W. B. MORSE.

AWL GRINDING MACHINE.

APPLICATION FILED AUG. 22, 1905.

969,896.

Patented Sept. 13, 1910.

2 SHEETS—SHEET 1.

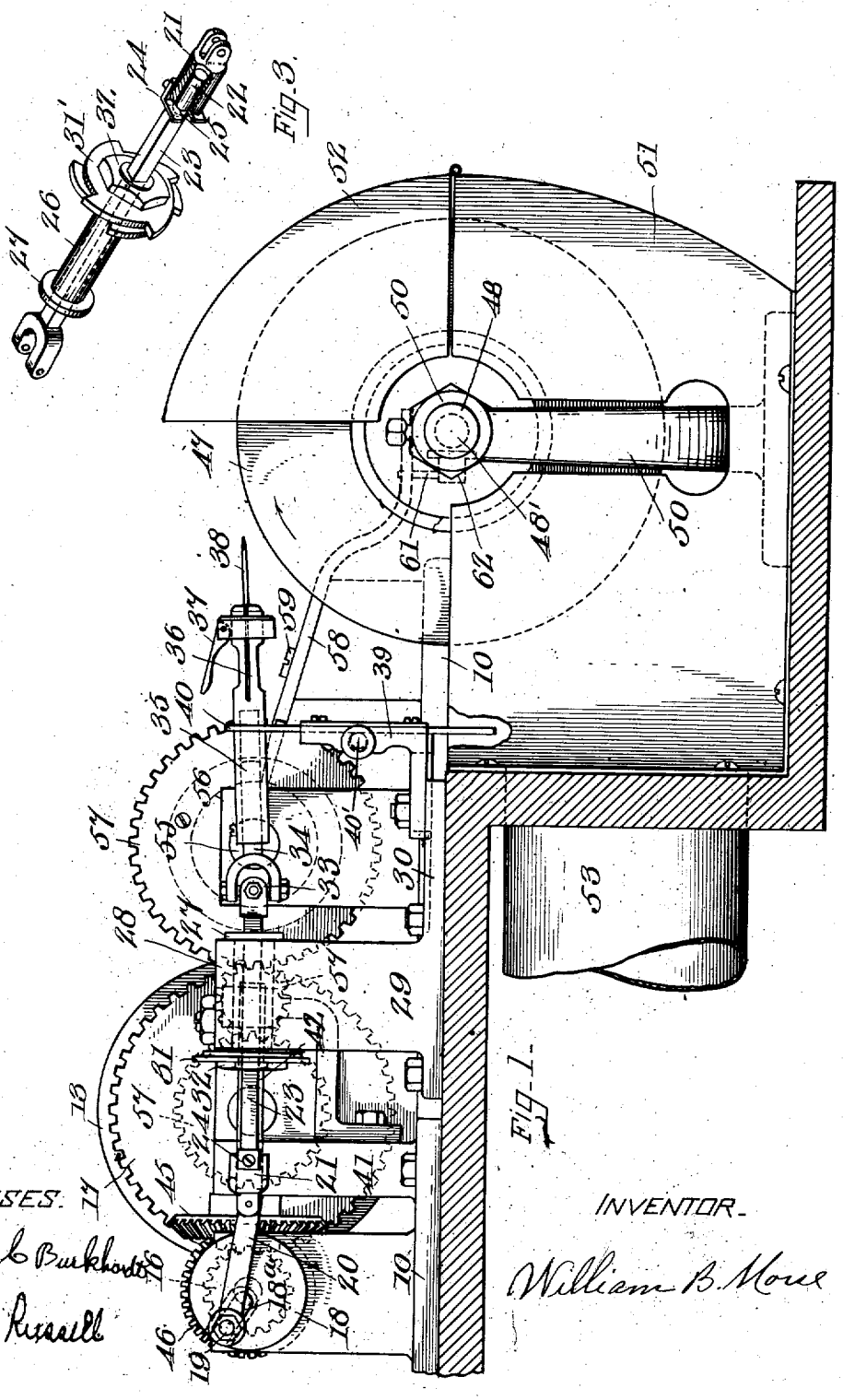

Fig. 1.

Fig. 3.

WITNESSES:

Adolph L. Burkhardt

Arthur L. Russell

INVENTOR.

William B. Morse

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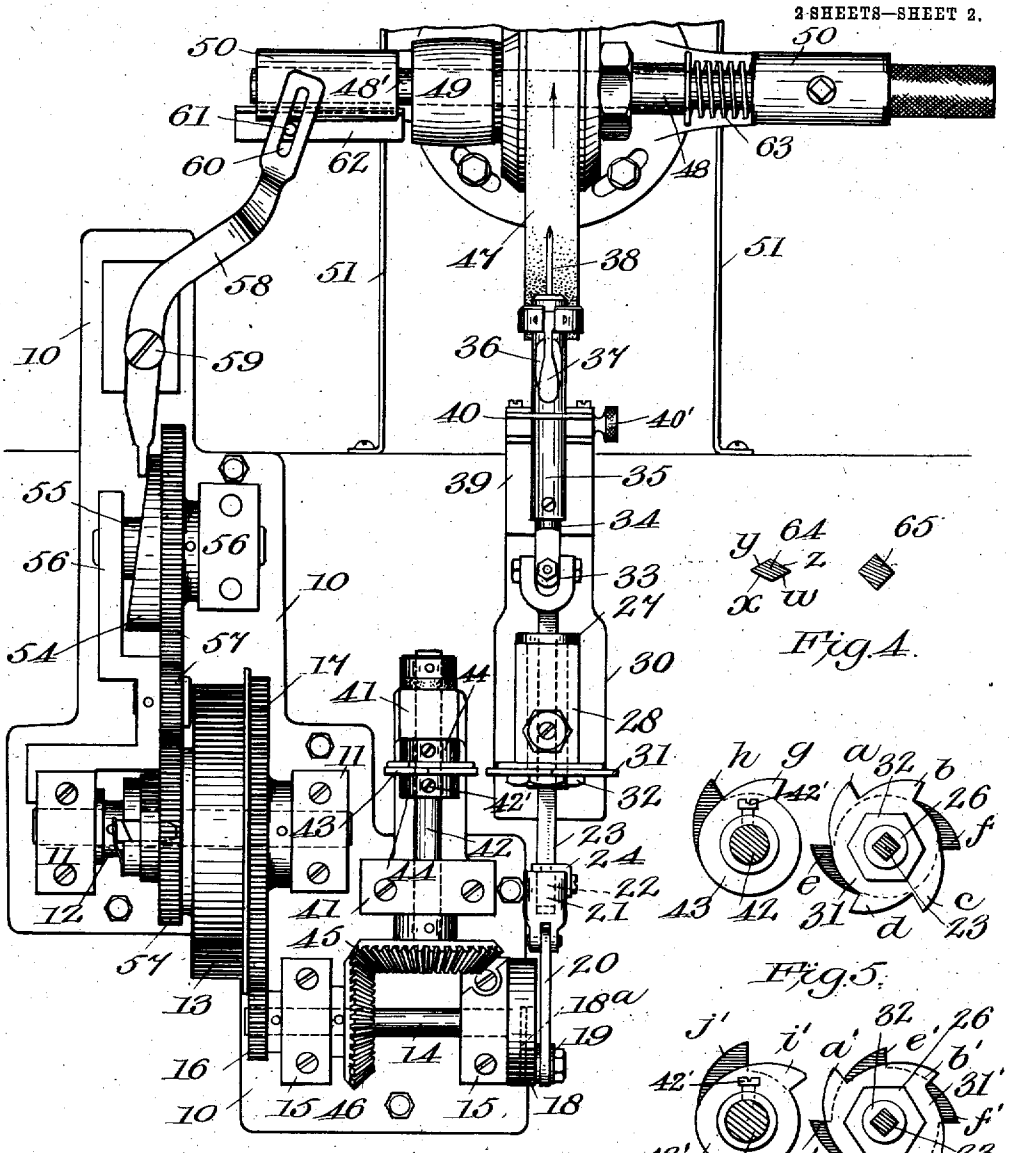

Fig. 1.

Fig. 4.

Fig. 5.

Fig. 6.

WITNESSES.

Adolph G. Burkhardt.

Arthur L. Russell.

INVENTOR

William B. Morse

UNITED STATES PATENT OFFICE.

WILLIAM B. MORSE, OF BEVERLY, MASSACHUSETTS, ASSIGNOR TO UNITED SHOE MACHINERY COMPANY, OF PATERSON, NEW JERSEY, A CORPORATION OF NEW JERSEY.

AWL-GRINDING MACHINE.

969,896. Specification of Letters Patent. Patented Sept. 13, 1910.

Application filed August 22, 1905. Serial No. 275,286.

To all whom it may concern:

Be it known that I, WILLIAM B. MORSE, a citizen of the United States, residing at Beverly, in the county of Essex and Commonwealth of Massachusetts, have invented certain Improvements in Awl-Grinding Machines, of which the following description, in connection with the accompanying drawings, is a specification, like reference characters on the drawings indicating like parts on the several figures.

This invention relates to machines for grinding bevels on the ends of blanks in the form of rods, such as are to form awls, needles and the like, and the objects of the invention are to improve the construction, speed of operation and accuracy of the motive parts of such machines and generally to increase their efficiency and overcome prior difficulties heretofore met in performing this class of work.

Heretofore two or more bevels were ground either directly by hand, by turning the blank back and forth through the desired angle and applying one end thereof at the same time to a proper grinding surface, or by securing a blank or blanks in a convenient clamp and then through a suitable mechanism attached to the clamp and operated by hand, give a predetermined turning movement thereto according to the number and location of the bevels desired to be ground. Both of these methods are objectionable, the first, because the manipulation of the blank in that way requires great skill, if anything approaching uniformity of product is the result, and the reproduction of a particular form unless a model is employed is almost impossible, and the second, because the attendant's hand must be constantly manipulating some part of the machine in order to effect the proper turning of the blank to secure the desired form of beveled point. These defects are obviated in the present machine by providing automatic means for rotating the blank during its movement against the grinding surface employed whereby an attendant is only needed to feed, start and stop the machine, no manipulation of the blank or machine parts being necessary during the operation of forming the particular beveled point for which the machine is set.

Further, a particular object of the machine is to provide means for rotating the blank to be ground through a series of varying angles which series are predetermined, the rotation through one after the other of this prearranged order of angles being automatically carried forward.

To the accomplishment of the above named objects and such others as may hereinafter appear, the invention comprises the novel construction and combinations of parts hereinafter described and claimed, reference being had to the accompanying drawings, showing the preferred embodiment thereof, in which:—

Figure 1 is a side elevational view of the machine, Fig. 2 is a plan view of the machine, Fig. 3 is a detail view of the preferred method of mounting the ratchet wheel. Fig. 4 is a detail showing two different cross-sections that may be ground, and Figs. 5 and 6 are elevational views of two different forms of ratchet wheels and the strikers therefor.

Although this machine can be successfully used for grinding beveled points for use in any connection, the description hereinafter following will, for simplicity, be confined in the terms used to a machine for grinding the bevels on awl blanks. With this in view, referring to the drawings, 10 denotes a frame in which is suitably journaled, in bearings 11, a shaft 12 carrying a driving pulley 13. Conveniently located on frame 10, is a second shaft 14 suitably journaled in bearings 15 and carrying at one end a gear 16 adapted to mesh with a gear 17 on shaft 12.

Any suitable means for holding an awl blank and effecting a relative movement between it and a suitable grinding medium may be used, the preferred means being the mechanism to be described immediately hereinafter.

The outer end of shaft 14 carries a wrist 18 provided with a slot 18^a in which is adjustably mounted a wrist pin 19, and to this pin is connected one end of a pitman 20. Pivotally connected to the forward end of pitman 20 is a socketed member 21 in which is rotatably secured, so as to effect a swivel connection therewith, the rounded end 22 of a slide 23, the securing means here shown being a U-shaped washer 24 seated in a groove 25 in the slide and rigidly secured to the member 21.

The main portion of the shank of slide 23

is of angular section, here shown as square, and on this shank is loosely mounted a sleeve 26 having a cylindrical surface, screw threaded at one end and having a collar or flange 27 at the other. This sleeve 26 is fitted within journal 28 formed on a supporting bracket 29 of an auxiliary frame 30. On the threaded end of sleeve 26 is screwed a ratchet wheel 31, to be more particularly described hereinafter, and this member is held in position and against the end of journal 28 by a lock nut 32. Connected to the forward end of slide 23, by a universal joint 33, is a rod or pin 34 on which is adjustably secured a chuck 35 of any suitable design, the one here shown having a split end 36 adapted to be drawn together by a cam lever 37 suitably mounted thereon. An awl blank fitted in the chuck is shown at 38. On auxiliary frame 30, beneath chuck 35 is a bracket 39 capable of longitudinal adjustment with respect to the chuck by any suitable connection with the frame, and also carrying a supporting plate 40 through the upper end of which the chuck passes, which is capable of vertical adjustment in the bracket 39 and is held in any desired position by any convenient means as a cam 40′. It will thus be seen that if sleeve 26 is turned, which may be done by rotating ratchet wheel 31, it will carry slide 23 with it, the slide turning on its swiveled end and thus carrying the awl blank through a definite angle.

The preferred means for mounting the means employed for effecting this turning movement are the following: Suitably journaled in a bracket 41 on frame 10 is an auxiliary shaft 42 substantially parallel to slide 23 which carries a striker 43, to be more particularly described hereinafter, preferably mounted on a sleeve 44 which is rigidly but adjustably secured to the shaft in any convenient manner, as by a set screw 42′, in such position that in its revolution it will engage the ratchet 31. Auxiliary shaft 42 is driven continuously in any convenient manner, preferably at the same speed as shaft 14, so that the awl blank may be carried through both a forward and backward stroke during one revolution of the striker, the means here shown being intermeshing bevel gears 45 and 46 mounted on shafts 42 and 14 respectively.

A suitable grinding medium, which term is meant to embrace abrading, cutting, dressing, polishing, etc., is shown at 47, located in line with the slide 23 and its connections, and preferably consists of a revolving wheel of any suitable substance as emery, conveniently mounted on a revoluble sleeve 48 carrying a pulley 49 the whole mounted on an axle 48′ which is in turn mounted in a suitable supporting frame 50. The grinding wheel 47 is also surrounded, as far as is practicable, by the usual guard casing 51 having a hinged top 52, and the interior of this casing is connected to a suitable suction device (not shown) through a pipe 53, whereby dirt may be removed.

If it is desired to prevent a groove being worn in the grinding medium, as is convenient but not essential, means are provided that will give said medium a transverse reciprocatory movement thus subjecting the whole width of the surface to equal wear. The preferred means, when any is used, for effecting this result comprise a cam 54 on a shaft 55 journaled in a conveniently located bracket 56 on the frame 10 which may be driven from the power shaft 12 by any suitable connections, as through a train of gears 57. Cam 54 engages and forces in one direction one end of an oscillating lever 58 pivotally mounted at 59, the other end thereof being provided with a slot 60 engaging a pin 61 on a slide 62 mounted in frame 50, which slide engages sleeve 48 to force it in one direction. Axle 48′ is also provided with a spring 63 confined between one end of sleeve 48 and frame 50 which is adapted to exert a pressure on the sleeve opposite to that of cam 54 and thus provide for the continuous reciprocation of wheel 47.

The ratchet wheel and striker shown in Fig. 5 are adapted to form a beveled point having the lozenge or diamond shaped cross-section shown at 64 in Fig. 4, while those shown in Fig. 6 are adapted to form a beveled point having the square cross-section 65 of Fig. 4.

The ratchet wheel 31 shown in Fig. 5 comprises two series of teeth, each series lying in a different plane, and each tooth being provided with a striking face which preferably forms an extension of a radius of the disk forming the body of the ratchet. As plainly shown one series comprises teeth *a*, *b*, *c* and *d* located at the four ends of two diameters forming an angle of 60° with each other, and the other series comprises but two teeth *e* and *f* diametrically opposite each other. These teeth may be on two separate disks or all formed on one, but in either case, the teeth *e* and *f* are placed centrally between teeth *a*—*d* and *b*—*c*, respectively, so that there is finally arranged a striking face for each 60° around the circumference of the disk. Striker 43 of this figure is provided with two teeth *g* and *h*, the former in the plane of teeth *a* to *d*, and the latter in the plane of teeth *e*, *f*, with their striking faces 60° apart.

The ratchet wheel 31′ of Fig. 6 is formed similarly to that of Fig. 5, the difference being that there are two series of four teeth each *a*′, *b*′, *c*′, *d*′, and *e*′, *f*′, *g*′, *h*′, the striking faces of each series being 90° apart, and the two series combined so that there

is finally a striking surface each 45° around the circumference of the disk. Striker 43′ of this figure is provided with two teeth i', and j', the former in the plane of teeth a' to d', and the latter in the plane of teeth e' to h', with their striking faces 45° apart.

The operation of the machine in forming a beveled point having the lozenge shaped cross-section 64 of Fig. 4 will be described first. The machine having been fitted with ratchet wheel 31 and striker 43, an awl blank 38 is clamped in chuck 36, the desired length of stroke is regulated through the adjustment of pin 19 in slot 18ª, the depth of the bevel desired is regulated by a proper movement of sleeve 35, and the desired longitudinal angle of each bevel is secured through a proper adjustment of sliding supporting plate 40 in bracket 39. Power being applied through driving pulley 13, the awl blank will be reciprocated against the revolving grinding surface, the first forward stroke grinding, say, bevel w (Fig. 4). The ratchet wheel and striker have been so positioned that during the return stroke striker tooth g engages ratchet wheel tooth a, the length of the teeth being such that the slide 23, together with the attached blank, is turned thereby through an angle of 60°, and the blank is then sent forward again and the next bevel x is ground. During the following return stroke striker g engages ratchet wheel tooth b and immediately afterward during the same stroke striker tooth h engages ratchet wheel tooth f and slide 23 and the blank are thus turned through 120° before the blank is again brought into contact with the grinder to form bevel y. During the next or third backward stroke teeth g and c engage and the slide and blank are again turned through 60°, bevel z being ground on the next forward stroke. During the next or fourth backward stroke teeth g and d engage turning the slide and blank 60° and immediately after, as before, teeth h and e engage turning them a second 60° before the blank is again brought in contact with the grinder, thus bringing the blank again in position to grind bevel w, and so on through the cycle just given as many times as may be required, when the feed is stopped, the beveled awl blank is removed and another blank inserted in the chuck.

For grinding a beveled point having the square cross-section, ratchet wheel 31′ and striker 43′ are fitted to the machine and the cycle is completed in a similar manner to that given above, the difference here being that on each backward stroke both teeth of the striker engage teeth of the ratchet wheel, each engagement turning the slide 23 and its attached blank through 45°, which consequently makes a complete turn of 90°.

From this description of the operation it is seen that the moment of time, during the period of movement between the work-holder and grinding mediums, at which the holder is given its angular movement is determined entirely by the angular position of the striker upon its driving shaft, since both shafts 14 and 42 are driven at the same speed, and also the slide 23 is turned through one or more successive angles at this moment according as the striker is provided with one or more striking teeth in different planes, and suitably positioned to effect the desired result.

For substantially all awl bevels now commercially in use, it has not been found necessary to resort to more than two teeth on the striker, and this being the case it is readily seen that when changing a style of bevel the ratchet alone need be removed, for the striker may be made in two parts each on its separate sleeve and carrying a single tooth, as shown in Fig. 2, and with this construction the angle between the two striker teeth may be adjusted to properly engage whatever particular ratchet wheel may be in place.

It is readily seen that ratchet wheels and strikers may be designed for forming a great number of different styles of bevel points by multiplying the number of teeth or the number of planes in which they are situated, or by proportioning the length of the teeth to the angle through which it is desired to turn the blank, and by this means the chuck holding the blank to be beveled may be turned through any prearranged series of angles. With this view it is not desired to be understood that the invention is limited to the details of construction and arrangement of parts as herein described and illustrated, as it is obvious that the grinding surface used may be of widely varying construction and operation, also any convenient means other than those particularly described for effecting a relative movement between the work-holder and grinding surface may be successfully employed, in adapting the machine to various conditions of use, and many other modifications within the scope of the invention may be made. Also, in this connection, it should be understood that the use of the term "work-holder" in the claims is designed to refer to any convenient single part, or series of parts, adapted to be rotated in the course of forming the bevels desired.

Commercially, that portion only of the machine shown in the drawings which is supported by the frames 10 and 30, *i. e.*, the left-hand portion of Fig. 1, is manufactured, and then mounted to operate in connection with any existing grinding medium already in use, the further connection constituted by the means for giving the grinder a reciprocatory motion being used or omitted as may be deemed expedient.

Having thus described the invention what is claimed as new is:—

1. In a machine of the character described, a work-holder, mechanism for reciprocating said holder, and means for rotating said work-holder through a predetermined series of angles during its movement.

2. In a machine of the character described, a work-holder, means for reciprocating said holder, and means for automatically rotating the same through a series of varying angles during its reciprocation.

3. In a machine of the character described, a work-holder, mechanism for reciprocating said holder, and means for rotating the same through a series of varying angles in prearranged order during its reciprocation.

4. In a machine of the character described, a grinding surface, a work-holder, mechanism for reciprocating said holder, means for effecting a relative movement therebetween, and means for rotating said holder through a series of varying angles during said reciprocation.

5. In a machine of the character described, a grinding surface, a work-holder, means for effecting a relative reciprocatory movement therebetween, and means for automatically rotating said holder through a series of varying angles during said movement.

6. In a machine of the character described, a grinding surface, a work-holder, means for effecting a relative reciprocatory movement therebetween, and means for rotating said holder through a series of varying angles in prearranged order during said movement.

7. In a machine of the character described, a grinding surface, a work-holder, means for simultaneously effecting a longitudinal and transverse relative movement therebetween, and means for rotating said holder through a series of varying angles during the period of longitudinal separation.

8. In a machine of the character described, a work-holder, actuating mechanism for imparting to said holder a reciprocatory movement, and means controlled by said actuating mechanism for rotating said holder intermittingly during its reciprocation.

9. In a machine of the character described, a driving shaft, a work-holder, operative connections between said shaft and holder for imparting to the latter a reciprocatory movement, and a rotary member constructed and arranged to engage and rotate said holder intermittingly during its movement.

10. In a machine of the character described, a driving shaft, a work-holder, operative connections between said shaft and holder for imparting to the latter a reciprocatory movement, a continuously rotating auxiliary shaft, and means mounted thereon constructed and arranged to engage and rotate said holder intermittingly during its movement.

11. In a machine of the character described, a driving shaft, a work-holder, operative connections between said shaft and holder for imparting to the latter a reciprocatory movement, an auxiliary shaft connected to rotate once for each reciprocation of said holder intermittingly, and means associated with said auxiliary shaft for engaging and rotating said holder during its movement.

12. In a machine of the character described, a ratchet wheel, means for turning said wheel through a predetermined series of angles, a movable work-holder controlled as to its angular movement by the movement of said wheel, and means for imparting a reciprocatory movement to said holder.

13. In a machine of the character described, a ratchet wheel, means for rotating said wheel, a work-holder connected to be rotated by the movement of said wheel, and means for imparting a longitudinal reriprocatory movement to said holder.

14. In a machine of the character described, a ratchet wheel, a rotary member constructed to engage and rotate said wheel, a work-holder connected to be rotated by the movement of said wheel, and means for imparting a reciprocatory movement to said holder.

15. In a machine of the character described, a ratchet wheel having teeth in two or more planes, spaced in a prearranged order, means for engaging said teeth successively to rotate said wheel, and a work-holder connected to be rotated by the movement of said wheel.

16. In a machine of the character described, a ratchet wheel having teeth in two or more planes spaced in a prearranged order, a striker having a tooth for each plane connected to engage said ratchet wheel teeth successively to rotate said wheel, and a work-holder connected to be rotated by the movement of said wheel.

17. In a machine of the character described, a ratchet wheel having teeth in two or more planes spaced in a prearranged order, a striker having a tooth for each plane connected to engage said ratchet wheel teeth successively to rotate said wheel, means for varying the angle between said striker teeth, and a work-holder connected to be rotated by the movement of said wheel.

18. In a machine of the character described, a work-holder, mechanism for reciprocating said holder, a series of striking faces operatively associated therewith, and

a striker controlled by said reciprocatory movement adapted to engage said faces and rotate said holder.

19. In a machine of the character described, a grinding surface, a work-holder, means for effecting a relative movement therebetween, a prearranged series of striking faces operatively associated with said holder, and a striker adapted to engage said faces successively and rotate said holder through a series of varying angles.

20. In a machine of the character described, a grinding surface, a work-holder, means for effecting a relative movement therebetween, a prearranged series of striking faces located in two or more planes operatively associated with said holder, and a striker constructed and arranged to engage said faces successively and rotate said holder through a predetermined series of angles.

21. In a machine of the character described, a work-holder comprising a slide having a chuck universally connected thereto, a grinding surface, means for adjusting said chuck relative to said surface, means for effecting a relative movement between said holder and surface, and means for rotating said holder.

22. In a machine of the character described, a work-holder comprising a slide and a chuck universally connected to one end thereof, means for adjusting the height of said chuck, a pitman swiveled to the other end thereof, means for actuating said pitman, and means for rotating said holder during its movement.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM B. MORSE.

Witnesses:
A. C. BURKHARDT,
ARTHUR L. RUSSELL.

Correction in Letters Patent No. 969,896.

It is hereby certified that in Letters Patent No. 969,896, granted September 13, 1910, upon the application of William B. Morse, of Beverly, Massachusetts, for an improvement in "Awl-Grinding Machines," an error appears in the printed specification requiring correction as follows: Page 4, line 79, the word "intermittingly" should be stricken out; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 3d day of January, A. D., 1911.

[SEAL.]

E. B. MOORE,
Commissioner of Patents.

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