

(No Model.)

4 Sheets—Sheet 1.

C. T. DAVIS.

ATTACHMENT FOR GRINDING MACHINES.

No. 461,567.

Patented Oct. 20, 1891.

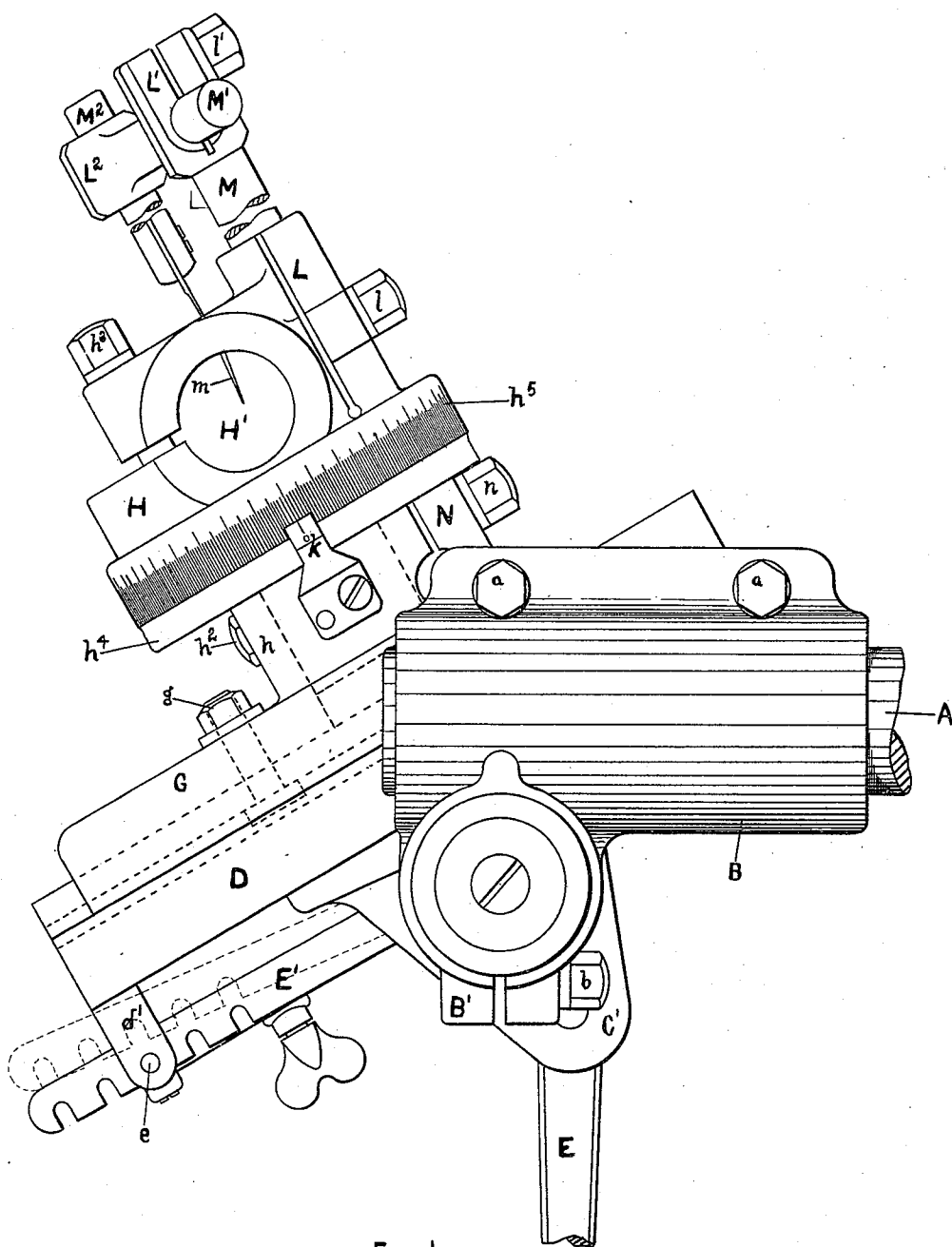


FIG. 1.

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(No Model.)

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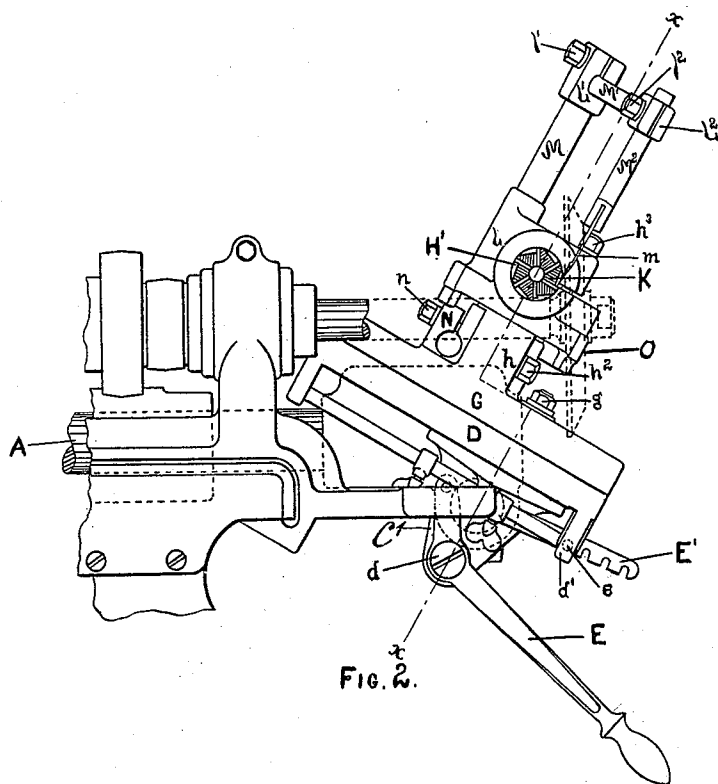


FIG. 2.

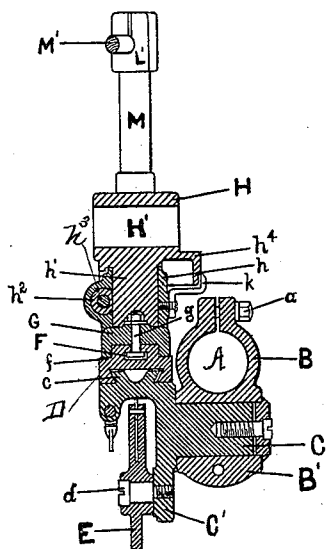


FIG. 3.

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(No Model.)

4 Sheets—Sheet 3.

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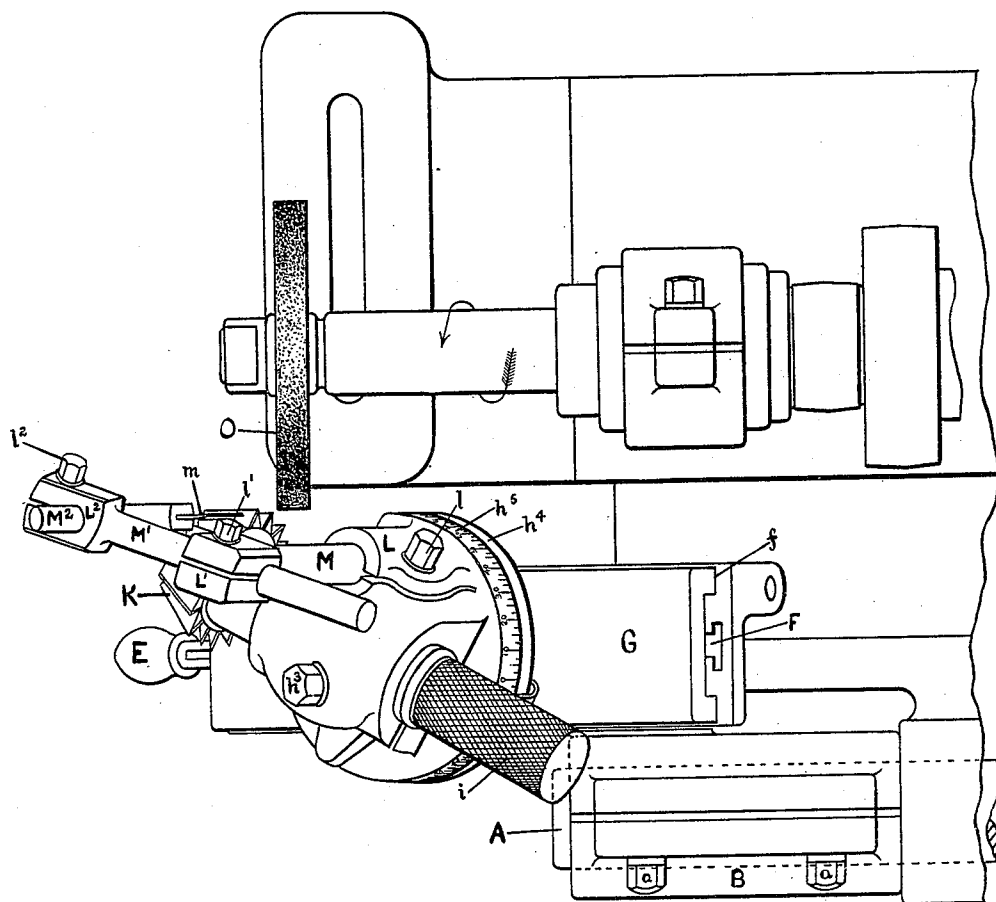


FIG. 4.

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(No Model.)

4 Sheets—Sheet 4.

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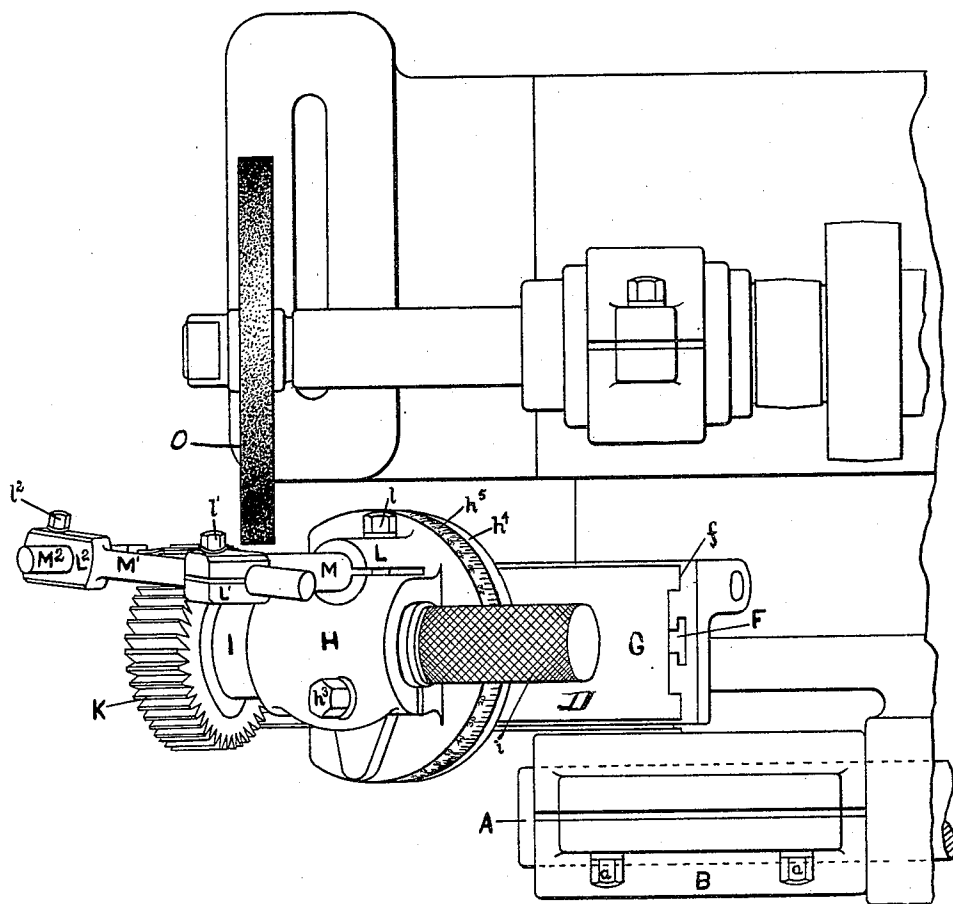


FIG. 5.

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UNITED STATES PATENT OFFICE.

CHARLES T. DAVIS, OF PROVIDENCE, RHODE ISLAND, ASSIGNOR TO THE
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ATTACHMENT FOR GRINDING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 461,567, dated October 20, 1891.

Application filed July 24, 1890. Serial No. 359,772. (No model.)

To all whom it may concern:

Be it known that I, CHARLES T. DAVIS, of the city and county of Providence, in the State of Rhode Island, have invented certain new and useful Improvements in Attachments for Grinding-Machines; and I do hereby declare the following specification, taken in connection with the accompanying drawings, forming a part of the same, to be a full, clear, and exact description thereof.

My invention relates to an attachment for holding cutting-tools, and particularly what are known as "milling tools or cutters," and presenting the cutting-teeth thereon in proper position to the action of a grinding-wheel to sharpen or grind said teeth.

The object of the invention is to furnish an attachment which shall be capable of all necessary adjustments and which shall possess the capacity to so present the teeth on all the various forms of mills or cutters that said teeth will be carried past the periphery of the grinding-wheel in a line of motion at an angle to the axis of said grinding-wheel, and thereby render possible the employment of a grinding-wheel of comparatively large diameter with all the beneficial effects and advantages resulting therefrom.

To that end the invention consists in the combinations and arrangements of parts hereinafter described, whereby the desired objects may be secured.

Attachments for enabling the desired results to be attained in the case of certain classes of mills and cutters have been heretofore devised and employed—such, for instance, as the attachment which forms the subject of Letters Patent No. 359,943, dated March 22, 1887, granted to George H. Smith. The attachment exhibited in said Smith patent, however, is only adapted for holding and presenting to be ground with a large grinding-wheel the teeth of end mills or the side teeth of side mills, and is not adapted to hold and present the teeth upon the periphery of a mill or the teeth of bevel-cutters. With my improved attachment the teeth on all these forms of mills can be presented and passed by the periphery of the grinding-wheel at the proper angular line of motion and a large grinding-wheel be employed in all cases.

Referring to the drawings, Figure 1 is a front view of my improved attachment. Fig. 2 is a rear view of the attachment upon a smaller scale, the grinding-wheel and a portion of its arbor being shown in dotted lines. Fig. 3 is a transverse section on the line $x x$ of Fig. 2. Fig. 4 is a top view of the attachment, showing the parts in proper position for grinding the teeth of a bevel-mill; and Fig. 5 is a top view of the attachment, showing the parts in the proper position for grinding the teeth upon the periphery of a mill.

A is a rigid bar, which runs along the front of the grinding-machine, upon which the attachment is mounted and upon which it may be adjusted. The attachment is provided with a split collar B, adapted to surround the bar A and to be clamped thereon by the clamp-screws $a a$. By loosening these clamp-screws it is evident that the attachment may be adjusted in position lengthwise of the bar A, and also that it may be adjusted or swung around the bar, so as to occupy different angular positions thereon. The collar B is also provided with a split projection B', in which is mounted the hub C of a frame or support C'. The hub C is so mounted in the projection B' that the frame C' can be adjusted angularly with relation to the bar A, and be held in any adjusted position by clamping the two portions of the split projection B' upon the hub C by means of the clamp-screw b . The frame C' is of approximately inverted-L shape in cross-section, as shown in Fig. 3, and upon its upper side is formed a dovetail guide or ways c . Mounted upon the frame C' and so as to slide upon the ways c is a sliding bed D, which is adapted to be moved backward and forward by means of a bell-crank lever E, which is pivoted to the lower end of the frame C', as at d . To the upper end of the bell-crank lever E is pivoted one end of an arm E', the opposite end of which is formed on its under side with a series of notches, as shown in Figs. 1 and 2. Extending downwardly from the sliding bed D is a projection d' , through a slit in which works the free end of the arm E', a pin e extending across the slit in such manner as to be engaged by one of the notches in the arm E'. By the connection described the bed D may

be moved back and forth by means of the lever E, the position of travel of the bed D being regulated by engaging one or the other of the notches with the pin *e*. The top of the sliding bed D is provided with a T-slot F and ways *f*. Upon the bed D is mounted an adjustable bed G, adapted to be slid along the ways *f*. The bed G is provided with a suitable T-bolt *g*, working in the T-slot in the sliding bed D, by means of which the adjustable bed G is clamped and held in any adjusted position. Projecting from the upper part of the adjustable bed G, and preferably made integral therewith, is a cylindrical socket *h*.

H is the tool-holder for holding the tool to be ground. This tool-holder H is provided with a hub or shank *h'*, which fits into the socket *h*, whereby said tool-holder, with the tool mounted therein, may be adjusted at any desired angle. The socket *h* is provided with a suitable clamping device *h²* for clamping the shank of the tool-holder and holding the latter in any adjusted position. The tool-holder H is also provided with a split socket *H'*, in which is mounted the tool-arbor I, to which the tool K is to be secured during the operation of grinding. The split socket *H'* is provided with a clamp-screw *h³* for bringing the socket to a close fit upon the arbor, but so as to permit the arbor to be turned therein by hand. The tool-holder H is also provided with a downwardly-extending hood or skirt *h⁴*, which serves to exclude dust and dirt from the shank *h'* and its bearing in the socket. Upon the face of this projection *h⁴* may be placed, if desired, a graduated scale, as at *h⁵*, which, in connection with the index-finger *k*, will serve to facilitate the operator in determining the angle at which to present the tool to the action of the grinding-wheel. The end of the tool-arbor I opposite that to which the tool to be ground is to be attached is preferably provided with a roughened surface, as at *i*, to be grasped by the operator in turning the arbor and the tool attached thereto to present successive teeth to the action of the grinding-wheel.

At the side of the tool-arbor socket and arranged at right angles thereto the tool-holder is provided with another split socket L, which is likewise provided with a clamp-screw *l*. In this socket L is secured a rod M, which is provided at its free end with a split socket *L'* and clamp-screw *l'*, in which socket *L'* is secured another rod M', standing at right angles to the rod M, and provided in turn at its free end with a split socket *L²* and clamp-screw *l²*. In the socket *L²* is secured another rod M², arranged at right angles to the rod M' and carrying at its free end a spring index-finger *m*. This index-finger *m* is so arranged as to bear against the face of the tooth to be ground, its purpose being to serve as a guide whereby the operator may locate and hold each successive tooth in the proper position to be acted upon by the grinding-

wheel. The purpose of the several bars and sockets for supporting said index-finger is to enable all possible or necessary adjustments of said finger to be made to enable it to properly gage the teeth of the various forms of mills or cutters for the grinding of which the improved attachment herein described is adapted. By the side of the socket *h* on the adjustable bed G and arranged at right angles to the socket *h* is another split socket N, with a clamp-screw *n*, in which the rod M may be secured when desired, and thereby enable the index-finger *m* to be presented in still different positions.

The operation of the mechanism in grinding a tooth upon a milling-tool and cutter after the parts have been properly adjusted for the particular form of mill or cutter to be ground is substantially the same as that of the attachment shown and described in the Smith patent above referred to, and will be readily understood by those conversant with the operation of devices of this general character.

By means of the construction and organization of parts hereinbefore described, with the resulting capacities for adjustment, it will be seen that any desired clearance of the teeth on the cutter can be secured, and also that each tooth can be carried past the periphery of the grinding-wheel O in a line of motion at any desired angle to the axis of the grinding-wheel, thereby enabling a grinding-wheel of comparatively large diameter to be employed. Furthermore, it will be seen that these results can be secured not only in grinding the teeth of end mills and the side teeth of side mills, but also in grinding the teeth upon the periphery of a mill and the teeth of bevel-cutters as well. Thus the tool-arbor can be adjusted to occupy the position shown in Fig. 2, in which position the teeth of an end mill or the side teeth of a side mill will be properly presented to the action of the grinding-wheel. If it be desired to grind the teeth of a bevel-cutter, the tool-holder, by unclamping its shank, so that it can be turned in the socket *h*, may be adjusted so that the tool-arbor will occupy the position shown in Fig. 4, in which position the teeth of a bevel-cutter will be properly presented to the action of the grinding-wheel, the shank of the tool-holder being clamped in its adjusted position. Again, if it be desired to grind the teeth upon the periphery of a cutter the tool-holder, its shank being unclamped for the purpose, may be adjusted so that the tool-arbor will occupy the position shown in Fig. 5, in which position the teeth upon the periphery of a cutter will be properly presented to the action of the grinding-wheel. In all cases the tooth to be ground can be carried past the periphery of the grinding-wheel in any desired angular line of motion, and any desired clearance of the teeth may be provided for.

By means of the adjustable bed G the position of the tool-holder may be adjusted

lengthwise of the attachment and secured by means of the clamping T-bolt in any adjusted position relatively to the grinding-wheel.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a grinding-machine attachment provided with means for attaching it to a grinding-machine, the combination of a frame or support capable of angular adjustment with relation to the axis of the grinding-wheel, and a sliding bed arranged to slide upon said frame or support and carrying a tool-holder capable of angular adjustment with relation to the line of travel of said sliding bed, whereby the teeth of various forms of cutters may be properly presented to the action of the grinding-wheel in any desired angular line of motion, substantially as described.

2. In a grinding-machine attachment, the combination, with a collar adapted to be secured to a supporting-bar and capable of angular adjustment thereon, of a frame or support pivotally attached to said collar and capable of angular adjustment with relation thereto, and a sliding bed arranged to slide upon said frame or support and carrying a tool-holder capable of angular adjustment with relation to the line of travel of said sliding bed, whereby the teeth of various forms of cutters may be properly presented to the action of the grinding-wheel in any desired angular line of motion and with any desired clearance, substantially as set forth.

3. In a grinding-wheel attachment, the combination, with a collar adapted to be secured to a supporting-bar and capable of adjustment thereon, of a frame or support pivotally attached to said collar and capable of angular

adjustment with relation thereto, a sliding bed arranged to slide upon said frame or support and carrying a tool-holder capable of angular adjustment with relation to the line of travel of said sliding bed, and a lever for operating said sliding bed to carry the tool-holder and the tool supported thereby past the periphery of the grinding-wheel, substantially as described.

4. In a grinding-wheel attachment, the combination, with a collar adapted to be secured to a supporting-bar and capable of adjustment thereon, of a frame or support pivotally attached to said collar and capable of angular adjustment with relation thereto, a sliding bed arranged to slide upon said frame, an adjustable bed mounted upon said sliding bed, and a tool-holder mounted upon said adjustable bed and capable of being turned angularly with relation thereto, substantially as described.

5. In a grinding-wheel attachment, the combination, with a collar adapted to be secured to a supporting-bar, of a frame or support pivotally attached to said collar and capable of angular adjustment with relation thereto, a sliding bed arranged to slide upon said frame, an adjustable bed mounted upon said sliding bed, a tool-holder mounted upon said adjustable bed, a lever for operating said sliding bed and the parts mounted thereon to carry the tool-holder past the periphery of the grinding-wheel, and an adjustable index-finger for gaging the position of the tooth to be ground, substantially as described.

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Witnesses:

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