March 10, 1931. A. GIRTANNER 1,796,096

HONING APPARATUS AND METHOD

Filed Oct. 8, 1929

FIG. 1.

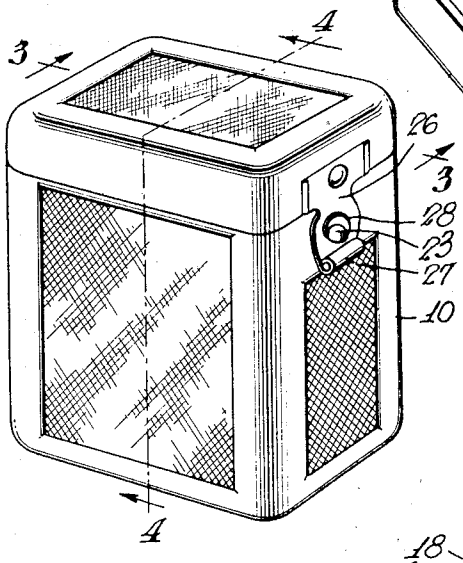


FIG. 2.

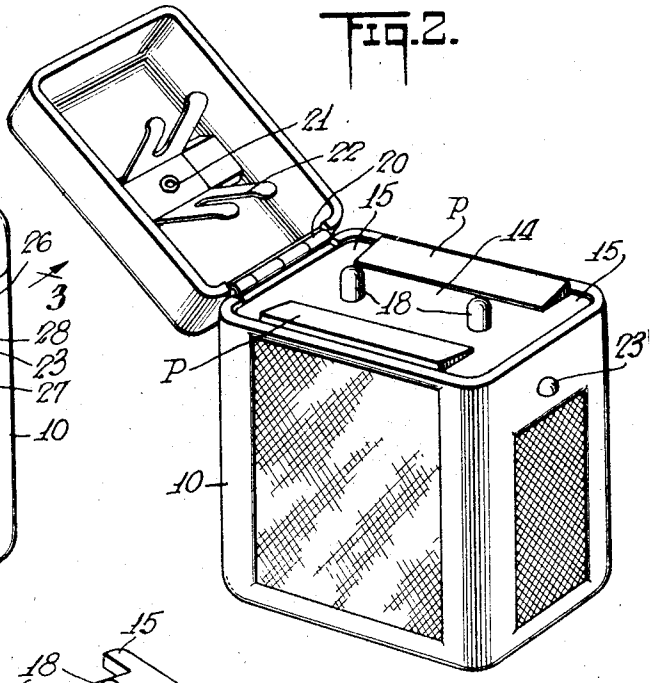


FIG. 5.

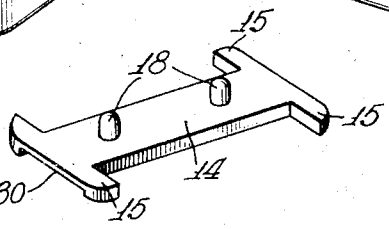


FIG. 3.

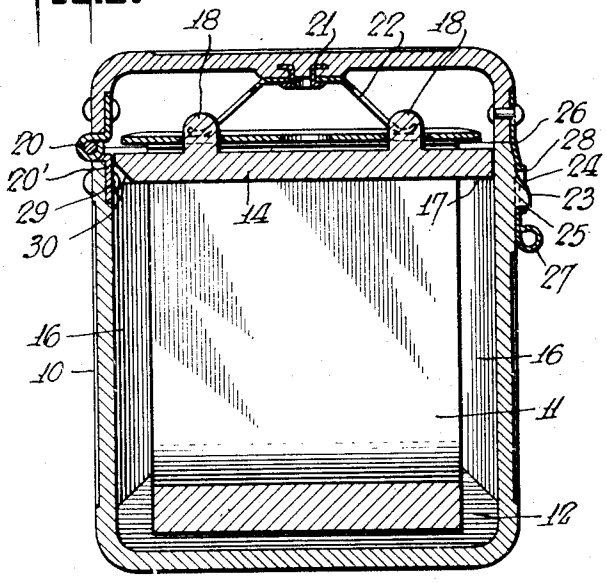


FIG. 4.

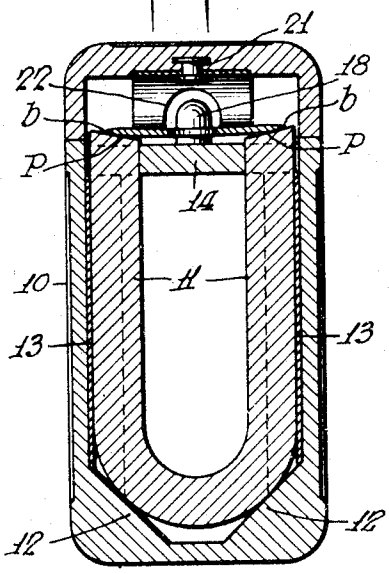
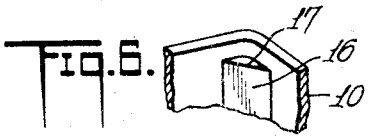


FIG. 6.



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A-212

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UNITED STATES PATENT OFFICE

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HONING APPARATUS AND METHOD

Application filed October 8, 1929. Serial No. 398,131.

The present invention relates to methods for honing ferrous blades by magnetic attraction and to apparatus for the purpose, and though primarily designed for honing safety razor blades, the invention is applicable also for keeping in, or restoring to condition other types of sharp steel cutting blades such as those of surgical instruments.

An object is to provide a magnetic hone of extremely simple, inexpensive and compact construction, which is self-contained, and the use of which requires no skill.

Another object is to provide a method of honing which requires no mechanical operation other than mere placement of the blade, obviating the need for any time consuming more or less noisy manual abrading or stroking action.

As conducive to a clear understanding of the invention, it is noted that the use of a blade such as that of a safety razor causes the cutting edge to be slit, and minute tongues or teeth to be bent out therefrom. Honing consists in restoring the teeth to the common plane as in the new blade.

According to the invention, the hone comprises magnetic pole pieces or ends of opposite polarity so related that the blade to be conditioned is bridged as an armature across the pole ends and in direct engagement therewith, the unedged area of the blade being maintained out of engagement with the corresponding pole piece or pieces.

The magnetic poles are preferably those of a permanent horse shoe magnet, each pole of width substantially equal to the length of the cutting edge.

The device preferably includes means for accurately positioning the blade with respect to the magnet poles, and for securely retaining the blade in position for effective application of the magnetic force to the cutting edges. The positioning means may coact with the holes or other parts of the blade, that serve to secure the latter in the razor or other handle or holder therefor.

In the honing operation it is preferred mechanically to press the blade so that its edge or edges engage the respective poles of the magnet thereby more effectively to cause honing or aligning action. Preferably the blade is thereupon removed and the operation repeated with the reverse side of the blade toward the poles.

The magnet is preferably enclosed in a case having a cover preferably hinged, with a leaf spring therein, to exert the pressure upon the blade, while in operative honing position within the closed case and the unedged surface of the blade preferably rests against a bridging piece between the magnet poles.

This application is a continuation in part of my copending applications Serial No. 143,173, filed October 31, 1926, and Serial No. 293,868, filed July 19, 1928, any and all claims generic to the disclosures of said prior applications being included in the present case.

In the accompanying drawings in which are shown one or more of various possible embodiments of the several features of the invention,

Fig. 1 is a perspective view showing the device in closed condition,

Fig. 2 is a perspective view showing the device open,

Fig. 3 is a longitudinal sectional view on line 3—3 of Fig. 1,

Fig. 4 is a longitudinal sectional view through the width of the case taken on line 4—4 of Fig. 1,

Fig. 5 is a perspective view of the bridge piece, and

Fig. 6 is a fragmentary view of a detail.

In the accompanying drawings is shown a case 10 preferably of non-magnetic material such as molded phenol condensation product. This case has securely mounted therein a permanent horse shoe magnet 11 of special shape to be described below. The case is molded with reinforcing fillets 12 at its bottom between which the reduced rounded end of the magnet fits within the case. The case is of interior width but little greater than the width of the magnet, which is maintained in place therein, preferably by the use of two cardboard sheets 13 both sides of each of which are coated with cement, and snugly clamped between the legs of the magnet and the corresponding sides of the case.

The hone shown in an embodiment suitable for blades of the Gillette razor type has pole ends P of length equal to the length of the cutting edges of the blade. The outer edges of the poles are separated by a distance greater than the width of the blade and the inner edges by a distance less than the width of the blade so that the cutting edges of a blade, and preferably the entire lengths thereof may be disposed in direct engagement with the respective poles. The magnet as shown is bent from flat steel stock about one fourth inch thick and 1½ inches wide. The pole ends P of the magnet preferably lie substantially flush with the rim and are somewhat shorter than the width of the corresponding side of the case 10.

A bridge piece 14 of non-magnetic material preferably also phenol condensation product is lodged in the space between the poles P of the magnet and has integral ears 15 straddling the edges of the respective magnet pole ends, thereby to close that portion of the mouth or open end of the case which is not occupied by the two pole ends. Preferably the case is formed with longitudinal fillets 16 extending along the respective vertical edges thereof, the upper ends of which fillets form stops or shoulders 17 supporting the respective ears 15 of the bridge piece and positioning the same, interposed dabs of cement permanently securing said bridge piece ears to the shoulders. While the magnet is securely cemented with respect to the walls of the case the bridge piece also serves as a mechanical stop to prevent ready movement of the magnet within the case. The bridge piece has a pair of upstanding studs 18 preferably molded as an integral part thereof, to extend through the corresponding apertures of the blade for positioning the same with respect to the magnet poles.

The case has a flanged cover 19 hinged at 20 to the edge of the case. The heads of rivets 29 that attach hinge plate 20′ to the case, clear the end of the bridge piece 14 which is beveled at 30 for that purpose. To the middle of the cover is riveted at 21 the middle of a leaf spring 22 the bifurcated free ends of which exert pressure upon the razor blade when the cover is closed.

The forward edge of the case is molded preferably with a latch lug 23 which is rounded at its upper face as at 24 and forms a shoulder 25 at its lower edge which is laterally rounded as shown. The cover has riveted thereto a spring metal finger piece 26 with a coiled lower edge 27 and an aperture 28 adjacent thereto adapted to snap over the latch lug 23. In the embodiment shown the poles P are beveled inward as shown and the bridge piece preferably comes nearly flush with the inner or lower edges of said pole pieces, so that when the cover is closed, with the blade in position the latter is resiliently flexed downward as best shown in Fig. 4, thereby bringing substantially only the beveled cutting edges *b* of the blade into direct engagement with the magnetic poles. Accordingly, the magnetic flux in seeking the path of least reluctance will pass from one pole through the adjacent cutting edge across the blade as an armature and through the other cutting edge to the other pole to complete the magnetic circuit. The pressure of the closed cover flexs the blade somewhat against the bridge piece and urges the cutting edges *b* of the blade into such close contiguity with the poles as to be effectively attracted thereby and the minute teeth that had been bent outward due to previous shaving operation and the edges of which thus contact the magnet poles are brought into the plane of the blade as the main length of the latter is drawn toward the poles. Preferably after this operation, the cover is opened, the blade removed, replaced in reversed position upon the magnet poles and the cover is again closed. The pressure of the closed cover and the magnetic attraction then just as immediately above described, cause the main length of the edges to be drawn inward toward the poles for alignment of those of the teeth that had been deflected in previous use, toward the side now facing the pole, whereupon the blade is ready for use.

In certain of the claims "the blade area at the cutting edge" is recited as in contact with the magnet pole end. This recital is intended to exclude and distinguish from prior arrangements in which the extreme cutting edge faces the magnet, and the blade area immediately contiguous to such edge is out of engagement with the magnet or the pole side and end surfaces thereof.

While reasonably satisfactory results are obtained by merely inserting the blade and closing the cover, and then removing the blade for use, it is preferred to duplicate the operation as above described with first one face and then the other face of the blade against the magnet poles. The pressure of the spring being removed from the blade when the cover is opened, the blade is readily removed for use, the entire operation of applying the blade, closing the cover, reversing the blade, closing the cover, and removing the blade, taking but a few seconds. While in describing the manipulations that constitute my process, I have set forth a theory of operation of the device, it is to be understood that such theory is advanced but tentatively and may be subject to modification.

The case serves as a convenient storing place for the blade between uses, thereby incidentally maintaining an armature across the magnetic poles and preserving the magnetism.

It is interesting to note in this connection

that the attraction of the permanent magnet is of order at least as high as the small force applied during shaving, for instance, that renders honing necessary. Furthermore, the blade and the individual teeth thereof are rendered magnetic by the hone and the teeth of the blade, accordingly, have a mutual attraction at their adjacent edges to resist deflection thereof. The action of the magnetic hone does not cause any wear on the blade, and it obviates the loss of time and the noise involved in the use of mechanical stroppers or hones.

The compression of the spring 22 against the surface of the blade in flexing the latter very slightly draws the cutting edges inward toward each other along the magnetic poles. Since the magnet is preferably of a hard chromium steel alloy capable of high magnetic retentivity, this action apparently contributes to the efficacy of the device.

It will be apparent to those skilled in the art that the present invention is applicable to razor blades of various familiar constructions, both of the single edge and double edge type, the length of the pole pieces and the gap therebetween in each case corresponding to the length of cutting edge and to the width of the blade. Obviously, the hone may be embodied in constructions suitable for larger or for smaller blades than those of safety razors, by appropriate dimensions of magnet. The invention is by no means limited to the use of a magnet pole end of width equal to the length of blade to be honed, but it is within the scope of my invention in its broader aspects, to employ a narrower pole end, and to successively place different parts of the length of a longer blade, as an armature across the pole ends.

It will thus be seen that there are herein described methods and apparatus in which the several features of this invention are embodied, and which in their action attain the various objects of the invention and are well suited to meet the requirements of practical use.

As many changes could be made in the above construction and method and many apparently widely different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

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

1. The method of honing a ferrous blade which consists in bridging the blade as an armature across a pair of magnetic pole ends of opposite polarity, with the blade area at the cutting edge in direct engagement with one of said pole ends.

2. The method of honing a ferrous blade which consists in the direct engagement of the entire length of a blade area at the cutting edge thereof with a magnetic pole and the concurrent direct engagement of another part of the blade with a magnetic pole of opposed polarity.

3. The method of honing a blade which consists in bridging the blade between magnetic poles of opposite polarity with the blade area of a cutting edge thereof in direct engagement with one of the poles, then reversing the blade and bridging the same thus reversed across said poles with the blade area at said cutting edge in direct engagement with one of the poles.

4. The method of honing a double-edged blade, which consists in bridging said blade as an armature across a pair of magnetic poles, with the blade area at the cutting edges thereof in direct engagement with the respective poles, and the intervening area free from engagement with said poles.

5. The method of honing a double-edged blade which consists in bridging said blade as an armature between magnetic poles of opposite polarity with the blade area at the cutting edges thereof in direct engagement with the respective poles, then removing and reversing the blade and bridging the same thus reversed, as an armature between, with the blade area at the cutting edges thereof in direct engagement with the respective poles.

6. The method of honing a blade which consists in bridging the same across magnetic poles of opposite polarity with area at a cutting edge of the blade in direct engagement throughout the length thereof with one of the poles while mechanically pressing said area toward the corresponding pole.

7. The method of honing a blade which consists in bridging the same across magnetic poles of opposite polarity with the area at a cutting edge of the blade in direct engagement throughout the length thereof with one of the poles, while resiliently pressing said area toward the corresponding pole.

8. The method of honing a blade which consists in placing one face thereof in engagement with magnetic poles of opposite polarity, the length of the cutting edge in contact with one of the poles while mechanically pressing the blade toward the said poles, removing the blade with respect to said poles, reversing it and repeating the operation with the opposite face of the blade against the respective poles.

9. The method of honing a ferrous metal blade which consists in bringing the entire length of the blade area at the cutting edge thereof into direct physical contact with the pole end of a magnet.

10. The method of honing a ferrous metal blade which consists in bringing the entire length of the blade area at the cutting edge thereof into direct physical contact with the

pole end of a magnet while mechanically pressing the cutting edge toward the pole end.

11. A hone comprising a pair of magnet pole ends, one end of a length substantially equal to that of the cutting edge to be honed, and means for positioning the blade to be honed as an armature between said pole ends with the entire length of the cutting edge in direct engagement with said pole end.

12. A hone for conditioning a double-edged safety razor blade comprising a pair of opposed magnetic pole ends, said ends symmetrically conformed and arranged, and means for positioning the blade as an armature across said poles, with the cutting edges in direct engagement with the respective poles, each of said pole ends being of length to engage the entire length of the corresponding cutting edge.

13. A hone comprising a pair of magnetic poles of opposite polarity, a blade holder extending between said poles, and means positioning a blade with respect to said holder to dispose the length of a cutting edge of the blade in direct engagement with one of the magnetic poles, and another part of the blade in direct engagement with the other magnetic pole.

14. A hone comprising a pair of magnetic poles of opposite polarity, a blade support between said poles, and means for clamping a blade against said support with a cutting edge thereof in direct engagement with one of said poles and another part thereof in direct engagement with the opposite pole.

15. A hone for magnetically conditioning a flexible blade with a beveled cutting edge, said hone comprising a pair of magnetic poles of opposite polarity, and holding means for retaining said blade as a flexed armature, with a cutting edge in direct engagement with one of the magnetic poles.

16. A hone for a double-edge flexible razor blade comprising a pair of symmetrically conformed and positioned magnetic poles of opposite polarity, and clamping means for retaining the blade to be honed longitudinally flexed with its respective cutting edges in direct engagement with the opposite poles.

17. A hone for a double-edged flexible razor blade comprising a pair of symmetrically conformed and positioned magnetic poles of opposite polarity, and clamping means for retaining the blade to be honed longitudinally flexed with its respective cutting edges in direct engagement with the opposite poles, said clamping means comprising a blade support fixed with respect to said magnetic poles and a coacting member movable with respect thereto to permit application of the blade.

18. A hone comprising a pair of magnetic poles of opposite polarity, a bridging member extending between said pole ends and having a central part thereof out of alignment therewith and means for clamping a blade against said bridging portion, for disposing the blade as a curved armature between said poles with the cutting edge or edges in direct engagement with the respective poles, and the intervening area free from engagement with said poles.

19. A magnetic hone for a flexible double-edged razor blade comprising a pair of magnetic pole ends of opposite polarity, each of said pole ends beveled inward, a bridge piece of non-magnetic material extending between and below said pole ends, and means for holding the blade to be honed, with its opposite cutting edges in direct engagement with the respective beveled pole ends and the central area thereof flexed toward said bridge piece.

20. A magnetic hone for conditioning a double-edged flexible safety razor blade of the Gillette type, said hone comprising a pair of magnetic pole ends of opposite polarity and of length equal to that of the blade cutting edges, a bridge piece of non-magnetic material extending between said poles, fixed with respect thereto, and having its central part out of alignment with said pole ends, and means coacting with said bridge piece for clamping a blade in position and flexing said blade with respect to said bridge piece to bring the cutting edges into direct engagement with the respective pole ends.

21. A magnetic hone for conditioning a double-edged flexible razor blade, said hone comprising a pair of magnet poles of opposite polarity, having their pole ends beveled inward, a bridge piece of nonmagnetic material, below the beveled ends of the poles and fixed with respect thereto, studs rising from said bridge piece for coaction with the holding instrumentalities of the blade to be honed, and means for flexing the blade toward the depressed bridge pieces with the cutting edges in direct engagement with the pole ends.

22. A magnetic hone comprising a horse shoe magnet, of width substantially that of the length of the cutting edge to be honed, and of thickness much less than its width, said magnet having its opposite pole ends in parallelism, and means for positioning the blade to be honed in fixed position relative to the magnet with the opposite edges thereof in direct engagement with the respective pole ends.

23. A magnetic hone comprising a case, permanent magnet means therein having poles of opposite polarity, accessible from near an end of the case, and means for disposing the blade to be honed with the opposite edges thereof including the cutting edge, in direct engagement with the respective poles thereof.

24. A magnetic hone comprising a case, permanent magnet means therein, having

poles of opposite polarity accessible from the opened end of the case, and means for disposing the blade to be honed with the opposite edges thereof including the cutting edge, in direct engagement with the respective poles thereof, and a cover for said case including an element for clamping the blade with respect to the magnet poles.

25. A magnetic hone for conditioning a flexible blade of the safety razor type comprising a case, a horse shoe magnet in said case having its poles accessible from the open end thereof, a blade support extending between said poles and having a central part thereof out of alignment with said poles, means coacting with a blade to be honed for accurately positioning the same, with its opposite edges contiguous to the respective poles and a cover member having clamp means for flexing said blade about said support to dispose the opposite edges thereof in direct engagement with the respective pole ends.

26. A magnetic hone comprising a pair of opposed magnetic poles of opposite polarity, means extending between said poles for positioning the central area of a blade to dispose a cutting edge thereof in direct engagement with one of the poles and another part thereof, in direct engagement with the other pole.

27. In a device of the class described, the combination of a casing, a cover therefor, a blade supporting member made of magnetized material having two pole surfaces, said surfaces being formed at a slant in order to register with the surfaces of the edges of a razor blade supported thereby, enclosed in said casing, and means carried by said cover for exerting pressure against said blade, whereby said pole surfaces exert pressure against the lower surfaces of the edges of the razor blade.

28. In a device of the class described, the combination of a casing, a cover therefor, hinged onto said casing, a blade supporting member made of magnetized material, said member having a U section, the end surfaces of the legs or poles of said member being adapted to support a double edge razor blade along its entire length, enclosed in said casing, said surfaces being formed at a slant in order to register with the surfaces of the edges of said blade, means carried by said cover for exerting a pressure against said blade, whereby said end surfaces of the legs or poles exert pressure against the lower surfaces of the edges of the razor blade, and positioning means for said blade.

29. In a device of the class described, a blade supporting member made of magnetized material having two pole surfaces formed at a slant, in order to register with the surfaces of the edges of a razor blade supported thereby.

30. In a device of the class described, the combination of a blade supporting member made of magnetized material having two pole surfaces formed at a slant, in order to register with the surfaces of the edges of a razor blade supported thereby, and means for exerting pressure against said blade.

31. In a device of the class described, a blade supporting member made of magnetized material, said member having a U section, the end surfaces of the legs or poles of said member being adapted to contact with and support a double edge razor blade along its entire length.

32. In a device of the class described, a blade supporting member made of magnetized material, said member having a U section, the end surfaces of the legs or poles of said member being adapted to support a double edge razor blade along its entire length, said surfaces being formed at a slant in order to register with the surface of the edges of said blade.

33. In a device of the class described, the combination of a casing, a cover therefor, a blade supporting member made of magnetized material having two pole surfaces, said surfaces being formed at a slant in order to register with the surfaces of the edges of a razor blade supported thereby, enclosed in said casing, and means carried by said cover for exerting pressure against said blade, whereby said pole surfaces exert pressure against the lower surfaces of the edges of the blade.

34. In a device of the class described, the combination of a casing, a cover therefor, a blade supporting member made of magnetized material, said member having a U section, the end surfaces of the legs or poles of said member being adapted to support a double edge razor blade along its entire length, enclosed in said casing, said surfaces being formed at a slant in order to register with the surfaces of the edges of said blade, and means carried by said cover for exerting a pressure against said blade, whereby said end surfaces of the legs or poles exert pressure against the lower surfaces of the edges of the razor blade.

35. In a device of the class described, the combination of a casing, a cover therefor, a blade supporting member made of magnetized material having two pole surfaces, said surfaces being formed at a slant in order to register with the surfaces of the edges of razor blade supported thereby, enclosed in said casing, and springs carried by said cover for exerting pressure against said blade, whereby said pole surfaces exert pressure against the lower surfaces of the edges of the rabor blade.

36. In a device of the class described, the combination of a casing, a cover therefor, a blade supporting member made of magnetized material, said member having a U sec-

tion, the end surfaces of the legs or poles of said members being adapted to support a double edge razor blade along its entire length, enclosed in said casing, said surfaces being formed at a slant in order to register with the surfaces of the edges of said blade, and springs carried by said cover for exerting a pressure against said blade, whereby said end surfaces of the legs or poles exert pressure against the lower sufaces of the edges of the razor blade.

37. In a device of the class described, the combination of a casing, a cover therefor, hinged onto said casing, a blade supporting member made of magnetized material, said member having a U section, the end surfaces of the legs or poles of said member being adapted to support a double edge razor blade along its entire length, enclosed in said casing, said surfaces being formed at a slant in order to register with the surfaces of the edges of said blade, means carried by said cover for exerting a pressure against said blade, whereby said end surfaces of the legs or poles exert pressure against the lower surfaces of the edges of the razor blade and positioning means for said blade.

38. A blade supporting member made of magnetized material having a blade supporting portion formed at a slant in order to register in contact with a surface of a bevelled blade edge portion whereby the magnetic action of the flux passing through said blade edge serves to attract the portions thereof which extend away from the blade supporting member substantially into the plane of said slant surface for aligning the portions of the blade edge substantially into a single plane.

39. A magnetic sharpening device comprising a magnet, a blade supporting platform between the poles thereof, to back the center of a blade to be sharpened whereby the blade edges will be disposed in contact with the ends of the pole pieces over their entire length, said platform including means to prevent buckling of the blade at its center portion, and means urging the blade edges into operative relation relative to the poles of said magnet for effecting sharpening thereof.

40. A magnetic sharpener comprising a horseshoe magnet, means between the poles for supporting and backing double edged blade whereby its edges will be in contact with the ends of the magnet throughout their entire length, with the cutting edges thereof along the legs of the magnet for operative relation relative thereto and the center of the blade held against buckling by the supporting means.

Signed at New York, in the county of New York and State of New York, this 26th day of September A. D. 1929.

ALEXANDER GIRTANNER.