2 Sheets—Sheet 1.

C. RICHES.

Grinding-Machine.

No. 200,935. Patented March 5, 1878.

FIG. 1.

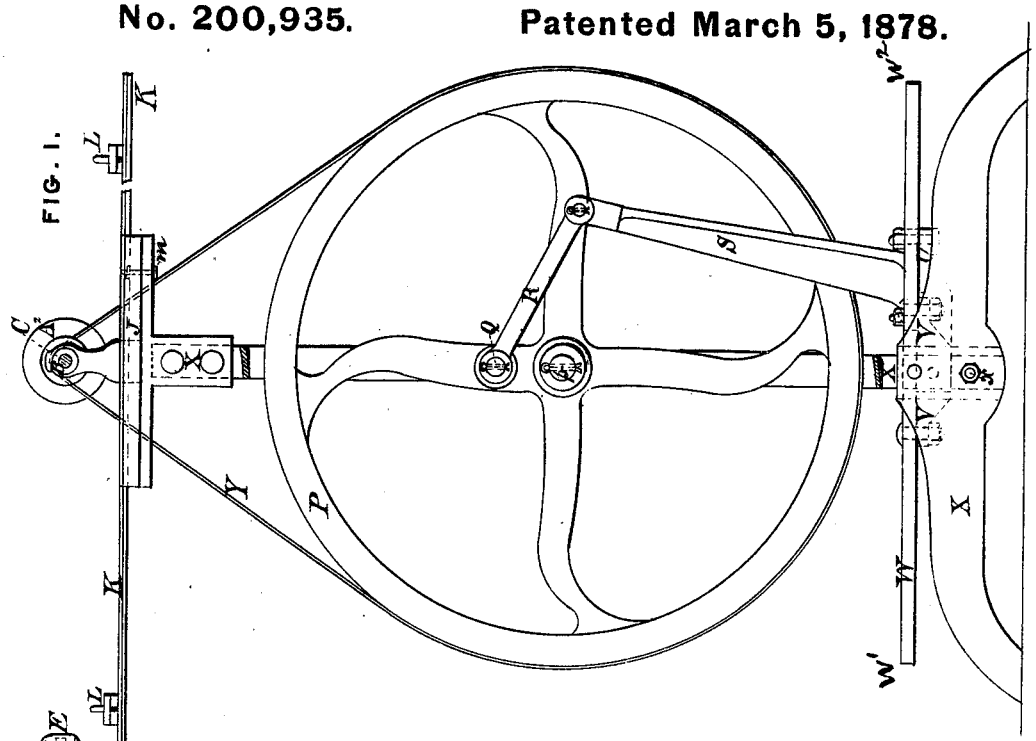
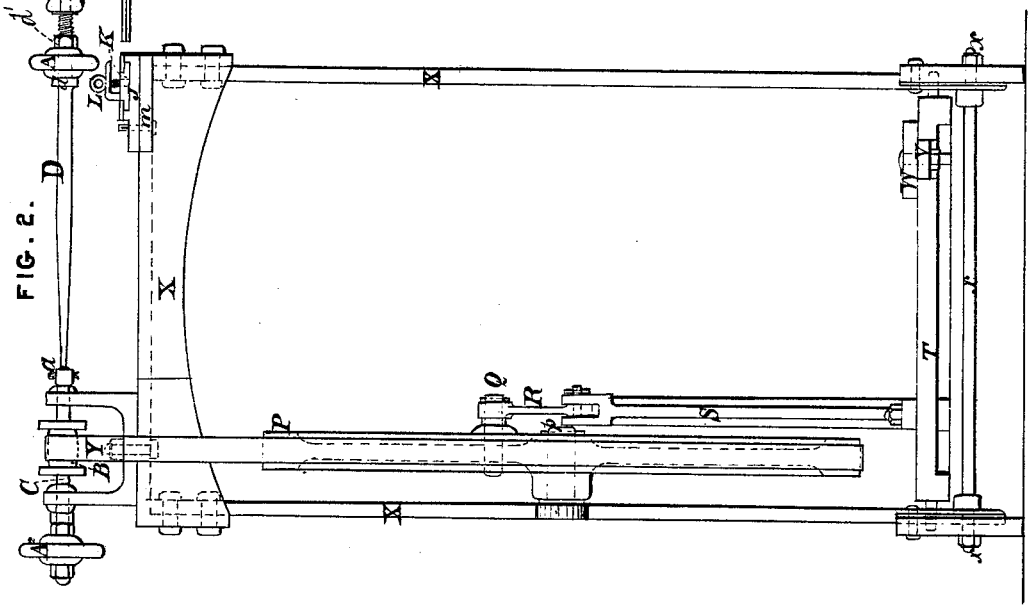


FIG. 2.



Attest:

C. F. Wells &
F. W. Farleigh

Inventor:

Charles Riches

by Colborne Brookes
Att'y.

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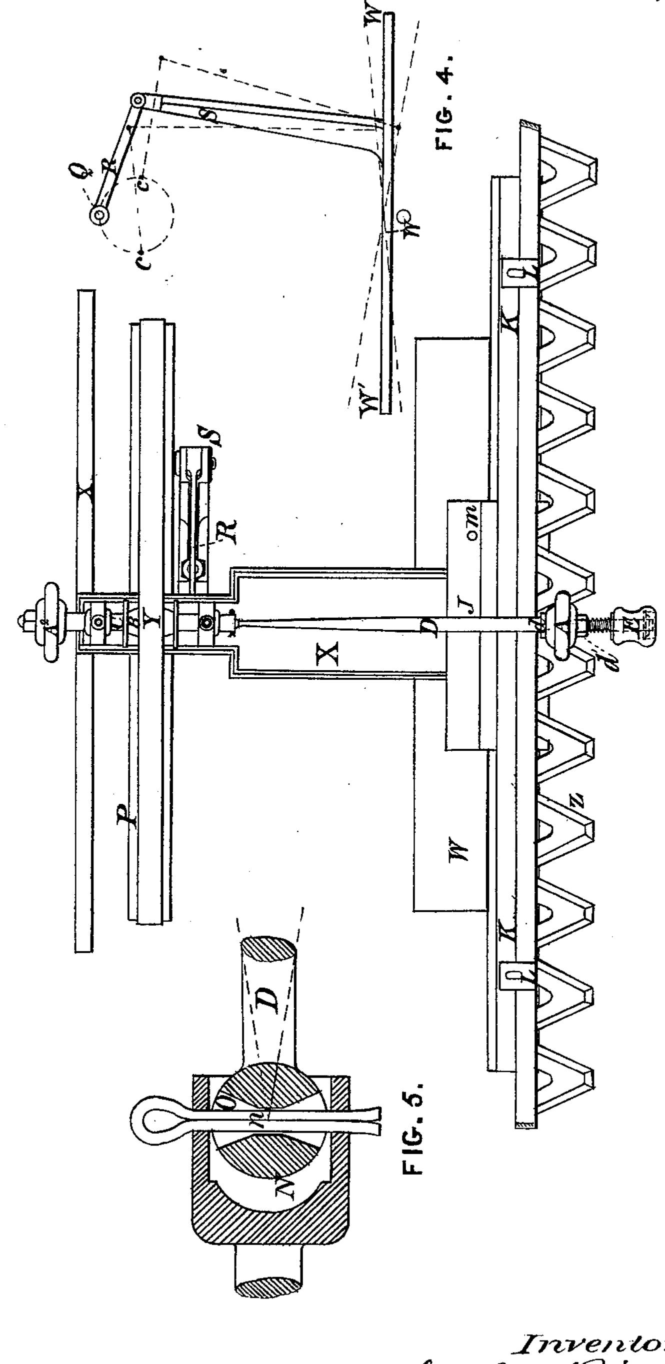

FIG. 4.

FIG. 3.

FIG. 5.

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by Colborne Brookes
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UNITED STATES PATENT OFFICE.

CHARLES RICHES, OF CAISTER, GREAT YARMOUTH, GREAT BRITAIN, ASSIGNOR OF ONE-HALF HIS RIGHT TO HENRY RICHARD JOHN DENTON, OF WOLVERHAMPTON, ENGLAND.

IMPROVEMENT IN GRINDING-MACHINES.

Specification forming part of Letters Patent No. **200,935**, dated March 5, 1878; application filed June 14, 1876; patented in England, October 2, 1874.

To all whom it may concern:

Be it known that I, CHARLES RICHES, of Caister, Great Yarmouth, in the county of Norfolk, in the Kingdom of Great Britain, have invented certain new and useful Improvements in Machines or Apparatus for Grinding and Sharpening Knives or Cutters of Reaping and Mowing Machines, and other knives, cutters, tools, or instruments; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to which they appertain to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

The nature of my invention consists in a grinding or sharpening machine provided with a sharpening-wheel the spindle of which, at one end, is connected by a universal joint with the driving mandrel or shaft, and at the other end is mounted or has its bearing in a simple directing-handle; and, also, in the combination therewith of a sliding rest or holder, mounted on a pivoted support, for holding the article to be sharpened.

According to my invention I mount, in a suitable frame-work, an emery-wheel or other grinding or sharpening appliance, in such manner that it shall receive rotary motion, and also lateral motion, so that its periphery may be applied to the edges to be ground or sharpened, (whether plain, serrated, or otherwise,) and in various directions. For this purpose the emery-wheel or other grinding or sharpening implement is mounted on a shaft, axis, or support so adjusted as to have motion in any direction laterally, as well as rotary motion.

The knife, cutter, or instrument to be ground or sharpened is supported in a socket, rest, or guide, in which it can be moved into the required positions, or it can be moved into such positions by a rack and pinion or other gearing.

I proceed to describe one mode in which proper motion is communicated to the various parts of the apparatus, and to the blade, cutter, or instrument to be operated on thereby; but this treadle movement forms no part of my present invention, though I contemplate making it the subject-matter of a separate application.

In a suitable frame I mount a crank-wheel, serving as a driving-wheel, and worked by a treadle acting through a vertical or inclined bar or arm fixed thereto, and at a distance from the center thereof, and having a connecting-rod connecting a pin at the top of the said bar with a crank-pin on the wheel. From this wheel motion is communicated, by a strap, band, or otherwise, to a pulley mounted on a spindle, which is connected at one extremity to the axis or spindle of the emery-wheel, or other sharpening or grinding implement, by means of a universal joint, so that the said emery-wheel or other grinding implement may have adjustable lateral motion.

The last-mentioned axis or spindle is free, except at the universal joint, and is provided with a handle, whereby to regulate its lateral motion.

The accompanying drawings represent a machine constructed according to my improvements, and intended for grinding and sharpening knives of reaping-machines and other cutting-instruments.

Figure 1 is a side view; Fig. 2, an elevation of the machine, and Fig. 3 a plan of the same. Fig. 4 is an elevation of the treadle arrangements only. Fig. 5 shows a modification of the universal joint; and this modification I prefer to employ. This view is shown in section.

When the same letters occur on different views they indicate corresponding parts.

X X X is the general frame-work, *x* being a transverse tie-bar or stay, forming a portion of the frame-work. A is an emery-wheel for sharpening and grinding the knife or cutter.

This wheel is driven by a treadle, T W, hereinafter described.

The wheel A is mounted on a spindle, D, which is connected with a spindle, C, by means of a universal joint, *a*. The spindle C is mounted in suitable bearings, and carries a pulley, B, to which rotary motion is communicated by an endless strap or band, Y, which passes over it, and also over a driving-wheel or fly-wheel, P, turning on a stud or strong pin, *p*, fixed to one of the uprights of the frame-work X X X. On the driving-wheel P is a crank-pin, Q, connected by means of a connecting-rod, R, with a bar, S, fixed to the treadle T W. The bar S is fixed to a projection, U, on the treadle-bar T. W is the foot-board of the treadle, fastened to the treadle-bar T by the connections V V. Thus, when reciprocating or vibrating motion is imparted to the treadle by the foot, rotary motion will be communicated to the emery-wheel A by means of the bar S through the parts or connections hereinbefore described—viz., the arm R, crank-pin Q, driving-wheel P, band or strap Y, pulley B, and spindles C and D.

The shaft D being connected with the shaft C by the universal joint *a*, the said shaft D can be moved into various angles, and the wheel A thereby worked in various positions, so that different parts of the edges of the knife to be ground can be attained by the emery-wheel A without interference with the rotary motion of the latter. For the purpose of moving the axis D in this manner it is provided with a handle, E, intended to be held and worked by the operator. By means of this handle E and of the universal joint *a*, the spindle of the wheel A (and therefore the wheel A itself) is moved to the required angle of adjustment with respect to the cutter to be ground.

The spindle D is provided with a collar, *d*, and a nut, *d'*, upon a threaded part of the said spindle D, and the emery-wheel, with a washer on each side thereof, is retained between the collar *d* and the nut *d'*. The end of the spindle D turns freely in the handle E.

The universal joint (see Fig. 5) will be readily understood. N is a ball with an opening, O, therethrough, circular in cross-section. Sufficient play is left between the pin *n* and the side of the opening to allow of the ball being turned the required distance up and down, as shown by the dotted lines, and the ball can be turned laterally upon the pin, as on a hinge, thus allowing the spindle D to be moved laterally in any direction.

The reaper-knife, or other cutter to be sharpened or ground, is held in a movable or sliding support, K K. (By way of illustration, a reaper-knife, Z, is shown in the plan, Fig. 3.) The knife Z is fastened by clips or clasps L L to the slide-bar K, forming a movable support, and capable of being slid or pushed by hand in either direction horizontally at right angles to the spindle C on a rest, guideway, or frame, J, attached to the general frame-work X X X. The knife which the bar K carries is thus moved or slid in the required direction or position of adjustment, so as to bring the required portion or section of the reaping-knife in proper position endwise thereof for being acted on by the emery-wheel A.

The frame J is carried upon a part of the frame X X X specially widened therefor, and is connected thereto by means of the stud-pin *m*, so as to turn freely upon it and allow of the reaper-knife or other cutter being pulled forward or pushed backward by the operator, the frame J and the pin *m* acting as a hinge.

The handle E is held in the operator's right hand, and he uses the left hand to shift the position of the knife, as required.

a^2 is an extra or supplementary emery-wheel mounted on the shaft C, and receiving motion therefrom, to sharpen table-knives or other even-edged or straight-bladed instruments.

The treadle can be worked by one foot or by both feet. If worked by both feet, the operator sets his feet on the foot-board W, the ends of which are marked W^1 W^2. (See Fig. 4.) He sets one foot at W^1 and the other at W^2. The fly-wheel P carries the crank over the dead-centers. The dead-centers of the treadle arrangement are shown at *c c*, (see Fig. 4;) and as the upper arc *c c* is larger than the lower arc *c c*, and therefore larger than a semicircle, it will be seen that in case of using one foot only for treading, an advantage will be gained by pressing with that foot which acts to force the crank Q through the larger arc, on account of the pressure from the foot being distributed over a greater extent of the revolution of the driving-wheel than in the case of the smaller arc, and hence the advantage of this arrangement of treadle over that usually employed for analogous purposes. The foot which should be used, of course, depends on the direction of rotation to be given to the driving-wheel. The dotted lines and circle in Fig. 4 show the paths of the crank-pin Q, connecting-rod R, vertical or inclined bar S, and treadle W.

Although I have spoken of an emery-wheel, it is obvious that any grinding, sharpening, or surfacing wheel or rotary appliance or implement may be employed instead of an emery-wheel, and actuated in manner and for the purpose above described.

Having now described the nature of the said invention, and in what manner the same may be performed, I declare that I claim—

1. In a grinding or sharpening machine, a sharpening-wheel, A, the spindle D of which, at one end, is connected by a universal joint

with the driving mandrel or shaft, and at the other end is mounted in a simple directing-handle, E, as a bearing, substantially as and for the purpose herein specified.

2. The sharpening-wheel A, having its spindle D supported at one end by a universal-joint connection with a driving mandrel or shaft, and at the other end by a handle, in which it turns, in combination with a sliding rest or holder, K, mounted on a pivoted support, J, for holding the article to be sharpened, substantially as and for the purpose herein specified.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

CHARLES RICHES.

Witnesses:

CHAS. JNO. PALMER,
28 *Regent Street, Great Yarmouth, Norfolk, Notary Public.*

FREDERICK ROBERT INGRAM,
His Clerk.