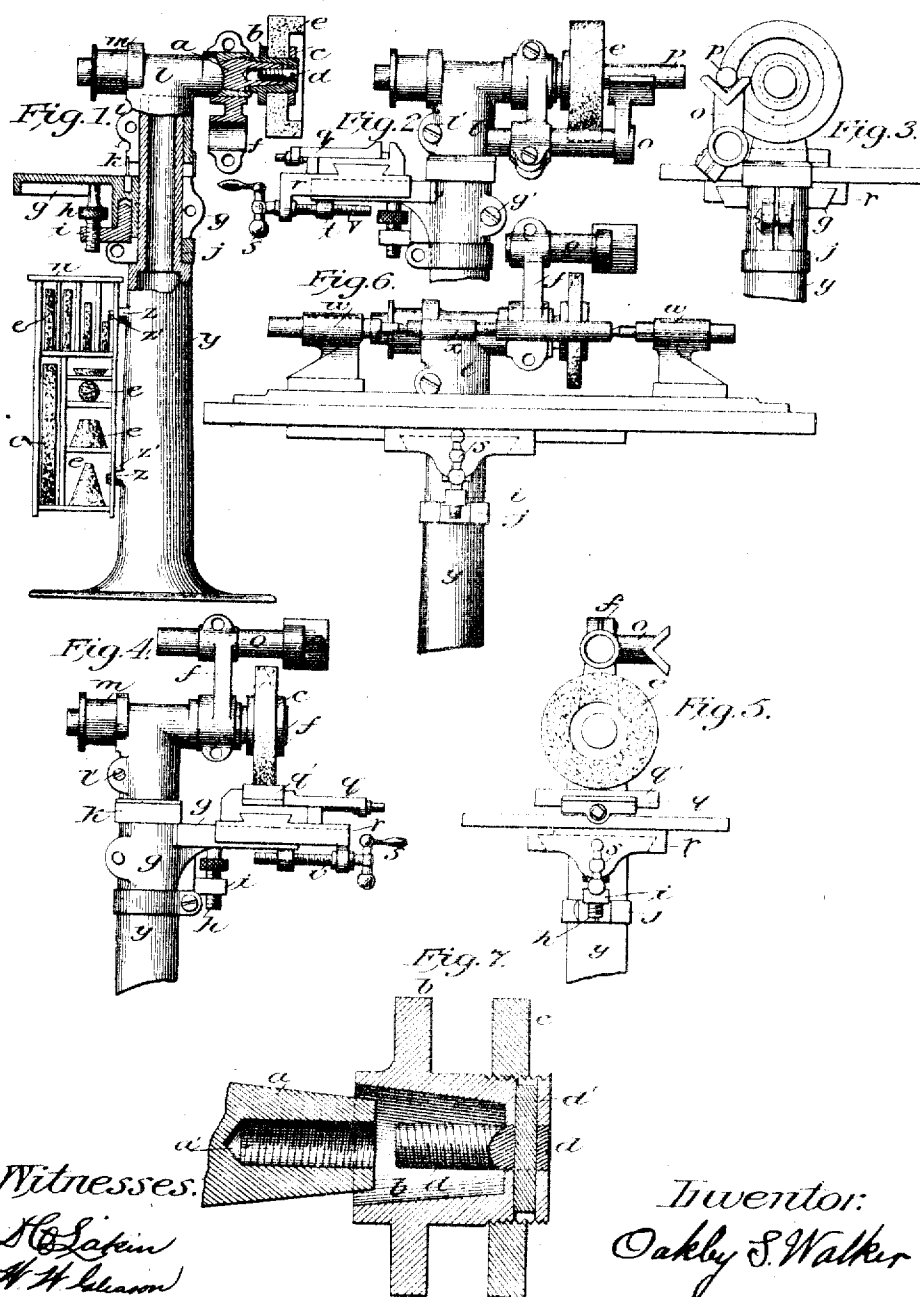


(No Model.)

O. S. WALKER.
GRINDING MACHINE.

No. 481,380.

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Witnesses:
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OAKLEY S. WALKER, OF WORCESTER, MASSACHUSETTS.

GRINDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 481,380, dated August 23, 1892.

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To all whom it may concern:

Be it known that I, OAKLEY S. WALKER, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented a new and useful Grinding-Machine, of which the following is a specification.

My invention relates more especially to tool-grinding machines of that class known as "universal tool-grinders;" and the object is to produce a machine especially adapted for a large variety of grinding operations with rapid changes from one kind of work to another.

To this end my invention consists of the various arrangements of tool-holding supports, interchangeable grinding-wheel collets, and other novel mechanism hereinafter more fully described.

Modern mechanical practice has demonstrated that the best results can be obtained in grinding operations by employing a wide range of grades and special shapes of grinding-wheels—as, for instance, a coarse grade-wheel could be best employed for shaping and roughing out work and a finer grade is more suitable for finishing, and where the machine is used for a variety of operations and in grinding metals of different kinds and various contours it is found desirable to employ grinding-wheels that are especially adapted for the work in hand.

As it is found impracticable to employ a multiple-spindle grinding-machine with all the required shapes, sizes, and grades of grinding-wheels ready mounted for instant use, a single-spindle grinding-machine adapted for rapid changes of emery-wheels and tool-grinding attachments is demanded. It is also necessary in changing the various grinding-wheels to and from the grinding-spindle that they may not only be changed quickly, but that they should also run true and be in balance.

These and other desirable features in a grinding-machine not being hitherto satisfactorily attained, the object of the invention, fully shown and described further on, will be set forth.

Referring to the drawings, Figure 1 is a part elevation and part section through the center of the machine, showing the detachable grinding-wheel case, one of the interchangeable

wheel-collets, and the swinging tool-holding supports and their adjusting mechanism. Fig. 2 is an elevation of the upper portion of the machine with the column broken away and shows two different tool-grinding attachments mounted on the supports, one of which is swung around out of the way while the other is in use. Fig. 3 is a view of Fig. 2, but at right angles to the same. Fig. 4 is an elevation of the upper portion of the machine similar to Fig. 2, except that the positions of the tool-grinding attachments are reversed—i. e., a different attachment being shown in use. Fig. 5 is a view of Fig. 4, but at right angles to the same. Fig. 6 is an elevation of the top part of the machine similar to Fig. 4, but shows a reamer-grinding attachment in place and the supporting-tool holder swung into a new position. Fig. 7 is an enlarged section of one of the interchangeable collets and one end of the grinding-wheel spindle, a portion being broken away.

Similar letters refer to similar parts throughout the several views.

g is the main supporting-column of the machine, upon which is mounted the swinging tool-holding support *g*, the swivel clamp-collar *j*, and the cap-piece *l*, which supports the grinding-spindle *a* and the upper mechanism of the machine. The tool-holding support *g* has a vertical adjustment upon the column by means of the milled screw *h*, the threaded portion of which works in the angular nut *i* and raises the tool-holding support by working in contact with the under side of the same. When the required position is obtained, clamping-screw *g'* is tightened and the support gripped firmly to the column. When the screws *h* and *g'* are slackened off, the tool-holder descends by its own gravity. One arm of the angular nut *i* is cylindrical in shape and is made to slide in the screws bored in the hub of the tool-holding support *g* parallel to the line of its vertical adjustment. The bottom part of the said nut is held in a recess in the top of the clamp-collar *j*, which may be clamped in any position by means of the screw shown, one side of the collar being cut apart.

It is obvious that the aforesaid angular nut performs the functions of a dowel or feather key, keeping the clamp-collar and the tool-holding support from swinging about the column except in unison, but at the same time

allowing them to approach or recede from each other longitudinally, the bottom of the angular nut being kept in contact in the aforementioned recess by the gravity of the tool-holding support. Also, when the collar *j* is clamped rigidly to the column the tool-holding support *g* may be vertically adjusted; but any tendency to move in a horizontal direction is prevented by the aforesaid nut recessed into both clamp-collar and tool-holding support. This is an important feature when it is desired to vary the vertical adjustment during a grinding operation when the slightest horizontal swinging movement would disturb the contact of the grinding-wheel with the work being operated upon—as, for instance, in the operation shown in Fig. 6.

n is the spindle-driving pulley, and *e* one of the grinding-wheels. *b* is one of the interchangeable collets and includes the screw-threaded washer *c* for holding the grinding-wheel in place and the centrally-fastened holding-screw *d*, held in place in the collet by a pin *d'*. The collet *b* is provided with an internally-tapered recess to fit the tapered end of the grinding-wheel spindle *a*, which in turn is provided with an internally-threaded central recess *a'* for the reception of the screw *d*, which holds the collet in place when mounted on the spindle *a*. Each collet being made precisely alike, they are thus interchangeable on the spindle and are sure to run true each time. A grinding-wheel being once mounted upon one of the collets may remain until worn out and be repeatedly adjusted upon the spindle and removed therefrom by a rotatory movement of the hand of the operator, who grasps the periphery of the grinding-wheel with one hand when at rest and by rotation screws it on or off at pleasure. The friction on the periphery of the wheel in grinding tends to screw the collet more firmly in place. Thus is made possible a rapid change of grinding-wheels and improved results are obtained.

f represents another tool-holding support arranged to swing about the projecting spindle-box on the cap-piece *l*. It will be noticed that the tool-holding support *g* swings in a horizontal plane, while tool-holding support *f* swings in a vertical plane. By this arrangement two tool-grinding attachments can be adjusted in place on the machine at the same time, as in Figs. 2, 3, 4, 5, and 6, one attachment being swung around out of the way while the other is being used, thus effecting a saving in the time of removing or adjusting the same.

The tool-grinding attachment *O* is an open V-shaped holder, and is designed for squaring the ends of punches, taps, and reamers, or any similar work.

In Figs. 2, 3, 4, and 5 are shown a slide and vise mounted upon the tool-holding support *g*, the vise *q* holding a piece of work *q'* in position for grinding the top surface of the same.

In Fig. 6 is shown an attachment for grind-

ing fluted reamers, one of which is represented held between centers by the sliding heads *w w'*.

In Fig. 1, *u* is the detachable grinding-wheel case held in place on the column *g* by the screws *z z'*, *z z'* being bosses on the column *g*. The advantages of the detachable grinding-wheel case *u* lie in the fact that it can be attached to the machine at pleasure, or it may be placed upon a bench or in any other convenient place.

The tool-holding supports *g* and *f* are each provided with clamping-screws, which pass through split hubs in the supports, as indicated.

In the wheel-case *u* are shown a variety of shapes of grinding-wheels, each of which is intended to be provided with an interchangeable collet. To avoid confusion in the drawings, the collets are not shown attached to the wheels in this case.

It will be seen by the foregoing that the system of swinging tool-holding supports shown accomplishes the improved result of enabling any two tool-holding attachments most in demand to be mounted upon the machine simultaneously and alternately brought into position in a rapid manner or much quicker than they could be removed from the machine and replaced.

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

1. In a grinding-machine, a suitable grinding-wheel arbor, a supporting-column, a tool-holding support arranged to swing about said column and to be vertically adjusted thereon and clamped at any point of its adjustment, combined with a clamping-collar mounted on the said column adjacent to the tool-holding support, and an angular nut fitted to recesses in both tool-holding support and clamping-collar to prevent a swinging movement of either except in unison with the other, but allowing a separate vertical adjustment of the tool-holding support, substantially as shown and described.

2. In a grinding-machine, the combination of interchangeable grinding-wheel collets and a grinding-wheel arbor suitably arranged and mounted in journal boxes, with a vertically-swinging tool-holding support swinging around and upon one of the journal-boxes and arranged to be fixedly clamped at any point, for the purpose set forth.

3. The combination of a suitable supporting-column and a grinding-wheel arbor mounted thereon, with interchangeable grinding-wheel collets provided with internally-tapered recesses at one end and internally-threaded recesses at the other end for the reception of a central fastening-screw, as fully set forth.

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