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B. BLOCK.

CUTLERY GRINDING MACHINE.

No. 575,562. Patented Jan. 19, 1897.

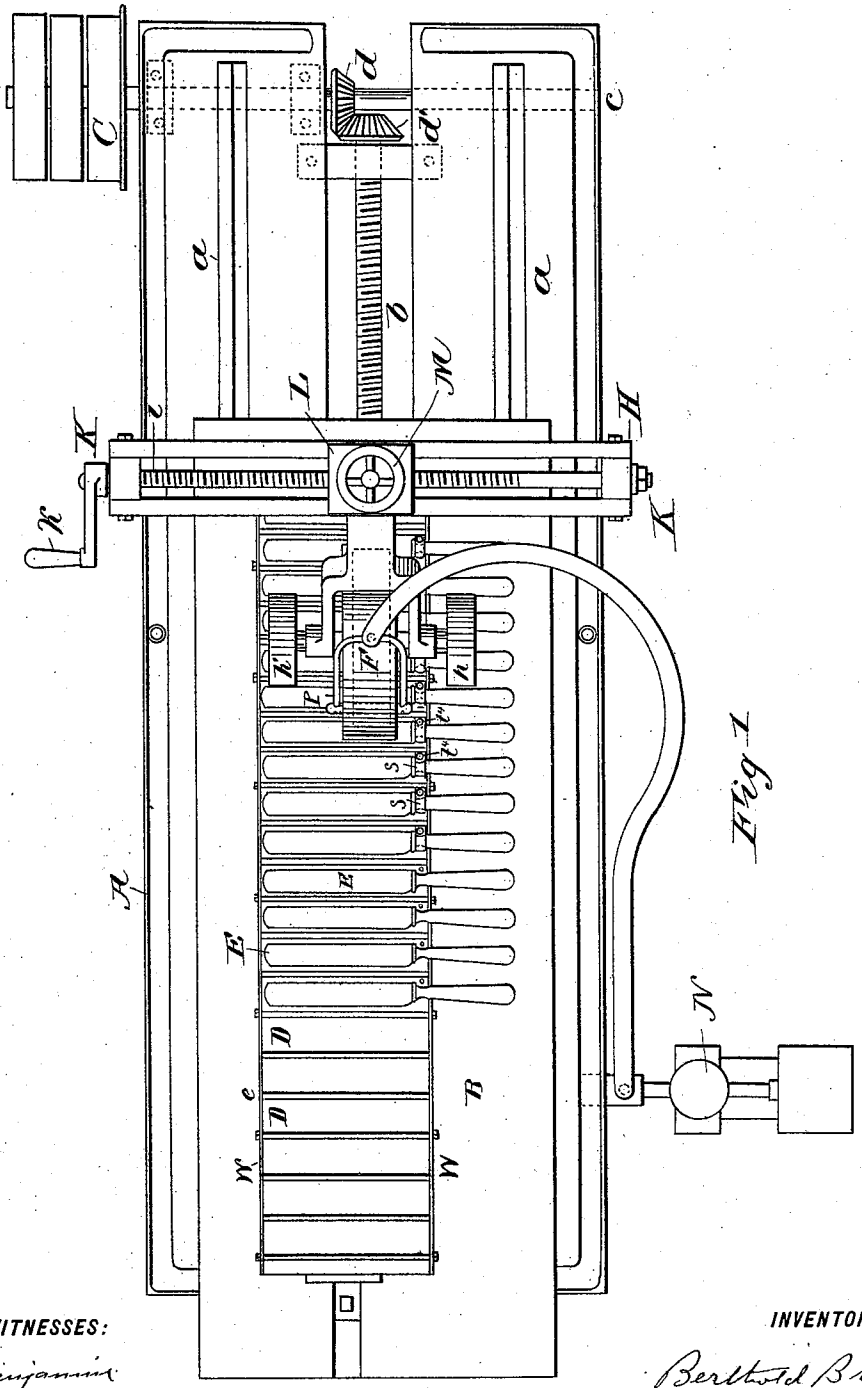

Fig. 1.

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CUTLERY GRINDING MACHINE.

No. 575,562. Patented Jan. 19, 1897.

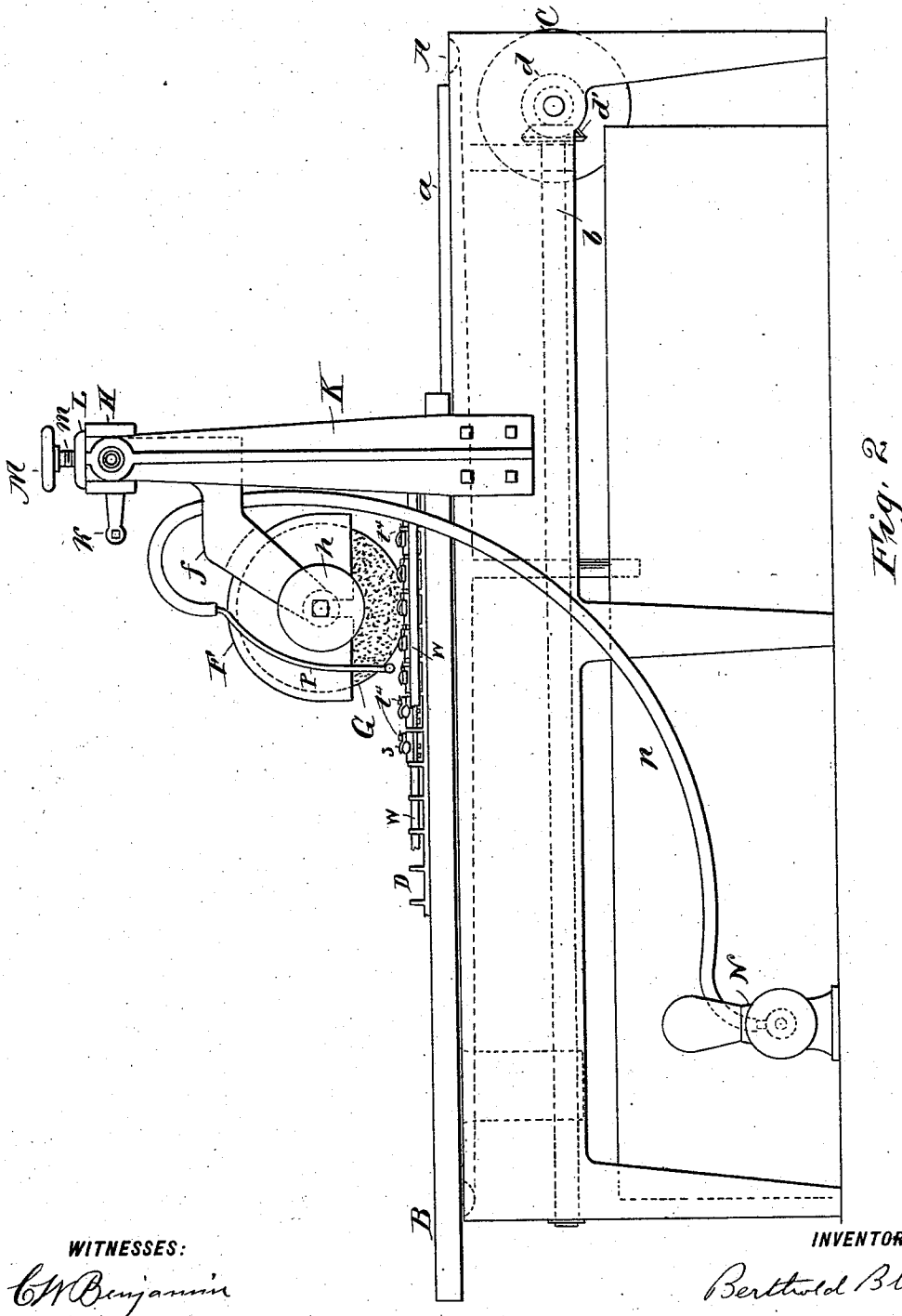

Fig. 2.

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CUTLERY GRINDING MACHINE.

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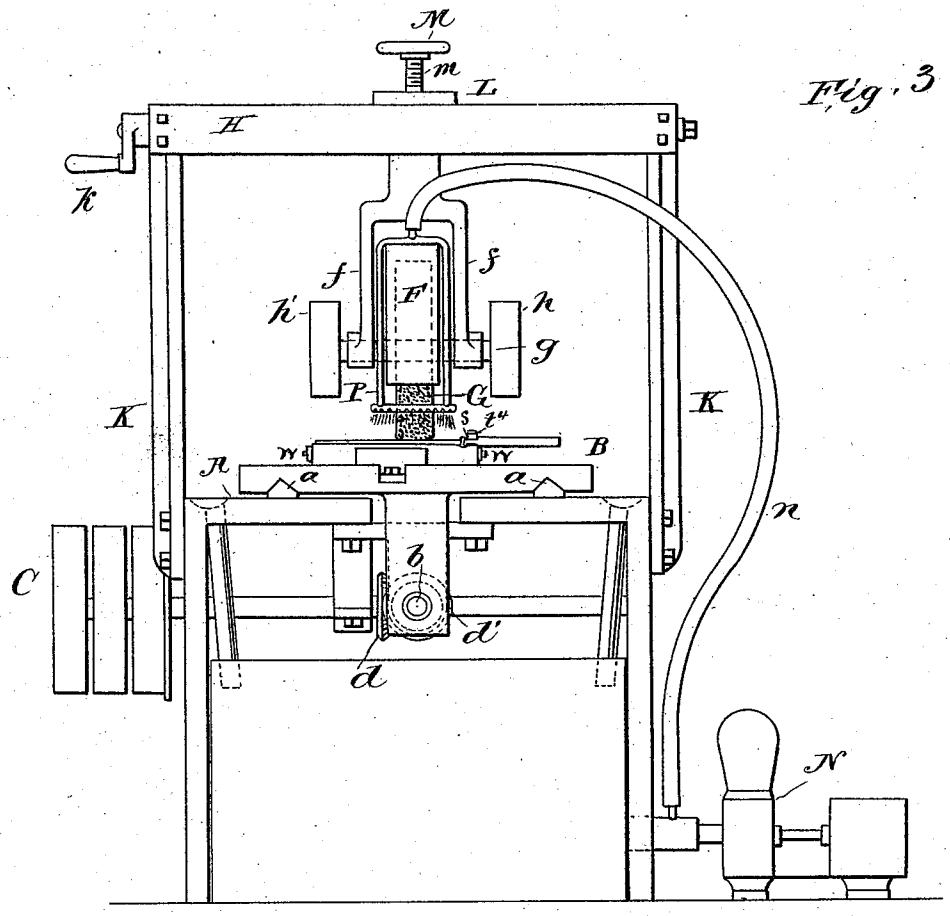

Fig. 3.

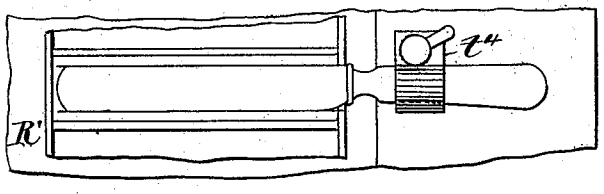

Fig. 12.

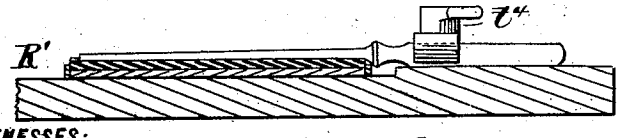

Fig. 13.

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Fig 4

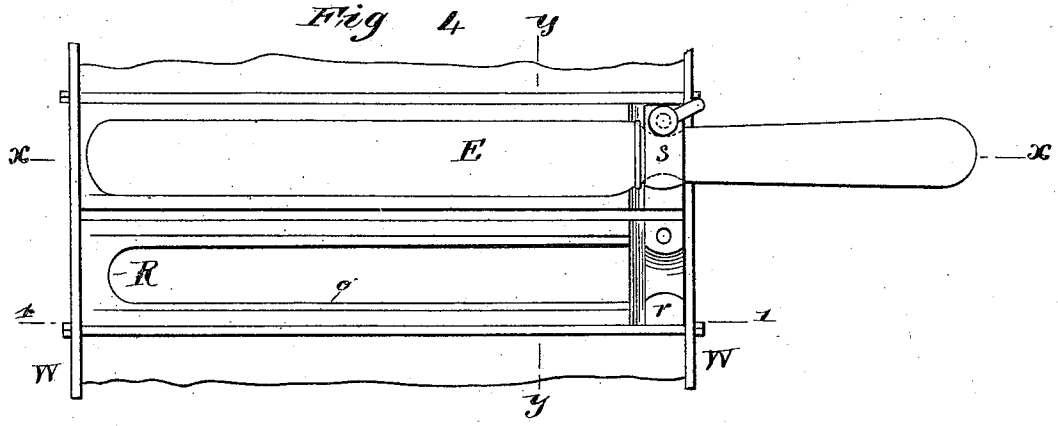


Fig. 5.

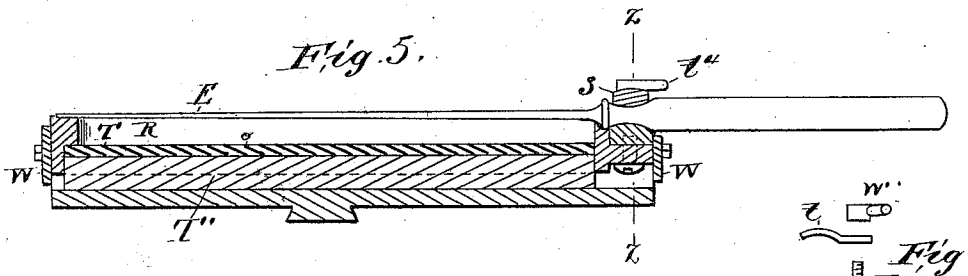


Fig. 10.

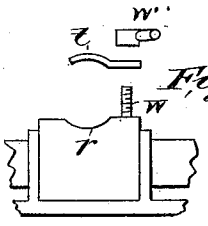


Fig. 6.

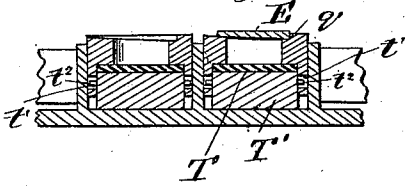


Fig. 8.

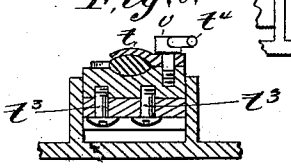


Fig. 7.

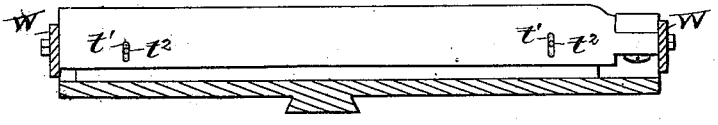
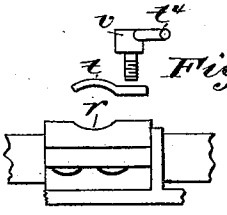


Fig. 9.



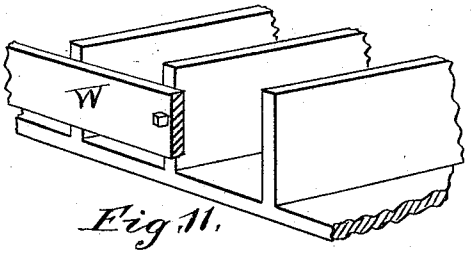


Fig. 11.

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BERTHOLD BLOCK, OF NEW ROCHELLE, NEW YORK, ASSIGNOR TO SYLVAN E. BIER, OF NEW YORK, N. Y.

CUTLERY-GRINDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 575,562, dated January 19, 1897.

Application filed December 24, 1895. Serial No. 573,184. (No model.)

To all whom it may concern:

Be it known that I, BERTHOLD BLOCK, a citizen of the United States, and a resident of New Rochelle, in the county of Westchester and State of New York, have made certain new and useful Improvements in Cutlery-Grinding Machines, of which the following is a specification.

The object of my invention is to provide a grinding-machine for knives, scissors, and other articles of cutlery and similar things whereby a considerable number of such things can be treated rapidly and effectively, instead of requiring the individual treatment under hand guidance, as has heretofore been the case. Grindstones driven by power have been heretofore employed, the operative holding the tool to be sharpened or ground against the grinding-surface. Sharpening-machines wherein a number of knives may be sharpened have also been employed.

The problems of grinding and polishing and of simple sharpening are quite distinct from each other and need quite different mechanism and adaptation of means to the desired end. This arises from the fact that in sharpening the blade of a knife, chisel, scissors, or other tool only the edge on one or both sides has to be treated, while in grinding and polishing the entire surface has to be reduced to give the blade the desired configuration and thickness, as well as to prepare its surface for plating by the electrodeposition of silver or other metal.

My invention, while applicable to the simpler forms of grinding and polishing where the thing to be ground has previously almost acquired its desired shape and polish, is more particularly intended for the treatment of table-knives recently forged. When such knives come from the forge, they are rough, unsightly, and with little or no sharpness, and consequently are considerably thicker than desired for use. Such knives, speaking generally, are of two kinds—those in which the blades are too thick, but already tapered to an approximate edge, and those which are of substantially uniform thickness. The former have to be uniformly reduced by grinding until the desired polish and sharpness are secured. The latter have to be reduced more toward one edge than the other, so as to secure the desired taper to the blade both from the rear to the front edge and from the handle to the tip. All this grinding, however, is practically level, as compared with the surface of the grinder, so that the difference in the mechanical operation consists in the means for presenting and sustaining the article to be ground and not in the angle of presentation. In simple sharpening, on the other hand, the angle of presentation becomes the important feature. I accomplish these objects by constructing a grinding-machine which has a properly-supported revolving grinder, which may be of a width the full length of the blade to be ground or less, if desired. In some cases there is an advantage in having it of greater width than said length. It contains, of course, proper mechanism for imparting the desired revolution to said grinder and in the case of a narrow grinder means for reciprocating or oscillating said grinder laterally, so that every portion of the surface to be ground may be reached. In table-knives the blade generally rounds out toward the bolster, and it is therefore desirable to have the edges of the grinder correspondingly rounded.

This grinding-machine is also supplied with mechanism for moistening the grinder and the knives, and the latter are carried on a transversely-channeled traveling bed, which is moved by suitable mechanism under the grinder continuously or intermittently, according to the character of the grinding-surface. Where the grinder is of full width, the motion of the bed may be continuous, as the whole surface of the knife-blade is acted on at once, and no lateral motion of the grinder is necessary. Where the grinding-surface is less than full width, lateral motion becomes necessary, and the motion of the traveling bed is therefore intermittent.

If the problem were simply that of sharpening, the successive knife-blades might be rigidly held at the desired angle; but as the problem involves the reduction to a predetermined point of irregularly-roughened surfaces the knife-blade cannot be rigidly presented, but must have a sufficient yielding pressure to enable the grinder to accommo-

date itself to the varying conditions presented by the successive knives or the successive portions of the same knife.

In the accompanying drawings I have illustrated two convenient ways of imparting this yielding pressure to the knife-blade and have shown the machine as mechanically adapted to the grinding of table-knives. The principles therein illustrated can readily be applied to the treatment of scissors, chisels, and other tools which have to be ground and polished without departing from the spirit of my invention.

Figure 1 is a top plan. Fig. 2 is a side elevation. Fig. 3 is an end view. Fig. 4 is an enlarged detail of the knife as arranged in the traveling bed. Fig. 5 is a section on line *y y* of Fig. 4. Fig. 6 is a section on line *z z* of Fig. 5. Figs. 7, 8, 9, and 10 show different forms of the knife-clamping device. Fig. 11 is a perspective view of part of the traveling bed. Figs. 12 and 13 illustrate a modification of the way of clamping the knives.

Same letters indicate similar parts in the different figures.

A is the frame of the machine.

B is the traveling bed, adapted to move on the tracks *a a* under the operation of the worm-shaft *b*.

C is the driving-pulley, operated by belting from a source of power. (Not shown.) This pulley is mounted on the driving-shaft *c*, which carries the beveled gear *d* and is journaled in the framework. This gear meshes with the beveled gear *d'*, which is mounted on the worm-shaft *b*, also journaled in the framework and operating the traveling bed B, as before stated. This traveling bed is provided with a series of transverse channels D, separated from each other by the partitions *e e* and preferably simple straight channels somewhat wider than the knife-blade which is to be inserted therein.

E E show a series of table-knives of ordinary construction inserted in the machine ready to be ground and polished.

G is the grindstone, provided with the usual cover F (see Fig. 2) and mounted on the arms *f f* by the shaft *g*. Revolution is imparted to this grindstone through the pulleys *h h'* (see Fig. 3) on the ends of the shaft *g*, the same being connected by belting with a source of power. (Not shown.) The arms *f f*, and through them the grindstone, are supported by the frame H, secured to the framework of the machine A, and preferably in such a manner that they may be caused to travel laterally, when desired. The means which I have shown for this purpose are the worm-screw *l*, journaled in the framework H and turned by the handle K, said worm-screw being threaded through the block L, to which said arms *f f* are rigidly attached.

The block, and with it the grindstone, may be raised and lowered, if desired, by the hand-wheel M in any usual and convenient manner, such as the worm-screw *m*, (see Fig. 3,) which is threaded through a suitable bearing (not shown) in the frame H.

As before stated, the edges of the grindstone G are preferably rounded off to adapt it to grind the portion of the blade next the bolster.

N is a pump by means of which a water spray (see Fig. 3) may be discharged through the pipe *n* and spraying device P upon the blades being ground immediately behind the grindstone. This situation of the spraying device enables the operator to keep the machine from getting clogged by the particles of emery-dust formed during the grinding process.

As before stated, the knives should be inserted in the channels D and held therein in such a way as to present a substantially level grinding-surface to the grinder and yet have sufficient power of yielding to enable the grinding to adapt itself to the different kinds of work required. The details of two forms of such yielding support will now be described.

I have found that the most effective way of placing the knives in the channels is to have the knives attached to a spring-cushioned chuck of suitable size and shape before they are put in the channel, so that the knife and its corresponding chuck may be placed in and removed from the channel as a unit. In this construction the chuck R (see Fig. 4) is a piece of wood, metal, or other suitable material of about the length and width of the channel and so adapted in its height at various portions that the knife-blade will project above the partitions *e e* the required distance for satisfactory grinding and polishing. This chuck is hollowed out at one end, as shown at *r*, Fig. 10, so as to receive the bolster *s*, Fig. 4, of the knife-handle, and is provided with a clamp *t*, secured thereto by the removable screw *v*, Fig. 9, or bolt and nut *w w'*, Fig. 10.

It will be readily seen that by turning the clamp *t* over the bolster of the knife-handle the knife may be firmly secured to the spring-cushioned chuck R without affecting the natural springiness of the blade. Further, not to interfere with the natural springiness of the blade the surface of the chuck is hollowed out, as shown at *o*, Fig. 4.

As before stated, that portion of the upper surface of the chuck on which the blade is to rest must be adapted to conform to the various thicknesses of the knife-blade. The blade being thinner toward the tip than toward the bolster it follows that the surface of the chuck must approach the top of the partitions, dividing the channels more closely at the inner than at the outer end. As the back of the blade is thicker at all points than the edge it follows that the surface of the chuck on the corresponding side should be lower than on the knife-edge side. This is true whether the chuck is to be used for a knife-blade which is already shaped or one

of uniform thickness which requires to be shaped in the grinding. The divergence of lines is clearly shown in Figs. 5 and 6, the right-hand channel in the latter figure containing a knife and the left-hand one not, the side for the knife-edge and the top of the wall for the back of the blade being substantially on the same level.

The under side of the chuck is hollowed out, as shown in Fig. 6, so as to receive a spring-cushion, by means of which the upper surface of the knife-blade is held up against the grinder with a yielding pressure derived from the bottom of the channel. This spring-cushion may be a block of rubber T, Fig. 6, or a spiral spring or any other convenient form of spring-cushion. The sides of the chuck may be slotted, as shown at t', Fig. 7, and a metal block T', provided below the cushion with pins t^2, engaging with said slot, or the cushion may be connected with the chuck in some other convenient manner.

The clamping device before described may, if desired, be detachably connected with the chuck, as shown in Figs. 5, 7, 8, and 9, instead of rigidly attached by means of the screws t^3 t^3. A rigid attachment, however, will ordinarily be sufficient, as the chuck can readily be made strong enough not to break at that point.

It will be readily seen that by associating the knife and the spring-cushioned chuck together before putting them in the machine the time of changing knives is diminished to the time necessary to pull one knife out and to thrust another knife into the channel.

A simpler form of chuck, but one which is not designed for attachment to the knife before insertion in the machine, is shown in Figs. 12 and 13. The chuck R' is a simple piece of wood, metal, or other suitable material properly shaped on its upper surface to meet the requirements of grinding, as before explained, and is of proper length and width to slip into the channel, where it rests upon the spring-cushion, which in this case is not necessarily attached to the chuck, but rests upon the bottom of the channel. The cushion might be dispensed with, but the work would not be as satisfactory either in result or in time consumed. In this simpler form of chuck the chuck remains in the channel and the knife only is removed and replaced, and I therefore provide an individual clamp t^4 for each knife, which secures the handle to the bed itself instead of to the chuck.

W, Fig. 11, is a retaining-bar which partially covers or closes the open ends of the channels D at both ends and serves the double purpose of preventing the chucks from working out of the channels in operation and of strengthening the partitions. This bar preferably leaves an open space below it for the water and grit to work out of the channels and does not reach the top of the partition, as a certain space is necessary for the up-and-down play of the chuck and to allow for the thickness of the knife-handle.

Although, for the sake of clearness, the knives are shown in the drawings with their handles projecting all one way, it is evident that the knife will be inserted from the right or left side, according to the side of the blade which is to be ground. Economy in grinding can be effected by arranging the knives in pairs, so that the right and left sides of adjacent knives are ground simultaneously.

An advantage of having the grindstone oscillate during its revolution is found in the better finish of the knife, as such oscillation smooths out the marks which would be left by straight grinding.

In grinding, the knives should be so placed that the grinding takes place from the edge to the back. The back of the blade, therefore, should be supported against the tendency of the pressure from the grindstone to force it out of line. I therefore provide a shoulder q, Fig. 6, on that side of the chuck, against which the back of the blade may rest. If this shoulder is omitted, the knife will have to be placed upon the chuck in such a way that the back will be supported laterally by the partition between the channels.

I claim—

1. A grinding-machine for knives, cutlery and similar articles, which consists of a revolving grinder, mechanism for imparting revolution thereto and mechanism for supplying moisture thereto, a transversely-channeled traveling bed, spring-cushioned chucks inserted in said channels adapted to receive and support the articles to be ground in such way as to present a full grinding-surface to said grinder and mechanism for feeding said bed under said grinder, substantially as and for the purposes specified.

2. A grinding-machine for knives, cutlery and similar articles, which consists of a revolving grinder, mechanism for imparting revolution thereto and mechanism for supplying moisture thereto, a transversely-channeled traveling bed, spring-cushioned chucks suitably fitted to the shape of the blade of the article to be ground and adapted to be secured to said article and to be inserted in said channels and to hold said article therein in such way as to present a full grinding-surface thereof to said grinder and mechanism for feeding said bed under said grinder, substantially as and for the purposes specified.

3. In a knife-grinding machine, a spring-cushioned chuck provided with devices for securing the article to be ground thereto and provided with a level surface for supporting the edge of the article to be ground and a shoulder, against which the back of the blade is supported and with the upper surface of said chuck hollowed out below said shoulder, so as to present a tapering surface lengthwise of said chuck, substantially as and for the purposes specified.

4. In a knife-grinding machine, a spring-

cushioned chuck provided with devices for securing the article to be ground thereto and the top of which is hollowed out to receive a portion of the blade of the article to be ground in such way as to taper at one edge from tip to bolster and form a wall, against which the back of the blade can rest; the surface of said chuck on each side of said hollow being substantially at the same level, substantially as described and for the purposes specified.

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