S. Stevens,

Edge-Tool Grinder,

No. 7,388, Patented May 21, 1850.

Fig. 4.

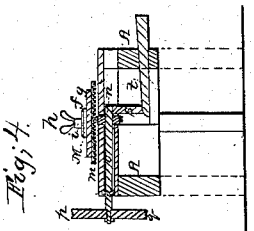


Fig. 5.

Fig. 6.

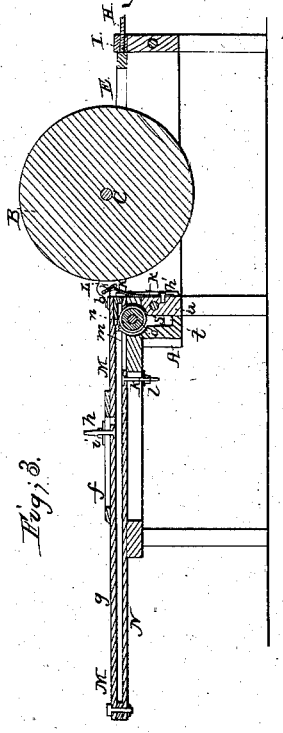


Fig. 7.

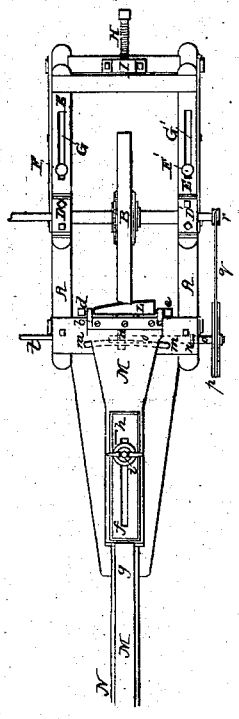
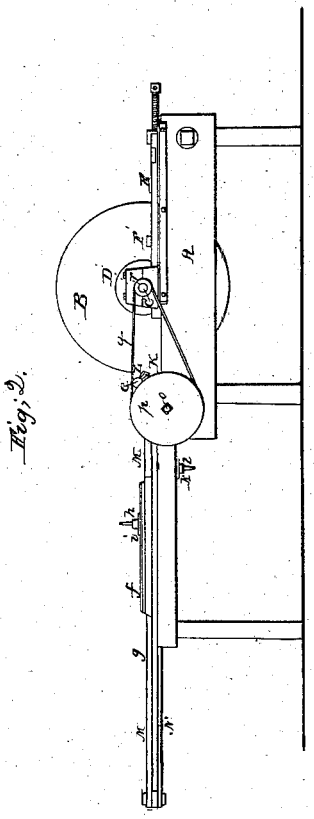


Fig. 8.



UNITED STATES PATENT OFFICE.

SILAS STEVENS, OF EAST BROOKFIELD, MASSACHUSETTS, ASSIGNOR TO GEO. FORBES, OF SAME PLACE.

MACHINE FOR GRINDING SPIRAL KNIVES.

Specification of Letters Patent No. 7,388, dated May 21, 1850.

To all whom it may concern:

Be it known that I, SILAS STEVENS, of East Brookfield, in the county of Worcester and State of Massachusetts, have invented a new and useful Improvement in Machinery for Grinding the Knives of Straw or Hay Cutter Cylinders; and I do hereby declare that the same is fully described and represented in the following specification and accompanying drawings, letters, figures, and references thereof.

Of the said drawings, Figure 1, denotes a top view of my improved machine; Fig. 2, a side elevation; Fig. 3, a longitudinal, vertical, and central section, and Fig. 4, a transverse and vertical section, taken through the worm gear by which the knife holding frame is operated.

In the said drawings, A, represents the main frame for supporting the operative parts, the said frame being made in any suitable manner and of any proper material.

B, is a grinding wheel, which is mounted on a horizontal axle, or shaft C, which rotates in bearings D, D′, affixed to an adjustable frame E. The said frame E, is placed on the main frame and confined in position by means of set screws F, F′, which pass through slots G, G′, made in and through it, in the positions as seen in Fig. 1. An impelling screw H, applied to the main frame, and made to pass through a stationary female screw box I, is made so as to act against the frame E, as to enable a person to force the said frame toward the rest K. The said rest K, is represented in Fig. 3, as an iron stud or projection affixed to the inner side of the cross bar *a*, of the main frame. It serves to support the edge of the knife which is in contact with the grinding wheel, and to keep it close against the said wheel during the operation of grinding.

The knife L, is fixed in, and held by a long arm or bar M, which turns horizontally on a center pin, extending from a bar N, projecting from the main frame as seen in the drawings. The arm M is provided with two projections *b*, *c*, through which pivot screws *d*, *e*, respectively pass, and enter at their points into countersunk holes, made in the ends of the knife, the said knife being made to turn freely on the points of the said screws.

The long arm M, is made in two parts, *f*, *g*, which lap on one another, and are so connected, by a set screw *h*, and nut *i*, as to render the arm capable of being lengthened or shortened as occasion may require. The bar N, is also adapted to the main frame in such manner as to be capable of being moved either outward therefrom or inward or toward it, and confined in position by a set screw *k*, and nut *l*, all as occasion may require.

A curved toothed rack *m*, is affixed transversely to the under side of the radial arm M, and made to engage with a worm gear, or endless screw *n*, placed in, and fixed to a cross shaft *o*, which is supported in suitable bearings, and has a grooved pulley *p* on one end. An endless band *q*, extends around this pulley, and a smaller one *r*, affixed on the shaft of the grinding wheel. When the grinding wheel is put in revolution, a progressive lateral movement will be imparted to the arm M, on its center pin.

In order that the arm M, may be readily moved back after the knife has been ground, and without the necessity of any back rotation of the worm gear, such worm gear should have some contrivance, adapted to it by which it, and its shaft may be depressed far enough to throw it out of action with the teeth of the rack. For this purpose the inner bearing *s*, of the shaft of the worm gear, is supported on a wedge *t*, which on being drawn outward allows the bearing to move down a short distance, sufficient to carry the endless screw out of gear with the rack, it being understood that the outer bearing *u*, is made large enough to permit the vertical movement of the shaft.

The cylinder knives of hay cutters are generally made of thin blades of steel or other metal, which are affixed to the wings of a rotary shaft. They are also what are termed either straight, helical, (or spiral) or elliptical. Most generally they are elliptical, from the fact that their cutting edges are elliptic arcs, they being formed by the junction of a plane with the surface of a cylinder, when the said plane is inclined to the axis of the cylinder. The knife takes a shape somewhat as represented in Fig. 5, its cutting edge being a portion of the perimeter of an ellipse, for the section of a cylinder diagonally to its axis is an ellipse.

In general the elliptic edge is so flat a curve, that it differs so little from a circular arc of long, radius, as in practice to be of no

importance. So with the helical arc when the knives have helix edges. By means of the radial bar, the flat or straight knife, as well as a twisted knife having a curved edge can be ground. The rest K, being confined to the frame by an adjustment screw *h*, which passes through a slot in the rest, it can be raised or depressed so as to regulate the inclination or bevel of the cutting edge of the knife.

By my improvement I am enabled to entirely dispense with the cutter stock such as used in the machine for grinding spiral knives, which has been patented by William Hovey, and which is essential to the correct operation of his machine.

I support the knife itself by and on pivots, and by means of the long radial arm. I produce a curve of the edge of the knife, which approximates so closely to either the true elliptic arc, or helical arc of the knife edge, as the case may be, as to all intents and purposes, to be practically the same.

I lay no claim to the invention or use of a carriage and stock, such as is used in the machine of the said Hovey, but

What I do claim as my invention, is—

The employment and use of the radial arm M, and its pivots, or contrivances for supporting the knife, substantially, in the manner, and connection with the other parts of the mechanism, as hereinbefore specified.

In testimony whereof I have hereto set my signature this twenty-first day of December A. D. 1849.

SILAS STEVENS.

Witnesses:
JAMES M. CORLIS,
ELHANAN W. CORLIS.