

Patented Oct. 4. 1870.

This perspective view shows the machine's components. A large circular disk (1) is mounted on a central vertical shaft (2). The shaft is supported by a bracket (3) that can be adjusted along the shaft's length. The bracket is secured by a screw (4) and a nut (5). The entire assembly is mounted on a base (6) that has a central vertical opening and a decorative, flared bottom. A small screw (7) is visible on the base's side.

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UNITED STATES PATENT OFFICE.

EDWARD S. M. FERNALD, OF SACO, MAINE.

IMPROVEMENT IN KNIFE-GRINDING MACHINES.

Specification forming part of Letters Patent No. **107,894**, dated October 4, 1870.

To all whom it may concern:

Be it known that I, EDWARD S. M. FERNALD, of Saco, of the county of York and State of Maine, have invented a new and useful Machine for Grinding Knives or various other Articles; and I do hereby declare the same to be fully described in the following specification and represented in the accompanying drawings, of which—

Figure 1 is a top view, Fig. 2 a rear elevation, Fig. 3 an end view, Fig. 4 a longitudinal section, and Fig. 5 a transverse section, of it.

The machine is specially intended for grinding or sharpening planing or leather-splitting machine knives, or various others requiring to be ground with a perfectly straight cutting-edge having a uniform bevel. The common process of grinding such knives by a revolving stone, the knife being held in the hands of a person and guided thereby to the stone, must necessarily be very uncertain or inaccurate, as well as tedious, a long experience being requisite to effect even a close approximation to accuracy in the formation of knife-edge by such means. With my machine the guiding or reduction of a knife-blade as required is effected automatically with great certainty, and requires little attention on the part of an operative when in charge of the machine.

In the drawings, a knife is shown at A as fixed on the upper surface of a long bed, B, having at its opposite ends two cylindrical journals to rest in two movable carriages or boxes, C C. This bed has a dovetailed groove, *a*, extending longitudinally through it and from its upper surface, such groove being to receive the heads of a series of screw-bolts, *b b*, which, with nuts *c c c*, are employed to fasten the knife down upon the bed. The groove admits of the bolts being moved or adjusted to the back slots, *d*, of any knife, however they may differ in distances apart with respect to those of any other such knife.

The two carriages or boxes C C are supported by and in two dovetailed and parallel rails or ways, D D, which in turn rest on and are secured to two arms or brackets, E E, projecting horizontally from and at right angles to the frame F, which is designed to support the main operative parts of the machine.

Adjusting-screws G G, applied to the ways D D and the boxes C C, serve to effect the movements and to determine the positions of the latter on the ways. By such screws an attendant on the machine will be enabled to advance or retire the knife relatively to the grinding-wheel or grinder, as occasion may require. The said grinder (shown at H) is a wheel having its periphery covered with emery. The shaft *e* of the grinder is tubular, and is supported in bearings in a frame or carriage, I, arranged in and so as to traverse upon a dovetailed rail, K, provided with a long slot, *f*, arranged in it in manner as shown in the drawings.

A long shaft, L, whose journals are sustained in boxes *g g* at the tops of standards *h h*, arranged as represented, extends through the bore of the grinder-shaft, the two shafts being provided with what is termed a "feather-connection," which consists not only of a groove formed lengthwise on the shaft L, but of a projection from the guide-shaft to enter such groove. The shaft L, at or near one end, is furnished with a "fast" pulley, *i*, and a loose pulley, *k*. It also has fixed in it, near its opposite ends, two grooved pulleys or wheels, *l m*, of equal diameter. Below the two pulleys *l m*, and arranged upon another horizontal shaft, M, so as to revolve freely on it, are two other pulleys, *l' m'*. An endless belt or band, *o*, goes around the pulleys *m m*. Another such belt, *n*, which is crossed, also goes around the two pulleys *l l'*.

Each of the two lower pulleys, *l' m'*, has teeth projected from its inner side, to co-operate with those of a clutch, N, arranged between the said two pulleys and upon their shaft M, the clutch being applied to the shaft by a feather-connection, so as to revolve with the shaft and be capable of being moved endwise thereon. The clutch, grooved around its periphery, receives in the groove a furcated arm, *p*, extending from one end of a long horizontal slide-rod, *q*, arranged in manner as shown, and supported so as to be capable of being moved in directions lengthwise of such rod.

On the shaft M is a long screw, N, which screws into and through an arm, O, projecting down from the grinder-carriage and through the slot of its supporting-rail. Fur-

thermore, there projects from such carriage another arm, R, through which the rod *q* passes. On the said rod *q* are two adjustable sliders, *r s*, guided with screws *t t*, by which they may be clamped to the rod, and between each of the said sliders and the arm R a small helical spring, S, is arranged on or so as to encompass the rod.

A slotted lever or arm, *u*, formed as shown in Figs. 1 and 3, projects from one of the journals of the knife-bed in manner as represented. A clamp-screw, *v*, goes through the curved slot of the lever or arm *u*, and a washer, *w*, interposed between the arm and the box of the journal, and being screwed into the box, serves, with the arm, to determine the inclination of the bed, as well as the knife, relatively to the grinder.

By revolving the shaft L there will be imparted to the grinder a rotary motion. At the same time the two wheels *l m* will be put in revolution in contrary directions, each, when clutched to its shaft M, causing such to revolve with the wheel, and in the same direction in which it may be moving. The shaft M, being in revolution, will revolve its screw N, whereby the grinder-carriage will be moved laterally on its supporting-rail. While the arm R of the grinder-carriage may be forced against either of the springs S, the rod *q* will be moved endwise, so as to move the clutch out of engagement with one of the pulleys, *l m*, and into engagement with the other, whereby a reversed motion will be imparted to the grinder.

From the above it will be seen that the grinder, while in operation, has reciprocating lateral motions, as well as a rotary motion, such as will cause it to travel first from one end to the other of the knife, and next in the oppo-

site direction, it grinding the knife in the meantime, the extent of lateral motion of the grinder being dependent on the positions of the sliders *r s* on the rod *q*.

In the machine hereinbefore described the grinder is supported by a rigid carriage and a stationary rail, upon which the said carriage traverses, such carriage being traversed by a screw arranged beneath the said rail, and the grinder being revolved by a shaft going through the tubular shaft of the grinder, and being disposed above the rail and the operative screw of the carriage. By such means of supporting and operating the grinder it has little or no tendency, while grinding the knife, to vibrate or spring toward and from it. When the screw for traversing the grinder is arranged in the shaft by which the grinder is revolved, and such grinder is supported only by such a shaft, as is the case in the knife-grinding machine represented and described in the United States Patent No. 104,584, the grinder is subject and has been found in practice to vibrate relatively to the knife, so as to prevent the grinding of the latter from being accurately performed.

What, therefore, I claim as my invention is—

The combination and arrangement of the supporting-rail K and carriage I, and the driving-shaft L and traversing mechanism, substantially as described, with the rotary grinder H, and mechanism, as set forth, for sustaining and moving, or for supporting, adjusting, and moving, the knife relatively to the grinder, in manner as explained.

EDWARD S. M. FERNALD.

Witnesses:

R. H. EDDY,
J. R. SNOW.