

No. 697,383.

Patented Apr. 8, 1902.

J. W. MILLIGAN & H. RALLINGS.

MACHINE FOR GRINDING AND POLISHING STEEL OR OTHER METALLIC PENS.

(Application filed Oct. 21, 1901.)

(No Model.)

5 Sheets—Sheet 1.

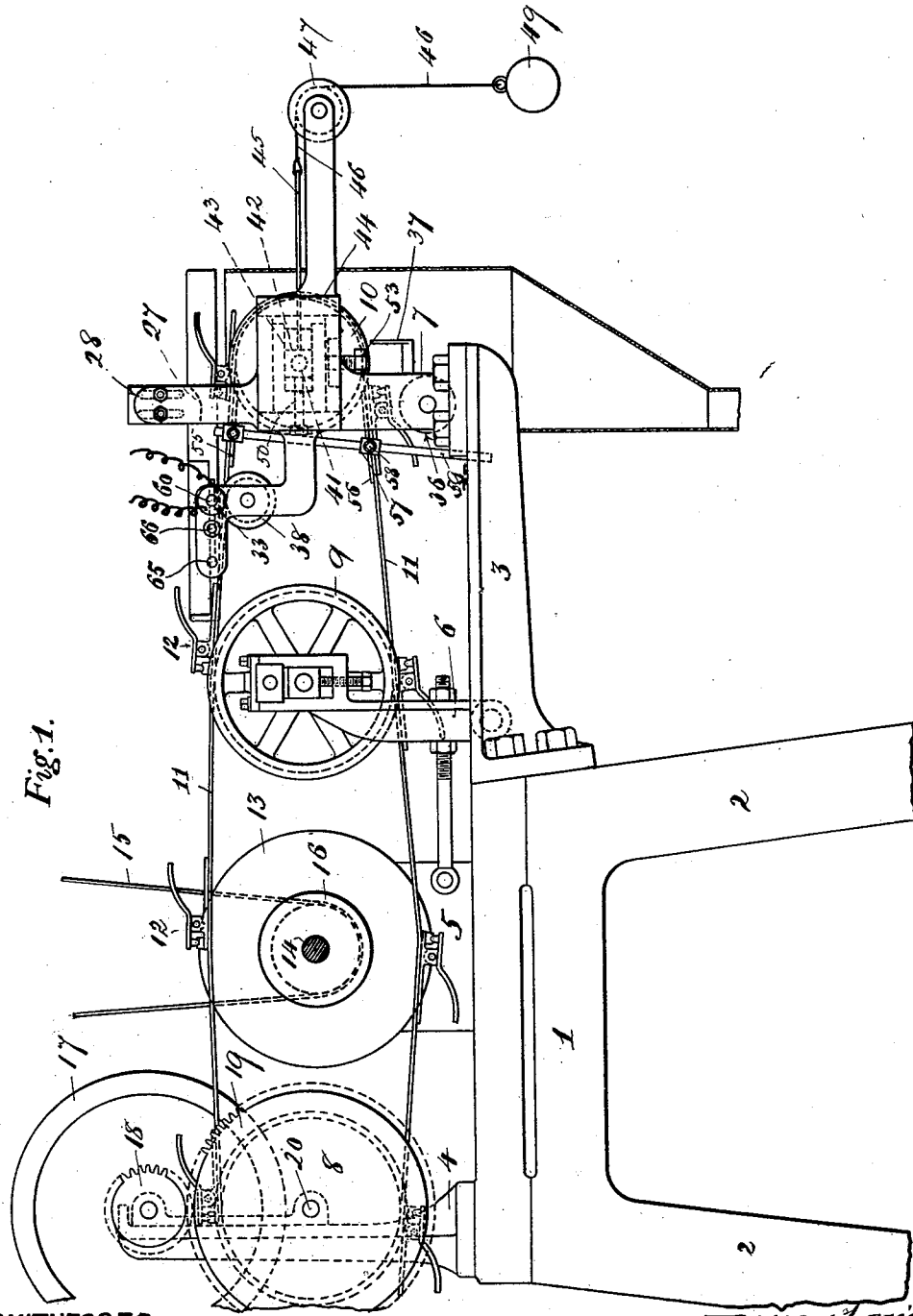


Fig. 1.

WITNESSES

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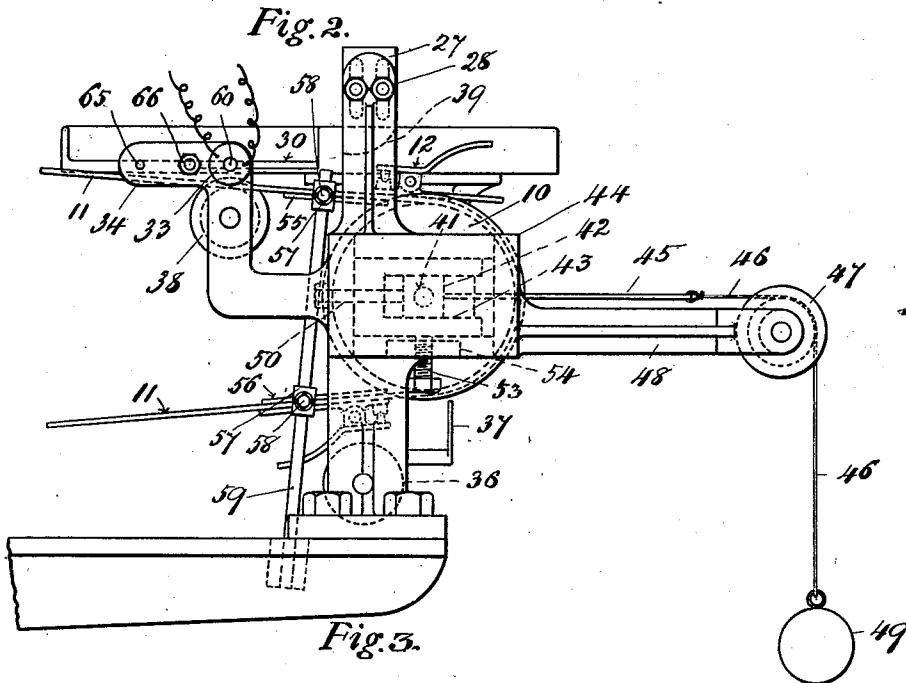
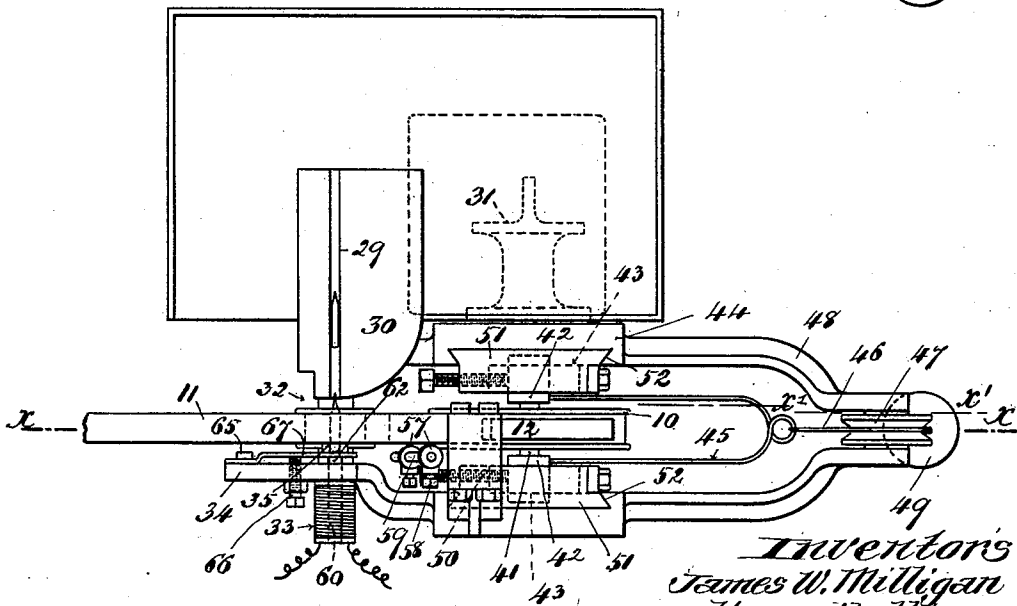


Fig. 3.



WITNESSES

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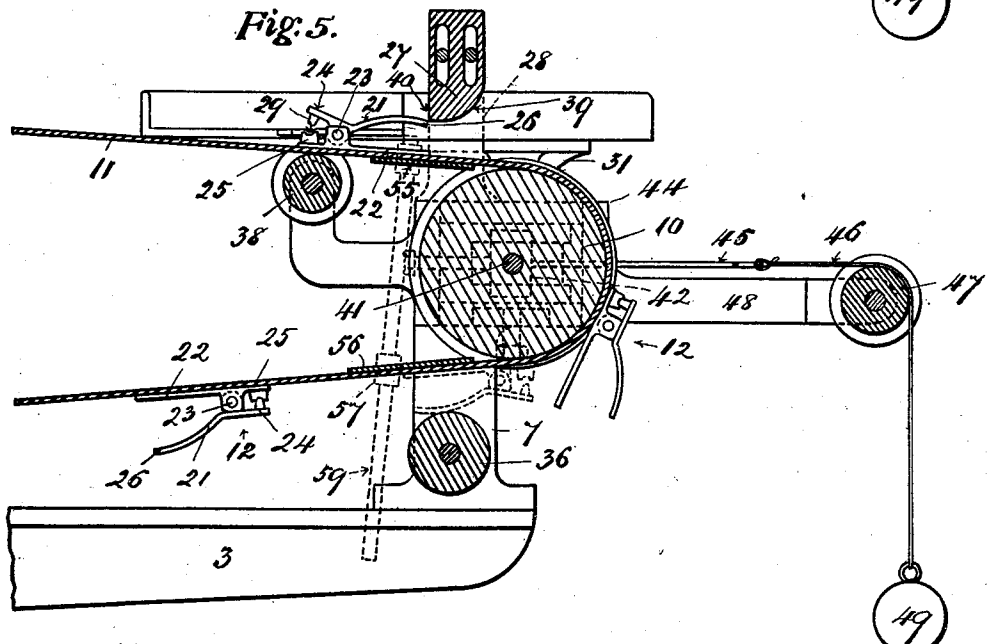
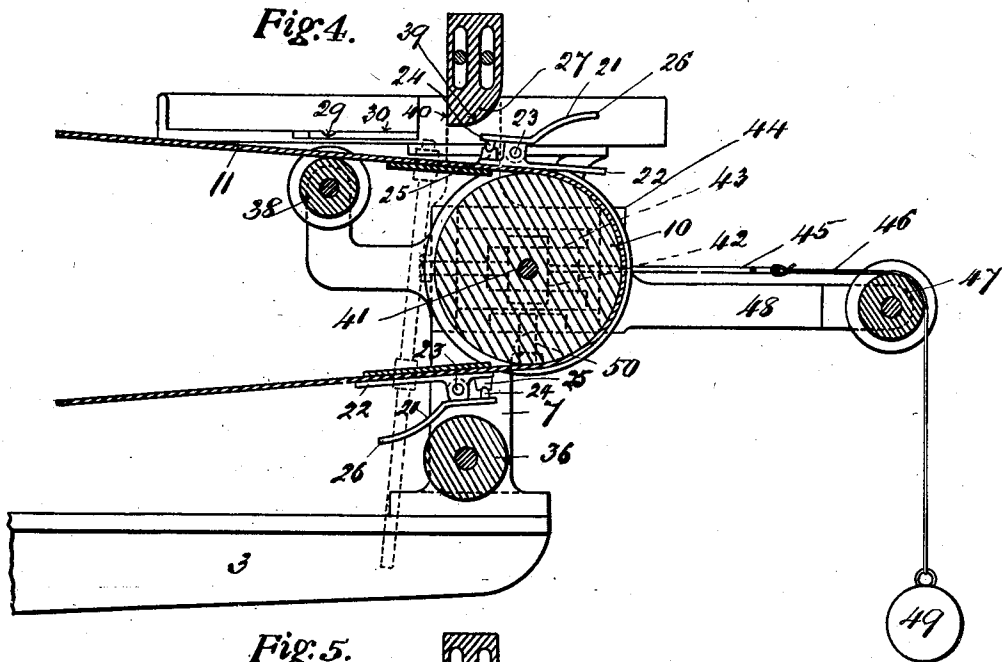
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5 Sheets—Sheet 3.



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Fig. 6.

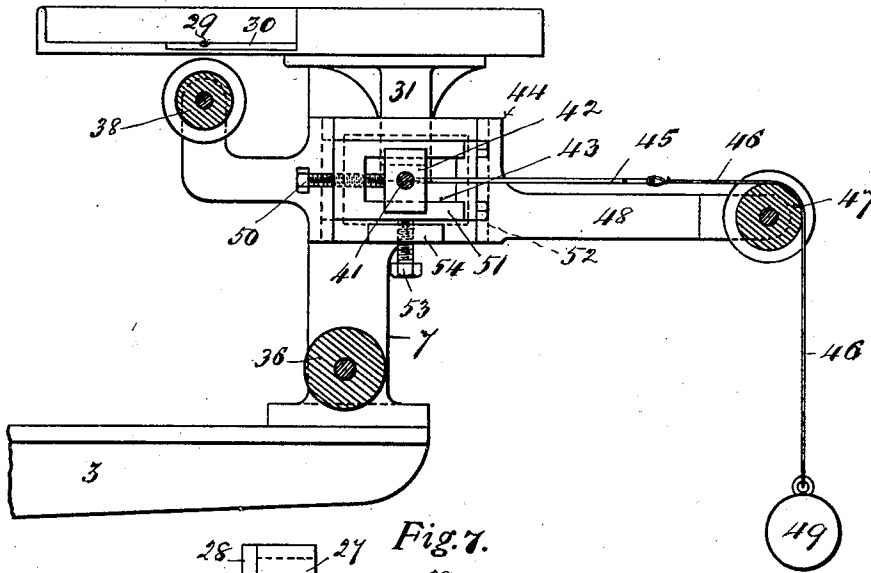
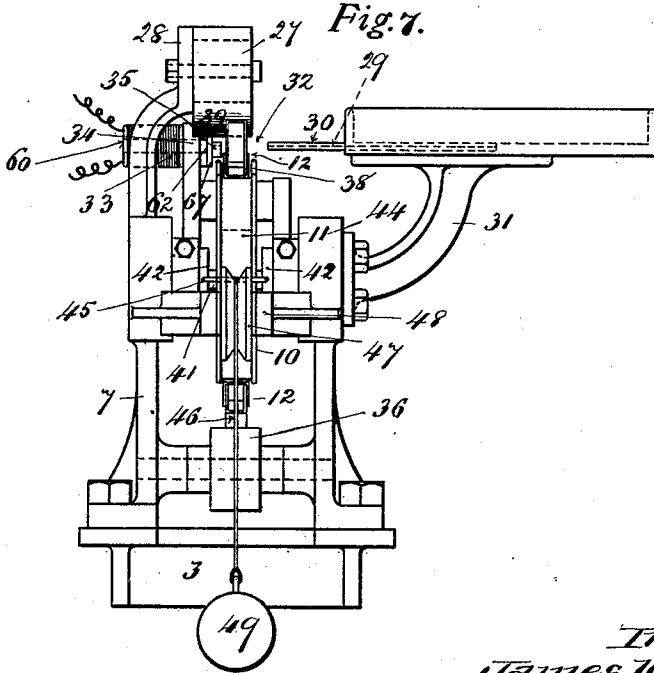


Fig. 7.



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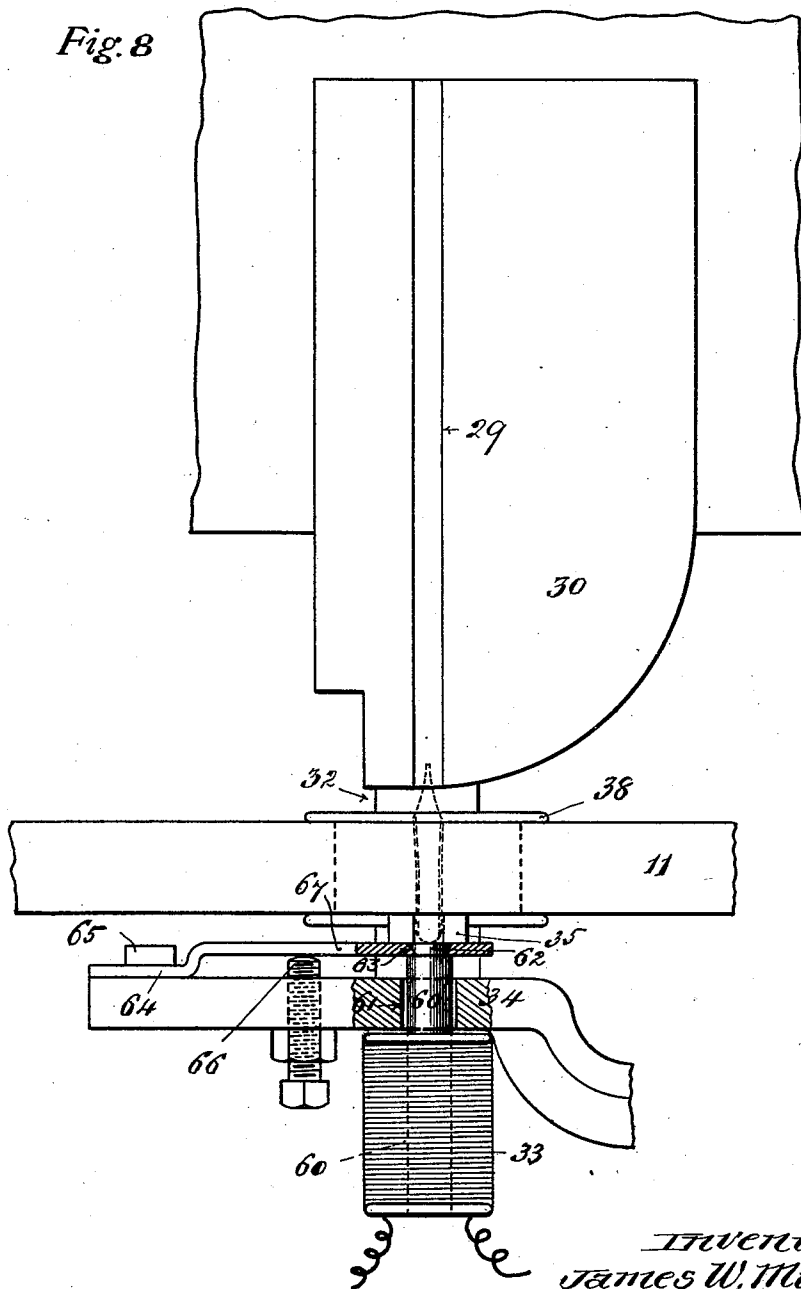
MACHINE FOR GRINDING AND POLISHING STEEL OR OTHER METALLIC PENS.

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(No Model.)

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Fig. 8



WITNESSES

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UNITED STATES PATENT OFFICE.

JAMES WARD MILLIGAN AND HENRY RALLINGS, OF BIRMINGHAM,
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MACHINE FOR GRINDING AND POLISHING STEEL OR OTHER METALLIC PENS.

SPECIFICATION forming part of Letters Patent No. 697,383, dated April 8, 1902.

Application filed October 21, 1901. Serial No. 79,478. (No model.)

To all whom it may concern:

Be it known that we, JAMES WARD MILLIGAN, director and secretary, and HENRY RALLINGS, engineer, subjects of the King of Great Britain, residing at Perryan Works, Lancaster street, Birmingham, England, have invented certain new and useful Improvements in Machines for Grinding and Polishing Steel or other Metallic Pens, of which the following is a specification.

This invention has relation to machinery to be used for grinding and polishing pen-nibs, but principally applicable for cross-grinding such nibs.

The improved machine is of that type in which a series of pen-grippers having spring-closed jaws are mounted upon a traveling endless conveyer-band, so as to present the curved top sides of the said pens or nibs to the periphery of an emery-bob or similar grinding-wheel, and in which provision is made for automatically opening the jaws of each gripper for receiving the pen to be ground (which is fed into the jaw by hand) and effecting its release after the grinding operation has been completed, the conveyer being automatically kept taut or in a proper condition of tension to obtain the necessary pressure for effecting the grinding as the pens are carried over the grinding-surface.

The objects of the present invention are to simplify the construction of machines of this class and to render the same efficient and certain in their action and to improve the feed arrangements whereby the machinery may be run at a higher rate of speed, which said objects are attained, first, by the employment in connection with the feed-table of means whereby the hand-feeding of the nibs into the gripping-jaws is made positive and easy of accomplishment without the proper and regular feed being dependent entirely on the skill of an attendant; secondly, by so disposing the grippers relative to the conveyer-band that the jaws travel in advance of the lever-arms in moving around with the said band, and, thirdly, by extending the length of the conveyer-band, so as to enable a larger number of grippers to be mounted thereon, and by employing in connection with such extended band a supplementary guide-pul-

ley, together with a weight-tensioning arrangement and a system of adjustable guides for steadying and supporting the said band, whereby sagging and oscillation are prevented, an even pressure is applied to the pens, and true cross-grinding is insured.

Figure 1 of the accompanying drawings represents a side elevation of a cross-grinding machine embodying our improvements. Fig. 2 represents, upon an enlarged scale, an elevation of that end of the machine at which the improved feed arrangements, the supplementary guide-pulley, and the band-tensioning device are located. Fig. 3 is a plan view of the same parts as are shown in Fig. 2. Figs. 4 and 5 are both longitudinal vertical sections of Fig. 3 upon the dotted line x , but in the first-named figure the two gripper attachments represented therein are both shown closed, whereas in Fig. 5 one of the said grippers is shown held open by the cam or wiper provided for that purpose in order to admit of the feeding of a pen-nib between the jaws thereof. Fig. 6 is another longitudinal vertical section of the same parts of the machine as are shown in Fig. 2; but the section is taken upon the dotted line x' to show the arrangement of the slide on which the supplementary tensioning-pulley is mounted. Fig. 7 is an end elevation of Fig. 2. Fig. 8 is an enlarged view of a part of Fig. 3, showing the feed arrangements more clearly.

The same numerals of reference indicate corresponding parts in the several figures of the drawings.

A cross-grinding-machine construction in accordance with our invention consists of a table or bed-plate 1, supported upon legs or standards 2 and having an extension 3 bolted to one end. Upon the top side of the table and its extension are arranged a series of brackets or bolsters 4, 5, 6, and 7, with the brackets 4, 6 on the table carrying guide-pulleys 8, 9, while the extension 3 forms the support for the bracket 7, in which the supplementary guide-pulley 10 and the tensioning arrangements hereinafter described are mounted, and running around the said pulleys is an endless conveyer-band 11, upon which a series of pen-gripping attachments 12 for carrying around the pens to be ground and presenting

them to the grinding-surface are secured. The grinding medium with which the machine represented in the drawings is provided consists of an emery-wheel 13, mounted on a spindle 14, supported between the opposite sides of the bracket 5 and driven by means of a band 15 and a pulley 16 or in any other convenient manner. The conveyer-band is made to travel around by driving the pulley 8 through the medium of a separate band and pulley 17, a pinion 18, and a toothed wheel 19, which latter is keyed to the spindle 20 of the said guide-pulley 8, the other guide-pulley 9 and the supplemental tensioning-pulley 10 both being followers rotated only by the friction of the band passing around them.

The gripper attachments 12 for holding the pens during grinding consist of a pair of levers 21 22, jointed to one another at 23 and having a double-armed spring surrounding the joint-pin, the tendency of which is to keep the gripping-jaws 24 25 constantly closed and to automatically close the said jaws after they have been opened to receive a pen. Each of the said gripping attachments is secured by riveting or otherwise to the conveyer-band in the longer direction of the travel of said band, so that a pen introduced upside down between said jaws is gripped by them and held transversely to the direction of the band's travel with the point end projecting beyond the edge of the said band to such an extent that its curved top side is presented to pass over the periphery of the emery-wheel, which is arranged at the side of the conveyer-band with its periphery lying in the path traversed by the point end of the gripped pen. When the grippers are disposed relative to the band in the manner described, the curved tail end 26 of the lever 21 of each gripper as it is carried around is acted upon, for opening the jaws, by means of a cam-block 27, adjustably mounted above the band and a little to one side of the feed attachments upon an extension 28 of the tension-pulley bracket 7.

The feeding of the pens is performed by passing them bottom upward and singly by the fingers of an attendant along an open-ended race or channel 29, formed in the top of an extension 30 of the feed-table, which is mounted upon a bracket 31, projecting from the front side of the extension-bracket 7. This race is directed at right angles to the travel of the conveyer-band and the path of traverse of the grippers, while located in the same axial line as the feed-race, but upon the opposite side of the gap 32, through which the band and grippers travel, is a horizontally-disposed electromagnet 33, carried by an arm 34, extending from the upright bracket 7. The core 60 of the magnet, which is disposed exactly in line with the open-ended feed-race, is directed through a slot 61 in the arm 34, and the end 62 is riveted at 63 to the free end of a spring-tongue 67, attached at the other end 64 to the arm 34 by means of a

screw 65 and adjusted laterally—*i. e.*, toward the feed-race—by means of the set-screw 66, whereby the machine may be adapted to accommodate various lengths of pen, and provision is made for exactly determining the position which the pen shall take within the jaws of a gripper. The strength of the magnet is so regulated that it is capable of just attracting the pen (after the finger of the attendant has been removed from it) out of the feed-race, across the gap 32, and up to the end 62 of its core 60. The pen is then lightly retained in this position by the attractive force exerted by the magnet, and is supported across the said gap 32 by its point and heel ends, respectively, lying within the open end of the feed-race 29 and upon a rest-ledge 35, carried by the spring-arm, immediately below the end of the magnet-core. The electrically-retained pen is thus supported at a plane a little above that of the conveyer-band until it is seized by the jaws of one of the traveling grippers, which are secured to the conveyer-band with their jaws leading or coming around first in the direction of travel of the band. With this arrangement a pen may be fed into position before the jaw which is to grip it comes along, and it is retained and supported in the manner described until a gripper with its jaws open (this opening having been previously accomplished by the action of the fixed cam-block 27 upon the tail end 26 of the jaw-lever, as shown in Fig. 5) travels up to the said pen lying across its path, and at the time when the seating or gripping parts of the jaws come over the pen the tail end of the jaw-lever is cleared from the cam, and then the jaws are by the expansion of their spring automatically closed onto the pen, which is firmly held and carried along by the gripper and presented to the action of the emery-bob or grinding-surface, after which the jaws are again opened for releasing the pen by being made to wipe past a roller 36, mounted in the space between the bracket 7 and over which the conveyer passes after having nearly completed its traverse. The released pen is then knocked out of the jaws by the action of the gripper or ejector 37. (Shown in Fig. 2.) To insure that the opened jaws of the grippers shall be properly presented to the fed-in pen, a roller 38 is arranged immediately below the gap 32, so as to prevent any inadvertent sagging of the band at this point.

The cam-block 27 for acting on the curved tail ends of the gripper-levers and opening out the jaws previous to the same being advanced up to the fed-in, supported, and electrically-retained pen is vertically adjustable upon its bracket and has a curved wiping-surface at 39 and a sudden shoulder or straight edge at 40, so that when the lever-tail is made to wipe under the curved back edge it is depressed for opening the jaws and then on clearing the lug the sudden shoulder or

straight edge of the lug will allow the jaw to be immediately closed onto the pen to be gripped by the action of its spring.

The part of the conveyer-band which is extended beyond the follower or guide-pulley 9 is made to pass over the supplementary guide and tensioning pulley 10, which is of smaller diameter than either of the other pulleys, so that the vertical distance between the opposite sides of the band gradually diminishes until it comes up to the said supplemental pulley, whose axis 41 is carried by a pair of longitudinally-sliding blocks 42, arranged within a pair of guide-slots 43, formed in the opposite sides of a frame or housing 44, which is itself supported by the upright bracket bolted on the extension 3 of the principal base-plate or table. The two blocks 42 are coupled together by a frame or stirrup 45, to which is attached one end of a cord 46, passing over a pulley 47, carried by an arm or extension 48 of the housing 44, the other end of said cord having suspended from it a tensioning-weight 49, whereby a constant or unvarying pull is applied to the supplementary pulley 10, and the conveyer-band running around it is kept taut or evenly tensioned, while the pressure with which the points of the pens are applied to the grinding-surface through the medium of the tensioned band is automatically regulated.

To limit the backward movement of the slides 42 by the pull of the conveyer-band acting in opposition to the tensioning effort of the suspended weight, adjustable stop-pins 50 are directed through the walls of the housing and extend into the slots 42, wherein the said blocks work. Further, in order to permit of the vertical adjustment of the supplementary pulley 10 the slotted sides 51 of the housing may be made to slide within dove-tail channels 52 and be provided with set-screws 53, working through fixed bottom bars 54, by the rotation of which screws the said frame sides may be raised or lowered to the desired extent, carrying the pulley 10 along with them.

In order to provide rigid bearings or supports for the gripper attachments during the time that they are being acted upon by the opening cam-block 27 and the releasing-roller 36, respectively, we arrange on the inner side of the band at points in line with the said cam-block and roller a pair of rigid plates 55 56, over and under which the said band runs, and its deflection by the wiping of the lever-tails past the cam-surfaces is thereby prevented, while the plates also serve as steadiers for preventing oscillation or sag of the band as it travels around. The plates

55 56 are carried by sleeves or eyes 57, adjustably secured by screw-pins 58 to a carrier-rod 59, fixed to the extension-bracket 3. The adjustment of these plates relative to the band is accomplished by shifting them up or down the carrier-rod to the required extent and then fixing them by set-screws.

The application of our invention to machines for straight grinding and polishing steel or other metal pens differs in no essential respect from its application to a cross-grinding machine as herein described.

Having fully described our invention, what we desire to claim and secure by Letters Patent is—

1. In a machine for grinding and polishing pens, the combination of a conveyer having means for holding the pens, means for feeding the pens, including an electromagnet arranged in juxtaposition to the conveyer, and serving to hold the pens in the path of the pen-holding means on said conveyer.

2. In a machine for grinding and polishing pens, the combination of a conveyer provided with grippers for holding the pen and a grinding and polishing device, said grippers being arranged lengthwise of the conveyer and having jaws adapted to secure the pens and feeding means for feeding the pens, including a magnet arranged to hold the pens in the path of the jaws.

3. In a machine for grinding and polishing pens, the combination of a grinding and polishing device, of a conveyer having jaws arranged in pairs, the respective jaws serving to grip the pens, means for actuating the jaws, and superposed plates between which the conveyer is arranged to travel, said plates being adjustably mounted and cooperative respectively with the jaw-actuating means.

4. In a machine for grinding and polishing pens, the combination of a grinding and polishing device, a conveyer having means for holding the pens and presenting them successively to said grinding and polishing device, means for feeding the pens crosswise of the line of travel of the conveyer, including an electromagnet, and a spring cooperative with the core of the magnet, the spring being adjustably mounted and arranged in the path of the pens as they progress toward said conveyer.

In testimony whereof we have hereunto set our hands in presence of two subscribing witnesses.

JAMES WARD MILLIGAN.
HENRY RALLINGS.

Witnesses:

HENRY SKERRETT,
HARRY PRATT.