R. T. WINN.

APPARATUS FOR SHARPENING BLADES.

APPLICATION FILED MAY 14, 1910.

985,088.

Patented Feb. 21, 1911.

Fig: 1.

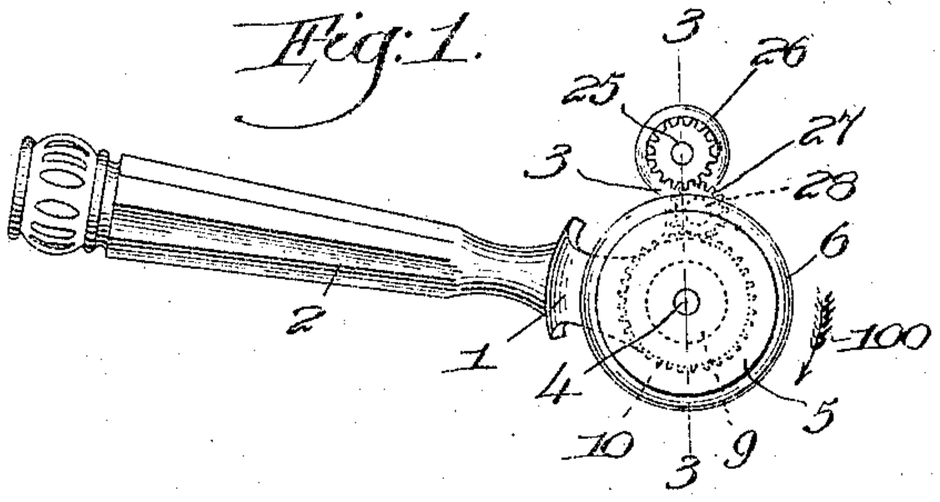

Fig: 9.

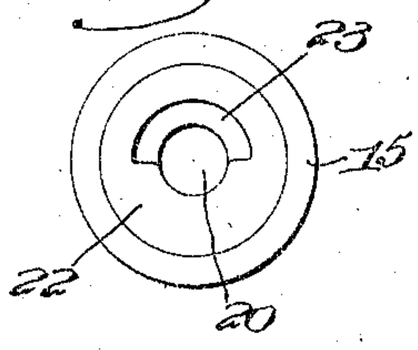

Fig: 10.

Fig: 2.

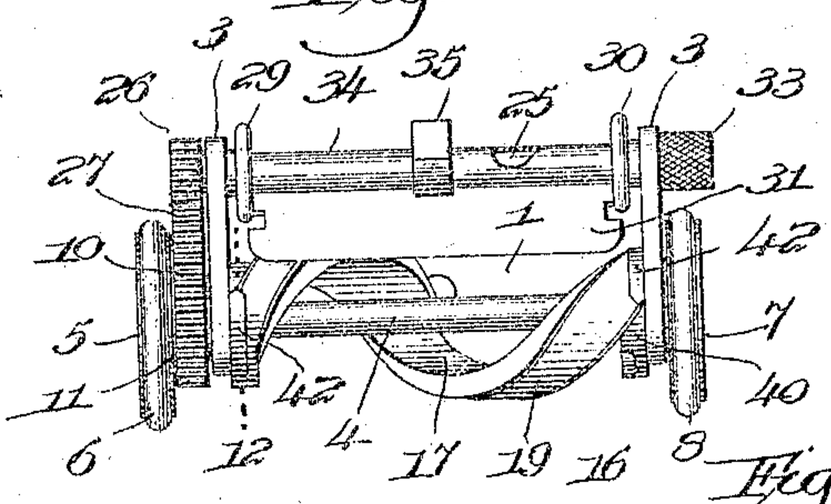

Fig: 13.

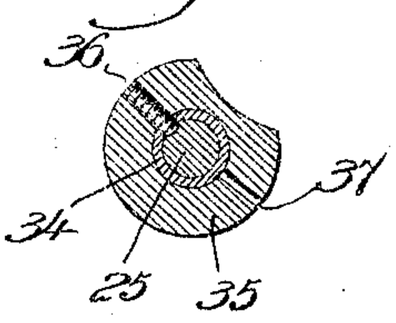

Fig: 3.

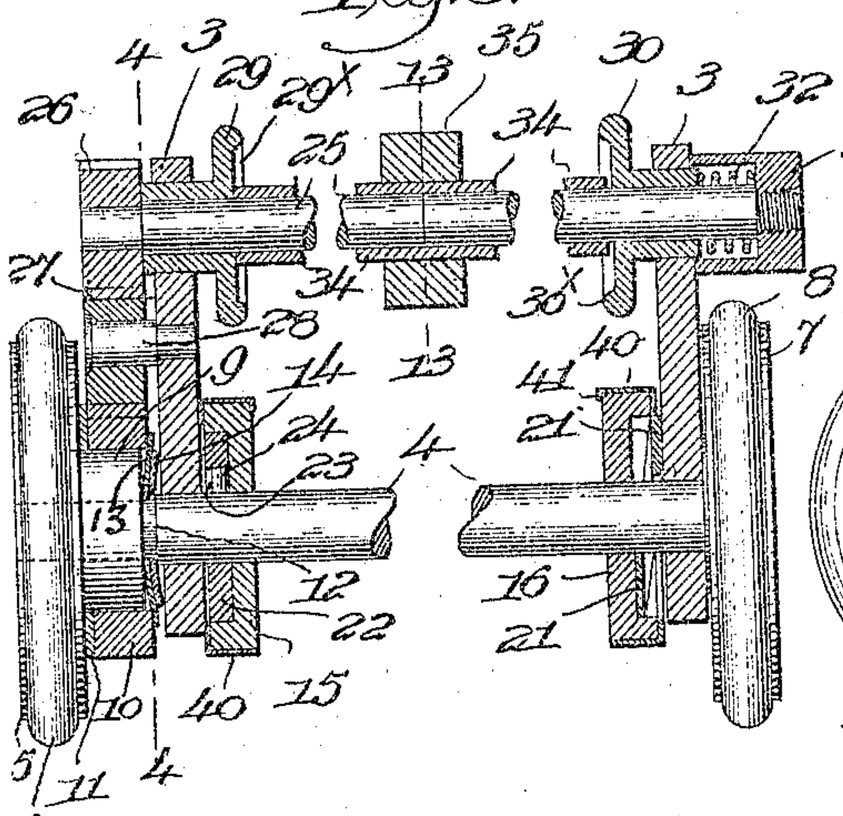

Fig: 11.

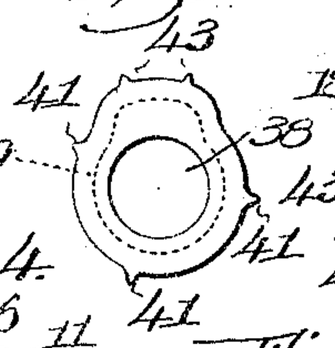

Fig: 12.

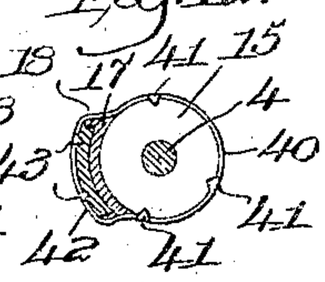

Fig: 4.

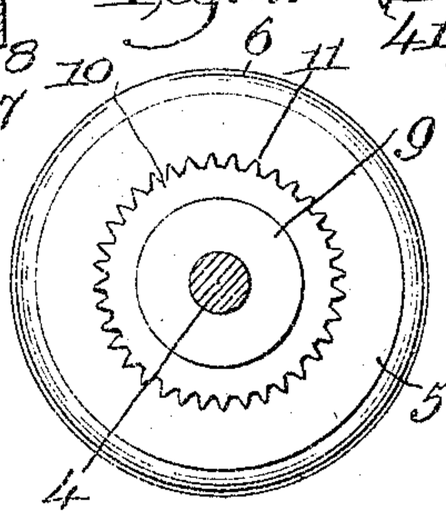

Fig: 5.

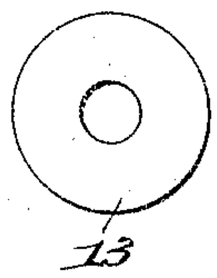

Fig: 6.

Fig: 7.

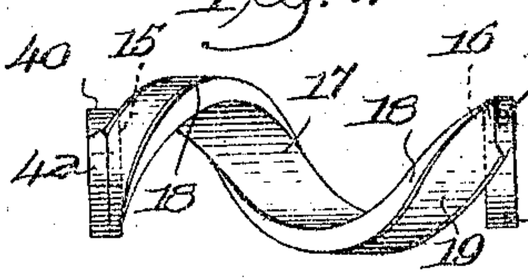

Fig: 8.

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by Mosby Gregory.
Attys.

UNITED STATES PATENT OFFICE.

RICHARD T. WINN, OF CLIFTONDALE, MASSACHUSETTS, ASSIGNOR TO LESLIE MANUFACTURING COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF MAINE.

APPARATUS FOR SHARPENING BLADES.

985,088.

Specification of Letters Patent. **Patented Feb. 21, 1911.**

Application filed May 14, 1910. Serial No. 561,274.

To all whom it may concern:

Be it known that I, RICHARD T. WINN, a citizen of the United States, and resident of Cliftondale, county of Essex, State of Massachusetts, have invented an Improvement in Apparatus for Sharpening Blades, of which the following description, in connection with the accompanying drawing, is a specification, like characters on the drawing representing like parts.

This invention relates to apparatus particularly designed for sharpening blades used in safety-razors, whereby such blades can be easily and properly honed, stropped, or otherwise sharpened, and my present invention has for its object the production of various novel features of construction and arrangement whereby the operation is improved and the cost of manufacture and assembling reduced.

The sharpening apparatus in which my present invention is embodied is of the type shown and described in United States Patent No. 908,470, granted January 5, 1909 to J. W. Leslie, wherein the sharpening surface is made as a rotatable cylindrical spiral, with means to rotate it first in one and then in the other direction, the blade being held in a suitable holder which automatically reverses the position of the blade to present the opposite faces thereof to the action of the sharpening surface.

In my present invention I have provided novel friction means between the blade-holder and the means for rotating the sharpening member, and I have also provided a novel and efficient support for such member. The lost motion connection between the sharpening member and the means for effecting its rotation has also been improved and simplified, as will be explained hereinafter.

The various novel features of my invention will be fully described in the subjoined specification and particularly pointed out in the following claims.

Figure 1 is a side elevation of a blade-sharpening apparatus embodying my present invention; Fig. 2 is a front view thereof, looking at Fig. 1 from the right hand, and partly broken out; Fig. 3 is an enlarged sectional detail centrally broken out, taken on the line 3—3, Fig. 1, looking toward the left, showing the friction connection between the blade-holder reversing means and the actuating means for the sharpening member, and also showing a portion of the lost-motion connection previously mentioned; Fig. 4 is a detail on the line 4—4, Fig. 3, looking toward the left, to be referred to; Figs. 5 and 6 are plan views of members of the friction connection, detached; Fig. 7 is a view in elevation of the novel support for the sharpening member; Fig. 8 is a cross-sectional view of such support and the sharpening member seated therein; Fig. 9 is an outer face view of one of the members of the lost-motion connection shown in section in Fig. 3; Fig. 10 is a separate edge view of the split annular spring or friction detent for preventing improper movement of the support for the sharpening member; Fig. 11 is a plan view of the blank from which is made one of the retaining caps for the sharpening member; Fig. 12 is a transverse sectional detail on the line 12, Fig. 2, looking toward the left, to be referred to; Fig. 13 is a cross-sectional detail through the center collar of the blade-holder, on the line 13, Fig. 3.

The frame 1 having an attached handle 2 and upturned, parallel sides 3, and the transverse shaft 4 rotatably mounted in the lower portions of the sides and having fixed to one of its projecting ends a disk-like carrier 5 provided with a tread 6 of leather, rubber or other suitable material, are in general substantially as in the Leslie patent referred to, and a similar carrier 7, having a tread 8, is fixedly secured to the end of the shaft 4 outside the other part 3 of the frame, as shown in Figs. 2 and 3.

As shown in Fig. 3 the carrier 5 has on its inner face a hub 9 on which is loosely mounted a large gear 10, and between the adjacent faces of the carrier and the gear is inserted a thin wearing washer 11, surrounding the hub and preferably made of soft steel, and by reference to Fig. 3 it will be seen that the inner face of the gear 10 projects beyond the end of the hub 9. The shaft 4 is reduced in diameter to leave an annular shoulder 12, outside the side portion 3 of the frame, and on the reduced part of the shaft between said shoulder and the contiguous end of the hub I mount a thin backing or friction disk 13, Fig. 5, and a star-shaped spring washer 14, made of spring steel. The friction disk 13, made of soft steel, rests against the inner face of the

gear 10, while the spring washer 14 rests against the shoulder 12 and between it and the friction disk, as shown in Fig. 3.

The parts described are made of such dimensions that when the carrier 5 is fixed on the shaft 4 the shoulder 12 flexes the spring 14 and the friction disk 13 and clamps them tightly between said shoulder and the end of the hub 9, to turn therewith, but the peripheral portion of the disk 13 bears frictionally against the inner face of the gear 10, thereby forming a friction connection between it and the shaft 4. Ordinarily this friction device or connection causes the gear to rotate in unison with the shaft and its fixedly attached parts, but when the rotative movement of the gear is arrested, as will be described, the friction connection permits the shaft to rotate while the gear is held from rotation.

The wearing washer 11 prevents undue wear between the gear 10 and carrier 5 when the former is held from rotation, and the resiliency of the washer-like spring 14 at all times acts to provide a firm frictional engagement between the gear 10 and the friction member or disk 13, as will be manifest.

By providing a large hub 9 for the gear 10 the latter is firmly supported and is held in proper position at all times, and it will be seen that the friction connection is operative at all times and is not interfered with or changed in its action by any slight longitudinal movement of the shaft 4 in its bearings in the frame sides 3. Owing to the small scale of Fig. 2 I have not attempted to indicate the parts of the friction connection, as the same is clearly shown in Fig. 3.

Between the sides 3 I mount loosely upon the shaft 4 two parallel and circular heads 15, 16 connected rigidly by a spiral bar 17 having its outer face channeled to leave parallel edge flanges 18, forming a spiral seat, in which is cemented or otherwise secured the sharpening member 19, said heads and the spiral bar connecting them constituting a skeleton support. The said bar 17 and sharpening member 19 are purposely omitted in Fig. 3 for the sake of clearness, such parts being fully shown in Figs. 2 and 7.

The sharpening member, which in practice presents a cylindrical, spiral surface, as will be apparent, may be relatively narrow strip of leather, treated canvas, or other suitable material, which will provide a sharpening surface, and it is made thick enough to project radially beyond the flanges 18, see Fig. 8, to prevent any contact of the edge of the blade therewith.

I have devised retaining caps which fit over the heads of the skeleton support, to secure the ends of the sharpening member in place, and such caps will be referred to hereinafter. Both heads are metal disks, centrally perforated, as at 20, Fig. 9, to receive loosely the shaft 4, and said heads are also circularly recessed on their outer faces, the recess in head 16 receiving a split and slightly twisted annular spring 21, Figs. 3 and 10, which surrounds shaft 4 and presses against the inner face of the adjacent side 3 of the frame. Said spring serves to press the skeleton support yieldingly toward the opposite side of the frame, and it also acts as a friction detent to prevent improper or accidental rotation of the skeleton support around the shaft.

The circular recess in the outer face of the head 15 has forced into it with a driving fit a flat disk 22, Figs. 3 and 9, provided with a segmental opening 23, into which enters a radial pin 24, Fig. 3, fixed in the shaft 4, so that a lost-motion connection is provided between said shaft and its attached carriers and the support for the sharpening member, the opening 23 being concentric with the center of the head 15, as shown clearly in Fig. 9, and being cut out to register with the aperture 20. As the disk 22 with its segmental opening 23 is died or stamped out of plate metal, and as the recessed heads 15 and 16 are made in like manner, the construction is very simple and inexpensive, the head 15 being completed by forcing into its circular recess the disk 22. Heretofore the recess for the pin on the shaft had to be cut with an end mill in a solid metal disk, the operation being slow, laborious and expensive, because of frequent breakage of the milling tool due to its small size. When the frame is moved bodily, with the carriers on a flat surface, said carriers and shaft will rotate in the direction of such bodily movement and when the pin 24 is at either end of the recess 23 the skeleton-support and the sharpening member 19 thereon will be rotated positively in unison with the shaft and carriers, and in the same direction.

Referring to Fig. 1, if bodily movement of the sharpening apparatus is to the right, the direction of rotation of the carriers, shaft and sharpening member will be as indicated by arrow 100, but if such movement of the frame be reversed the rotation of the carriers and the shaft 4 will be reversed, but the sharpening member will not be reversed and again rotated until the shaft has made substantially one-half revolution, and the pin 24 engages the opposite end of the segmental recess 23. Thus the sharpening member has a rest period each time bodily movement of the apparatus as a whole is reversed, as in the Leslie patent referred to, and herein the friction detent 21 acts during such rest period to prevent any accidental or premature rotation of the sharpening member. During the rest period of the said member the position of the blade to be sharpened is

changed or reversed, to present first one and then the other face of the blade to the action of the sharpening member.

The rocking blade-holder comprises blade-locking devices and a supporting shaft 25 rotatably mounted in the frame sides 3 above and parallel to shaft 4, shaft 25 having fast upon it a pinion 26 meshing with an intermediate pinion 27 rotatably mounted on a stud 28 extended laterally outward from the adjacent frame side 3, the intermediate pinion meshing with the gear 10, so that pinion 26 is rotated in the same direction as said gear, but at a higher speed, the gearing constituting reversing means for the blade-holder. If rotation of shaft 25 is arrested then the friction connection previously described between the gear 10 and the shaft 4 permits continued rotation of the said shaft, the hub 9 of the carrier 6 revolving within the gear, but when rotation of shaft 25 is not resisted it will be revolved when shaft 4 rotates, but more rapidly. The shaft has loosely mounted upon it two like but reversely positioned locking disks 29, 30, the elongated hubs thereof being rotatably extended through the frame sides 3, as shown in Fig. 3, the outer end of the hub of the disk 29 abutting against the pinion 26, and each disk is provided on its inner face with an annular, inturned lip or flange, said flanges being shown at $29^{\times}$, $30^{\times}$ in Fig. 3.

The flanges loosely enter notches in the ends of the blade 31, see Fig. 2, as in the Leslie patent referred to, the outer end of the hub of disk 30 bearing against a spring 32 coiled about the shaft 25 and inclosed within a chambered nut 33 tightly screwed onto the adjacent end of the shaft, so that the disk 30 may be moved outward away from the disk 29, to receive or release a blade. When the disk 30 is released the spring 32 forces it against the end of the blade, and the latter is locked in the holder between the two flanged disks, substantially as in the patent above referred to. A tube or sleeve 34 is slipped onto the shaft 25, one end abutting permanently against the inner face of disk 29, so that it cannot move longitudinally on the shaft, the other end of the tube being so positioned as to limit inward, spring-induced movement of the disk 30 and permit some looseness of the blade when locked in the holder. This tube obviates pinning the disk 29 to the shaft 25, and also obviates the use of a pin or other stop to limit inward movement of disk 30, thereby avoiding weakening the shaft, doing away with drilling operations and the fitting of small pins into the shaft, and materially reducing the cost of manufacture of this part of the apparatus. An intermediate collar 35 is fixedly held by a set-screw 36, Fig. 13, on the tube or sleeve 34 midway between the locking disks, the set-screw passing through a hole in the tube and being set up against the shaft 25, said collar having a radial slot or seat 37 therein for the back of the blade, and said seat is made wide enough to permit tipping of said blade when locked in the holder, as provided for in the Leslie patent, and for similar reasons, viz: to permit the blade to accommodate itself to the sharpening member. The parts of the blade-holder are very readily and quickly assembled, and the set-screw 36 serves the double purpose of holding the tube or sleeve tightly upon the shaft, and fixedly positioning the collar 35 on the tube, the construction and assembling costs being reduced materially by the arrangement shown.

When a blade is locked in the holder the operator grasps the handle 2 and rolls the apparatus back and forth upon a firm, flat surface. Initial rotation of the carriers 5 and 7 and shaft 4 acts through the gearing to position the blade-holder with the face of the blade adjacent its cutting edge against the surface of the sharpening member 19, and rotation of the latter and its traversing action along the edge of the blade sharpens the same accurately and with rapidity. When rotation of shaft 4 is reversed the sharpening member ceases to rotate but the friction connection between the shaft and the gearing causes the latter to be operated instantly to rock shaft 25 and reverse the blade-holder, the blade being swung upward and over the shaft and down upon the sharpening member at the opposite side of its axis of rotation. Blade reversal is effected before the lost-motion connection acts to effect rotation of the sharpening member with shaft 4 and in the same direction, so that it is impossible for the sharpening member to rotate toward the cutting edge of the blade. When the blade is brought against the sharpening surface the angular movement of the blade-holder is of course arrested, and then hub 9 revolves within the ring-like gear 10, the friction connection between the gear and shaft 4 acting through the reversing gearing to press the blade against the spiral surface of the sharpening member 19 as it is rotated. Inasmuch as said member projects radially beyond the spiral flanges 18 of the skeleton support it is impossible for the edge of the blade being sharpened to contact with such flanges at any time. The loose fit of the back of the blade in the radial seat 37 in the collar 35 permits the blade to adapt itself to the sharpening surface, as provided for in the Leslie patent.

I provide thin metal caps to fit over the heads 15 and 16 and retain the ends of the sharpening member securely in place, said caps being made from a substantially circular blank, Fig. 11, having a large central opening 38. The blank is shaped by suitable dies and upturned along the dotted line 39

to form a circular flange 40 which fits over the circumference of each head, the cap being held tightly thereon by prongs 41 bent over upon its inner face, Figs. 3 and 12. The enlarged part of the blank is bent to form a short segmental flange 42 which fits over the sharpening member 19 at its end, where it tapers, and prongs 43 on such flange are inturned and forced into such member, as shown in Fig. 12, holding it tightly within the inclosing part of the cap. That portion of the cap having the aperture 38 is located at the outer face of the head, the shaft 4 passing through the aperture, and the friction detent 21 in the recessed face of the head 16 extends through the aperture 38 of its cap. Said caps do away with pins or screws to fasten the ends of the sharpening member to the heads, which would otherwise be necessary owing to the tapered form of said member at each end of the spiral seat in the bar 17 of the skeleton support. The caps are readily made, and in assembling the parts they can be applied to the heads quickly and easily, thus reducing cost of construction while at the same time giving a desirable finish to the apparatus.

Various changes or modifications in different details of construction and arrangement may be made by those skilled in the art without departing from the spirit and scope of my invention as set forth in the claims annexed hereto.

Having fully described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. In a blade-sharpening device, a frame, a shaft rotatably mounted therein and having attached carriers, a skeleton support mounted loosely on and concentric with said shaft and provided with an external spiral seat, a sharpening member fixed in said seat, and a lost-motion connection between said skeleton support and the shaft, to rotate the former by and in unison with the latter after the rotation of the shaft in either direction has begun.

2. In a blade-sharpening device, a frame, a shaft rotatably mounted therein and having attached carriers, a skeleton support comprising circular heads rotatably mounted on the shaft and a spiral, externally-channeled bar rigidly connecting the heads, a sharpening member fixed in the channeled portion of the bar, and a positively acting lost-motion connection between one of the heads and the shaft, whereby said support remains at rest during a predetermined angular movement of the shaft after each change in the direction of rotation thereof.

3. In a blade-sharpening device, a frame, a shaft rotatably mounted therein and having attached carriers, a skeleton support mounted loosely on and concentric with said shaft and provided with an external spiral seat, a sharpening member fixed in said seat, a lost-motion connection between said support and the shaft, whereby the support remains at rest during a partial revolution of the shaft after each change in the direction of rotation thereof, and a friction detent cooperating with the support to restrain accidental rotation thereof during a rest period.

4. In a blade-sharpening device, a frame, a shaft rotatably mounted therein and having attached carriers, a skeleton support having an external spiral seat and circular heads through which the shaft is loosely extended, a sharpening member, fixed in said spiral seat, one of the heads having its outer face circularly recessed, a disk having a segmental opening, driven into the circular recess, and a radial pin on the shaft entering the recess formed by the segmental opening in the disk, to form a lost-motion connection between said support and the shaft.

5. In a blade-sharpening device, a frame, a shaft rotatably mounted therein and having attached carriers, a support loosely mounted on the shaft and having at one end a head provided with a circular recess in one face thereof, a sharpening member spirally arranged upon the support, a disk fitted tightly in the recess of said head and having a segmental opening, and a radial pin in the shaft entering the segmental opening of the disk, to form therewith a lost-motion connection between the shaft and support.

6. In a blade-sharpening device, a frame having upturned sides, a shaft rotatably mounted in and extended beyond the sides, carriers fixed on the extended ends of the shaft, one of the carriers having a hub on its inner face, an annular shoulder on the shaft opposite said hub, a gear rotatably mounted on the hub and projecting beyond is inner end, a friction disk and a spring washer clamped between the hub and the shoulder, said disk frictionally engaging the projecting portion of the gear and being pressed against it by the spring washer, to form a friction connection between the gear and the shaft, a blade-holder mounted in the frame, a pinion fast on said holder, an intermediate pinion meshing with the gear and with the pinion on the holder, to reverse the blade-holder when rotation of the shaft is reversed, and a sharpening member rotated by the shaft and adapted to act upon the face of a blade mounted in said holder.

7. In a blade-sharpening device, a frame, a shaft rotatably mounted therein, carriers on the shaft, a spiral sharpening member loosely mounted on the shaft, a lost-motion connection between said member and shaft, to rotate the latter, a rocking blade-holder carried by the frame, reversing gearing be-

tween said blade-holder and shaft, including a pinion fixedly attached to the holder and a gear concentric with the shaft, and a friction connection between said gear and shaft, to actuate the reversing gearing by rotation of the shaft when the holder is free to rock and permitting continued rotation of the shaft when the holder prevents rotation of the gear.

8. In a blade-sharpening device, a frame, a shaft rotatably mounted therein, carriers on the shaft, a spiral sharpening member loosely mounted on the shaft, a lost-motion connection between said member and shaft, to rotate the latter, a rocking blade-holder carried by the frame, reversing gearing between said blade-holder and shaft, including a gear loosely mounted on the shaft, and a friction connection between said gear and shaft, to rotate them in unison and operate the gearing to rock the blade-holder while permitting rotation of the shaft when the blade-holder prevents rotation of said gear.

9. In a blade-sharpening device, a frame, a shaft rotatably mounted therein, and having an annular shoulder near one end, carriers fast on the shaft, a hub on one of the carriers opposite the annular shoulder, a gear loose on the hub and projecting beyond its inner end, a friction disk and a spring washer clamped between said hub and shoulder, the disk being pressed by said spring washer against the projecting portion of the gear, to frictionally connect the latter with the shaft, a blade-holder, means actuated by rotation of the gear to reverse said holder, and a sharpening member rotated by said shaft and adapted to act upon first one and then the other face of a blade mounted in the holder.

10. In a blade-sharpening device, a frame, a blade-holder mounted to rock thereon, an actuating shaft rotated by bodily movement of the frame, reversing means for the blade-holder, including a gear loose on the shaft, and a friction connection between said gear and shaft, to operate said reversing means whenever the rotation of the shaft is reversed, said friction connection comprising a friction disk and a washer-like spring fast on the shaft, the disk being held in frictional engagement with the gear by said spring.

11. A support for the sharpening member of a razor-sharpening device, comprising a spirally twisted rigid bar having external and radially-extended flanges to form a spiral seat, and parallel, circular heads fixedly connected by said bar and centrally apertured.

12. A skeleton support comprising parallel circular heads, a spiral connecting member rigidly attached thereto and having parallel spiral flanges on its external face, to form a spiral seat, and a sharpening member fixed in the seat and extending beyond the tops of said flanges.

13. In a device for sharpening blades, a frame having parallel sides, a shaft rotatably mounted therein and having fixedly attached carriers thereon outside the frame, a skeleton support loosely mounted on the shaft between the sides, a spiral sharpening member fixed on said support, a yielding detent interposed between one side of the frame and the adjacent end of the support, to prevent accidental rotation and longitudinal movement of the support on the shaft, a lost-motion connection between the latter and the support, a blade-holder carried by the frame, reversing means for said holder, and a friction connection between said means and the shaft, to effect reversal of the position of the blade-holder when the rotation of said shaft is reversed.

14. A support comprising parallel, circular heads, a bar rigidly connecting them and having an external, spiral seat, a sharpening member mounted in the seat, and retaining caps having flanges to embrace the heads and engaging the ends of the sharpening member, to retain the same in place.

15. A support comprising parallel, circular heads, a spiral bar rigidly connecting them and having an external seat, a sharpening member fixed in the seat and retaining caps mounted on the heads, each cap having a portion thereof overhanging and fixedly engaging the adjacent end of the sharpening member to retain it securely in the seat.

16. A support comprising parallel, circular heads, a spiral bar rigidly connecting them and having an external seat, a sharpening member fixed in the seat, and retaining caps mounted on the heads, each cap having a segmental flange overlapping the adjacent end of the sharpening member and provided with inturned prongs entering the same.

17. A support comprising parallel, circular heads, a spiral bar rigidly connecting them and having an external seat, a sharpening member fixed in the seat, and circularly flanged retaining caps tightly fitting over the heads, each cap having a pronged portion overlapping the adjacent end of the sharpening member, with the prongs inturned to penetrate said member.

18. In a device of the class described, a blade-holder comprising a rocking shaft, opposed locking disks thereon to engage the ends of a blade and retain it in the holder, a sleeve on the shaft between said disks, a central collar on the sleeve, having a radial seat to receive loosely the back of the blade, and a set-screw in said collar fixedly con-

necting it with the sleeve and passing through the latter to bear upon the shaft and thereby secure the sleeve upon the shaft.

19. In a device of the class described, a blade-holder comprising a rocking shaft, opposed locking disks having outwardly extended hubs loose on the shaft, a pinion fixed on one end of the shaft adjacent the outer end of one of said hubs, a chambered nut fixed on the other end of the shaft, to receive the other hub, a spring within the nut acting against said hub, a sleeve fixed on the shaft between the disks, to limit spring-induced inward movement of one disk and to position the other disk with its hub against the pinion and a collar on the shaft between said disks, having a radial seat for the back of the blade.

20. In a device of the class described, a blade-holder comprising a rocking shaft, a locking disk mounted loosely on said shaft, means to limit outward movement of said disk, an opposed, spring-controlled locking disk longitudinally movable on the shaft, to engage the ends of a blade and retain it in the holder, a sleeve on the shaft between said disks, to limit inward movement of the spring-controlled disk, and to prevent inward movement of the other disk, whereby the latter is fixed in position on the shaft, a collar on the sleeve between said disks and having a radial seat to receive the back of the blade, and means common to both the collar and the sleeve to hold them in fixed position on the shaft.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

RICHARD T. WINN.

Witnesses:
JOHN C. EDWARDS,
FREDERICK S. GREENLEAF.