W. S. HARMAN.

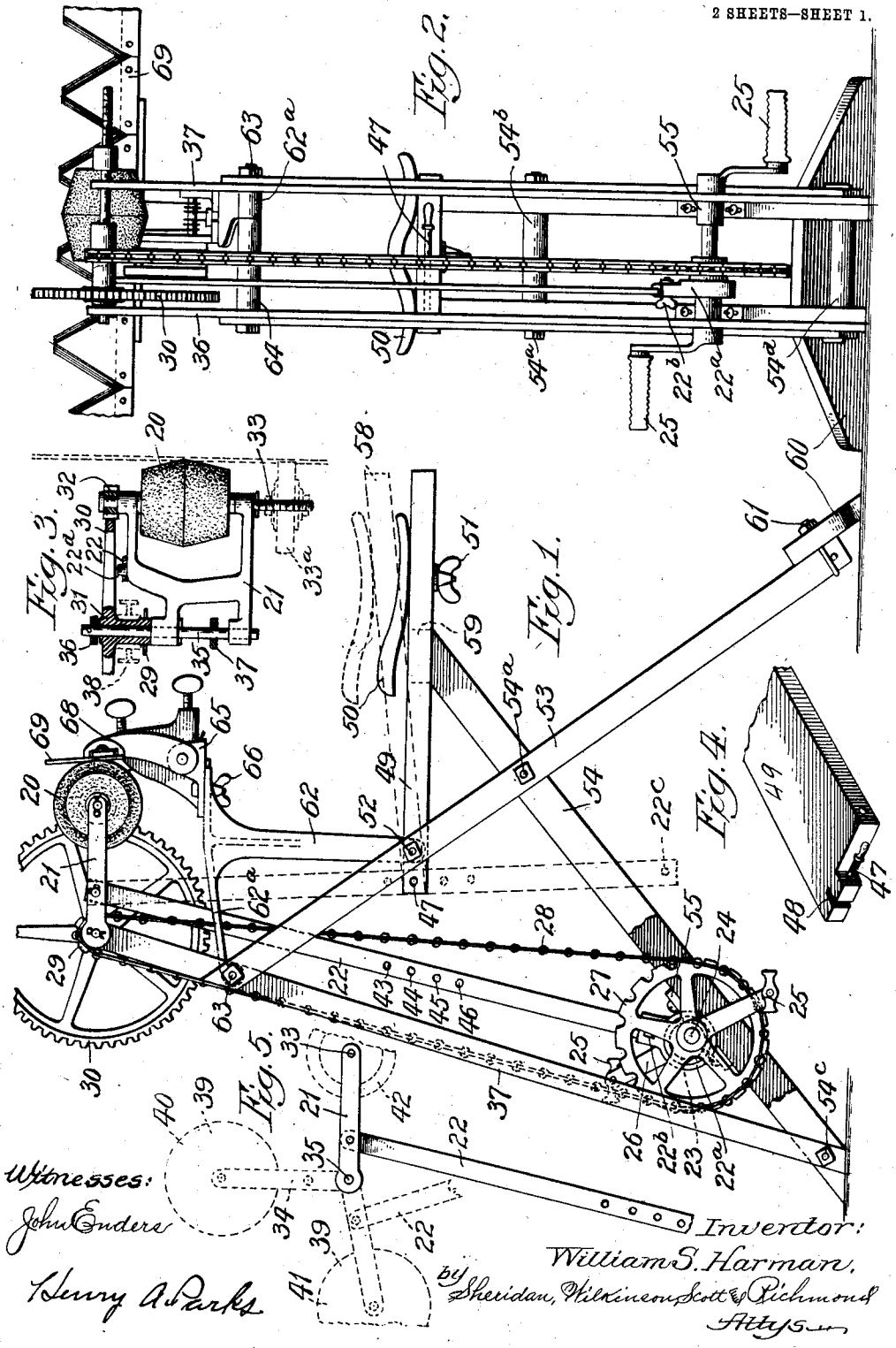
SICKLE GRINDER.

APPLICATION FILED AUG. 18, 1910.

1,037,902.

Patented Sept. 10, 1912.

2 SHEETS—SHEET 1.



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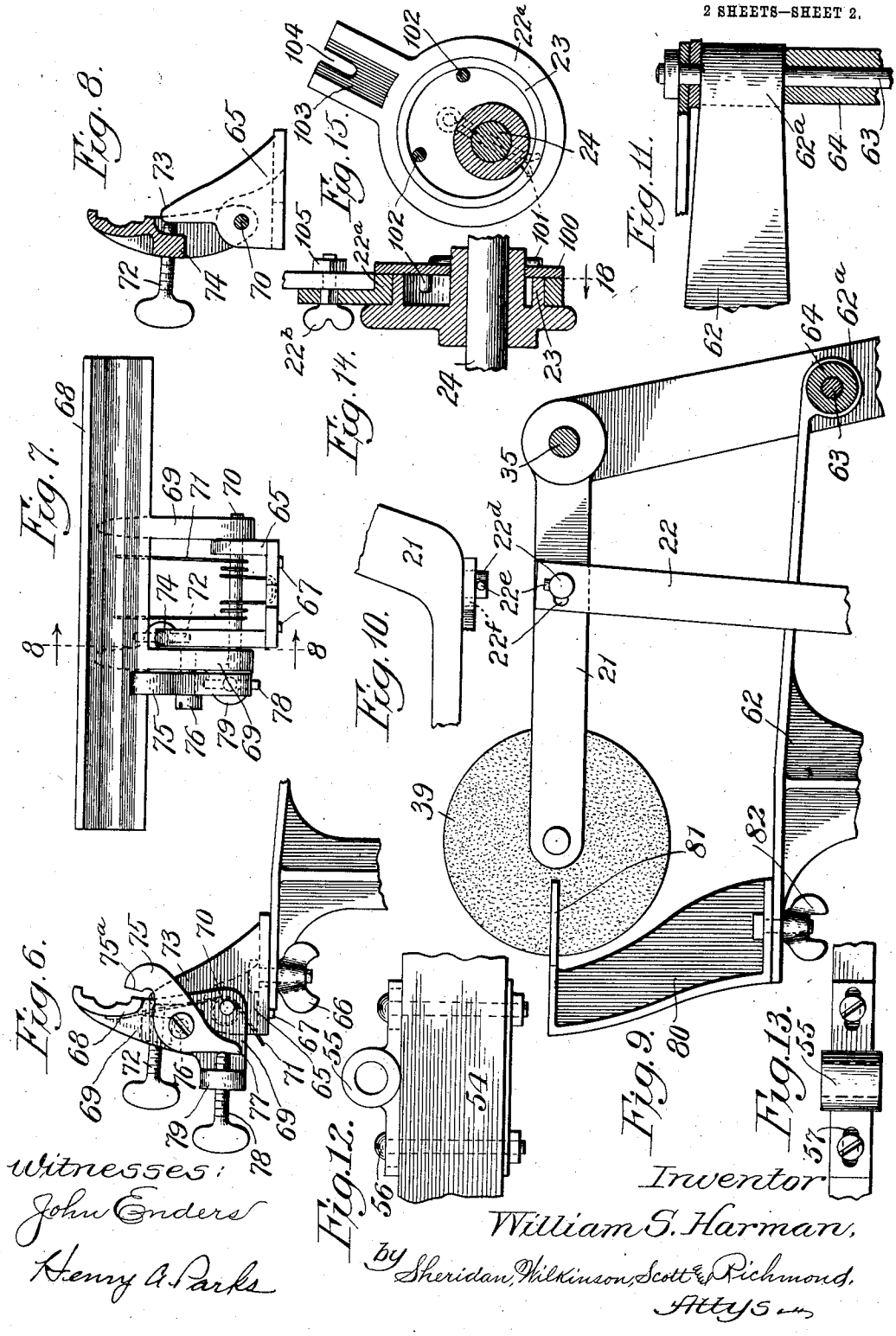

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UNITED STATES PATENT OFFICE.

WILLIAM S. HARMAN, OF RIVERSIDE, ILLINOIS.

SICKLE-GRINDER.

1,037,902. Specification of Letters Patent. Patented Sept. 10, 1912.

Application filed August 18, 1910. Serial No. 577,740.

To all whom it may concern:

Be it known that I, WILLIAM S. HARMAN, a citizen of the United States, residing at Riverside, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Sickle-Grinders, of which the following is a specification.

The object of my invention is to provide an improved grinding machine which may be used for grinding sickles and which may be easily and quickly converted into a grinding machine for various other tools. When used as a sickle grinder the grinding wheel is given an oscillating movement as well as a rotary one. The oscillating movement above referred to is effected by a connecting rod leading to mechanism which is wholly below the upper or head portion of the machine.

A further object of my invention is to provide means for holding the movable grinding wheel arm or frame in a variety of fixed positions to permit use of the wheel upon a variety of tools in a convenient manner. In doing this I have utilized the connecting rod which ordinarily is used for transmitting an oscillating movement to the wheel carrying arm as a holding means. By disconnecting this rod from the eccentric on the driving shaft to which it is attached and fixedly attaching it to certain portions of the framework, I am enabled to hold the grinding wheel rigidly in the desired position.

A further object of my invention is to make certain improvements in the sickle holding device by which the said sickle is more satisfactorily held in the desired relation to the grinding wheel.

Other features of my invention comprise a bracket or support which I have attached to the framework of the machine and which is adapted to carry a variety of holding or supporting devices; an adjustably supported seat for the operator; adjustable bearings for the driving shaft of the machine; means by which a driving pulley may be very conveniently attached to the hub of one of the gears of the grinding wheel driving mechanism, whereby a driving belt may be used to drive the grinding wheel; and improved means for attaching the connecting rod to the grinding wheel arm.

Other features of my invention will be made apparent in the following specification, taken in connection with the accompanying drawings, and the novel elements and combinations thereof will be particularly set forth in the claims.

In the drawings—Figure 1 is a side elevation of the machine. Fig. 2 is a front elevation. Fig. 3 is a plan view of a portion of the grinding wheel and frame and gearing connected therewith. Fig. 4 is a perspective view of a portion of the seat board. Fig. 5 is a detail showing the grinding wheel arm and connecting rod, a number of positions of the same being shown in dotted lines. Fig. 6 is a side elevation of the sickle holding and locking device. Fig. 7 is a front elevation of the same. Fig. 8 is a vertical section on the line 8, 8 of Fig. 7. Fig. 9 is a side elevation of the grinding wheel arm and its support, a tool rest, and means of attachment of the connecting rod to said arm. Fig. 10 is a plan view of a detail of said connecting rod attachment. Fig. 11 is a detail of the frame. Fig. 12 is a side elevation of the adjustable bearings for the main driving shaft. Fig. 13 is a plan view of the same. Fig. 14 is a sectional view of the eccentric; and Fig. 15 is a section on line 18—18 of Fig. 17.

I accomplish the objects of my invention chiefly by means of the grinding wheel 20, which is carried by an oscillating arm or frame 21, and which is given an oscillating movement by the connecting rod 22. The connecting rod 22 is removably attached to an eccentric strap 22^a, which is fitted to an eccentric 23, fixed to the drive shaft 24. This drive shaft 24 is ordinarily driven by means of pedals 25, which the operator actuates with his feet while sitting upon the seat 50. A rotary movement is given to the grinding wheel 20 by a simple train of mechanism comprising a sprocket wheel 27 fixed upon the shaft 24 and which meshes with and drives a sprocket chain 28, which, in turn, meshes with and drives a sprocket wheel 29 attached to the hub of the spur gear 30. This spur gear is loosely mounted upon a shaft 35 carried by the frame of the machine. The gear wheel 30 is provided with an elongated hub 31, of which the sprocket wheel 29 may form an integral part, or which may be fixedly attached thereto. The spur gear 30 meshes with and drives a pinion 32 fixed to the shaft 33. The shaft 33 is rotatably mounted in the oscillating arm 21, and carries a grinding wheel 20, which is fixed on said shaft. The grind-

ing wheel 20 is preferably of the double-cone form when used for grinding sickles. This grinding wheel may be replaced by wheels of cylindrical or other form when the machine is used for grinding other tools.

As above mentioned the oscillating arm or grinding wheel frame 21 is given an oscillating movement by means of the connecting rod 22. This connecting rod may be disengaged from the eccentric strap 22^a by removing the bolt 22^b, which is fitted to the slot 22^c in the lower end of said rod. When thus removed from said eccentric strap the rod 22 may be used for rigidly holding the oscillating arm or frame 21 in any one of a variety of fixed positions. This is done by fixedly attaching the said rod to a stationary portion of the framework as will be described later.

The shaft 35 is carried by the frame members or bars 36 and 37 by being inserted in apertures in the upper ends of said bars. These bars are given a substantially vertical position though they may preferably be inclined slightly toward the rear as shown in Fig. 1.

The grinding wheel 20 may be replaced by grinding wheels of cylindrical form such as shown at 39 when it is desired to grind other tools than sickles. In this case the oscillating movement is not necessary and the arm or frame 21 may be moved to other positions as shown in dotted lines 40 and 41 of Fig. 5, and rigidly held in these positions. The arm or frame 21 may also be rigidly held in the position shown at 42 in some cases. The means for holding the said arm rigidly in any position desired consists of holes 43, 44, 45 and 46 in the rod 22 any one of which may be placed in register with a hole 47 in the forward end of the seat board 49. When thus placed a pin 47 may be inserted in said holes. A slot 48 in the forward end of the seat board 49 is provided for receiving the connecting rod.

The seat board 49 may carry a suitable seat or saddle 50, which may be attached to said board by any suitable means, such as an ordinary screw which is provided with a thumb nut 51. The seat board 49 is pivotally attached at its forward end to the frame members or bars 53 by means of a bolt 52. There are preferably two of the frame bars 53 which are given a sloping position as seen in Fig. 1, and which lie outside of the frame members or bars 37 at their upper ends. Other frame bars 54 extend from the lower ends of the bars 37 to a point substantially midway of the length of the bars 53 and terminate at a point immediately below the seat board 49 which they support. The bars 54 are held in position with relation to the bars 53 by the bolts 54^a, which pass through all the said bars and also through a spacing or separating sleeve 54^b. When the bolts 54 are tightened the bars are rigidly held in their relative positions. A bolt 54^c and spacing sleeve 54^d are provided at the lower ends of the member 37 at their points of connection with the frame bars 54 in a similar manner.

The inclined seat supporting frame members 54 support the main driving shaft 24 by means of adjustable bearings 55. These adjustable bearings are shown more in detail in Figs. 15 and 16. They are held in position on the bars 54 by the bolts 56 which pass through slots 57 in the bases of said bearings. By means of these slots the bearings may be moved along the bars 54 and the driving chain 28 may be thereby adjusted for tightness.

The seat 49 is pivotally attached to the framework by means of the bolt 52 and is unattached to the bars 54. It merely rests upon the upper ends of these bars and may therefore be lifted out of contact with them. When so lifted a spacing block 59 may be placed beneath the seat board, and the said seat board held in an elevated position as shown in dotted lines at 58. By using blocks of different thicknesses the desired adjustments in height of the seat 50 may be secured.

The lower ends of the bars 53 are attached to a foot 60, of a considerable length transversely of the machine, by means of suitable clamping bolts 61. By means of the great length of this foot or base member 60 the machine is made to rest upon the floor in a stable condition.

I provide a bracket 62 for supporting a variety of tool holding devices. This bracket is attached to the framework at its lower end by means of the bolt 52 and the forwardly extending arm 62^a of said bracket is attached to the framework by means of the bolt 63 where it passes through the eye 62^a of said bracket. The frame members 53 are spaced or separated at this point by means of the eye 62^a and the sleeve 64.

I have provided an improved form of sickle holding and locking device which is mounted upon the said bracket 62 when in use. The attachment to said bracket is accomplished by means of the base 65, which is attached to the said bracket by means of a suitable bolt provided with a thumb nut 66. The said base 65 is positioned upon the bracket 62 by means of lugs or pins 67, which are brought against the edge of the bracket 62.

The main body of the sickle holder comprises an elongated portion 68 against which the sickle may be placed when it is to be clamped thereto. The member 68 is provided with arms 69 by which in connection with the pin 70 it is pivotally attached to the base 65. The sickle holding member 68 is normally pressed toward the grinding

wheel by means of a spring 71 which is coiled around the pin 70 and which presses upon the base 65 at one side of said pin and against the rear face of the member 68 on the other side of said pin. The member 68 may be moved or adjusted in a direction away from the grinding wheel by means of a set-screw 72 which passes through a lug 74 and bears at its end upon an upwardly extending portion 73 of the base 65.

The sickle may be locked or rigidly held in contact with the member 68 by means of the clamping device 75 which is pivotally attached to said member 68 by means of the pin 76. This clamping device 74 is provided with an arm 77 against which a set screw 78 bears at its end. The set screw 78 is threaded through a lug 79 on one of the arms 69 of the member 68.

The clamping device 75 is provided with a hook-shaped or curved end 75^a which comes in contact with the sickle bar and holds it against the member 68 when the set screw 78 is turned and caused to act upon the arm 77.

A tool rest 80 is provided for supporting a variety of tools in the desired relation to the grinding wheel 39, Fig. 9. This tool rest 80 is provided with a platform or a flat portion 81 at its upper end for supporting the tools while the grinding operation is proceeding. The tool rest 80 may be attached to the bracket 82 by a suitable bolt and thumb nut 82.

The shaft 33 is provided with an elongated threaded end, to which a polishing or buffing wheel 33^a may be attached.

The connecting rod 22 may be pivotally connected with and disconnected from the grinding wheel arm 21 very conveniently and quickly by the following means: The arm 21 is provided with a lug or projecting pin 22^d, which is adapted to engage an eye in the end of the rod 22. This eye has an offset 22^f, which is adapted to slip over a small pin or lug 22^e projecting laterally from the pin 22^d. The pin 22^e prevents displacement of the rod 22 from the pin 22^d when the rod occupies its normal or operative position. When the rod 22 is moved to such an angular position that the offset or notch 22^f comes opposite the pin 22^e, the said rod may be removed from the pin or replaced thereon as the case may be.

The eccentric strap 22^a is held in position upon the eccentric 23 by a disk 100, which is, in turn, held in place by a split cotter pin 101. The disk is held against rotation with relation to the shaft by projections 102, which enter the hollow portion of the eccentric and bear upon its walls. The strap 22^a is provided with a socket 103, in which there is a slot 104 having an open end. The rod 22 has a hole 22^c near its end, and through this hole and through the slot 104 a thumb-screw 22^b is inserted, having a nut 105. The slotted end 104 permits convenient disconnection of the parts. By this arrangement of the screw, it is compelled to move with the rod when disconnected and is then out of the way of the sprocket wheel 27 and the machine frame.

The operation of my invention has already been largely referred to, and the following remarks will be added thereto. In order to grind an ordinary sickle, the operator will insert it in the holding device 68 and adjust the set-screw 78 until the clamp 75 holds the sickle rigidly therein. By operating the set-screw 72 the exact position of the sickle relative to the grinding-wheel may be adjusted. The spring 71 will press the sickle toward the grinding wheel; the set-screw 72 coöperating with the upwardly projecting lug 73 will limit the movement of the sickle toward the grinding wheel, and thereby regulate the extent of grinding. In attaching the sickle holder to the machine the operator has merely to place the base 65 upon the bracket 62, to press the same forwardly until the lugs 67 bear upon the bracket, and then to tighten the thumb nut 66. When using the machine as a sickle grinder the operator attaches the connecting rod 22 to the eccentric strap 22^a, by means of the bolt 22^b. While sitting upon the saddle 50 he then actuates the pedals 25 with his feet and, through sprocket wheel 27, chain 28, sprocket wheel 29 and spur gearing 30, 32, the grinding wheel is rotated. At the same time the rotation of the shaft 24 causes the eccentric 23 to produce a reciprocating movement in the connecting rod 22, and this reciprocating movement causes an oscillating movement of the wheel-carrying arm or frame 21. By means of this oscillating movement the grinding wheel is made to travel backward and forward over the sickle blades. The doubly conical shape of the grinding wheel, taken in connection with the position of the sickle relative thereto, insures the desired grinding action upon the sickle. When the operator desires to use the grinding machine for grinding some other tool which does not require an oscillating movement, he may fix the arm 21 in any position, by attaching the connecting rod 22 to the end of the seat board 49, by means of the pin 47. A series of holes 43, 44, 45 and 46 permit him to fix the arm 21 in any angular position, as previously described, and in such position as is most convenient for the particular grinding operation which he wishes to perform. For grinding such implements as shovels, a vertical position of the wheel-carrying arm 21 will be desired; while in grinding some tools it is desirable to support them while the grinding operation is being carried on, and the tool rest 80 may then be used. When such tool rest

is used, the wheel-carrying arm 21 will preferably be held in a horizontal position, as shown in Fig. 9, and in the position indicated by 42 in Fig. 5. When it is desired to perform buffing or polishing operations, a buffing wheel may be attached to the threaded end of the shaft 33, as shown in dotted lines 33a.

It will be seen that I have provided a very efficient grinding machine for a great variety of purposes, and one which is very simple, durable, and economical in manufacture.

While I have described my invention more or less precisely as regards details of construction, I do not wish to be understood as limiting myself thereto, as I contemplate changes in form and proportion of parts, and the substitution of equivalents, as circumstances may suggest or render expedient, without departing from the spirit of my invention.

I claim—

1. In a device of the character described, a rotary grinding element, said element being also adapted to have a vibratory movement, a drive shaft mounted in the machine frame below the head portion of said machine, means actuated by said drive shaft for giving a rotary movement to said grinding element, and an independent means directly actuated by said shaft for giving a vibratory movement to said grinding element.

2. In a device of the character described, a rotary grinding element, a vibratory element in which said grinding element is rotatively mounted, a frame comprising upright bars to which adjacent their upper ends said vibratory element is pivotally attached, a gear wheel rotatively supported by said bars adjacent their upper ends, a gear wheel fixedly attached to said grinding element and meshing with said first named gear wheel, a drive shaft mounted adjacent the lower ends of said upright bars, means by which rotary motion may be transmitted from said drive shaft to said first named gear wheel, means by which the rotary motion of said drive shaft may be converted into vibratory motion and said vibratory motion imparted to said vibratory element.

3. In a device of the character described, a rotary grinding element, a vibratory arm carrying said element, an upright bar to which said arm is pivotally attached adjacent its upper end, an inclined bar fixed to said upright bar adjacent its upper end and extending to the floor in the rear of said upright bar, a cross bar fixed to said upright bar adjacent its lower end and to said inclined bar adjacent the middle of its length and extending beyond said incline bar, a seat supporting member pivotally attached to said inclined bar and resting upon said cross bar, and a seat fixed to said seat member.

4. In a device of the character described, a rotary grinding element, a vibratory arm carrying said element, an upright bar to which said arm is pivotally attached adjacent its upper end, an inclined bar fixed to said upright bar adjacent its upper end and extending to the floor in the rear of said upright bar, a cross bar fixed to said upright bar adjacent its lower end and to said inclined bar adjacent the middle of its length and extending beyond said cross bar, a seat supporting member pivotally attached to said inclined bar and resting upon said cross bar, a seat fixed to said seat member, a pedal shaft having bearings carried by said cross bar, and means by which rotary and vibratory movements are independently transmitted from said pedal shaft to said grinding element.

5. In a device of the character described, a grinding element having rotary and vibratory movements, a pair of upright bars to which said element is attached, a pair of bars fixed to said upright bars adjacent their upper ends and sloping therefrom to the floor at an angle with said upright bars, a pair of bars fixed to said upright bars adjacent their lower ends and sloping upwardly therefrom and crossing said second named bars, and a seat member pivotally attached to said second named bars and supported by said third named bars.

6. In a device of the character described, a grinding element having rotary and vibratory movements a pair of upright bars to which said element is attached, a pair of bars fixed to said upright bars adjacent their upper ends and sloping therefrom to the floor at an angle with said upright bars, a pair of bars fixed to said upright bars adjacent their lower ends and sloping upwardly therefrom and crossing said second named bars, a seat member pivotally attached to said second named bars and supported by said third named bars, and a base member arranged transversely of said second named bars and fixed to their lower ends.

7. In a device of the character described, a grinding element having combined rotary and vibratory movements, a frame to which said element is attached in its upper portion, a drive shaft adjustably supported on said frame adjacent its lower portion, and means which are adapted to be connected with said drive shaft to impart a vibratory movement to said grinding element or to be fixed to said frame to hold said element in a stationary position.

8. In a device of the class described, a frame comprising upright bars, inclined bars secured to and leading from said upright bars, cross bars connected and secured to said upright and said inclined bars, a

grinding element attached to the upper portion of said upright bars, a tool supporting table located adjacent to said grinding element, said supporting table having portions secured to said upright bars, and a depending portion secured to said inclined bars.

9. In a device of the character described, a grinding element having combined rotary and vibratory movements, a pivoted member for holding a sickle against said grinding element, a clamping member adapted to rigidly hold the sickle in place on said pivoted member, and a flexible member under tension for yieldably pressing said pivoted member against said grinding element.

10. In a device of the character described, a grinding element having a combined rotary and vibratory movement, a pivoted member for holding a sickle against said grinding element, a clamping member pivotally attached to said pivoted member, hand operated means for pressing said clamping member against said pivoted member and thereby holding said sickle rigidly on the pivoted member, and a flexible member for yieldably pressing said sickle against said grinding element.

11. In a device of the character described, a grinding element having combined rotary and vibratory movements, a pivoted member for holding a sickle against said grinding element, a clamping member adapted to rigidly hold the sickle in place on said pivoted member, a flexible member under tension for yieldably pressing said pivoted member against said grinding element, and means for limiting the movement of said pivoted member toward said grinding element.

12. In a device of the character described, a pivoted member for holding a sickle against a grinding element, a base to which said member is pivotally attached, means by which said base may limit the movement of said pivoted member toward said grinding element.

13. In a device of the character described, a pivoted member for holding a sickle against a grinding element, a base to which said member is pivotally attached, a projecting part on said base, and adjustable means carried by said pivoted member and adapted to meet said projecting part and limit the movement of said pivoted member toward said grinding element.

14. In a device of the character described, a grinding element having a rotary movement, a vibratory arm in which said element is rotatively mounted, a rod by which vibratory motion is imparted to said vibratory arm, said arm having a projecting pin or the like and said rod having an aperture with an offset into which said pin is placed, and means on said pin for holding said rod in place, said means being incapable of passing through the offset when the rod occupies a normal or working position with relation to said arm.

15. In a device of the class described, a rotary grinding element, a vibratory arm carrying said element, an upright, one end of said vibratory arm being pivotally secured to said upright, a drive shaft, means to transmit rotary motion from said drive shaft to said grinding element, an eccentric secured to said drive shaft, a strap carried by said eccentric, and a connecting rod detachably connected at one end to said eccentric strap and at the other end to said vibratory arm, whereby rotary motion of said shaft and eccentric will cause a vibration of said vibratory arm.

In testimony whereof, I have subscribed my name.

WILLIAM S. HARMAN.

Witnesses:
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