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P. ECKSTEIN
STROPPING DEVICE

3,479,774

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Fig. 3

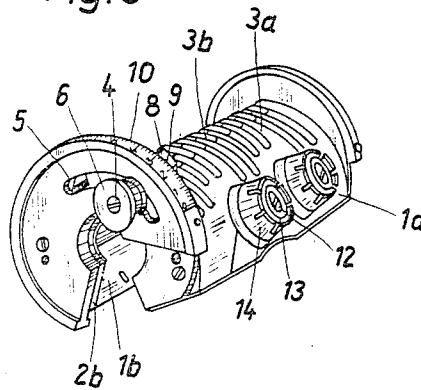
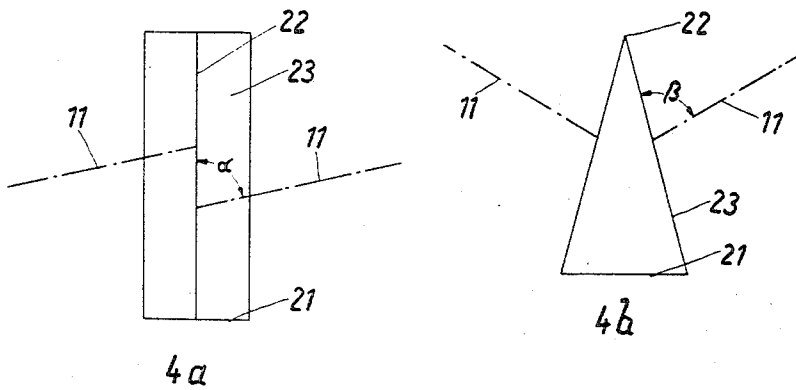


Fig. 4



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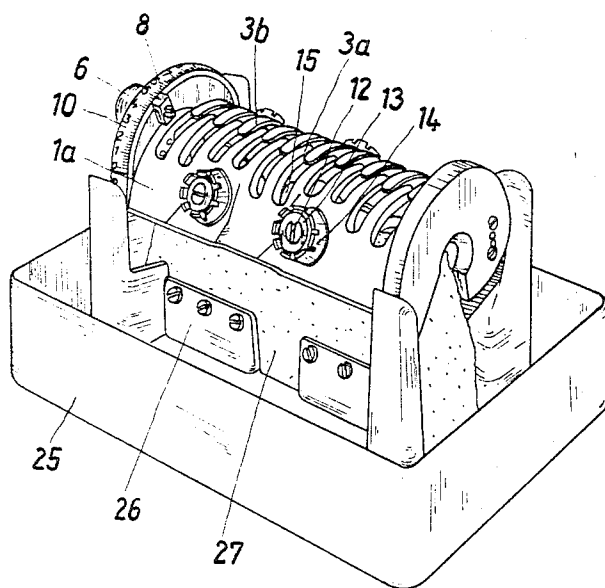
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Fig. 5



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STROPPING DEVICE

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7 Claims

ABSTRACT OF THE DISCLOSURE

A stropping device including two housings having opposed stropping rings, the housings being adjustable towards and away from each other to accommodate the knife to be sharpened. The stropping rings are rotatably mounted on spindles which in turn are mounted in the housings, and guides are also provided in the housings to guide the stropping rings. In use the housings are adjusted into the proper position and then secured after which the housings are grasped by the hand and reciprocated manually along the knife edge causing the stropping rings to rotate while sharpening the knife edge. Apertures are provided through the housings for visual purposes while a scale is also provided to indicate the adjusted position of the housings. During pauses in the stropping operation or when the housings are not in use, they may be rested on a wetting device comprised of a box containing a wetting liquid and a sponge secured in the box to receive the housings and transmit the wetting liquid to the stropping rings.

The present invention concerns a novel stropping device for straight knife edges or the like.

Grinding machines for bands of knives have been known to include several grinding discs positioned in series one behind the other on both sides of the cutting edge. The band of knives are moved past rotating grinding discs which are equipped with rotational drives. In addition to the grinding discs, such machines also employ rotating stropping discs located one behind the other, for the fine treatment of the edges of the knives after the latter have been ground by the grinding discs. However, in most cases, the removal of fins or burrs on ground cutting edges of knives is accomplished manually with whetstones as a result of which the danger of injury to even the most attentive laborer is always present.

One of the objects of the present invention is a novel stropping device for straight edged knives which device is independent of any grinding machine while having low production costs and small weight and spatial dimensions. Included herein is a stropping device which is particularly suitable for eliminating fins or burrs from a ground knife edge subsequent to a grinding process which may be carried out by means of a special grinding machine. In addition however the stropping device of the present invention may also be used for resharpening knife edges on machine tools.

A further object of the present invention is to provide such a stropping device which can be handled by any workman completely without any danger and which may also be reliably operated even by an unskilled laborer.

Achieving these objects is a stropping device having stropping rings which are rotatable in use upon manual actuation of the device thus omitting power drives. A wetting box having a wetting liquid receives the stropping device and whets the stropping rings while serving as a repository for the stropping device. In order to give the stropping device a compact construction according

to the invention, the stropping rings are mounted on spindles rotatably journaled in two generally or partly cylindrical members which form the housing of the stropping device and are herein sometimes referred to as "handle housings." The handle housings are rotatably interfitted by means of an alternate arrangement of elongated slots and fingers formed circumferentially in each handle housing so as to cooperatively mesh or register with the opposite slots and fingers of the other handle housing. The handle housings are thus relatively rotatable in opposite directions between open and closed positions during which movement the handle housings are guided by reception of the elongated fingers of one handle housing in the elongated slots of the other handle housing. In addition to guiding the handle housings, the fingers and slots serve to decrease the weight of the stropping device and also permit a view into the interior of the device to observe the knife edge and stropping rings during an operation. The spindles extend inwardly of the handle housings through bores in the handle housings and on their internal ends are fixed, disc plates with raised edges. Attached to the disc plates are the stropping rings respectively so as to expose free annular surfaces on the stropping rings which surfaces actually perform the stropping action.

So that the stropping rings will operate with an optimum degree of effectiveness, they have been oriented in such a manner in the stropping device in relation to the knife that is to be treated, that the cutting edge of the knife will form a secant to the annular circles formed by the stropping rings. Moreover the axes of rotation of the spindles are positioned at acute angles with respect to a plane bisecting the cutting edge and with respect to the adjacent lateral surface of the knife being stropped.

In order to enable an optimum setting of the stropping apparatus for any kind of machine knife with a straight edge, provision has been made according to the invention so that the angles of incidence of the spindles axes can be set for any given knife through guide supports or rollers which are adjustably secured in slots in the handle housings between the stropping rings. The adjustment of said angles correspond with a certain opening angle of the two handle housings which themselves may also be adjusted preselectively by means of an adjusting screw fixed on a threaded bolt secured to one handle housing and projecting through an arched slot at the front surface of the other handle housing, with the screw being located externally of the handle housings. To indicate and determine the angular adjustment of the handle housings a scale and pointer are also provided.

The wetting box which forms the second main part of the invention consists according to one embodiment of the invention of an enclosure including a base for the reception of whetting fluid, and a sponge holder fixed on the base, and a sponge adjustably secured to the holder. The sponge has a wedge-like upper edge which receives the handle housings to supply the stropping rings with whetting liquid while also serving as a repository for the stropping device.

Further objects and advantages characterizing the present invention will appear from the attached drawings and following description of a device which is in accordance with the present invention but is disclosed herein only by way of example.

In the drawings:

FIG. 1 is a diagrammatic view of stropping rings in relation to a machine knife in accordance with the present invention;

FIG. 2 is a perspective view of a stropping device embodying the present invention with portions broken away to show internal parts and construction;

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FIG. 3 is a fragmental perspective view of the stropping device taken from one end thereof;

FIGS. 4a and 4b are diagrammatic views illustrating the geometric relationship between the cutting edge and lateral surface of a knife and the rotational axes of the stropping rings; and

FIG. 5 is a perspective view of a wetting box with the stropping device mounted in it.

Referring to the drawings in detail the device embodying the invention includes a housing formed by two generally or partly cylindrical members 1a and 1b which also provide a handle for the device and are thus termed "handle housings." Handle housings 1a and 1b are guided for relative rotational movement about a common longitudinal axis by arched guides 2a and 2b formed on the opposite ends thereof and received in corresponding arcuate guideways formed in the housings. In addition arcuate fingers 3a and 3b are formed circumferentially on the upper sides of the handle housings to be received in slots which separate and partly define fingers 3a and 3b. By manual rotation of the handle housings 1a and 1b, as may be effected with both hands, the bottom sides thereof may be moved closer together for purposes of a stropping operation as will be subsequently described in detail. Opposite rotational movement of the housings 1a and 1b will cause the bottom sides thereof to move away from each other. Thus during opening movement of the handle housings, fingers 3a and 3b are moved into opposing slots while during closing movement, fingers 3a, 3b are moved out of the slots, and in this position one can see through the slots into the interior of the device. Since in stropping, the device operates in the closed position of the housings 2a, 2b one can observe the operating process through the slots and control the proper functioning of the stropping tools located in the housing.

On one front end of the stropping apparatus, a threaded bolt 4 connected with housing 1a projects through an arched slot 5 in the front surface of housing 1b. By means of a set screw 6 rotatable on the threaded bolt, the handle housings may be fixed at any desired angular position within an overall range which is shown as being greater than 90 degrees. A small plate 8 connected with a mark or an indicator 9 is connected at the front surface of housing 1a. Upon relative rotation of the housings 1a, 1b, the mark or indicator 9 moves along a scale 10 attached to the front surface of the housing, the mark or indicator 9 coming to rest along the markings of the scale. This feature allows preselective adjustment of the opening of the housings.

Spindles whose rotational axes are shown in the FIGS. 4a and 4b by lines 11, run on ball bearings and extend through bores in the housings 1a, 1b. The spindles which are not clearly visible in the figures are attached to ball bearing cages 13 by means of attaching screws 12. The ball bearing cages are retained against the handle housing by screw caps 14. The ends of the spindles located in the handle housings 1a, 1b are screwed into flanges 15 formed on plates 16, and stropping rings 17 are cemented onto plates 16 so as to form a raised edge or flange on plate 16. Stropping rings 17 serve as the operating tools for performing the stropping operation. They therefore are made from suitable material such as artificial stone or an Arkansas oilstone suitable for stropping purposes. The free annular surfaces 18 of rings 17 are the operating surfaces which engage the knife edge to perform the stropping. Between rings 17 are guide supports or rollers 19 screwed firmly into oblong holes 20 of housings 1a and 1b. Oblong holes 20 permit adjustment of guide rollers 19 to obtain a desired angular setting of the rotational axes of the stropping rings.

FIG. 1 shows the operating position of stropping rings 17 as compared to the edge 22 of a machine knife 21. It can be seen from the stropping rings located on the far side of the knife, that the knife edge has the position of a secant in relation to the inner annular surface 18 of the

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stropping rings. From the diagrammatic presentation of the FIGS. 4a and 4b it will also be seen that the rotational axis 11 of each spindle is positioned at an acute angle in relation to the vertical plane which bisects the knife edge, and also in relation to the lateral surfaces 23 of the knife. These angles (alpha and beta) are designated as angles of incidence of the rotational axes 11 of the stropping ring spindles, in relation to the knife edge and the lateral surfaces of the knife. According to the invention, they are slightly smaller than 90 degrees. It is possible to set the angles of incidence for each machine knife with the help of the guide supports or rollers 19, adjustable in oblong holes 20.

In a modified design of the invention, which is not shown in the drawings, the ball bearings on which the spindles rotate are located in casings having external threads; the spindles being rotatable about their own axes. These casings are mounted rotatably in threads of bores made in the handle housings 1a, 1b by means of the external threads of the casings. Slots run starting from the bores, almost radially outward, into the handle housings. By drawing together the parts of the handle housings separated through the slots it is possible to clamp down the casings in the bores of the handle housings. Prior to the clamping down, it will be possible to adjust the spindles and the stropping surfaces of the stropping rings connected with them, by turning the casings about the longitudinal axes of the spindles. This adjustment permits the stropping surfaces to accommodate knives of various dimensions. But the adjustment may also be employed to balance out any wear and tear on the annular surfaces.

Stropping rings 17 arranged on both sides of the longitudinal axes of the handle housings treat the edge of a machine knife on both sides simultaneously in a manner known in itself. However according to the present invention, and in contrast to known edge stropping devices, stropping rings 17 are not driven through special driving arrangements but rather are driven by hand manipulation which characterizes the stropping device of the invention as a hand tool. The stropping contact pressure of the annular or operating surfaces 18 of the stropping rings 17 results from the net weight of the device and the pressure of the hand which is applied by advancing the stropping device relative to and along the knife cutting edge thus causing the stropping rings to rotate. Because of friction, there is developed a slippage or rotation of rings 17 relative to the knife edge which thus results in the stropping method according to the invention.

The design of the edge stropping apparatus shown by way of example in the drawings is equipped with five stropping rings 17, but the number of stropping rings can also be less or more than five. In the most simple case, two stropping rings will suffice. Their maximum number is limited by the permissible weight of the stropping apparatus that can be operated by hand. In a modified design of the invention, it is possible to arrange on one longitudinal side of the apparatus, large stropping rings and on the other longitudinal side, smaller stropping rings. In this case, and deviating from the design shown in the figures, preferably one small stropping ring will be opposed to one large ring, whereby the operating surfaces of the small rings operate within the operating surfaces of the large rings on the edge of the knife.

The method of operation of the stropping apparatus according to the present invention may be designated as a fine sharpening apparatus. The stropping apparatus operates in conjunction with a wetting liquid which is applied to the stropping rings. In FIG. 5 there is shown a wetting device for use in combination with the stropping apparatus according to the invention. The shown wetting device includes a box including a tub 25, which receives and maintains a wetting liquid. In the tub is a holder 26 in which a wedge-like pointed sponge 27

has been attached by means of screws. The sponge 27 is made of a porous synthetic material. In order to supply wetting liquid to operating surfaces 18 of the stropping rings 17 during pauses in the stropping process the stropping device is pressed with its opened side from time to time against the edge of sponge 27. During pauses in operation or when storing the device, the sponge serves as a repository for the stropping apparatus. Through its own weight, the stropping device weighs the sponge downwardly so strongly that the wetting liquid will gain access to stropping rings 17 in the rest position of the stropping device for the purpose of cleaning the operating surfaces 18.

The optimum adjustment of the angle of incidence of the axes 11 of the spindles in relation to the cutting edge and lateral surfaces of a certain machine knife will be accomplished first of all through adjustment of the guide supports or rollers 19. A certain opening angle of the handle housing 1a, 1b will correspond to this setting. This opening angle can be read from scale 10 by pointer 9. The optimum adjustment is made empirically. It can be controlled and, if need be, corrected as a result of observation through the open slots or gaps on the handle housing 1a, 1b during the stropping process. The stropping apparatus according to the invention, needs no special care. Although the stropping rings 17, are located inside the handle housing they are easily accessible such as for replacement, they can be exchanged without any great expenditure of labor or time so that the apparatus will always be ready for operation.

Modifications and adaptations of the present invention readily apparent from the foregoing description and associated drawings, although not specifically mentioned herein, will nevertheless be included within the scope of the present invention as indicated in the appended claims.

I claim:

1. Stropping apparatus for a knife edge and the like comprising in combination, a stropping device including a plurality of stropping rings mounted for rotation in response to friction between the rings and a knife edge engaged between the rings resulting from relative movement between the stropping device and the knife edge, and a wetting device having a liquid for wetting the stropping rings, said wetting device also having means for supporting the stropping device whereby the wetting device also serves as a repository for the stropping device, the stropping device further including two partly cylindrical housing members having means including a number of mating elongated slots and fingers extending generally circumferentially of the housing members for guiding said housing members for relative rotation with respect to each other between an open, inoperative position, and a closed operative position, said housing members being rotatable between said positions by manual manipulation thereof, spindles rotatably mounted to said housing members and extending internally of said housing members, said stropping rings being mounted to said spindles so as to be movable upon movement of said housing members to said closed position into engagement with opposite sides of a knife edge, said elongated slots exposing the stropping rings and knife edge to

view when the housing members are in the closed operative position.

2. The combination defined in claim 1 further including disc plates fixed to the internal ends of said spindles for rotation therewith, said stropping rings being fixed on one angular surface to said plates with the opposite angular surface of the stropping rings serving as stropping surfaces engageable with the knife edge to strop the same.

3. The combination defined in claim 1 further including means for securing said housing members against movement including an arcuate slot formed in one housing member, a threaded bolt fixed to the other housing member and extending through said slot to a point externally of the stropping device, and a screw engageable on the bolt.

4. The combination defined in claim 1 further including guide rollers within the housing members for maintaining said stropping rings at a preselected angle with respect to the knife being stropped, and means adjustably mounting said guide rollers to said housing members.

5. The combination defined in claim 4 wherein said last recited means includes oblong slots extending generally circumferentially of said housing members and screws received through said slots into said guide rollers.

6. The combination defined in claim 5 further including indicating means for indicating the angular relationship between said housing members, said indicating means including a scale and a pointer movable along the scale.

7. A stropping device comprising in combination, a pair of housing members each having a number of stropping rings rotatably mounted therein, means mounting said housing members for movement towards and away from each other to adjust the stropping rings to permit a knife to be sharpened to be placed between the housings into proper engagement with said stropping rings, said housings being dimensioned to be grasped manually and reciprocated relative to the knife edge to be sharpened to effect the stropping operation, and said housing members having a partly cylindrical shape including a plurality of circumferentially extending and mating elongated slots and fingers for guiding the housing members for relative rotation during adjustment.

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