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## PENCIL SHARPENER

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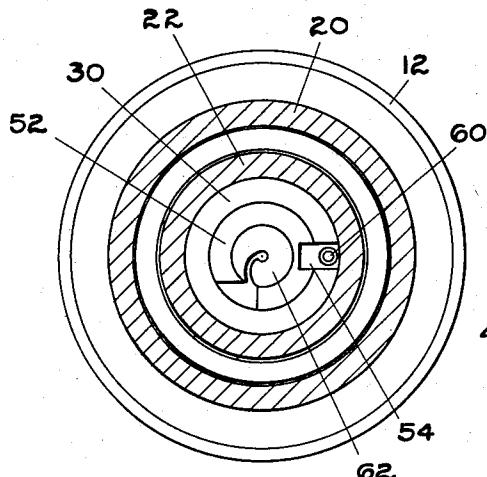


Fig. 2

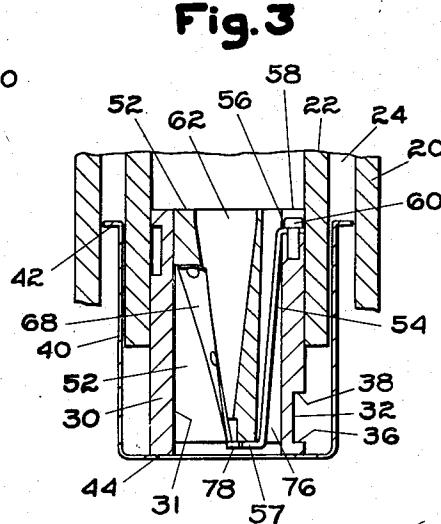


Fig. 3

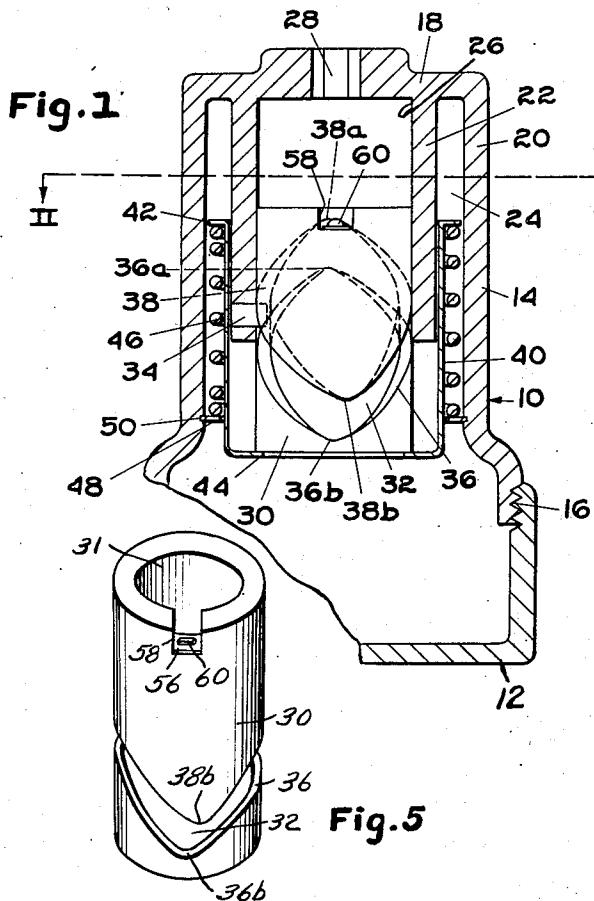
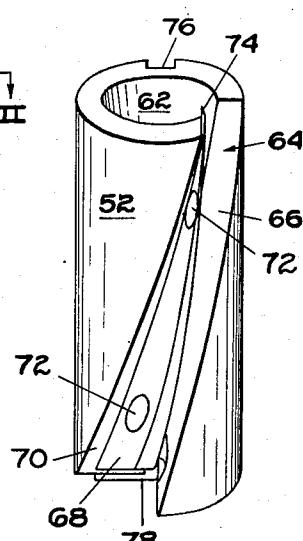


Fig.5



<sup>3</sup> Fig. 4

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## UNITED STATES PATENT OFFICE

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## PENCIL SHARPENER

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5 Claims. (Cl. 120—96)

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The present invention pertains to a pencil sharpener and more particularly to a pencil sharpener adapted for quick one hand operation.

One object of the present invention is to provide a pencil sharpener capable of being actuated by one hand.

Another object of the present invention is to provide a pencil sharpener adapted to be actuated by pressing the pencil to be sharpened thereinto.

Another object of the present invention is to provide a pencil sharpener adapted to be actuated by a reciprocating motion of the pencil to be sharpened.

Another object of the present invention is to provide a pencil sharpener having a cutting blade therein which is rotated continuously by a reciprocating motion of the pencil being sharpened.

Another object of the present invention is to provide a pencil sharpener having means to prevent continued cutting away of the pencil after it has been sharpened to a predetermined degree.

Another object of the present invention is to provide a pencil sharpener having a readily replaceable blade and blade holder.

Another object of the present invention is to provide a pencil sharpener having means to hold 30 a pencil being sharpened against rotation.

Another object of the present invention is to provide a portable pencil sharpener that can be conveniently operated while setting on a desk, drawing board, table or the like.

Other objects of the invention will be obvious and will in part appear hereinafter.

The invention accordingly comprises the product possessing the features, properties and the relation of components which are exemplified in 40 the following detailed disclosure, and the scope of the application of which will be indicated in the claims.

For a fuller understanding of the nature and objects of the invention, reference should be had to the following detailed description taken in connection with the accompanying drawing wherein:

Figure 1 is an elevational view, partly in section, showing the pencil sharpener of the present 50 invention with cam half way depressed;

Fig. 2 is a sectional view taken on line II—II of Fig. 1 and looking in the direction of the arrows;

Fig. 3 is an enlarged fragmentary view showing the cam and blade holder in section;

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Fig. 4 is a perspective view of the blade and blade holder; and

Fig. 5 is a perspective view of the cam.

The present invention comprises a pencil sharpener adapted to rest on a desk, table, drawing board, etc., and be operated to sharpen a pencil by inserting the pencil in an opening in the top thereof and into contact with a cutting blade carried by a cam. Downward pressure of the pencil against the blade and the cam move said blade and cam longitudinally of the pencil sharpener to cause the cam surfaces of said cam to move across a stationary cam actuating pin. Movement of the cam surfaces across the pin 15 causes the cam and blade to rotate relative to the pencil to thereby cause said blade to sharpen the pencil. When the downward stroke of the pencil and cam is completed release of the pressure of the pencil against the blade permits a spring to move the cam and blade upwardly to bring a second cam surface into contact with the stationary cam actuating pin to continue to rotate the cam and blade in the same direction whereby the pencil is also sharpened during its 20 outward stroke.

The blade and cam are contained in a housing member having a pencil receiving opening in alignment with said blade and cam. The pencil receiving opening is preferably so shaped that it holds the pencil against rotation as it is moved in and out of the mechanism.

The blade is held by a blade holder which is carried by the operating cam in such a manner that it is readily removable therefrom to permit the insertion of a new blade and blade holder when the blade in use becomes dull.

Referring now to the drawing there is disclosed a two part housing member 10 comprising a bottom part 12 and a top part 14, adapted to be removably connected together, as by threads 16. Top part 14 is comprised of a circular top piece 18 which is provided with concentric depending outer and inner cylindrical sleeves or flanges 20 and 22 respectively. Flanges 20 and 22 cooperate to form an annular slot or groove 24, which houses a cam operating spring and sleeve in a manner to be explained hereinafter, and flange 22 also defines a vertical axial bore 26. A hexagonal hole 28 extends through the center of top piece 18 and is of such a size as to permit a pencil having a hexagonal cross-section to pass therethrough into the housing 10 but which holds such a pencil extending therethrough against rotation.

A cylindrical barrel cam 30 having an axial bore 31 and a continuous cam slot 32 formed in

its periphery is journaled for both reciprocation and rotation in the axial bore 26 formed by inner flange 22. An inwardly projecting cam actuating pin 34 is carried by inner flange 22 adjacent its lower edge and extends into bore 26 and into cam slot 32. Cam slot 32 is defined by two side walls 36 and 38 each of which form a cam surface on opposite halves of the cam barrel, i. e. wall 36 forms a cam surface on the right hand side of barrel cam 30 as viewed in Fig. 1, and wall 38 forms a cam surface on the left side. The cam surface formed by side wall 38 is engaged by pin 34 as the cam barrel moves downwardly in bore 26 to rotate said barrel in a counterclockwise direction as viewed in Fig. 2. The cam surface formed by side wall 36 is engaged by pin 34 as the cam barrel moves upwardly to continue to rotate said barrel in a counterclockwise direction. The apexes 36a and 38b formed by the changes in direction of side wall 36 are radially displaced from the apexes 38a and 36b formed by the changes in direction of side wall 38 so that the start of the cam surface formed by side wall 36 is beneath apex 38a and the start of the cam surface formed by side wall 38 is above apex 36b. Thus it will be seen that as barrel cam 30 is moved downwardly in bore 26 the cam surface formed by side wall 38 is brought into engagement with cam actuating pin 34 to rotate said barrel cam until said pin is contacted by the apex 38a adjacent the upper edge of the barrel. It will be noted that when apex 38a is contacted by pin 34 that pin 34 is beyond apex 36a formed by side wall 36 and is above the beginning of the cam surface formed by wall 36. Therefore, when barrel cam 30 moves upwardly pin 34 contacts the cam surface portion of side wall 36 and that cam surface continues to rotate barrel cam 30 in a counterclockwise direction as said cam moves upwardly. When barrel cam 30 reaches its uppermost position apex 36b formed by side wall 36 adjacent to the lower edge of said barrel cam is contacted by pin 34 to prevent any further upward movement of the cam. It will be noted that apex 36b is beyond apex 38b so that downward movement of barrel cam 30 causes pin 34 to engage the cam surface portion of side wall 38 to cause the cam surface formed thereby to start or continue, as the case may be, the counterclockwise rotation of said cam.

Means are provided for retaining barrel cam 30 in bore 26 and for permitting it to move downwardly in said bore under the thrust of a pencil being sharpened; and to return it to its uppermost position when said thrust is removed whereby cam slot 32 and pin 34 cause it to rotate. The retaining means comprises a sleeve 40 slidably embracing the outer surface of flange 22 and having an outwardly turned annular flange 42 formed on its upper end, and an inwardly turned flange 44 formed on its lower end. Inwardly turned flange 44 is of sufficient width to extend beneath flange 22 and engage the bottom edge of barrel cam 30 to support said cam for rotation thereon. A helical spring 46 is housed in annular slot 24 so as to engage the under surface of outwardly turned flange 42 to support said flange and through it sleeve 40 and barrel cam 30. Spring 46 is supported in annular slot or groove 24 by means of a snap or clamping ring 48 which engages in an annular groove 50 formed in the inner surface of flange 20. It will therefore be seen that barrel cam 30 is supported in housing 10 by means of helical spring 46 acting through sleeve 40.

A generally cylindrical blade holder 52 is removably carried in the bore of barrel cam 30, to move said cam downwardly under the thrust of a pencil and for rotation by said cam, by means of a spring clip 54. Spring clip 54 has a bent over upper end 56 which is located in a notch 58 formed in the upper edge of barrel cam 30 and is attached thereto by means of a pin or rivet 60. Spring clip 54 extends downwardly within the bore of barrel cam 30 to adjacent the lower edge of said barrel cam at which point it terminates in an inwardly bent over lower end 57 adapted to engage the under side of blade holder 52. Blade holder 52 is provided with a tapered axial opening or hole 62, the taper of which corresponds to the taper it is desired to impart to the pencils to be sharpened by the pencil sharpener of the present invention. A spiraling slot 64, generally V shaped in cross section, extends from the upper edge of said blade holder to its lower edge. One wall 66 of slot 64 is substantially radial to blade holder 52 and its other wall 70 is at substantially 90 degrees to wall 66. A knife or blade 68 is fixedly mounted by any convenient means as, for example, rivets 72 to the wall 70 of slot 64. Blade 68 is so located on wall 70 of blade holder 52 that its cutting edge 74 projects into the tapered opening or hole 62 through the spiral slot 64 a slight distance so that when said blade and blade holder are rotated relative to a pencil located in opening 62 said blade will shave the wood and lead of said pencil to form a new writing point thereon. It will be noted that due to the spiraling of slot 64 knife or blade 68 spirals down blade holder 52 so that its cutting edge is at an angle to the longitudinal axis of a pencil placed in said blade holder whereby said knife cuts across the grain of the wood to thereby cut smoothly and easily. The periphery of blade holder 52 is provided with a longitudinal notch 76 which extends throughout its length. Longitudinal notch 76 forms a passageway for receiving spring clip 54 to permit said clip to extend from adjacent the upper surface of barrel cam 30 to adjacent its lower edge to position its inwardly bent over end 57 beneath said blade holder. Notch 76 also functions as a keyway which cooperates with spring clip 54, which also functions as a key, to prevent relative rotation between blade holder 52 and cam 30 so that rotation of said cam will also rotate said blade holder. It will be seen that spring clip 54 releasably holds blade holder 52 in the bore 31 of cam 30 and that said blade holder can readily be removed from said cam by swinging inwardly bent over end 57 of said clip radially outwardly from under said blade holder whereupon it will drop out of said cam. If blade 68 has become dull from prolonged use a new blade holder and sharp blade can be inserted in cam 30 by again swinging bent over end 57 outwardly until it can pass into notch 76 and then sliding the blade holder upwardly in bore 31 of cam 30 until said bent over end emerges from the lower end of notch 76 and snaps under said blade holder. A pencil lead engaging projection 78 is formed on the lower surface of blade holder 52 in such a manner that a portion of its upper surface projects beneath the axis of downwardly tapering opening or hole 62. The upper surface of pencil lead engaging projection 78 is located slightly above what would be the apex of tapering opening or hole 62 so that the lead of a pencil being sharpened engages said projection before it has been cut completely across and thereby prevents continued cutting away of the pencil after a pre-

determined point has been formed on the pencil. The mode of operation of the present invention is as follows. The pencil sharpener is placed in an upright position on a table or drawing board and a pencil having a hexagonal cross-section is inserted in hexagonal hole 28 in top piece 18 until its end engages in the downwardly tapering hole 62 in blade holder 52. Continued downward movement of the pencil forces blade holder 52 downwardly and this downward movement of said blade holder by reason of spring clip 54 is transmitted to and moves barrel cam 30 downwardly to bring its cam surface 38 into engagement with cam actuating pin 34 whereby said pin causes said barrel cam 30 to rotate in a counterclockwise direction as viewed in Fig. 2. Counterclockwise rotation of barrel cam 30 is transmitted to blade holder 52 by spring clip 54 and causes knife or blade 68 carried by blade holder 52 to shave off wood and lead from the end of the pencil. When the end of the downward stroke is reached, i. e. when apex 38a in cam surface 38 engages cam actuating pin 34, downward pressure on the pencil being sharpened is relaxed a sufficient amount to permit helical spring 46 to lift barrel cam 30 and blade holder 52 whereby pin 34 engages cam surface 36 to continue the counterclockwise rotation of said cam and blade holder, and continue shaving wood and lead, during the upward movement of said cam and blade holder. When the pencil has been sharpened to a predetermined desired extent the end of the pencil lead will engage projection 78 and said projection will prevent the pencil from entering tapering hole 62 thereafter and will thus hold the pencil from continuing to engage blade 68 whereupon any further reciprocation of cam 30, blade holder 52 and blade 68 will not cut the pencil.

Shaving and chips removed from the pencil during the sharpening operation fall into the bottom part 12 of housing 10 through the spiral slot 64 and are removed therefrom from time to time as may be convenient.

Since certain changes may be made in the above product without departing from the scope of the invention herein involved, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. In a pencil sharpener the combination comprising a housing having an outer wall and an inner cylindrical sleeve spaced therefrom, a cylindrical barrel cam having an axial bore therethrough carried by said sleeve for reciprocation and rotation therein, said cam having a cam slot formed in its periphery defining two cam surfaces, an abutment projecting from the inner wall of said sleeve and engaged in said cam slot, a blade removably mounted in the bore of said cam and adapted to be engaged by the end of a pencil to be sharpened, said blade and said cam being adapted to be moved in one direction by pressure from a pencil in engagement with said blade to cause one of said cam surfaces to engage and move across said abutment to rotate said cam and blade, a spring in the space between said wall and said sleeve, and means connecting said spring to said cam, said spring being capable of moving said cam and blade in the other direction upon release of pressure from said pencil to cause the second cam surface to engage and move across said abutment to thereby continue to rotate said cam and blade in the same direction.

2. In a pencil sharpener the combination comprising a housing having an outer wall and an inner cylindrical sleeve spaced therefrom, a cylindrical barrel cam having an axial bore therethrough carried by said sleeve for reciprocation and rotation therein, said cam having a cam slot formed in its periphery defining two cam surfaces, an abutment projecting from the inner wall of said sleeve and engaged in said cam slot, a blade 10 removably mounted in the bore of said cam and adapted to be engaged by the end of a pencil to be sharpened, a second sleeve surrounding said inner sleeve, said second sleeve having an inwardly turned flange on one end and an outwardly turned flange on its other end, said inwardly turned flange engaging one end of said cam, a compression spring between said second sleeve and said wall and having one of its ends in engagement with said outwardly turned flange and its other end in engagement with retaining means carried by said wall, said blade and cam being adapted to be moved in one direction by pressure from a pencil in engagement with said blade to compress said spring and to cause one of said cam surfaces to engage and move across said abutment to rotate said cam and blade, said spring acting through said second sleeve being capable of moving said cam and blade in the other direction upon release of pressure from said pencil to cause the second cam surface to engage and move across said abutment to thereby continue to rotate said cam and blade in the same direction.

3. In a pencil sharpener the combination comprising a housing having an outer wall and an inner cylindrical sleeve spaced therefrom, a cylindrical barrel cam having an axial bore therethrough carried by said sleeve for reciprocation and rotation therein, said cam having a cam slot formed in its periphery defining two cam surfaces inclined in opposite directions and having the start of each cam surface overlapped by the finish of the other, an abutment projecting from the inner wall of said sleeve and engaged in said cam slot, a blade removably mounted in the bore of said cam and adapted to be engaged by the end of a pencil to be sharpened, a second sleeve surrounding said inner sleeve, said second sleeve having an inwardly turned flange on one end and an outwardly turned flange on its other end, said inwardly turned flange engaging one end of said cam, a compression spring between said second sleeve and said wall and having one of its ends in engagement with said outwardly turned flange and its other end in engagement with retaining means carried by said wall, said blade and cam being adapted to be moved in one direction by pressure from a pencil in engagement with said blade to compress said spring and to cause one of said cam surfaces to engage and move across said abutment to rotate said cam and blade, said spring acting through said second sleeve being capable of moving said cam and blade in the other direction upon release of pressure from said pencil to cause the second cam surface to engage and move across said abutment to thereby continue to rotate said cam and blade in the same direction.

4. In a pencil sharpener the combination comprising a housing including a top having an outer depending wall and an inner depending cylindrical sleeve spaced from said wall, said top having a hexagonal hole for admitting a pencil into said housing and holding it against rotation, a cylindrical barrel cam having an axial bore therethrough carried by said sleeve for reciprocation

and rotation therein, said cam having a cam slot formed in its periphery defining two cam surfaces, an abutment projecting from the inner wall of said sleeve and engaged in said cam slot, a blade removably mounted in the bore of said cam in alignment with said hole and adapted to be engaged by the end of a pencil inserted therethrough, said blade and said cam being adapted to be moved in one direction by pressure from a pencil in engagement with said blade to cause one of said cam surfaces to engage and move across said abutment to rotate said cam and blade, a spring in the space between said wall and said sleeve, and means connecting said spring to said cam, said spring being capable of moving said cam and blade in the other direction upon release of pressure from said pencil to cause the second cam surface to engage and move across said abutment to thereby continue to rotate said cam and blade in the same direction. 20

5. In a pencil sharpener the combination comprising a housing having an outer wall and an inner cylindrical sleeve spaced therefrom, a cylindrical barrel cam having an axial bore therethrough carried by said sleeve for reciprocation and rotation therein, said cam having a cam slot formed in its periphery defining two cam surfaces, an abutment projecting from the inner wall of said sleeve and engaged in said cam slot, a blade holder removably mounted in the bore of 30 said cam and held against movement relative thereto, said blade holder being provided with a tapered axial hole extending therethrough, a blade carried by said blade holder, said blade, blade holder and cam being adapted to be moved 35

in one direction by pressure from a pencil in engagement with said blade and blade holder to cause one of said cam surfaces to engage and move across said abutment to rotate them, a 5 spring in the space between said wall and said sleeve, means connecting said spring to said cam, said spring being capable of moving said cam and blade in the other direction upon release of pressure from said pencil to cause the second cam surface to engage and move across said abutment to thereby continue to rotate said cam, blade holder and blade in the same direction, and a stop member carried by said blade holder and extending across the small end of said tapered hole for engagement by the lead of said pencil 15 when a predetermined degree of sharpness has been attained to prevent further cutting away of the pencil.

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