No. 665,328. E. A. JOHNSTON. Patented Jan. 1, 1901.

GRINDER FOR SICKLES OF MOWERS, REAPERS, &c.

(Application filed Feb. 14, 1900.)

(No Model.) 3 Sheets—Sheet 1.

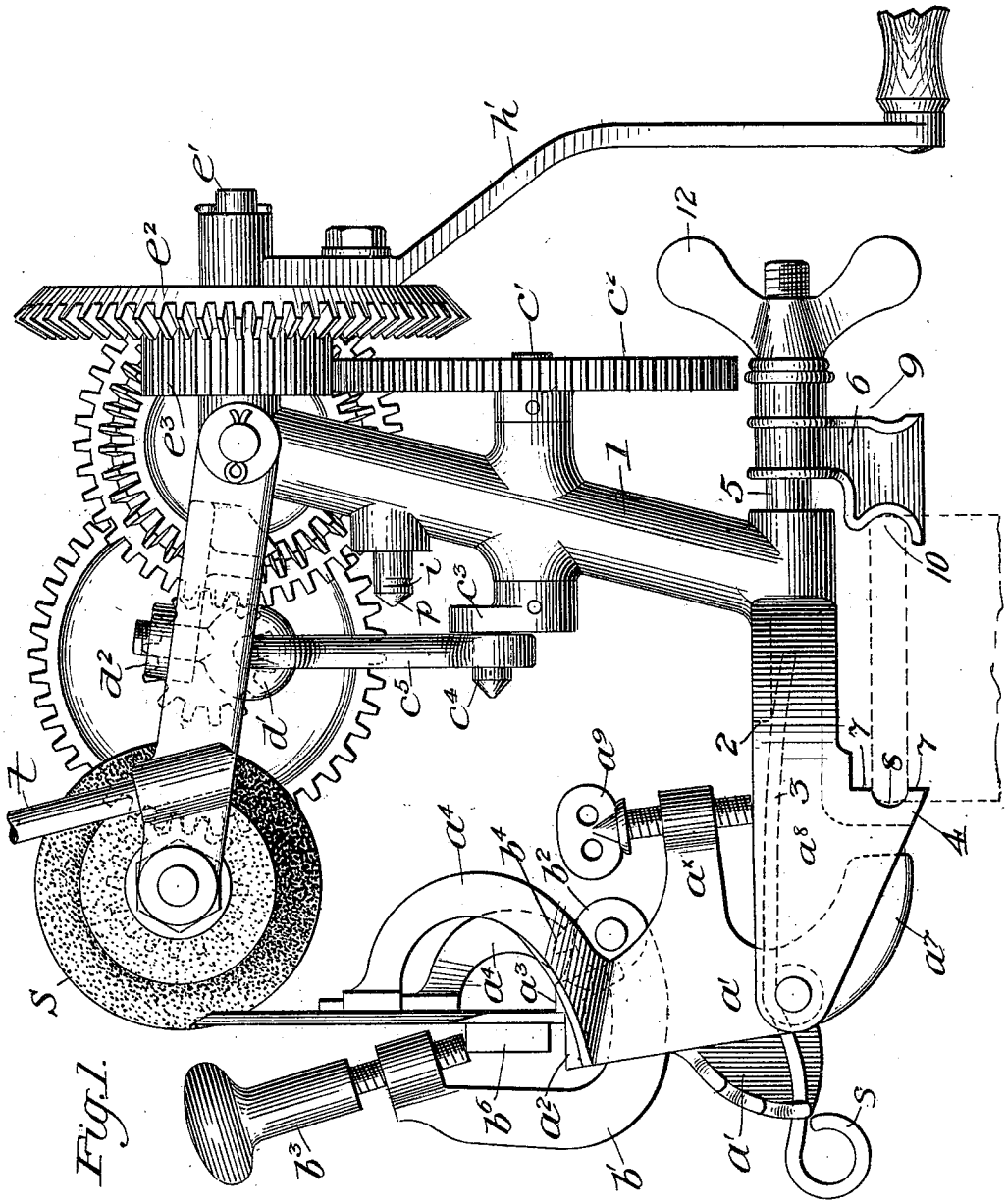


Fig. 1.

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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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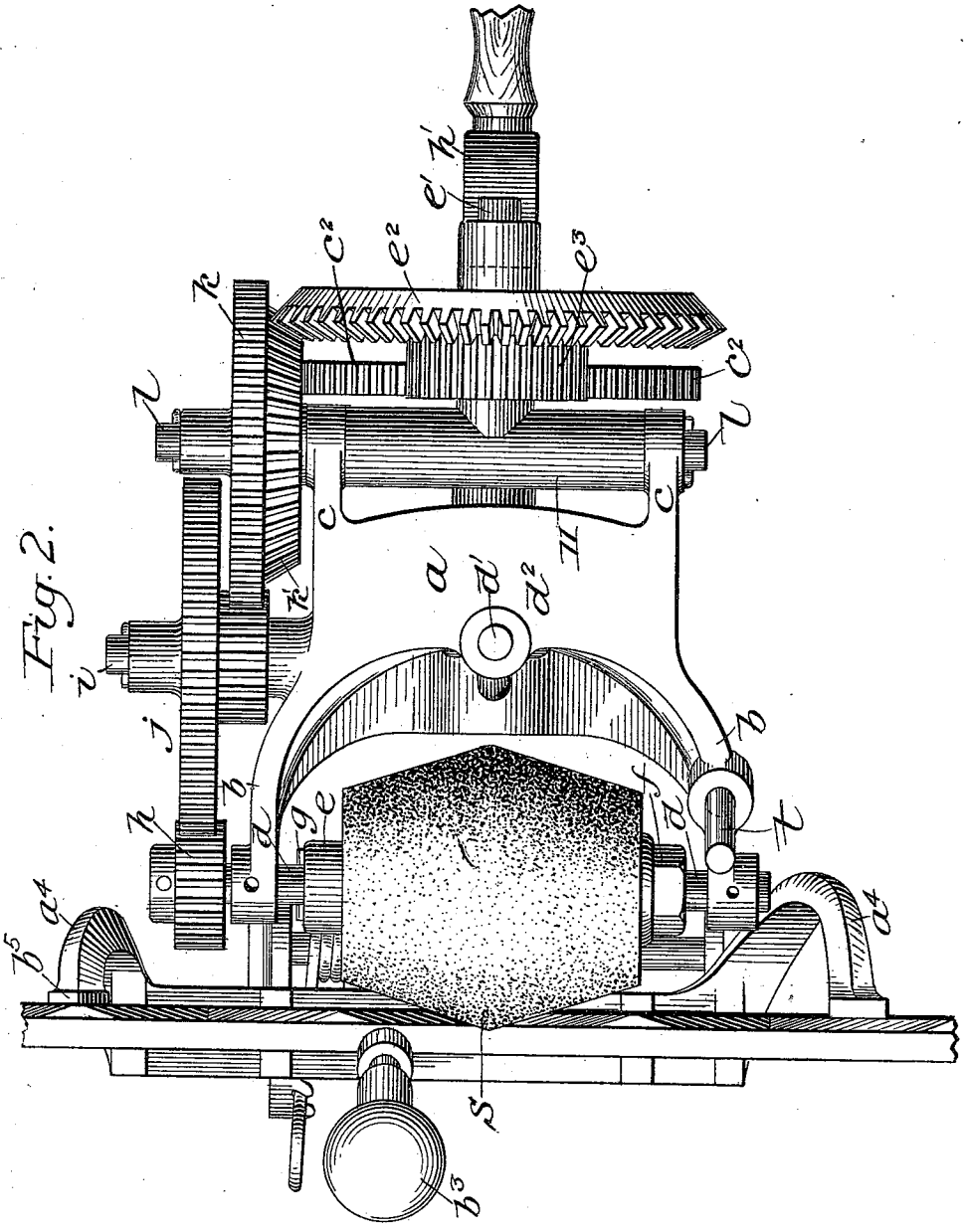
GRINDER FOR SICKLES OF MOWERS, REAPERS, &c.

(Application filed Feb. 14, 1900.)

(No Model.)

3 Sheets—Sheet 2.

Fig. 2.



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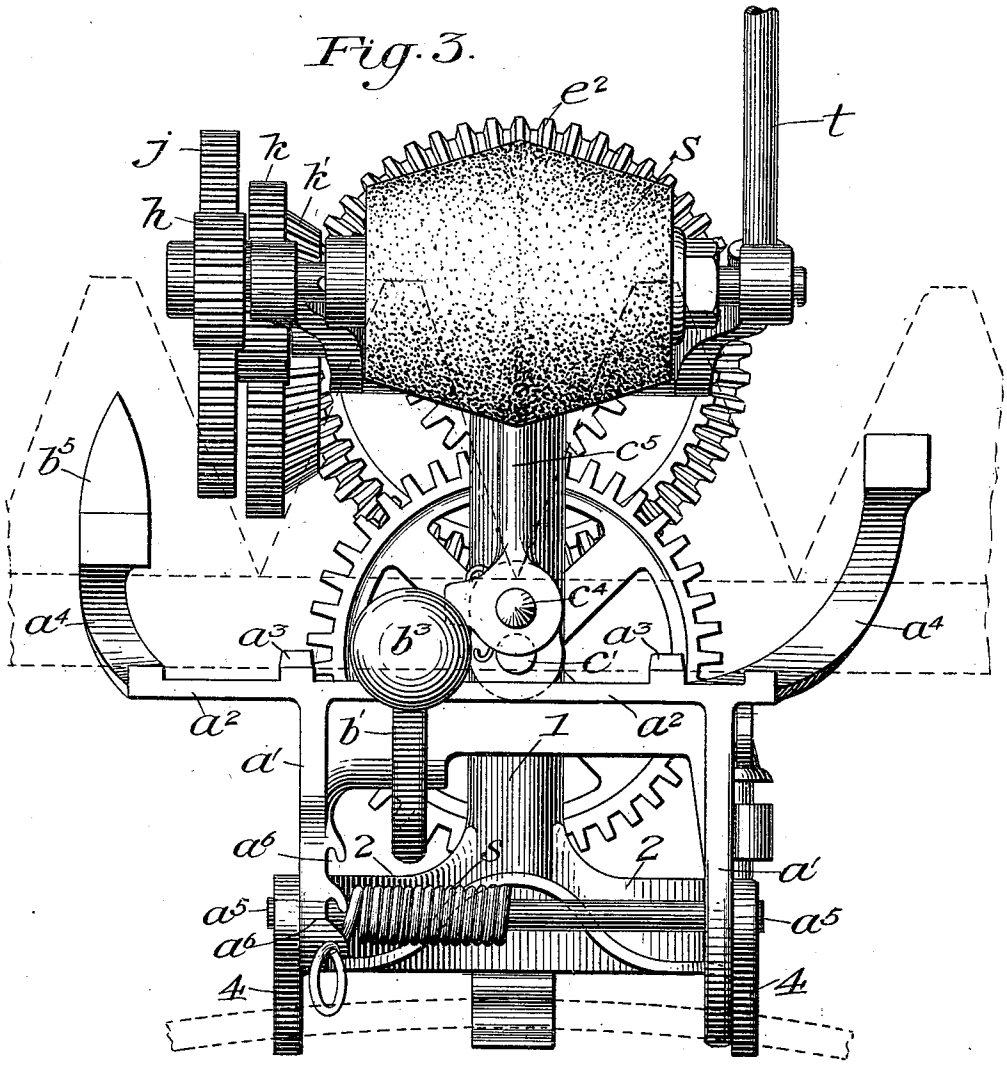
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(Application filed Feb. 14, 1900.)

(No Model.) 3 Sheets—Sheet 3.

Fig. 3.



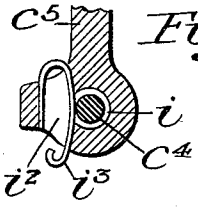


Fig. 4.

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UNITED STATES PATENT OFFICE.

EDWARD A. JOHNSTON, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE McCORMICK HARVESTING MACHINE COMPANY, OF SAME PLACE.

GRINDER FOR SICKLES OF MOWERS, REAPERS, &c.

SPECIFICATION forming part of Letters Patent No. 665,328, dated January 1, 1901.

Application filed February 14, 1900. Serial No. 5,204. (No model.)

To all whom it may concern:

Be it known that I, EDWARD A. JOHNSTON, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Grinders for the Sickles of Mowers, Reapers, and the Like; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The invention relates to that class of grinders for the sickles of mowers, reapers, and the like where the grinder is mounted in an oscillating frame so as to travel to and fro over the edges of the knife-sections as it revolves and has also a pivoted knife-carrying frame provided with a spring to yieldingly hold the knife up to the action of the grinder.

The invention is illustrated in the accompanying drawings, forming part of this specification, wherein—

Figure 1 is a side view of the complete grinder in place on the rim of a harvester-wheel, which is indicated in dotted lines. Fig. 2 is a plan view of the same. Fig. 3 is an end elevation looking toward the grinder-stone, the knife being shown in dotted lines. Fig. 4 is a detail showing a convenient device for detachably securing the link by which the grinder-frame is connected to its operating-crank.

The main frame of the grinder consists of an upright post 1, preferably inclined, as shown in Fig. 1, and having a base formed of arms 2 2, projecting laterally and horizontally from the post and separated some distance apart, as illustrated in Fig. 3, and provided with depending lugs 4 4. Projecting from the base of the post 1 in the opposite direction from the arms 2 and in a plane about equidistant between them a rigid rod 5, having a screw-threaded end, carries a clamp 6, which is loosely sleeved upon the arm and is adjusted to various positions thereon by means of the thumb-nut 12 screwing on the end of the rod.

The grinder is adapted for attachment either to a square-sided block or to the wheel of a harvester or mower, and in order to provide for either attachment the lugs 4 4 of the arms 2 2 are provided with square shoulders 7 7 and a groove 8, and the adjustable clamp 6 is made reversible and is provided on one side with a plain straight edge 9, and on the opposite side with a groove 10. When the grinder is to be attached to the rim of a wheel, the adjustable clamp is set in the position indicated in Fig. 1, and the wheel-rim occupies the grooves 8 and 10 and is clamped between the lugs 4 of the frame-arms 2 and the adjustable clamp 6 by means of the jam-nut 12. When it is desired to secure the grinder to a bench or block having straight sides, the clamp 6 is reversed and the bench is clamped between the straight edge 9 of the clamp and the straight shoulders 7 7 of the lugs 4.

At the upper end of the post 1 the grinder-frame *a* is mounted. This frame is forked at its front end, and in the arms *b b* of the fork the grinding-stone S is journaled. Ears *c c* project from the opposite end of the grinder-frame, and by means of these ears the frame is pivoted so as to oscillate in a vertical plane, the upper end of the post 1 being provided with a transverse tubular sleeve 11, forming a bearing for the pivot-pin. The grinder-stone is clamped upon its shaft *d*, between a washer *e* near one end and a nut *f* near the opposite end, the washer being held in place by a pin *g*. The stone is thus clamped securely yet removably to its shaft, and the nut and washer by which it is secured are both inside the fork-arms *b b*. Thus the stone can be easily removed by taking out the pin *g*, removing the nut *f*, and slipping the shaft endwise out of its bearings in the fork-arms.

Outside the fork-arm the shaft of the grinder-stone is provided with a spur-pinion *h*, and on a stud *i*, projecting from the grinder-frame midway between its ends, is a speeding spur-gear *j*, the larger wheel of which meshes with the pinion *h* and the smaller wheel of which meshes with a spur-gear *k*, journaled upon the pin *l*, upon which the grinder-frame is pivoted, as before described. It will be readily understood that this train of gearing allows the grinding-stone to travel with the oscillations of the frame without interfering with the operation of the gears.

Pivoted on a bolt passing through the outer ends of the arms 2 of the main frame is the

knife-carrying frame, consisting of depending arms a' a', a ledge or cross-piece a^2 a^2, provided with lugs or shoulders a^3 a^3, to form seats for the knife, and with upstanding arms a^4 a^4, which are preferably bowed inwardly, as shown in Fig. 1, and project upwardly into position for the sections of the knife to bear against and be steadied by them. A spring s is coiled around the pivot-bolt a^5 of the knife-carrying frame and reacts between this frame and the base-frame of the grinder, the outer end of the spring being adjustable into any one of a number of notches a^6 a^6 on one of the side bars of the knife-carrying frame, and the other end of the spring being hooked under a flange of the base-frame. The purpose of this spring is to press the knife-carrying frame inwardly, so as to hold the knife yieldingly against the surface of the stone. In order to prevent the frame from falling down, one of its side bars a' is provided with a foot or extension a^7, which is adapted to abut against a shoulder a^8 on the inner side of the corresponding side bar of the base-frame, as indicated in dotted lines in Fig. 1. The tendency of the spring s being to force the knife-carrying frame inward when the oscillation of the grinder-frame carries the stone to the limit of its upward motion, the sections of the knife would move so far under the stone as to be struck on the return movement of the stone, and to limit this inward movement of the frame one of its side bars a' is provided with an ear or lug $a^\times$, projecting slightly laterally, so as to overhang the corresponding side bar 2 of the base-frame, and has a set-screw a^9 tapped into a threaded hole therein. This set-screw abuts against the upper edge of the arm 2 of the base-frame and forms an adjustable stop for the purpose of limiting the extent of inward movement of the knife-carrying frame.

For the purpose of clamping the knife or sickle in place upon its carrying-frame I provide a clamp consisting of an arm b', pivoted to the knife-carrying frame at a point below the knife-seats and preferably to lug b^2, projecting inwardly from the cross-piece of the frame. From this point the arm b' extends outwardly and then upwardly to a point considerably above the ledge a^2 and has its upper end overhanging said ledge, where it is provided with an adjustable clamping-screw b^3, adapted to bear against the upper edge of the knife-bar when the knife is seated on its carrying-frame. The clamp b', it is to be noted, swings in the same plane and direction as the knife-carrying arm, and in order to prevent its falling down out of convenient reach it is provided with a lug b^4 near its pivot, which contacts with a corresponding lug on the knife-carrying frame and limits its downward movement.

As shown in Fig. 1 of the drawings, the arms 2 2 of the base-frame are extended so far outwardly as to permit the pivoting of the knife-carrying frame approximately in the plane of the arc described by the grinding-stone and approximately in the same vertical plane as the seats for the knife. This arrangement of the pivot of the knife-carrying frame is important, for the reason that it locates the point upon which the frame swings approximately in the plane of the center of gravity of the knife and its carrying-frame, and thereby permits the use of a lighter spring than would be possible were the pivot located out of the plane of the knife-rest.

For the purpose of oscillating the grinder-frame there is journaled in the bearing in the post 1 in line with and in the same vertical plane as the grinder-frame a crank-shaft c', which has upon its outer end a speed-reducing spur-gear c^2 and upon its opposite end a crank c^3, upon the pin c^4 of which the lower end of the link c^5 is to be connected, the upper end of said link being attached in any suitable manner to the grinder-frame, a convenient form of attachment being that shown in the drawings, where d' denotes an eyebolt passing vertically and centrally through the grinder-frame, and d^2 indicates a nut screwed upon the threaded upper end of the same.

On a stud-shaft e', projecting rearwardly from the upper end of the frame-post 1, parallel with and in the same plane as the crank-shaft c', is mounted the main operating-gear of the grinder. This consists of the beveled gear e^2, which meshes with the corresponding gear k' of the gear k in the train of the grinder-operating gears and has also a spur-pinion e^3 meshing with the reducing-gear c^2, which oscillates the grinder-frame. The main operating-gear thus rotates in a plane transversely to the train of gears operating the grinder-wheel and parallel with the position of the knife, and the advantage of this arrangement of gearing is that it enables the hand-crank h', by which the grinder is operated, to be made considerably longer than if it operated transversely to the knife and also locates it in a position most favorable to the workmen. It is also to be noted of this arrangement of gearing that it insures the proper and permanent timing of the rate of oscillating movement of the frame with the rapidity of rotation of the grinding-roller.

As thus far described the grinder is entirely automatic in action and only requires that the position of the knife in the carrying-frame shall be shifted along as it is desired to sharpen the different sections. It is sometimes desirable, however, to operate the grinder manually for the purpose of grinding out nicks and uneven places in the sections, and partly for this purpose and partly for another reason which will be described later on I make the connection between the link c^5 and its operating crank-pin c^4 detachable, and I provide the grinder-frame proper with a detachable post or handle t, which is preferably screwed into an opening in one of the fork-arms of the frame. This permits the grinder-frame to be held in any desired posi-

tion or to be raised and lowered by hand at any rate desired without regard to the speed of rotation. It is also desirable that the grinder should be adapted to other uses than that of sharpening sickle-sections, and I provide for securing the grinder-frame in an elevated fixed position, so that it may be used as an ordinary grinder-stone for the purpose of sharpening tools generally. In order to secure this adjustment of the grinder-frame, there is a rigid pin p, projecting from the post 1 of the main frame just above the bearing for the crank-shaft. This pin is adapted to receive and fit the opening at the lower end of the link c^5, and when the link is detached from the crank-pin c^4 and hooked over the pin p the grinder-frame will be rigidly held in an elevated stationary position, where the inclined stone shown in the drawings may be used for grinding tools generally, or a cylindrical stone may be substituted by simply taking out the stone-shaft, as before described.

In Fig. 4 I have shown a convenient device for securing the eye of the link c^5 to the crank-pin c^4 or to the stud-pin p. Each of the pins is provided with a groove i, and the end of the link has a lateral offset i', having an opening i^2, in which there is seated a spring i^3, which snaps into the groove of either pin when the link is in place. The lower end of the spring preferably projects in Fig. 4 in order that it may be readily released.

For the purpose of aiding in correctly positioning the knife, so that the sections shall properly register with the grinding-stone, I provide one of the arms a^4 with a pointer b^5, which is set at such distance from the center of the stone as to correspond with the standard sizes of knives, and which when placed in a position centrally of one of the sections will bring the space between adjacent sections into proper alinement with the stone.

The knife is set in position for sharpening, as indicated in full lines in Fig. 1 and dotted lines in Fig. 3, with the rear edges of the sections abutting against the shoulders a^3 of the ledge a^2 of the knife-carrying frame. This brings the upper ends of the arms a^4 against the sections, and the knife is secured in position by the screw b^3 of the clamp b' taking against the upper edge of the knife-bar b^6, as shown in Fig. 1. This securely locks the knife in position downwardly upon the seat a^2 and laterally against the shoulders a^3 and the arms a^4, thereby rigidly clamping the knife in position vertically and horizontally by the one device.

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

1. In a grinder for the sickles of mowers, reapers, and the like, the combination with the main frame, of a pivoted grinder-frame, a knife-carrying frame, gearing for rotating the grinder, a shaft journaled in the main frame and driven by the grinder-operating gearing, said shaft having a crank on one end connected by a detachable link with the grinder-frame, and a handle connected with the grinder-frame whereby it may be manually controlled.

2. In a grinder for the sickles of mowers, reapers, and the like, the combination with the main frame, of a pivoted grinder-frame, a knife-carrying frame, gearing for rotating the grinder, a shaft journaled in the main frame and driven by the grinder-operating gearing, said shaft having a crank on one end connected by a detachable link to the grinder-frame, and a stud on the main frame adapted to have the link connected to it when disconnected from the crank so as to hold the grinder-frame in fixed position, the grinder-gearing being adapted to operate the grinder whether its frame be fixed or oscillating.

3. In a grinder for the sickles of mowers, reapers, and the like, the combination with the main frame, of a grinder-frame, a knife-carrying frame provided with a seat for the knife and vertical arms for steadying the sections, of a knife-holding clamp and having an adjustable tightening device overhanging the knife-bar and clamping the same down upon its seat on the frame, one of said vertical arms being constructed to form a pointer for indicating the proper adjustment of the knife-sections with the stone.

4. In a grinder for the sickles of mowers, reapers, and the like, the combination with the main frame, of a grinder-frame, a knife-carrying frame provided with a horizontal seat for the knife and vertical arms for steadying the sections, of a knife-holding clamp consisting of an arm horizontally pivoted below the frame to swing transversely of the knife, said arm extending upwardly and overhanging the position of the knife, and having an adjustable screw or tightener adapted to engage the edge of the knife-bar and clamp the knife down and against its seat.

5. In a grinder for the sickles of mowers, reapers, and the like, the combination with the main frame, of an oscillating grinder-frame, and a knife-carrying frame pivoted to swing toward and from the grinder, said carrying-frame having a stop to prevent it from swinging too far away from the grinder, a spring to press it yieldingly toward the grinder, means for adjusting the spring to vary the pressure of the sections on the grinder, and an adjustable stop to prevent the spring from throwing the sections too far under the grinder when the latter is raised.

6. In a grinder for the sickles of mowers, reapers, and the like, the combination of an oscillating grinder-frame, a pivoted knife-carrying frame swinging toward and from the grinder in the same vertical plane as the grinder-frame, a shaft journaled in the main frame and having a crank on one end link-connected with the grinder-frame, a train of gears carried by the grinder-frame for driving

the grinder, a gear on the opposite end of the crank-shaft perpendicular to the grinder-driving gears, and a hand-operated gear rotating in a plane parallel with the position of the knife, and having a spur-pinion meshing with the gear on the crank-shaft, and a bevel-gear meshing with a bevel-pinion in the grinder-operating train.

7. In a grinder for the sickles of mowers, reapers, and the like, the combination with the main frame, of the arms 2, 2, having depending lugs 4, 4, provided with plane surfaces 7, 7, and a groove 8, the opposing reversible clamp 6 having a plane surface on one edge and a groove 10 in the opposite edge, and a screw 12 adjustable on the threaded rod 5.

In testimony whereof I affix my signature in presence of two witnesses.

EDWARD A. JOHNSTON.

Witnesses:
CHAS. W. ALLEN,
WM. H. FERGUSON.