Jan. 6, 1953 M. TALL 2,624,317

PENCIL SHARPENER

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Fig. 3.

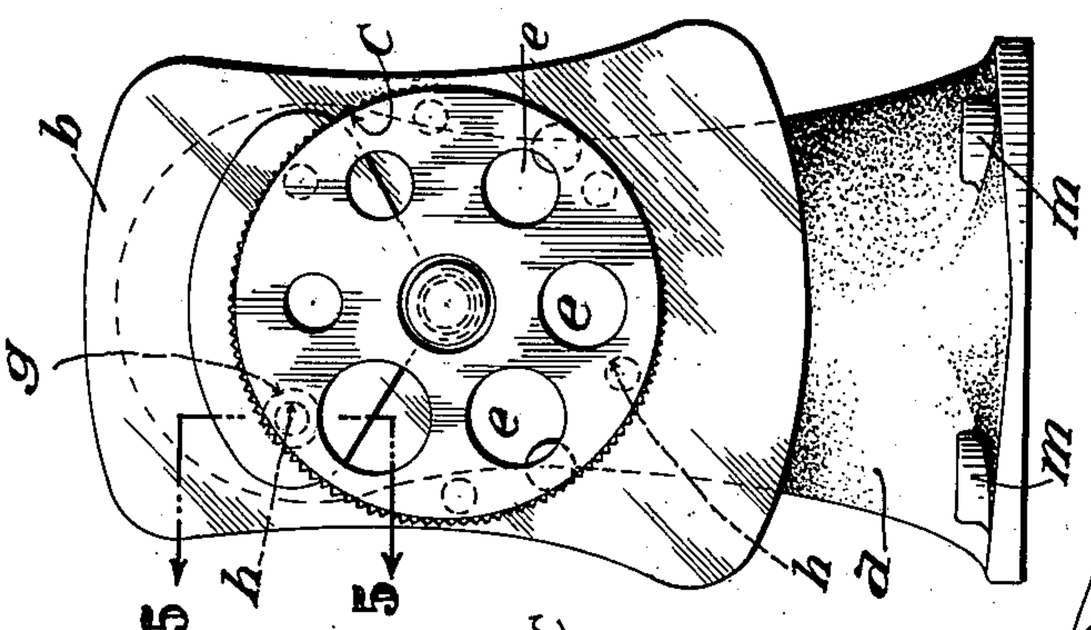

Fig. 2.

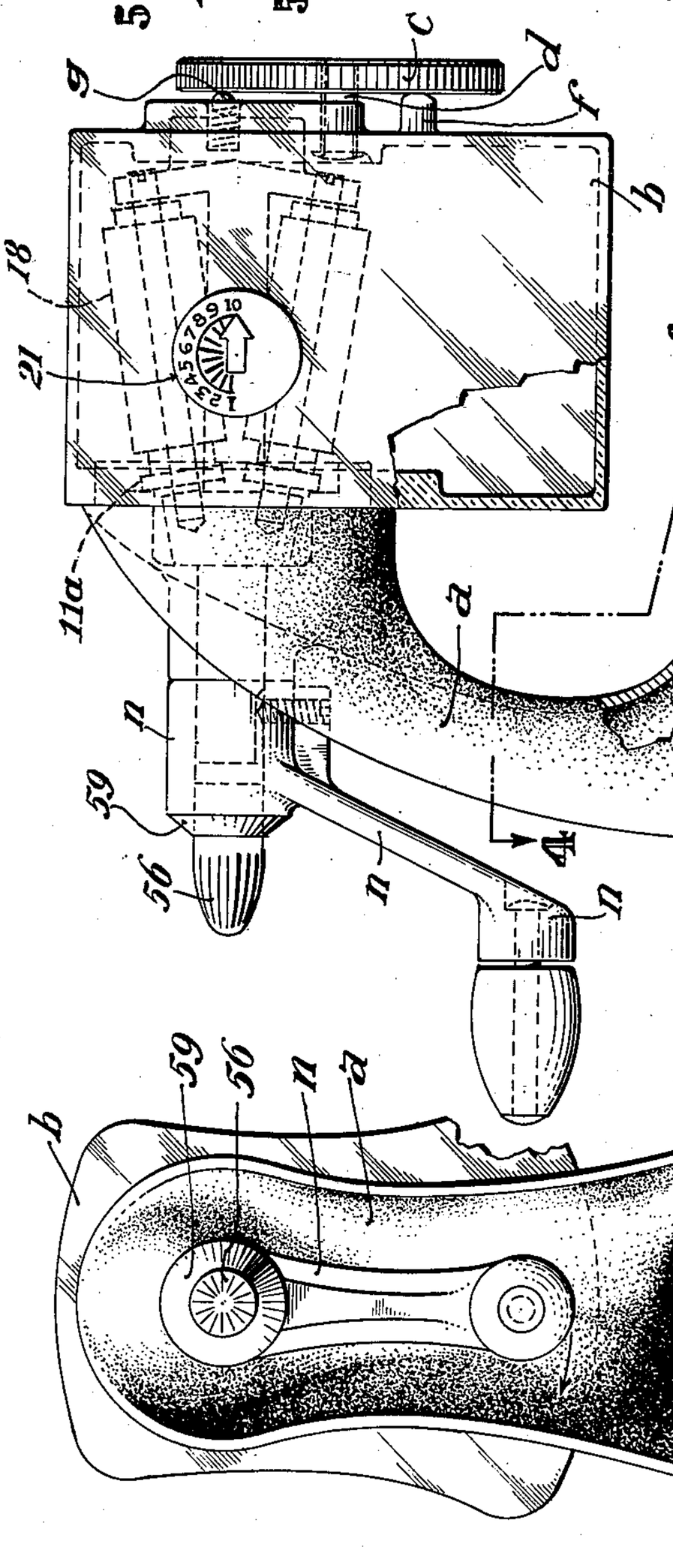

Fig. 4.

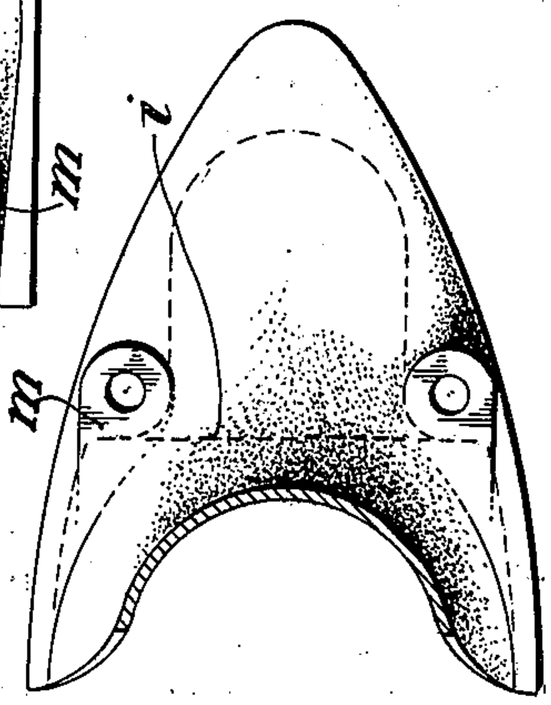

Fig. 5.

Fig. 1.

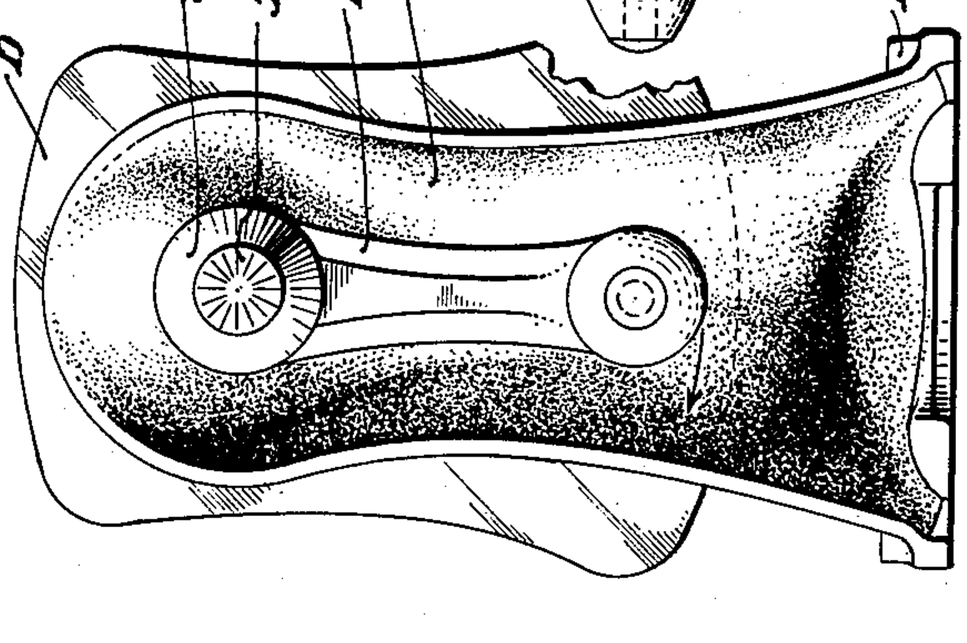

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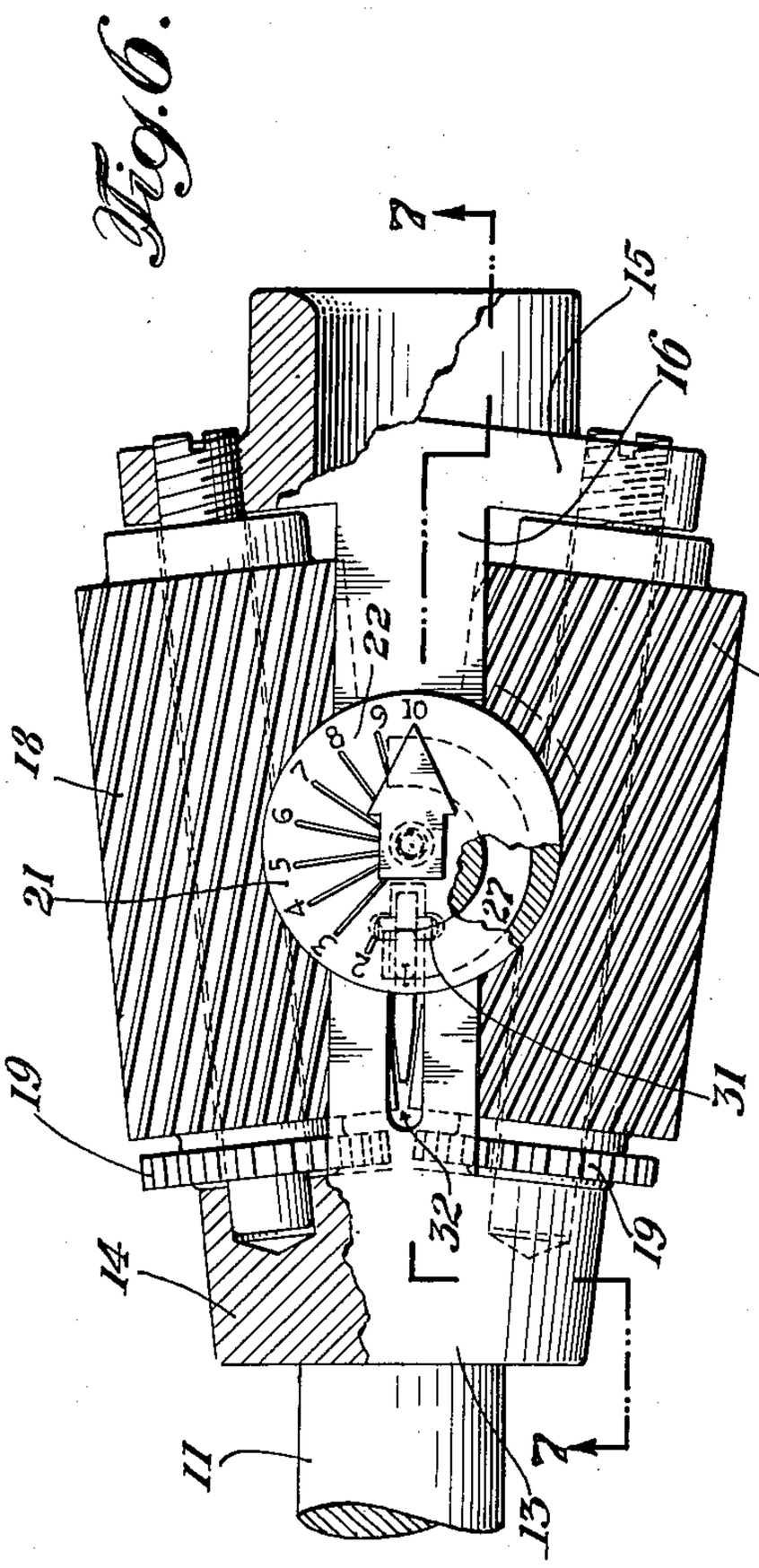
Fig. 6.



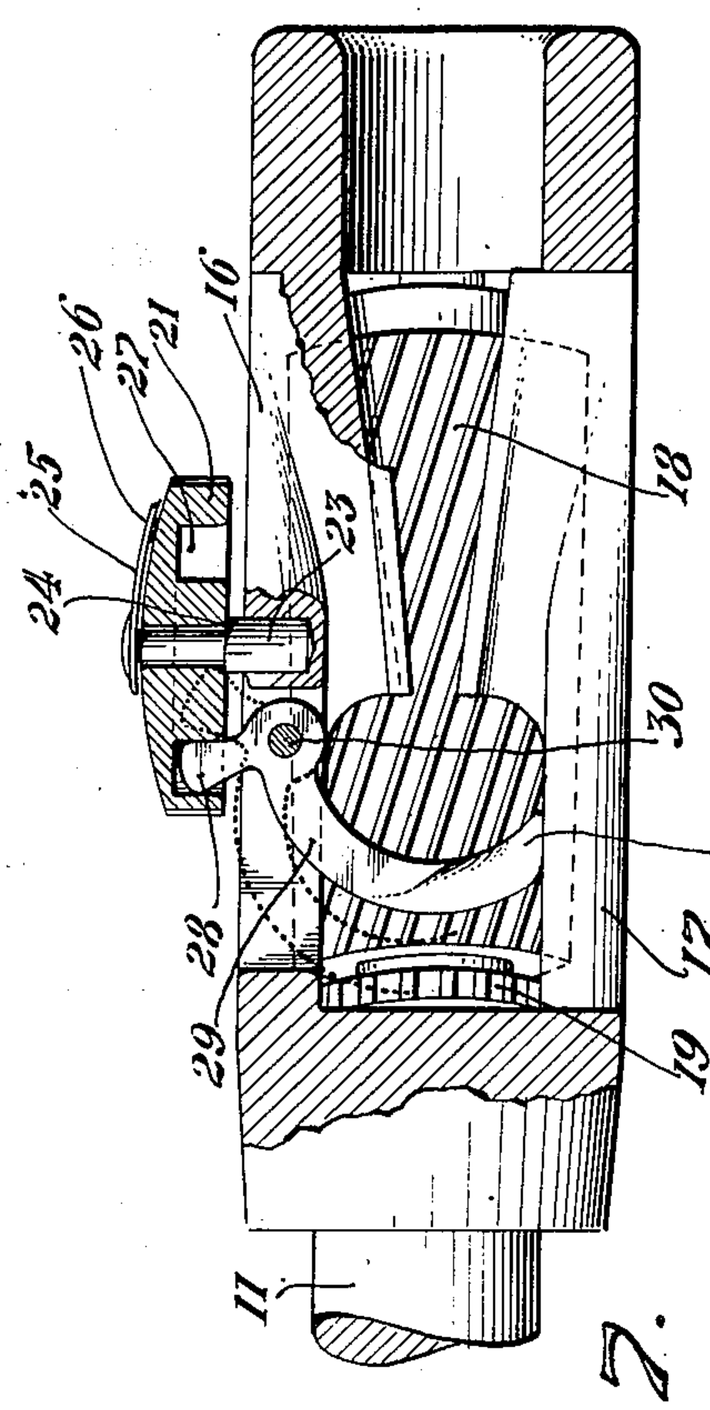


Fig. 7.

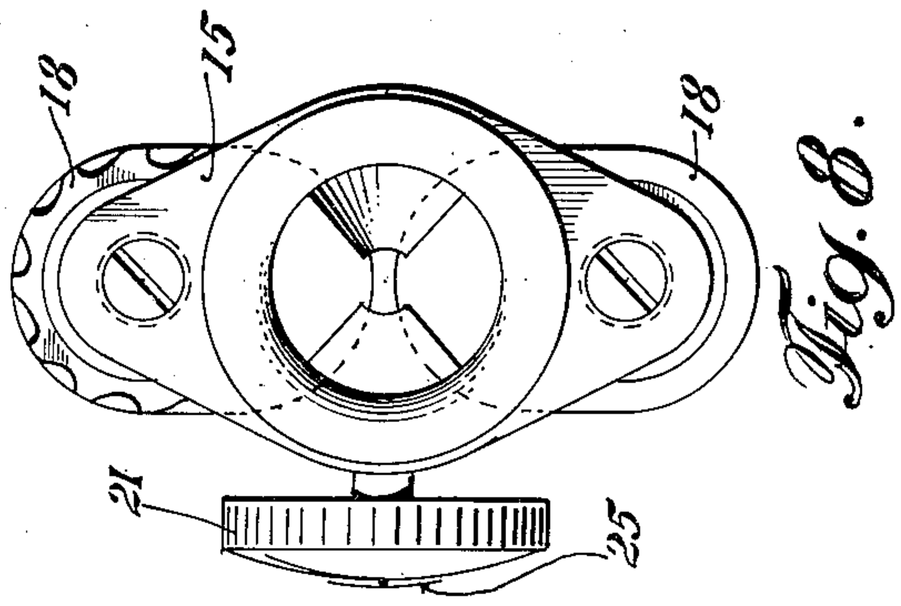


Fig. 8.

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PENCIL SHARPENER

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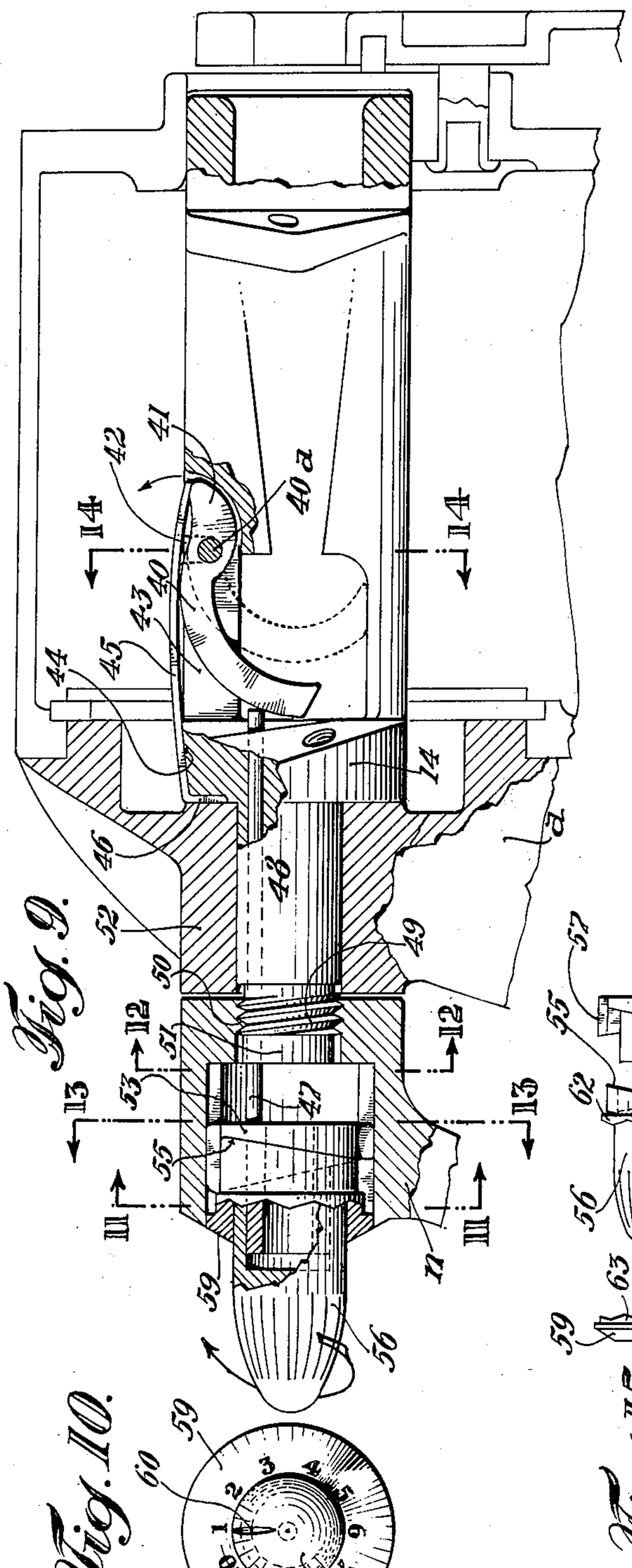

Fig. 9.

Fig. 10.

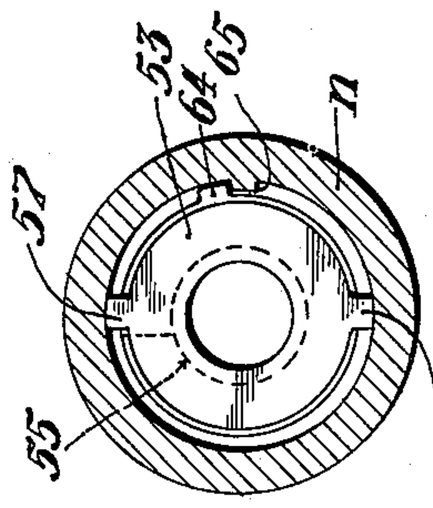

Fig. 13.

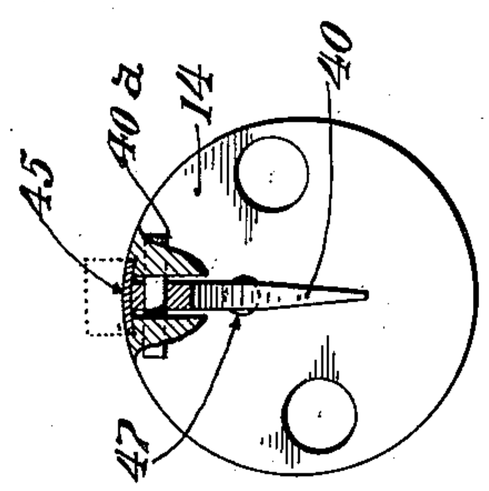

Fig. 14.

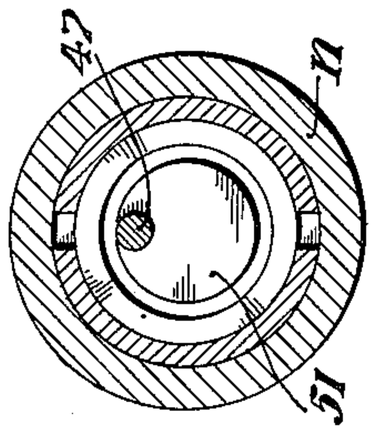

Fig. 12.

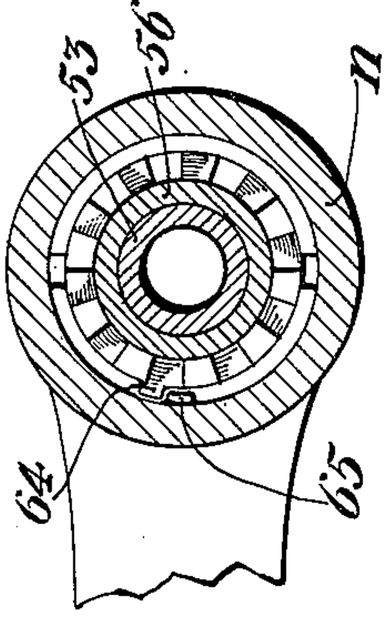

Fig. 11.

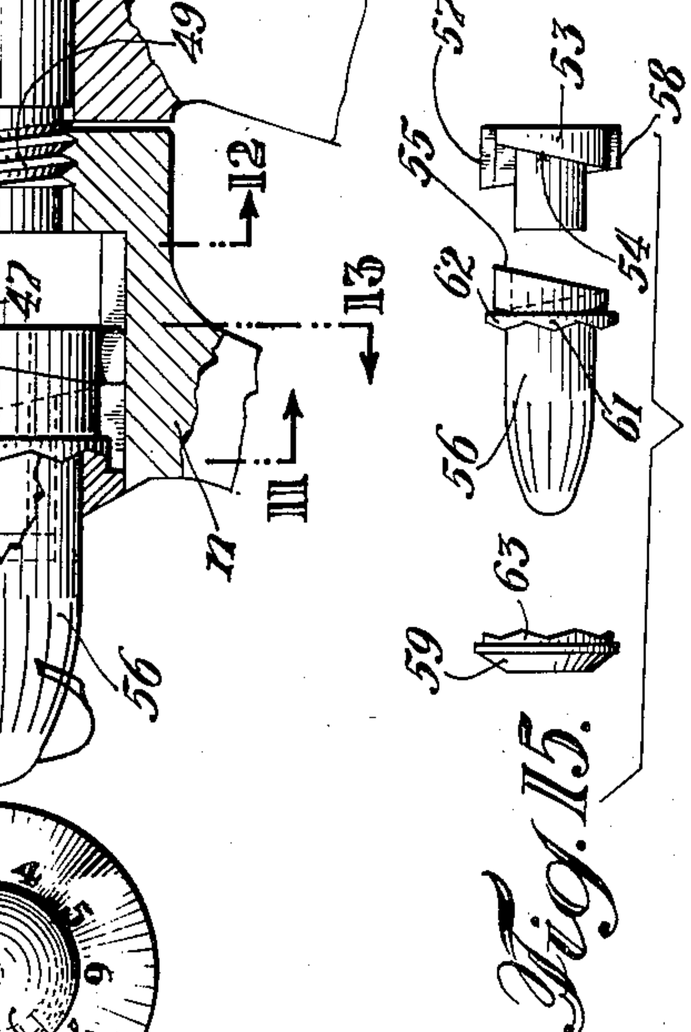

Fig. 15.

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UNITED STATES PATENT OFFICE

2,624,317

PENCIL SHARPENER

Murry Tall, New Rochelle, N. Y.

Application September 7, 1949, Serial No. 114,310

20 Claims. (Cl. 120—96)

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The present invention relates to pencil sharpeners of the type having rotary cutters operated by planetary gearing and adapted to be operated either manually or by an electric motor.

It is the general object of the present invention to provide a pencil sharpener of the type indicated, having improved means whereby the length and shape of the point on the sharpened pencil can be regulated to suit the type of pencil and the manner in which the pencil is to be used.

More specifically, it is an object of the present invention to provide improved stop means of such construction that the clearance between the stop and the cutters of the sharpener remains practically constant for all positions of the stop, whereby breakage of the pencil point and "chewing" of the pencil through accidental insertion of the pencil point between the stop and the cutter are prevented.

It is a further object of the invention to provide improved means including a dial for setting the stop at its various selected positions.

It is also an object of the invention to provide a stop device which can be operated either from the inside or the outside of the chips or grindings-receiving container or casing, and which is of arcuate form and of varying thickness, and is so mounted that successive portions thereof of increasing or diminishing thickness can be introduced between the cutters in a manner to present an increased thickness where a stub point is to be produced, and a diminished thickness where a fine point is to be obtained.

It is a still further object of the invention to provide a reliable and simplified mechanism for operating the stop by way of a dial having an eccentric groove from which the stop is controlled.

An additional object of the invention is to provide an improved dial and pointer assembly associated with the stop, wherein the pointer is fixedly positioned above the rotatable dial and is provided with a protuberance adapted to engage in a series of grooves or notches in the dial to indicate the position of the adjusted stop, the pointer being in sprung condition, so as to snap into the successive notches in the manner of a detent.

A still further object of the invention is to provide a pivoted adjustable stop of arcuate form which is so shaped that in all adjusted positions thereof, a stop surface is presented between the cutters which is substantially normal to the pencil point, so that a positive stopping action is provided and danger of slipping of the pencil point along the stop eliminated.

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Another object of the invention is to provide a pencil sharpener having adjustable stop means wherein the stop means can be controlled by rotation of a knob outside of the casing and adjacent to the operating handle of the sharpener.

Still other objects and advantages of the invention will become apparent from the following detailed description thereof.

The accompanying drawings illustrate a satisfactory embodiment of the invention. In said drawings,

Fig. 1 is a rear end view of a pencil sharpener constructed in accordance with the present invention;

Fig. 2 is a side view thereof, partly in section;

Fig. 3 is a front end view of the sharpener;

Fig. 4 is a detail of the base and is taken along the line 4—4 of Fig. 2;

Fig. 5 is a view taken along the line 5—5 of Fig. 3;

Fig. 6 is an enlarged view of the cutter mechanism and supporting frame therefor, with the adjustable stop and the mechanism for operating the same mounted on such frame, the view being partly in section;

Fig. 7 is a view along the line 7—7 of Fig. 6 looking in the direction of the arrows;

Fig. 8 is an end view of the structure shown in Fig. 6;

Fig. 9 is a view partly in section through a modified structure wherein the stop device is controlled from outside the casing;

Fig. 10 is a view of the dial for indicating the selected position of the stop;

Figs. 11, 12, 13 and 14 are sections taken, respectively, along the lines of 11—11, 12—12, 13—13, and 14—14 of Fig. 9; and

Fig. 15 is an exploded view of the stop adjusting and position-indicating means.

Referring to the drawings, wherein similar numerals and letters indicate corresponding parts, the reference character *a* indicates the base or support of the sharpener which may be manufactured by die casting or otherwise. At its upper end the base is provided with a thread by means of which the casing or chamber *b* for receiving the wood shavings is detachably secured to the base. At the front of the casing *b* there is supported the selector *c* on a stub shaft *d*, the selector having a number of apertures *e* for receiving pencils of different diameters. The selector bears against a projection *f* and also against a spring-pressed ball *g*. This is adapted to be received in a series of circular depressions *h* on the rear surface of the selector *c* and acts as a detent to hold the selector in adjusted posi-

tion. The base *a* is provided with an enlarged anchoring plate *i* which is of hollow construction and is provided interiorly thereof with a plate *j* which can be made to cooperate with a flange or plate secured, for example, to a table top for securing the sharpener to the latter. This flange or plate may be directly secured to a table top in spaced relation thereto or may form part of a clamp *k* which is secured to the edge of a table or the like, as by means of a thumbscrew *l*. However, if desired, the base may be secured to a table, desk or the like by means of screws passing through apertured bosses *m* integral with the base. The sharpener can be operated by means of a handle *n*, in known manner.

Referring now more particularly to Figs. 6 to 8, the numeral **10** indicates the rotatable shaft of the pencil sharpener which is operated by the hand crank or by a motor (not shown). The shaft is journalled in a bearing **11***a* (Fig. 2) cast integrally with the base *a* of the sharpener. The shaft is secured at its right hand end, as seen in Fig. 6, to a frame **13** composed of end members **14** and **15** connected by bars **16** and **17** cast integrally therewith. Between the end members **14** and **15** are journalled a pair of cutters **18**, which may be arranged with their axes lying in the same plane or in planes disposed at an acute angle to each other. At their inner ends the shafts of the cutters are provided with gears **19** which mesh in known manner with an internal gear **20** (Fig. 2, but not shown in detail) fixed to the base of the sharpener. As will be apparent, upon rotation of the shaft **10**, the frame **13** will be rotated about the axis of the shaft, while the cutters **18** will have bodily rotation about the same axis and, by reason of the engagement of the gears **19** with the stationary internal gear **20**, they will be simultaneously rotated about their own axes, as is well understood in the art.

The improved stop mechanism of the present invention is controlled from a dial **21** having in the top surface thereof a series of numbered radial notches **22**, the same being ten in number in the example illustrated. The dial is rotatably mounted upon a stud **23** which may be force-fitted into a suitable opening in the frame bar **16** or may be cast integrally with the frame. It is preferably provided with a shoulder **24** upon which the dial bears. An index or pointer **25**, provided with a rectangular slot, receives the correspondingly shaped upward end of the stud **23**, such end being then struck down over the pointer to secure the same in fixed position on the stud. The underside of the pointer is provided with an elongated protuberance **26** which may be created by suitably notching the pointer, such elongated protuberance being adapted to be received in the successive notches or grooves **22**. The pointer **25** is made of spring metal, such as a beryllium-copper alloy, and in its mounted position is in sprung condition, so that the protuberance **26** will produce a click as it enters the successive notches **22**, thereby indicating that the stop is in the selected position.

The underside of the dial **21** is provided with an eccentric groove **27** which receives the end of the shorter arm **28** of a bell-crank lever **29** which is pivoted on a pin **30** suitably journalled in a recess **31** in the bar **16**. The bar is provided with an elongated slot **32** in which the bell-crank lever moves, as shown best in Fig. 6.

The longer arm **33** of the above crank lever **29**, constitutes the stop member proper and as can be seen from Fig. 7, is so positioned as to

enter the wedge-shaped space between the cutters **18** at their left hand or inner ends.

As indicated by the dotted line position of the bell-crank lever **29** in Fig. 7, rotation of the dial **21** in clockwise or counterclockwise direction will move the arm **28** of the lever radially inwardly or outwardly, respectively. As this occurs, the stop arm **33** will recede into a narrower portion of the wedge-shaped space between the cutters or move into the wider portion of such space. As the position of the stop **33** changes, the character of the point imparted to the sharpened pencil will likewise change, depending upon whether such point is permitted to penetrate to the extreme left-hand end of the cutters **18**, or is stopped at a distance therefrom by the stop **33**.

According to a further feature of the present invention, the stop **33** is so shaped that as it moves into wider portions of the wedge-shaped space between the cutters, it presents a wider surface to the pencil point for engagement therewith. At the same time, the stop takes up the increasing clearance between the cutters so that the clearance between the stop and the two cutters remains substantially constant. In consequence, the danger of the pencil point being caught between the stop and the cutter is eliminated and wasteful "chewing up" of the pencil is prevented. The stop thus serves to center the pencil properly and uniform sharpening is obtained.

I obtain the just described result most simply by tapering the stop in such manner that its thickness increases from its free end toward its fulcrum. The degree of taper will depend upon the angularity of the axes of the two cutters, but in general the thickness of the stop will vary from about 0.025 inch from a point near its free end, to about 0.062 inch, at a point about midway along its length, these figures representing the thicknesses of the regions engaged by the pencil point at the two extremes of adjustment of the stop. In the illustrated embodiment of the invention the stop has ten positions which are spaced about 0.020 inch apart in the axial direction of the pencil.

The stop **33** is of arcuate form and the curvature of its surface in a plane passing through the axis of the pencil is so determined that in all positions of the stop, its surface is substantially at right angles to the axis of the pencil at the point where the pencil engages the stop. By this construction, the pencil is held in fixed position during the cutting operation, both when a long and sharp point is desired, and the stop is in its fully retracted position, or when a shorter stub point is sought, when the stop is in its extreme opposite position, and also in all intermediate positions.

It will be noted that by reason of the engagement of the shorter arm of the bell-crank lever, of which the stop forms a part, within the spiral groove in the dial, a positive locking of the stop in all of its selected positions is assured, and there is no danger that pressure with the pencil on the stop will cause displacement of the latter. Also, the parts are so constructed and related that equal angular movements of the dial will produce substantially equal displacements of the stop. It will be apparent that in place of a centrically mounted dial having an eccentric groove therein, a reverse arrangement could be employed; that is, the dial could be mounted eccentrically and provided with a more or less centrically positioned circular groove.

In use, the sharpener above described has been found to provide a well balanced structure which prevents breaking or splitting of the pencil and provides better centering of the pencil with accurate control of the stop device. Whether the pencil is fed by hand or automatically by any known form of spring-controlled mechanism or the like, a uniform cutting of the pencils is obtained and chewing of the pencil is avoided.

In the mechanism hereinabove described it is necessary to remove the shavings-receiving casing before the dial for adjusting the stop device can be operated. In a further development of the invention I have provided a modified stop adjusting mechanism which can be controlled from outside the casing but which embodies the essential improvements of the structure shown in Figs. 1 to 8. The modified pencil sharpener structure is illustrated in Figs. 9 to 14. Referring to such figures, the stop member is shown at **40** and is provided intermediate its ends with trunnions **41** which are adapted to be received in an open transverse groove **42**, the stop member itself passing through a longitudinal groove **43** in the frame. The frame is countersunk as shown at **44** to provide a seat for leaf spring **45**, the latter being normally retained within the countersink flush with the outer surface of the frame. The spring may be provided with a lip **46** extending at right angles to the body of the spring and received within a notch **47** at the left-hand end of the countersink to aid in positioning and retaining the spring within the countersink. The anchored end of the spring can be secured permanently in position by staking over or striking down the metal at the edges of the countersink. It will be understood that the free end of the leaf spring engages the shorter arm of the stop to the right of the trunnions, whereby increased leverage is provided and uniform pressure is exerted on the stop. This construction also makes possible an easier movement of the adjusting knob to be described hereinafter.

The stop member **40** is adapted to be engaged by a longitudinally movable rod **47** slidable in a suitable bore in the rotating frame **14** and in the shaft **48**, such bore being located above the central axis of the frame to enable the rod to clear the cutters which are set at an angle to each other. The shaft **48** as threaded is shown at **49**.

The operating handle *n* of the sharpener is provided with a hollow hub which is threaded as shown at **50** to engage the threaded portion **49** of the shaft. The handle is also provided interiorly thereof with a cylindrical stop **51** which engages the end face of the first thread on the shaft **48** in such position that sufficient clearance is provided between the hub of the handle and the boss **52** on the base *a* to enable the handle to be rotated freely, together with the shaft and the rotating frame.

The rod **47** extends for a short distance, say about 0.180 of an inch, beyond the left-hand end of the shaft and bears against the surface of a bushing **53** which is provided upon its opposite face with a helical cam surface **54**, which cooperates with a complementary helical cam surface **55** at the inner end of a knob **56**. The bushing **53** is provided with two keys **57, 58** which are received within diametrically opposite longitudinal grooves or key-ways in the hub of the handle, the bushing being thus free to move only longitudinally relatively to the hub of the handle on its keys. The knob itself is journalled in a washer **59** which is slipped over the end of the knob

and is locked in position against the edge of the hub by staking or striking down the metal at the edge of the hub over the outer rim of the washer. The knob is free to rotate relatively to the washer and is provided with an index groove **60** to indicate the adjusted position of the stop, as will be explained more fully below.

It will be understood that the rod is normally under the pressure of the spring **45** and in the assembled position of the parts, when the stop is in its most retracted position, the end of the rod just bears against the face of the bushing. Upon rotation of the knob, the cooperating cam surfaces will cause the bushing **53** to move axially inward and thereby shift the rod to the right (Fig. 9). This will cause rotation of the stop **40** on its trunnions and the stop will be moved toward the right from an initial to a final position. In practice I have found ten positions to be a convenient number for indicating the whole range of adjustment of the stop. As in the construction shown in Figs. 6 to 8, the thickness of the stop increases from its free end toward its fulcrum, which takes account of the fact that the space between the cutters increases toward the right. For the reasons given above, I prefer to make the taper on the stop correspond to the increasing distance between the cutters in these positions, so that the clearance between the stop and the cutters remains substantially constant in all positions of the stop.

To indicate the different positions of the stop, I provide index numerals on the washer **59**, the groove on the knob serving as a pointer to indicate the different positions of the stop. To enable the operator to determine the different positions of the stop, that is, to indicate to him tactually the arrival of the stop at the successive positions, I provide a series of ten teeth **61** on a serrated collar **62** on the knob which are adapted to mesh successively with a similar series of crown teeth **62** on the serrated inside face of the washer; the knob being under the action of the spring, the teeth will mesh with a "click." To provide the necessary clearance to enable the ridges of the circular rows of crown teeth to pass each other as the stop is set at successive positions, the washer is staked down with a clearance between it and the teeth on the collar **62** equivalent to about the height of the crown teeth. For this purpose a clearance of about .015'' will ordinarily be sufficient. It will be noted that as the knob is set to different positions all of the crown teeth on the washer and on the knob will be in continuous engagement, so that the wear is reduced and binding is eliminated, and at the same time a uniform and even action is secured, which results from the fact that the helical cam surfaces engage each other over extended distances, so that here again wear is reduced and the life of the device increased.

The knob is provided with a stop **64** which is adapted to engage a corresponding lug or stop **65** inside the hub of the handle. The stops are so positioned that at the limit of movement in one direction the index groove will be opposite the number **1** on the washer **59** and at the opposite limit of movement it will be opposite the number **10** on the washer.

It will be apparent that by operation of the knob, indexing and positioning of the stop occur simultaneously.

I claim:

1. In a pencil sharpener, the combination with a pair of rotary cutters disposed with their axes

at an acute angle to each other, of an adjustable stop for the point of a pencil being sharpened therein, said stop being positionable along the central axis between the cutters and movable transversely to such axis as its distance from the converging ends of the cutters, and in the direction of the diverging ends thereof, increases, said stop being of increasing thickness transversely to such central axis corresponding approximately to the increase of the clearance between the cutters as the stop is adjusted to positions at increasing distances from the converging ends of the cutters, whereby the clearance between the stop and the cutters is maintained small and approximately constant for all positions of the stop along the central axis.

2. A pencil sharpener as defined in claim 1, wherein the stop is of arcuate form and is of gradually increasing thickness from one end thereof toward the other.

3. In a pencil sharpener, the combination with a casing, a rotatable frame therein, a pair of rotary cutters having their axis disposed at an acute angle to each other, said frame including a bar extending over the cutters and spaced from the central axis of the frame, of an adjustable stop for the point of a pencil being sharpened, said stop being mounted on said bar and being movable between the cutters, and means for adjusting said stop and including a rotary member operatively connected with said stop and disposed on said bar.

4. A pencil sharpener as defined in claim 3, wherein said rotary member comprises a dial provided with an eccentric groove, and means engaging said groove and connected with the stop.

5. A pencil sharpener as defined in claim 3, wherein the rotary member comprises a dial having a series of indentations corresponding with the different positions of adjustment of the stop, and a fixed pointer cooperating with the dial and provided with a protuberance engaging within the indentations.

6. A pencil sharpener as defined in claim 3, wherein the rotary member comprises a dial having a series of indentations corresponding with the different positions of adjustment of the stop, and a fixed pointer cooperating with the dial and provided with a protuberance engaging within the indentations, the pointer being disposed above the dial and being mounted concentrically.

7. A pencil sharpener as defined in claim 3, wherein the rotary member comprises a dial having a series of elongated, radial indentations, corresponding with the different positions of adjustment of the stop, and a fixed pointer arranged above and cooperating with the dial, and provided with an elongated protuberance on its underside engaging within the said indentations.

8. A pencil sharpener as defined in claim 3, wherein the rotary member comprises a dial having a series of indentations corresponding with the different positions of adjustment of the stop, and a fixed pointer cooperating with the dial and provided with a protuberance engaging within the indentations, the pointer being disposed above the dial and being normally sprung so as to catch into the successive indentations as the dial is rotated.

9. In a pencil sharpener, the combination with a casing, a rotatable frame therein, a pair of rotary cutters mounted in the frame for sharpening the point of a pencil, the frame including a bar extending over the cutters and spaced from the central axis thereof, of a stop member mounted on said bar and movable to present an abutment surface to the point of a pencil at successive positions between the cutters and along said central axis, and a rotary member disposed externally of the casing and operatively associated with the stop member for adjusting the same along said central axis.

10. A pencil sharpener as defined in claim 9, including a rod engaging the arcuate member and controlled by the rotary member.

11. A pencil sharpener as defined in claim 9, including a spring normally urging the stop member into an extreme position, and cam elements controlled by the rotary member and bearing on the rod to move the same against the action of the spring.

12. A pencil sharpener as defined in claim 11, wherein the cam elements are provided with complementary helical cam surfaces, one of the cam elements being mounted for axial movement and held against rotary movement, while the other cam element is secured to the rotary member.

13. A pencil sharpener as defined in claim 9, including a serrated disc held against rotary movement, and a correspondingly serrated disc fixed to the rotary member and engageable with the first disc to give a tactual indication of the arrival of the rotary member at successive stop positions.

14. A pencil sharpener as defined in claim 9, including stop means for limiting the movement of the rotary member.

15. A pencil sharpener as defined in claim 9, wherein the stop member is of arcuate shape and in the different adjusted positions thereof presents surfaces which are substantially perpendicular to the axis of the pencil.

16. A pencil sharpener as defined in claim 9, wherein the stop member presents different thicknesses at the different positions thereof to maintain its clearances between itself and the cutters substantially constant.

17. A pencil sharpener comprising a base, a frame rotatable on the base, cutters rotatably mounted in the frame, said frame having a shaft passing through the upper portion of the base, a handle having a hub threadedly engaged with the shaft, an arcuate stop member pivoted on the frame and movable into different positions between the cutters and along the axis of rotation of the frame for engagement by the pencil point, a rod bearing on the stop and passing through the shaft, an axially slidable cam member having a helical cam surface and mounted within the hub of the handle, a rotatable knob closing the outer end of the hub and provided with a complementary cam surface bearing upon the first mentioned cam surface to effect axial movement of the cam member upon rotation of the knob, a spring bearing upon the stop member to urge the same into retracted position, a stationary washer between the knob and the hub and provided with index numerals, and a mark on the knob cooperating with said numerals to indicate the successive positions of the adjusted stop.

18. A pencil sharpener as defined in claim 17 wherein the rear surface of the washer is serrated, and a serrated collar on the knob and adapted to cooperate with the serration on the washer to give a tactual indication of the arrival of the rotary member into successive stop positions.

19. A pencil sharpener as defined in claim 17, wherein the stop member is of increasing thickness toward its fulcrum point along the region which enters between the cutters, whereby sub-

stantially uniform clearance between the stop member and the cutters is maintained in all positions of the stop member.

20. In a pencil sharpener, the combination with a pair of rotary cutters disposed with their axes at an acute angle to each other, of an adjustable stop for the point of a pencil being sharpened, said stop member being movable both along and transversely to the central axis between the cutters, said stop being disposed between the cutters and being of increasing thickness from one end toward the other transversely to the central axis and being so mounted that thicker portions thereof become disposed between the cutters as the stop is progressively moved to positions more distant from the converging ends of the cutters and in the direction of the diverging ends thereof, whereby the clearance between the stop and the cutters is maintained small and approximately constant to prevent insertion of the pencil point between an edge of the stop and the adjacent cutter.

MURRY TALL.

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