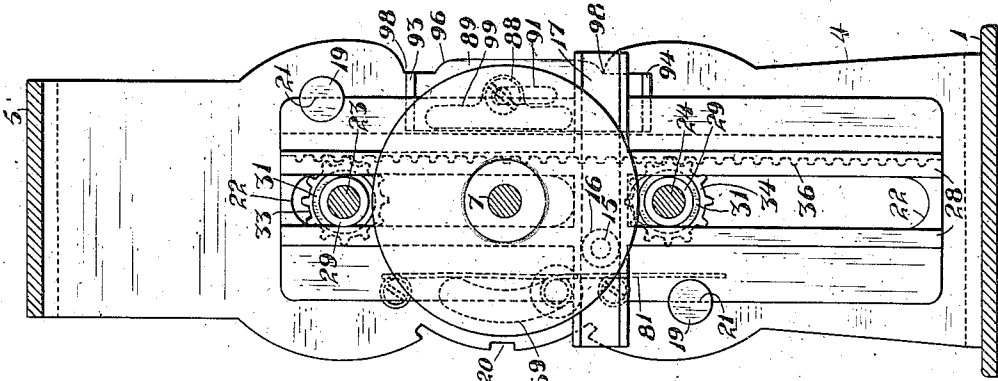


Fig. 5.

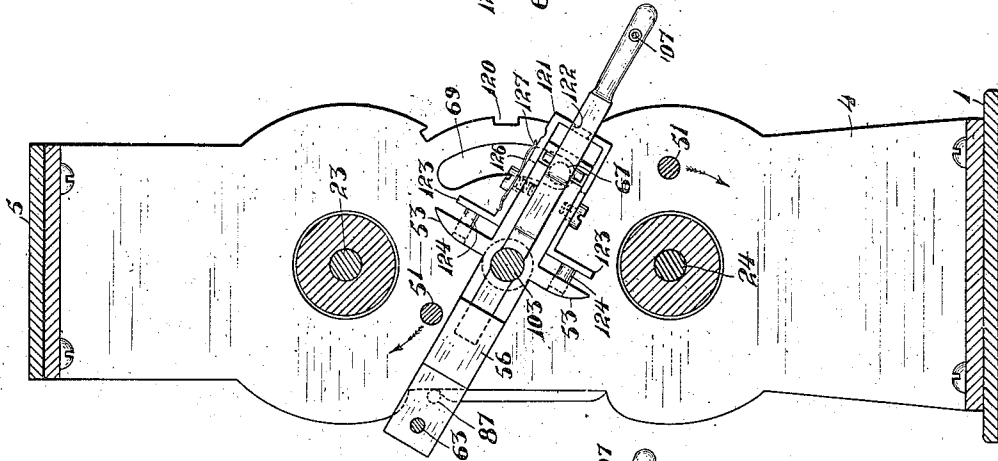
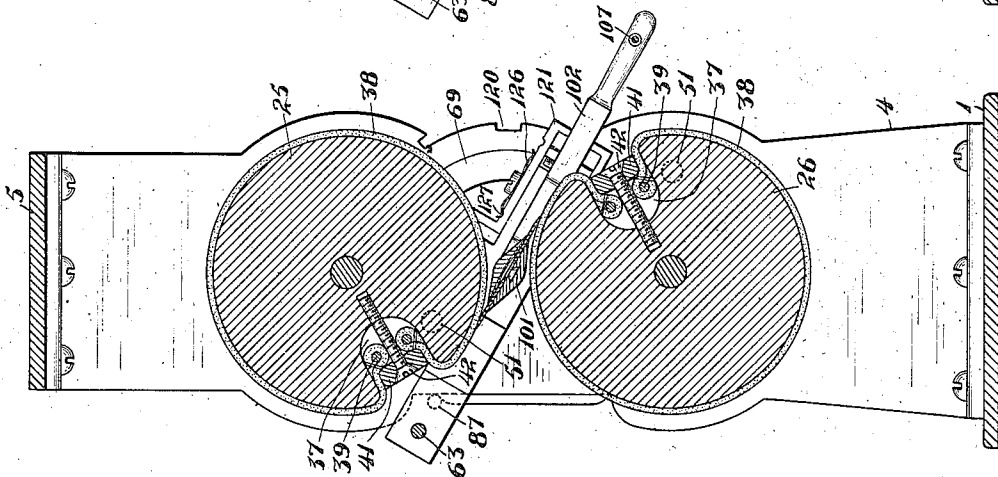


Fig. 4.



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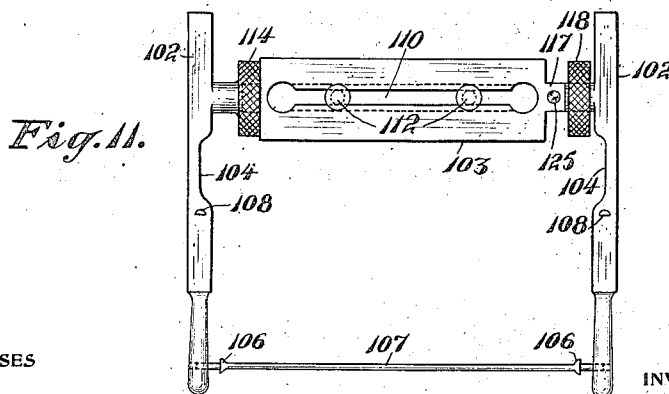
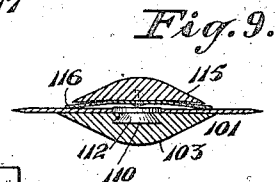
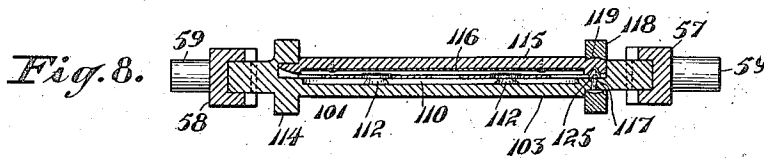
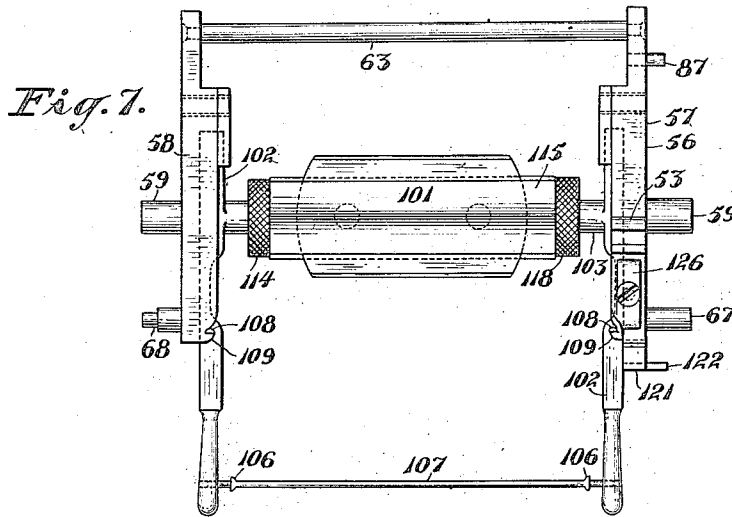
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4 SHEETS-SHEET 3.



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4 SHEETS-SHEET 4.

Fig. 14.

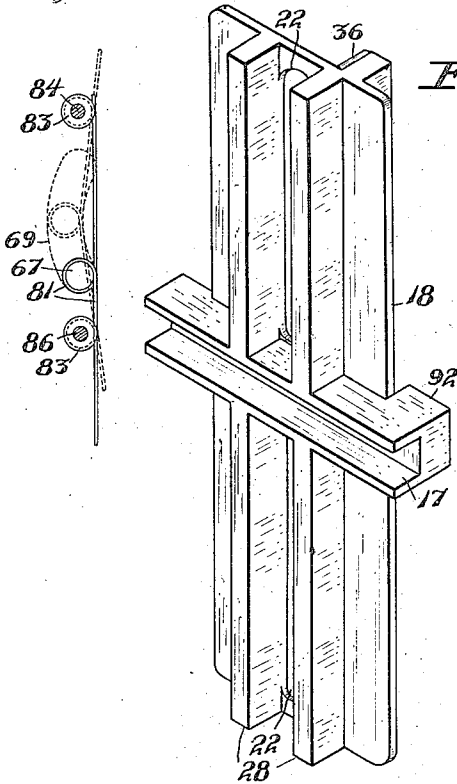


Fig. 12.

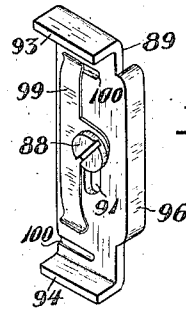


Fig. 13.

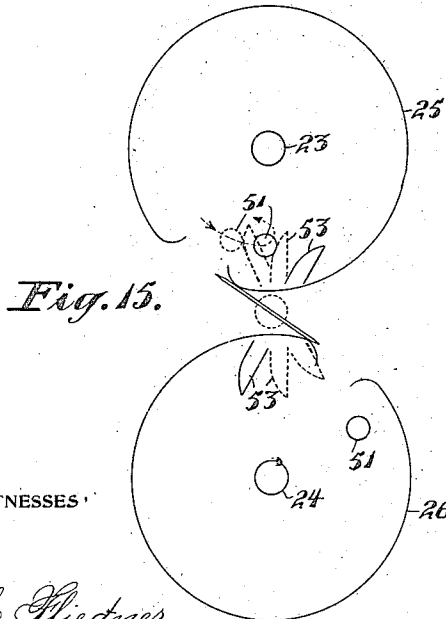


Fig. 15.

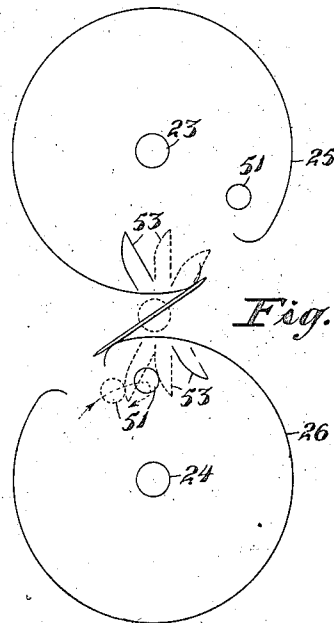


Fig. 16.

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UNITED STATES PATENT OFFICE.

JOHN A. CARDINELL, OF SAN FRANCISCO, CALIFORNIA.

MACHINE FOR SHARPENING RAZOR-BLADES.

1,064,885.

Specification of Letters Patent.

Patented June 17, 1913.

Application filed November 4, 1912. Serial No. 729,213.

To all whom it may concern:

Be it known that I, JOHN A. CARDINELL, a citizen of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented new and useful Improvements in Machines for Sharpening Razor-Blades, of which the following is a specification.

One object of the present invention is to provide a machine for sharpening a razor blade which will sharpen opposite sides of its cutting edge alternately, and in very rapid alternations automatically; also one adapted to sharpen a blade having two cutting edges, and by which both edges of the blade will be sharpened at the same time, first on one side, and then on the other side by which this result can be obtained by the continuous rotation of an operating shaft; in which, if the operating shaft is turned in the wrong direction, the machine will not be actuated; in which it will be impossible for either cutting edge of the blade to be brought into contact with the sharpening means, except under proper conditions for sharpening the blade thereon, so that it will be impossible for said blade to cut said sharpening means or to be injured thereby; also having convenient means for holding the blade while being sharpened, and from which it may be readily removed; also having means insuring that the blade will be held accurately in the proper position for being sharpened; also in which the blade will be held adjustably, thereby enabling irregular wear upon the sharpening surfaces to be avoided; also one which is capable of holding and sharpening blades of safety razors of nearly all makes; also having improved means for pressing the edge of the blade firmly against the sharpening means.

In the accompanying drawing, Figure 1 is a front view of my improved machine; Fig. 2 is a broken end view thereof; Fig. 3 is a detail sectional view; Figs. 4, 5 and 6 are vertical sectional views on the line 4—4, 5—5, and 6—6 respectively of Fig. 1; Fig. 7 is a plan view of the blade-holding frame detached; Fig. 8 is a sectional view thereof; Fig. 9 is a detail cross-section of the blade-holder; Fig. 10 is a detail sectional view of a clamping plate and spring; Fig. 11 is a plan view of the blade holder detached; Fig.

12 is a perspective view of the rack-carrying plate, detached; Fig. 13 is a similar view of a slide; Fig. 14 is a detail side view of a double-acting spring; Figs. 15 and 16 are diagrammatic end views showing the relative positions of the rolls and blade.

Referring to the drawing, 1 indicates a base, suitably apertured to permit of its attachment to a table or other support, upon which base are erected two outer vertical plates 2, 3, and an inner vertical plate 4, connected to a top plate 5, connected at its ends to the outer vertical plates 2, 3. Secured to the outer vertical plate 2 and extending outwardly therefrom is a bearing 6 for an operating shaft 7, upon which is secured a sleeve 8 spaced from the shaft at its outer end, and formed in its cylindrical surface and extending obliquely inward from its spaced end with diametrically opposite recesses 9, which recesses are adapted to receive pins 10 extending radially outward from a hub 11 secured, if the machine be intended to be operated by hand, to the inner end of a crank arm 12, the outer end of which is pivotally attached to a handle 13. By this arrangement the shaft can, by means of said handle, be turned in one direction only, for, if the handle be rotated in the opposite direction, the pins move outwardly from the oblique recesses, and can no longer engage said recesses.

If power is to be employed for operating the machine, the power is applied, in any suitable way to the hub 11. On said shaft 7, at the inner side of said outer plate 2, is secured a disk 14, on the face of which, near its periphery, is secured an outwardly extending pin 15 carrying a roller 16, which moves between, and engages, the walls of a horizontal groove 17 formed on a vertical plate 18, so that said shaft, by its rotation, imparts a vertical reciprocation to said plate 18. Said plate is guided in its vertical movement partly by pins 19, extending outwardly from the vertical plate 4, and formed with grooves 21 engaging opposite edges of the plate 18. Said plate 18 is formed with two vertical slots 22, through which can pass shafts 23, 24, of upper and lower rolls 25, 26, hereinafter more particularly described, said shafts rotating in bearings 27, secured to the outer sides of the plates 2 and

3. Upon the outer side of said plate 18 and above and below said groove 17, are secured vertical walls 28, which form guideways in vertical alinement with each other, the inner surfaces of said walls engaging rollers 29, on the shafts 23, 24. Said rollers 29 have flanges 31, which engage the inner side of the plate 18, and are received within circular depressions formed on the outer sides of pinions 33, secured to said shafts 23, 24. On the inner side of said vertical plate 18 is formed a rack 36 having teeth engaging said pinions 33, 34, whereby from the reciprocation of the rack an oscillating motion is imparted to the rolls 25, 26. Said rolls 25, 26, are formed each with a deep longitudinal groove 37 in its circumference, the upper edges of the grooves being rounded. Leather strops 38 are secured on said rolls each having its ends secured around wires 39. Each strop is stretched over its roll, so that its ends containing the wires extend into the longitudinal groove 37. Between the ends of the leather strop that are inserted in the groove a plate 41, having rounded inner edges, is pressed down so that its bottom and inner edges rest against the terminal portions of the strop, and said plate is then secured to the roll by screws 42, thereby pressing the ends of the strop deeply into the groove and drawing it tight around the roll. The roll is formed with flanges 43, which engage the edges of the strop to prevent lateral movement on the roll, but do not extend to the surface of the strop, so that the blade placed in the holder can be adjusted longitudinally of the roll, thus avoiding the wearing of a groove in the strop, and permitting the strop to be worn evenly throughout its surface by the sharpening of the blade thereon.

From the same ends of both rolls extend arms 51, in a direction parallel to the axes of said rolls, which arms are adapted alternately to engage outstanding arms 53 of the inner right-hand side of an oscillating blade-holder frame 56. Said frame comprises two holder guides 57, 58, having outwardly extending shafts 59 rocking in bearings 61, 62, secured on the outer sides of the vertical plates 3 and 4 respectively. These bearings are exactly in the center between the rolls carrying the strops. The guides are firmly connected at the rear ends only by a bar 63, so that the whole frame will move at the same time in a true circular arc, and the action of the hereinafter described springs 74, 81 will be imparted uniformly to the frame. The bar is located sufficiently far from the center of the frame that, when the frame is oscillated in a circular arc, the bar will not interfere with, or strike, the rolls.

The ends of the arms 53 extending from the guide 57, against which abut the arms

51, extending from the rolls, as before mentioned, are convexly curved, in order that the action of the arms 51 on the arms 53 shall take place as near as possible to the vertical plane through the axes of the rolls and frame, thereby reducing friction, as illustrated in Figs. 14 and 15, and these arms when moved past the center of their arc of oscillation are forced to its ends by springs 74, 81. Extending outwardly, or at right angles thereto, from the free ends of the guides 57, 58, are pins 67, 68, which extend through arcuate slots 69, formed in the plates 3 and 4, and carry, outside said plates, collars 71.

The pin 68 which extends outwardly from the guide 58 passes through an aperture in one end of a link 72, formed with an opening 73 sufficiently large that the bearing 61 does not prevent the free oscillation of the link, the other end of said link being attached to one end of a coiled spring 74, of which the other end is attached to a screw 76 screwed in the outer side of the plate 3. Since the arcuate slot 69 is in a circle described about the center of the bearing 61, the distance of the center of said slot from said screw 76 is greater than the distance of either end. Consequently the tendency of the said spring is to pull the pin 68 to the nearest end of the arcuate slot when it has passed the center.

On account of the rack and pinions at the other end of the blade-holder frame it is not possible to adopt this construction at said end for obtaining a double-acting spring tension. I therefore adopt the following construction. Around the pin 67 which passes through the other arcuate slot 69 is secured a wire spring 81 having outwardly extending arms which are normally straight. Said arms are, however, drawn back so as to be under tension, and are passed behind grooved rollers 83 on upper and lower studs 84, 86, extending outwardly from the inner plate 4. These studs are located in such positions, relative to the ends of said arcuate slots 69, that said spring arms are under greater tension when the pin 67 is at the middle of the slot than when it is at either end of the slot. Consequently said spring acts like the spring 74 to quickly move the stud to the nearest end of the arcuate slot when it has passed its center. These springs 74, 81, also act to press the blade tightly on the strop.

It will be observed that the arms 51 extend from the rolls in such position that each operates upon an arm 53 at the time when the rolls have nearly completed an oscillation, and the rack has nearly completed a reciprocation, the oscillation of the blade-holder frame being completed just about the time that the rolls are at rest before beginning the return movement of oscillation.

By this oscillating movement of the blade-holder frame, the blade is moved into a position in which its opposite edges extend slightly into the grooves in the two rolls as shown in Figs. 15 and 16. Upon the return oscillatory movement of the rolls, the edges of the blade move out of said groove and engage the abrading surface of the rolls, as the rolls move thereunder.

I provide the following means for controlling the travel of the blade holder frame, and preventing the blade coming in contact with the wrong stop. On the outer side of the vertical plate 4, and near the rear edge thereof, there is secured, by a screw 88 screwed in said vertical plate 4, a vertically reciprocable slide 89, the screw passing through a vertical slot 91 in said slide. The front vertical edge of said slide moves against the rear vertical face of the rack. It is reciprocated vertically, with the vertical reciprocation of the rack, by a lug 92, extending inwardly from the rack-carrying plate 18, which lug engages alternately upper and lower outwardly bent ends 93, 94, of the slide. This vertical movement of the slide is intermittent, and takes place only at the end of each vertical movement of the rack. A rear portion 96 of said slide is bent inwardly, at right angles to the main portion, and moves over the rear edge of said vertical plate 4. The inwardly bent portion 96 is not of the full length of the main portion, but its ends are spaced from the top and bottom respectively of the main portion of the slide a distance equal to the extent of movement of the slide. The rear end of the vertical plate 4 is cut away to form upper and lower recesses 98, which, in the reciprocation of the slide, are alternately closed, and opened by the rear bent portions thereof. Into these recesses alternately, a pin 87, extending toward the crank arm from the rear portion of the guide 57, is moved, in the oscillating movement of the holder frame, provided that the recess is open at the time when said pin arrives thereat. But if such recess is closed by the inwardly bent portion 96 of the slide plate, then the pin, on approaching said recess, instead of entering the recess, abuts against the upper or lower end, as the case may be, of the bent portion 96 of the slide. In that case, the holder frame does not oscillate to its full extent, and the blade does not come in contact with the stop. But in the ordinary operation of the device, the slide will, by the vertical reciprocation of the rack plate, move vertically to open said recess just before the pin 87 arrives thereat, so that said pin 87 can enter the recess and the blade contact with the roll. This slide is, in its upper or lower position to which it has been moved by the rack

plate, retained by means of a flat spring 99, through which the screw 88 also passes, the ends of which spring are bent inwardly, or toward the slide, and have a spring pressure against said slide, and enter alternately grooves 100 formed in the upper and lower terminal portions of the slide adjacent to its bent end. The pressure of either end of the spring in the corresponding groove in the slide is sufficient to retain the slide against displacement unless moved by a greater force of the lug 92.

101 indicates the blade holder, which is formed with two side pieces 102, which can slide with a snug fit in the grooves of the holder frame, and a connecting piece 103 integrally connecting said pieces 102, and at the same time forming one clamping member for the blade. Said side pieces 102 are cut away, as shown at 104, to render them sufficiently resilient and capable of being pressed inward toward each other, this inward movement being limited by thickened portions or bosses 106 formed on a thin rod 107, the ends of which enter apertures at the front portion of the blade holder, said bosses abutting against the inner ends of said apertures when said side pieces 102 are pressed inward toward each other, the ends of the rods then sliding in said apertures. Pins 108 extend from said side pieces in a direction perpendicular to the plane of the blade holder, the outer portions of the rear sides of said pins being inclined or beveled, so that, when said blade holder is pushed rearwardly into place, the slide pieces 102 sliding in the grooves in the holder frame, their just before the ends of said slide pieces 102 arrive at the ends of said grooves, said inclined portions of the pins engage beveled surfaces 109 on the inner sides of the front ends of the guides 57 of the holder frame, so that, in the continued advance of the blade holder, the slide pieces are pressed inward, or toward one another, to permit said pins 108 to pass said inclined surfaces 109. Immediately behind said inclined surfaces 109, the guides 57 of the holder frame are formed with recesses into which the pins 108 immediately move outward from the resilient force of the compressed side pieces of the holder. These are so located that, when the pins are in place in said recesses, the ends of the side pieces of the holder abut against the ends of the groove in the holder frame.

The connecting piece 103 is formed with a central wide shallow groove 110 having undercut beveled edges, and enlarged at both ends, so that slide pins 112, having conical heads to engage said undercut sides of the groove, can be inserted in the groove. These pins can be moved to any position in said groove so as to adapt them to enter

holes formed in the razor blade to be sharpened. The different makes of blades are formed with holes in different positions and of different sizes. By the above construction pins of different sizes can be moved into different positions, and thus the holder can be used with nearly all the standard makes of safety razor blades. Formed integral with said connecting piece is a ring 114 having a milled edge, formed with a concavity to receive the reduced end of a clamp piece 115 having riveted thereto a spring plate 116 which rests upon the blade and tightly grips the same, the other reduced end of said clamp piece registering with a correspondingly reduced portion 117 of said connecting piece, on which connecting piece can slide a collar 118 also having a milled edge, which collar is formed centrally with a cavity 119 to receive said reduced portions of the connecting piece and the clamp piece, and thus to clamp them tightly together. To prevent accidental displacement the cavity is slightly enlarged at its central portion. Extending above the surface of the connecting piece and secured therein is a guide pin 123 which enters a conical recess formed in the under surface of the clamping piece and guides the latter to its proper position on the connecting piece.

Immediately before the withdrawal of the blade holder from the holder frame, it is desirable that the blade holder should be in position with both edges of the blade out of contact with the strops. To retain it in this position the front edge of the plate 4 is formed with a notch 120, and there is slidably secured to the adjacent side of the guide 57 a yoke 121, from the middle portion of which extends outward a lug 122 of proper size to fit in said notch. When the blade holder has been moved by hand to a central position between two strops, then the operator pushes inward said yoke upon said guide 57, so that the lug engages said notch, and retains the holder frame in the position desired. The holder can then be withdrawn from the frame by pressing inward its side pieces until the pins are withdrawn from their recesses. To avoid the necessity of having to withdraw by hand the lug from the notch, when the blade holder has been replaced and it is desired to operate the machine, said yoke is formed with outward extensions 123 parallel with the arms 53 in the ends of which extensions are pins 124 extending through apertures in the corresponding ends of the arms 53, and in such positions that the arms 51 abut against the projecting ends of said pins 124, and press said pins inwardly, thereby moving also the yoke 121 forwardly, and removing the lug 122 from the notch 120, so that said blade holder frame is free to

oscillate. In order to prevent accidental movement of the yoke there is provided a flat spring 126 having an inwardly bent end 127 pressed into one or the other of two grooves or notches formed in the yoke 121, said spring being pressed downward by a screw 129 passing through a hole in the spring and a slot in the yoke and screwed into the side of the adjacent guide 57.

It will be evident that the above machine, a proper blade holder being used, may be employed for sharpening a razor blade having only one cutting edge, one side of the cutting edge being abraded by one roll, and the other by the other roll, although it is most advantageously used on a blade having two cutting edges, because then it operates on both cutting edges at the same time. It is to be observed that, since the pressure against both cutting edges is of equal magnitude but in opposite directions there is no tendency to displace transversely the blade from the central position between the two rolls.

I claim:—

1. The combination of a rack, means for reciprocating the rack, two rolls, means for oscillating the rolls with the reciprocation of the rack, abrading material around the rolls, a blade-carrying frame movably mounted on an axis parallel with the rolls and midway between them, means operated with the reciprocation of the rack and the corresponding oscillation of the rolls for oscillating said frame into one or the other of two positions in which opposite sides of the two edges of the blade are moved into contact with said abrading material thereon, and means for pressing said opposite sides toward the two rolls respectively.

2. The combination of parallel rolls having cylindrical abrading surfaces, a shaft, operative connections from the shaft to the rolls, whereby the latter are oscillated from a continuous rotation of the former, a blade-holding frame mounted to oscillate between said rolls, means for oscillating said frame at each oscillation of said rolls, and means for removably holding a blade in said frame.

3. The combination of parallel rolls having cylindrical abrading surfaces, means for oscillating said rolls, a blade-holding frame mounted to oscillate between said rolls, means for oscillating said frame at each oscillation of said rolls, means for removably holding a blade in said frame, and a double-acting spring arranged to press the blade in either terminal position of said oscillation toward the surface of the adjacent roll.

4. The combination of parallel rolls having cylindrical abrading surfaces, a shaft, operative connections from the shaft to the rolls, whereby the latter are oscillated from

a continuous rotation of the former, a blade-holding frame mounted to oscillate between said rolls, means for oscillating said frame at each oscillation of said rolls, means for
 5 removably holding a blade in said frame, and means for pressing the blade in either terminal position of said oscillation against the surface of its adjacent roll.

5. The combination of parallel rolls having cylindrical abrading surfaces, means for
 10 oscillating said rolls, a blade-holding frame mounted to oscillate between said rolls, means for oscillating said frame at each oscillation of said rolls, means for removably
 15 holding a blade in said frame, and springs acting on opposite sides of the blade-holding frame and arranged by the pressure upon said frame to press said blade in either terminal position of the oscillation of
 20 the frame toward the adjacent roll.

6. The combination of parallel rolls having cylindrical abrading surfaces, means for oscillating said rolls, a blade-holding frame mounted to oscillate between said rolls,
 25 means for oscillating said frame, means for removably holding a blade in said frame, and means for pressing the blade against said rolls alternately, comprising stationary pins, grooved rollers thereon, a pin secured
 30 to the frame and oscillating therewith, and a spring secured to said latter pin and having arms in the grooves of the respective rollers.

7. The combination of parallel rolls having cylindrical abrading surfaces, means for
 35 oscillating said rolls, a blade-holding frame mounted to oscillate between said rolls, said frame comprising means for guiding a blade holder, a blade-holder guided by said guid-
 40 ing means, means for limiting the movement of the blade holder so guided, and automatic means for locking the blade holder when so limited.

8. The combination of parallel rolls having cylindrical abrading surfaces, and hav-
 45 ing arms extending therefrom, means for oscillating said rolls, and a blade-holding frame mounted to oscillate between said rolls, and having arms extending therefrom
 50 adapted to be actuated by the arms extending from the rolls to oscillate the frame from one position to the other.

9. The combination of parallel rolls having cylindrical abrading surfaces, and hav-
 55 ing arms extending therefrom, operative connections from the shaft to the rolls, whereby the latter are oscillated from a continuous rotation of the former, a blade-
 60 holding frame mounted to oscillate between said rolls, and having arms extending therefrom adapted to be oscillated by the arms extending from the rolls, and a double-acting spring for assisting the latter oscillation.

10. The combination of parallel rolls hav- 65
 ing cylindrical abrading surfaces, and having arms extending therefrom, means for oscillating said rolls, and a blade-holding
 frame mounted to oscillate between said rolls, and having arms extending therefrom 70
 having convexly curved surfaces adapted to be engaged by the arms extending from the rolls to oscillate the same from one position to the other.

11. The combination of parallel rolls hav- 75
 ing cylindrical abrading surfaces, means for oscillating said rolls, a blade-holding frame mounted to oscillate between said rolls, means for oscillating said frame with the
 oscillation of said rolls, means for prevent- 80
 ing the frame moving to the extreme end of its oscillatory movement, and means for withdrawing said preventive means at the
 end of each oscillation of the rolls.

12. The combination of parallel rolls hav- 85
 ing cylindrical abrading surfaces, and having arms extending therefrom, means for oscillating said rolls, a blade-holding frame mounted to oscillate between said rolls, and
 having arms extending therefrom adapted 90
 to be oscillated by the first-named arms, a slide piece arranged to obstruct said arms of the frame in its oscillation to prevent
 complete oscillation thereof, and means 95
 movable with the rolls and adapted to engage said slide piece at the ends only of the oscillatory movement of the rolls to with-
 draw said slide piece from the path of said arms.

13. The combination of parallel rolls hav- 100
 ing cylindrical abrading surfaces, means for oscillating said rolls, a blade-holding frame mounted to oscillate between said rolls, means for oscillating said frame with the
 oscillation of said rolls, means for support- 105
 ing said blade-holding frame in a mediate position of its oscillation, and means actuated in the oscillation of the rolls for withdrawing said supporting means.

14. The combination of a plate having a 110
 notch, parallel rolls having cylindrical abrading surfaces, means for oscillating said rolls, a blade-holding frame mounted to oscillate between said rolls, means for oscillat-
 ing said frame with the oscillation of said 115
 rolls, a movable yoke on said frame having a lug arranged to extend into said notch, and having pins extending through aper-
 tures in said frame in position to be actu-
 ated by said oscillating means to withdraw 120
 the lug from the notch.

15. The combination of a plate having a notch, parallel rolls having cylindrical
 abrading surfaces, and having arms extend-
 ing therefrom, means for oscillating said 125
 rolls, a blade-holding frame mounted to oscillate between said rolls, and having arms extending therefrom adapted to be oscil-

lated by the arms extending from the rolls,
a movable yoke on said frame having a lug
arranged to extend into said notch, and hav-
ing pins extending through apertures in the
5 arms of said frame in such position that the
arms of the rolls impinge upon said pins
and withdraw the lug from the notch.

In testimony whereof I have hereunto set
my hand in the presence of two subscribing
witnesses.

JOHN A. CARDINELL.

Witnesses:

F. M. WRIGHT,
D. B. RICHARDS.