3 Sheets—Sheet 1.

L. H. STELLMANN.

Knife-Grinding Machines.

No. 215,025. Patented May 6, 1879.

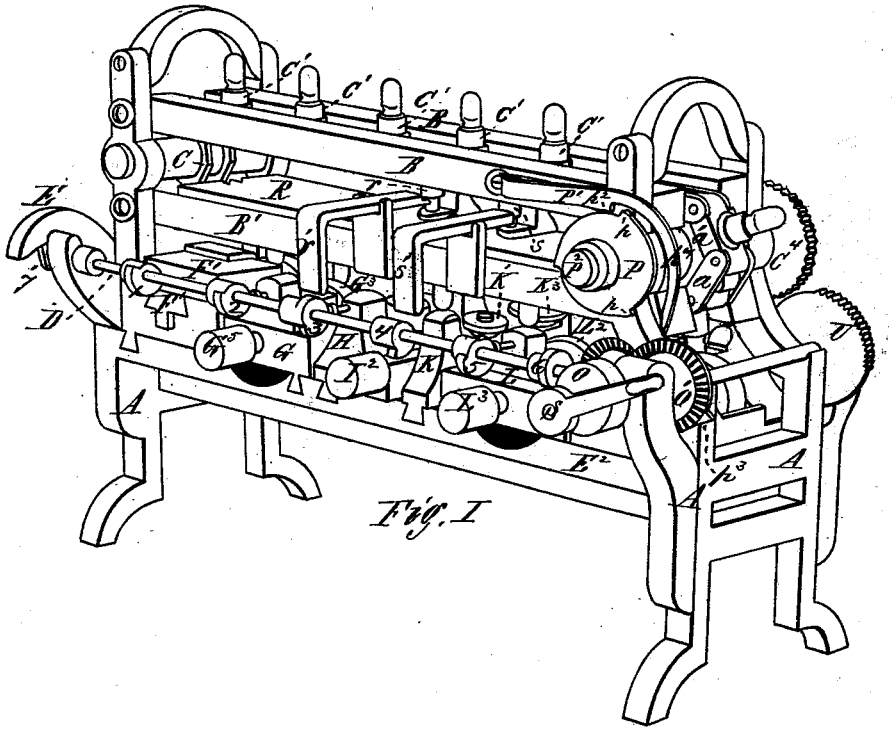

Fig. I

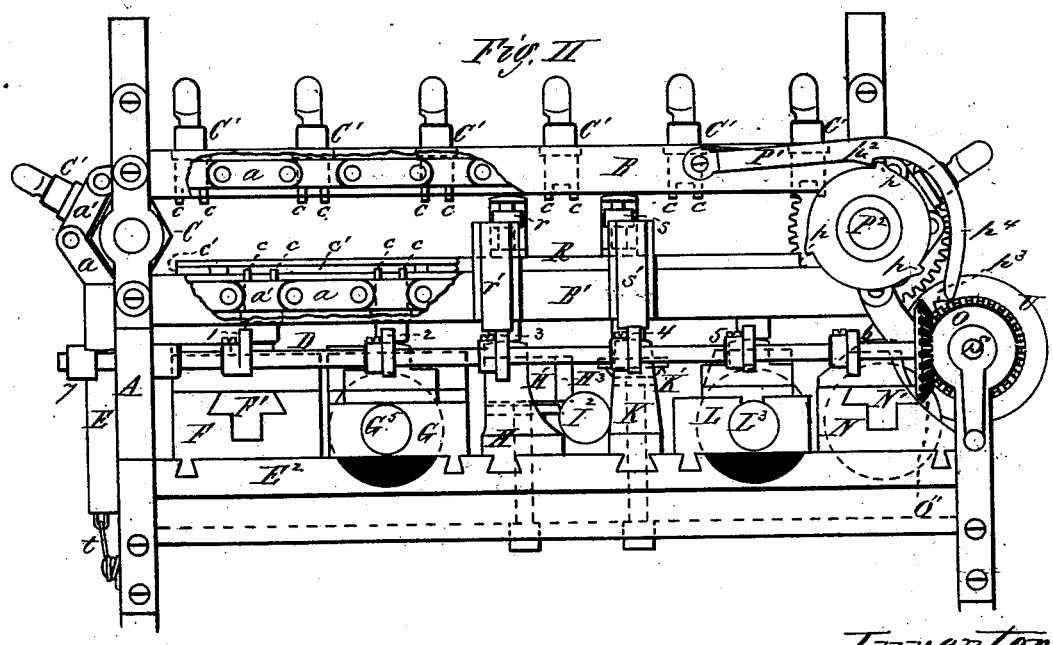

Fig. II

Witnesses.
C. E. Bockland.
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Inventor.
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By T. A. Lewis, his Atty.

3 Sheets—Sheet 2.

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No. 215,025. Patented May 6, 1879.

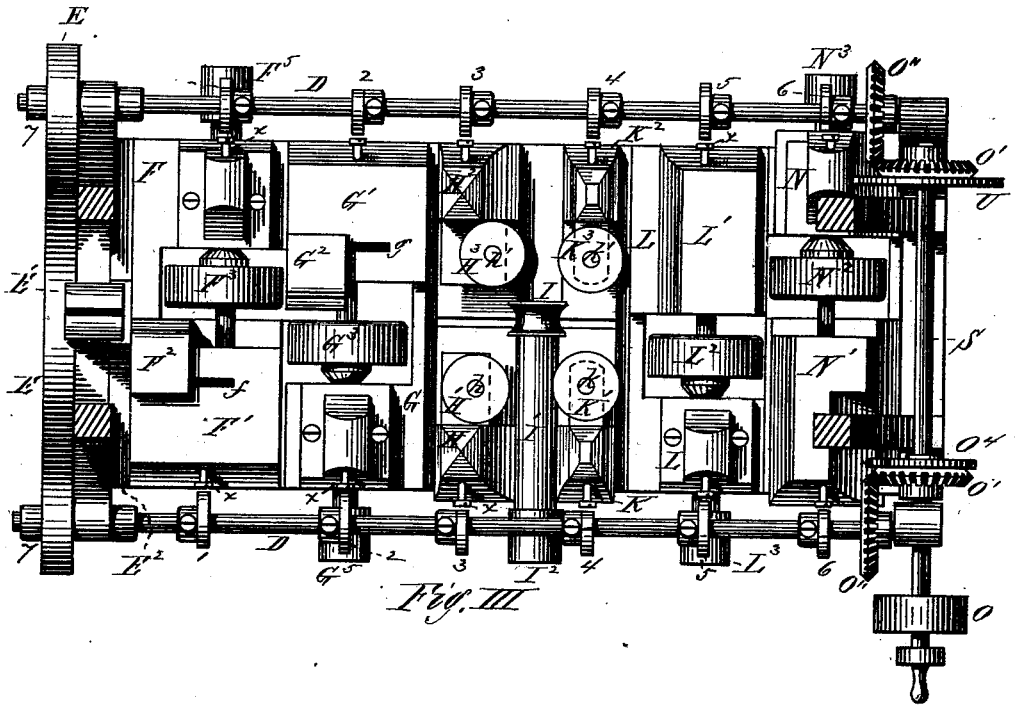

Fig. III

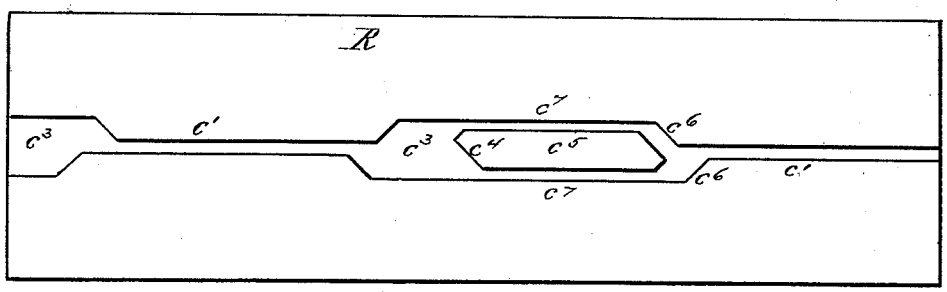

Fig. IV

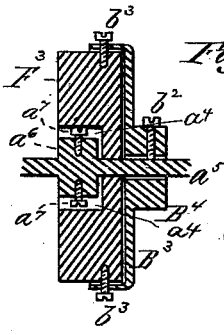

Fig. V

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Fig. 6.

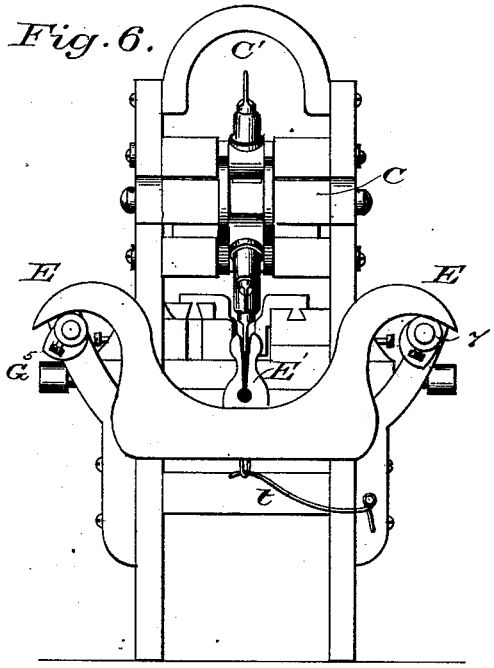
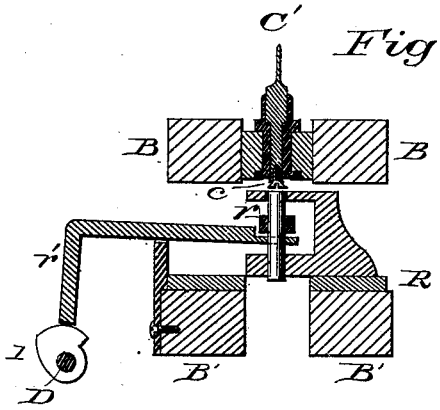


Fig. 7.



Witnesses:

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Inventor:

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UNITED STATES PATENT OFFICE.

LOUIS H. STELLMANN, OF WEST BRATTLEBOROUGH, VERMONT.

IMPROVEMENT IN KNIFE-GRINDING MACHINES.

Specification forming part of Letters Patent No. **215,025**, dated May 6, 1879; application filed March 22, 1878.

To all whom it may concern:

Be it known that I, LOUIS H. STELLMAN, of West Brattleborough, in the State of Vermont, have invented a new and useful Machine for Automatically Grinding Knife-Blades; and that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification, and to the letters of reference marked thereon.

My invention relates to machinery for automatically grinding the blades of table and other cutlery, in which the finishing may also be included; and it consists of a frame provided with a bed supporting a series of revolving grinding-wheels and sliding presser-blocks for holding or bearing the knife-blades against the wheels. The latter are arranged in the machine in a manner similar to each other; and in order to more clearly indicate the different stages of finishing the blades in the grinding process, I designate a portion of the wheels as "grinding-stones," and a portion "polishing-wheels," and designate them all by different reference-letters. With this in view, then, the bed of the machines supports, first, a sliding block provided with a revolving grinding-stone and a sliding presser-block for holding the knife-blade against the side of the stone; second, a sliding or movable block provided with a similar revolving grinding-stone and a movable presser-block for holding the knife-blade against said stone for grinding the other side of the blade; third, a movable block provided with a horizontally-revolving grinding-stone, and on the other side of the machine another movable block provided with a horizontally-revolving polishing-wheel, by means of which the back of the blade is ground and polished as the blade moves; fourth, two other similar movable blocks, one opposite the other, one provided with a horizontally-revolving grinding-stone and the other with a horizontally-revolving polishing-wheel, both for grinding and polishing the bolster of the blade; fifth, a movable block provided with a polishing-wheel and a movable presser-block for holding the blade against said wheel to polish one side; and, sixth, another movable block provided with a similar polishing-wheel and a presser-block for polishing the other side of the blade. This movable feature of the grinding-stones and polishing-wheels is provided for the purpose of keeping the grinding-surfaces of the stones and wheels always into the path of the knife-blade as it moves through the machine as the said surfaces wear away, and the movable presser-blocks hold the knife firmly against the grinding or polishing surfaces while being operated upon.

My invention also consists of a grinding-stone made adjustable upon its arbor, and adapted to be used for grinding on its side, said adjustable feature being accomplished by a cylindrical projection on the shaft and set-screws, and a flanged plate and set-screws securing said plate to the stone and to the shaft at one side of the latter.

It also consists of an endless feeding-chain passing over and carried by rolls having an intermittent rotary movement produced by suitable mechanism, whereby each knife-blade, being inserted into a rotating holder in the feed-chain, is moved into a position opposite each grinding stone or wheel, and there held while being ground, and is afterward carried forward into a position to be removed from the machine.

It also consists of a series of rotary holders arranged in the feeding-chain at suitable intervals, said holders being provided with pins which slide in a grooved plate to hold the holders in their proper position while the blades are passing through the machine, and also of an automatic feeding-clamp for placing the knife-blades into the holders, all which will be more fully hereinafter described.

Figure I is a perspective view of my invention. Fig. II is a side view of the same. Fig. III is a horizontal section of the machine, showing a plan view of the grinding stones and wheels and of the movable presser-blocks operating in connection therewith. Fig. IV is a reverse plan view of the grooved plate in which the holder-pins traverse to guide the blades while passing through the machine, and Fig. V is a vertical section of one of the grinding-stones, showing the construction for adjusting its grinding side to the path of the blades. Fig. VI is an end

view showing the spring-clamp and the piece which raises it, and Fig. VII is a cross-section through one of the clutches, which turns or partially rotates the holders.

In the drawings, A represents the frame of the machine, having a suitable bed, E^2, upon which are arranged the sliding blocks in which the grinding stones and wheels have their bearings. The first of these blocks, F, slides in ways or guides transversely across the bed E^2, and in this block in suitable bearings is hung the shaft of the grinding-stone F^3; and moving upon this block in suitable ways or guides is the presser-block F^1, both said blocks moving in the same direction. A presser-pad block, F^2, may be arranged to slide in a groove, *f*, made in the block F^1 lengthwise the machine. The next block, G, is arranged to move in ways or guides upon the bed, is provided with a grinding-stone, G^3, a sliding presser-block, G^1, and, if desired, a presser-pad block, G^2, and in all respects is arranged in a similar manner to the block and stone just described, except that its position is reversed upon the bed, so that the stone F^3 is upon one side of a line extending through the machine lengthwise, and the stone G^3 is upon the other side of said line, and the grinding sides of both stones toward said line. H is a block also arranged to move transversely in ways on the bed E^2, and is provided with a grinding-stone, H^1, revolving horizontally on a vertical shaft, *h*, having its bearings in the block H, and opposite this block H is another sliding block, H^2, provided with a polishing-wheel, H^3, upon a shaft, h^1, hung in bearings in the block H^2, the said wheel H^3 being placed a little in advance of the grinding-stone H^1 instead of opposite the latter, for reasons which will be explained hereinafter.

Next is the grooved wheel I, revolving in a line extending lengthwise the machine between the two stones F^3 and G^3 on a shaft, I^1, having its bearing in the bed of the machine.

The block K, arranged to slide in ways like the others above described, is likewise provided with a grinding-stone, K^1, revolving in a horizontal plane upon a vertical shaft, *k*, opposite which is a similar sliding block, K^2, having a horizontally-revolving polishing-wheel, K^3, fixed on a vertical shaft, *k'*.

The block L, also movable upon the bed E^2, is provided with a finishing-wheel, L^2, revolving on one side of the before-mentioned line extending through the machine, and with a presser-block, L^1, moving thereon similar to the arrangement of the first block, F, and the block N, also movable transversely across the bed, is provided with the finishing-wheel N^2 and sliding presser-block N^1 precisely similar to that shown at L, but arranged in a reversed position.

The two feed-chain rolls C, one at each end of the machine, have their bearings in the frame A, and are each provided with any suitable number of straight sides, over which passes the endless feed-chain, consisting of the links *a* and a^1, secured together so as to be flexible in a vertical direction; and this endless chain is provided with the holders C^1, placed at suitable intervals, said holders being adapted to hold a knife-blade by being inserted into a socket in said holders, and also to rotate in their bearings in the chain, and each holder is provided with two projections, *c*.

Suitable supports B and B^1 are secured to the machine at each end alongside the chain, upon each side, both above and below, to serve as supports for the chain, and secured to the upper side of the lower supports, B^1, across from one to the other, is the plate R, having a groove, c^1, in its lower side, just above the holders C^1 as the latter move along, and this plate is so secured to the machine that, as the holders move along, the projections or pins *c* move in the groove c^1 in the lower side of the plate.

On one end of the machine is a piece, E, capable of being moved in a vertical direction, to which is fixed a clamp, E^1, the two sides of which are made elastic and spring inward toward each other, and which I denominate a "spring-clamp," E^1, and disposed in suitable bearings in the frame are the shafts D, one on each side, extending along its length, upon which shafts are secured the cams 1, 2, 3, 4, 5, and 6, one of each on each side to each sliding block, and to its corresponding stone or wheel, as well as to each horizontally-revolving wheel and stone.

A cam, 7, is also secured to the end of each shaft D, to operate in raising the piece E and spring-clamp E^1, which may be depressed again by means of a spring or any other convenient means. These cam-shafts D are rotated by means of the bevel-gears O^1 on the shaft S, gearing into similar-toothed wheels O'', fixed on the cam-shafts D, and an intermittent rotary movement is given to the feed-chain rolls C by means of the mutilated gear U, fixed on the shaft S, and gearing with the toothed wheel C^4.

A stop-wheel P, provided with stops or detents *p*, is fixed to the shaft P^2, (which is the shaft upon which one of the feed-chain rolls C is secured,) and a detent or stop-lever, P^1, provided with a projection, p^2, is pivoted to the frame, by means of which the endless chain is prevented from moving accidentally after each stop until the beveled projection p^3 on the periphery of the wheel O^4 raises said lever by striking against and moving under its extreme end.

The grinding-stones I construct as follows, and as shown in Fig. V of the drawings, in which F^3 is the grinding part of the wheel, counterbored at a^4, which is its central portion, and a^5 is the shaft, on which it is secured with a collar, a^6, or a protuberance on the shaft inside the counterbore a^4, and set-screws a^7 turned into the collar, so that the bearing of

the stone on the shaft may be adjusted or properly balanced by turning the said screws either in or out with their heads bearing against the inside of the counter-bore.

An annular flanged plate, B^3, is secured to the shaft by a set-screw, b^2, turned into its hub B^4, and set-screws b^3 are turned through the flange of the plate against the periphery of the stone or into it, so that the stone may be adjusted in any position along the shaft. As thus arranged, as the blades are held against the side of the stone while being ground, as the stone wears away on its side, it may be easily moved along its shaft by loosening the set-screws b^2, moving the wheel or stone along a little, with the set-screws a^7 also turned in a little, and then turning in the set-screws b^3, as before, and turning out the screws a^7 against the inside of the counter-bore.

The grinding-stones F^3 and G^3 are each rotated by a belt around their respective pulleys F^5 and G^5, on the outer ends of their shafts, which project through their blocks, in which the shafts have their bearings, the grinding-wheels H^1, H^3, K^1, and K^3 by belts around the pulleys at the ends of their respective shafts, and the wheels L^2 and N^2 like the stones F^3 and G^3.

In this description I have used the grinding-stone and polishing-wheel merely to denote the degree of finish given to the knife-blade at its different stages of progress through the machine; but in general terms I denominate all the revolving disks used in the machine to give the surface of the knife-blade any degree of finish "grinding-wheels," as they all operate to grind the surface of the metal, whether coarsely, as in the first stages of the process, or more finely, as in the latter stages, and operate alike so far as their relations to the blocks with which they operate are concerned.

The operation of the invention is as follows: The power is applied to the shaft S, which being rotated the segment of teeth on the mutilated gear-wheel U, as they come into engagement with the teeth on the wheel C^4, attached to the shaft P^2, cause the latter to make a partial revolution, carrying one of the holders C^1 into a position just over the spring-clamp E^1. As the shaft continues to rotate, a rotating movement is given to the shafts D, on each side of the machine, and the cams 7 on the extreme ends of the shafts operate to raise the piece E, and the spring-clamp E^1 attached thereto, and, the blade having first been inserted into said clamp with its shank uppermost, as the clamp rises it inserts the shank of the blade firmly into the holder C^1, which has just moved to its position above the clamp.

As the teeth of the mutilated gear U again engage with the gear C^4 the shaft P^2 is again partially rotated, and the chain is given another movement, which carries the holder C^1 and the knife-blade (which has been inserted therein by the clamp E^1) forward to a position opposite the grinding-stone F^3, the sliding block F^1 being forced in by the cam 1, with the pad F^2, against the blade as it moves in, and pressing the latter against the side of the stone, and, while the chain is stopped in its movement, grinding one side of the blade, and the clamp E^1 moving up as before, another blade is inserted into the next holder C^1, which has stopped just over the clamp.

At the next movement of the chain actuated by the mutilated gear another holder C^1 is brought into position over the clamp, the latter is raised by the action of the cam 7, the second knife-blade inserted, having been carried to the stone F^3, is ground on the side as the first was, and the first one inserted having been carried to a point opposite the stone G^3, the cams 2 force the sliding block G^1, with its pad G^2, and the stone G^3, together, and the other side of the first blade is ground at the same time the second blade is having its first side ground.

At the next movement of the chain another holder C^1 is brought into position over the clamp E^1, the third blade carried to a point opposite the stone F^3, the second blade carried to a point opposite the stone G^3, and the first blade carried to a point opposite the horizontally-revolving grinding-stone H^1. Up to this point the holders C^1 pass beneath the plate R, with the pins c on the inner ends of the holders, one behind the other, until each holder reaches a point beneath the enlarged open space c^3 in the plate, and beneath a revolving clutch, r, operating in or through the plate, when the cam 3 on one side of the machine raises the clutch-lever r', and forces down the clutch for an instant, so that it engages with the pins c of the holder and turns the latter three-fourths of a revolution while the chain is stationary, the cam 3 forcing in the grinding-stone H^1, so that the back of the knife is ground as the blade and holder are being turned. The blade is left by the clutch r at this point in its progress, with its back toward the polishing-wheel H^3, and as soon as the chain starts again this blade, as it passes along, is polished on the back by the wheel H^3, which is forced in against the blade, by the cam 3 on that side of the machine.

When the holder C^1 and the blade therein is left by the clutch r, after having been turned as above described, the holder is then in a position with one of its pins c in one of the grooves c^7, and the other pin in the other groove, and after the chain starts again, after leaving the stone H^1, it is carried along in a position at right angles to that which it occupied before reaching the stone H^1, and as it passes over the revolving grooved polishing-wheel I its end is ground and finished by said wheel.

When the chain stops again the first blade has reached a point between the grinding-stone K^1 and the polishing-wheel K^3, and as it reaches that point the cam 4 raises the clutch-lever s', depressing the clutch s, which engages with the pins c on the holder, and revolves the latter one revolution and a quarter,

the grinding-stone K^1 and the polishing-wheel K^3 being moved in against the bolster of the blade by the cams 4, so that the whole circumference of the bolster is ground and polished.

At the next movement of the chain the first blade is moved to a point opposite the polishing-wheel L^2, and the cams 5 move the wheel L^2 and its presser-block L^1 toward each other with the blade between, and one side of the blade is finished, and at the next movement of the feeding-chain the blade is carried to a position between the wheel N^2 and the presser-block N^1, which being brought together by the cams 6 the blade is finished on the other side. This completes the grinding and finishing of the blade in all its parts.

The holders C^1 are placed at regular intervals in the feeding-chain, the distance between each two being the same as the distance between the stones and wheels in the bed of the machine, so that after the first blade is inserted in its holder and is moved forward it is in position to be either ground or polished by some one of the stones or polishing-wheels at every subsequent stop, while the holders are brought in succession into the position over the clamp E^1, and each blade in the whole series of holders, as they pass along the machine beneath the plate R in a vertical position past the wheels and stones, is being ground or polished by some one of the stones or wheels at the same time.

The blades may remain in the holders until they are carried to the top of the machine and back to the rear end again and be removed there, or they may be removed at the front end of the machine, as may be most desirable.

The clutches *r* and *s* may be rotated by a belt passing around a small pulley placed on each shaft above the plate R, the stones and wheels H^1 H^3 and K^1 and K^3 by a pulley at the lower end of each of their shafts, and the other stones and wheels by similar pulleys on their respective shafts.

The piece E, which is moved upward by the cams 7 on the end of each shaft D, may be forced down again by a spring, or it may be moved down by a cam with a groove.

In practice it may be found more desirable to separate the grinding-stones from the polishing-wheels, so that all the coarser grinding may be done on the stones on one machine, and all the finer grinding or polishing may be done on wheels in a separate machine.

When the wheel O^4 starts to rotate, the cam p^3 thereon rides under the extreme end of the curved part of the stop-lever and raises it so that the stop-wheel P may rotate, and after it has turned so that the projection *p* on the stop-wheel has passed the projection p^2 on the lever the latter is permitted to drop again, with the projection p^2 thereon resting on the periphery of the stop-wheel P, to be ready for the next stop.

Of course, in the above-described machine, the wheels F^3, G^3, L^2, and N^2 operate in a similar manner, both separately and in connection with their presser-blocks, which hold the blades to the wheels while being ground or finished, and also the cams which force the blocks together; and the horizontally-revolving wheels H^1, H^3, K^1, and K^3, together with the sliding blocks in which they are hung, and which are forced together by their cams, also operate alike; and in this description different reference-letters have been given to those sliding blocks and to those grinding-wheels which are similar in operation, more especially to aid in the description and to show their relative position, one with the other, in the machine.

For greater facility in adjusting the movements of the sliding blocks nicely I turn a screw into each block, against which each corresponding cam impinges in its revolution, the duration of time while the cam and screw remain in contact, and the consequent movement of the block, being regulated by the screw being turned in or out, as the case may be. The cams also operate alike, but are numbered, as shown, more to designate their position rather than any particular construction, as any ordinary mechanic will be able to construct each cam according to the time required to hold each blade in contact with each wheel in the series.

Each block may be moved out by a spring, or the cam may be grooved with a finger moving therein and connected with the block to draw it out.

Each presser-block opposite the stone F^3 or G^3 is of the desired form on its face, and is provided with black diamonds fixed therein, so that as it is forced up to the stone the proper form of the latter is preserved, and glazing of its grinding-surface is effectually prevented.

Having thus described my invention, what I claim as new is—

1. In a machine for grinding the blades of cutlery, the combination of the feeding-chain with the holders C^1 as a means of moving the blades to the grinding-wheels and holding them while being ground, substantially as set forth.

2. In a machine for grinding the blades of cutlery, a series of movable blocks, each having a grinding-wheel hung in suitable bearings therein, and a series of corresponding presser-blocks, one opposite each grinding-wheel, for pressing the blade against the side of each wheel, said grinding-wheels and presser-blocks being arranged to be moved toward each other by a corresponding series of cams or eccentrics, whereby each blade is ground automatically as it passes through the machine, substantially as described.

3. In a machine for grinding the blades of cutlery, the combination of the feeding-chain, the rotary holders C^1, and the spring-clamp E^1, substantially as and for the purpose described.

4. In a machine for grinding cutlery-blades, the grooved plate R, in combination with the revolving holders C^1, provided with the projections *c*, as a means of guiding the blades

through the machine while being operated upon by the grinding-wheels, substantially as set forth.

5. In a cutlery-grinding machine, the combination of one or more clutches, *r*, arranged to be operated each by a cam, with the revolving holders C^1 provided with projections *c*, for the purpose of turning the blade into the proper position to be ground, substantially as described.

6. An adjustable grinding-wheel consisting of the disk F^3, counterbored at the central portion, and adapted to be balanced on its shaft by set-screws a^7, turned into a protuberance on the shaft within the counterbore, and the flanged plate B^3, secured to said disk and also to its shaft, whereby said disk F^3 is adapted to be adjusted on its shaft in any direction, substantially as set forth.

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