March 1, 1927. M. M. KAUFMANN ET AL 1,619,736

GRINDING MACHINE

Filed May 7, 1925 3 Sheets-Sheet 1

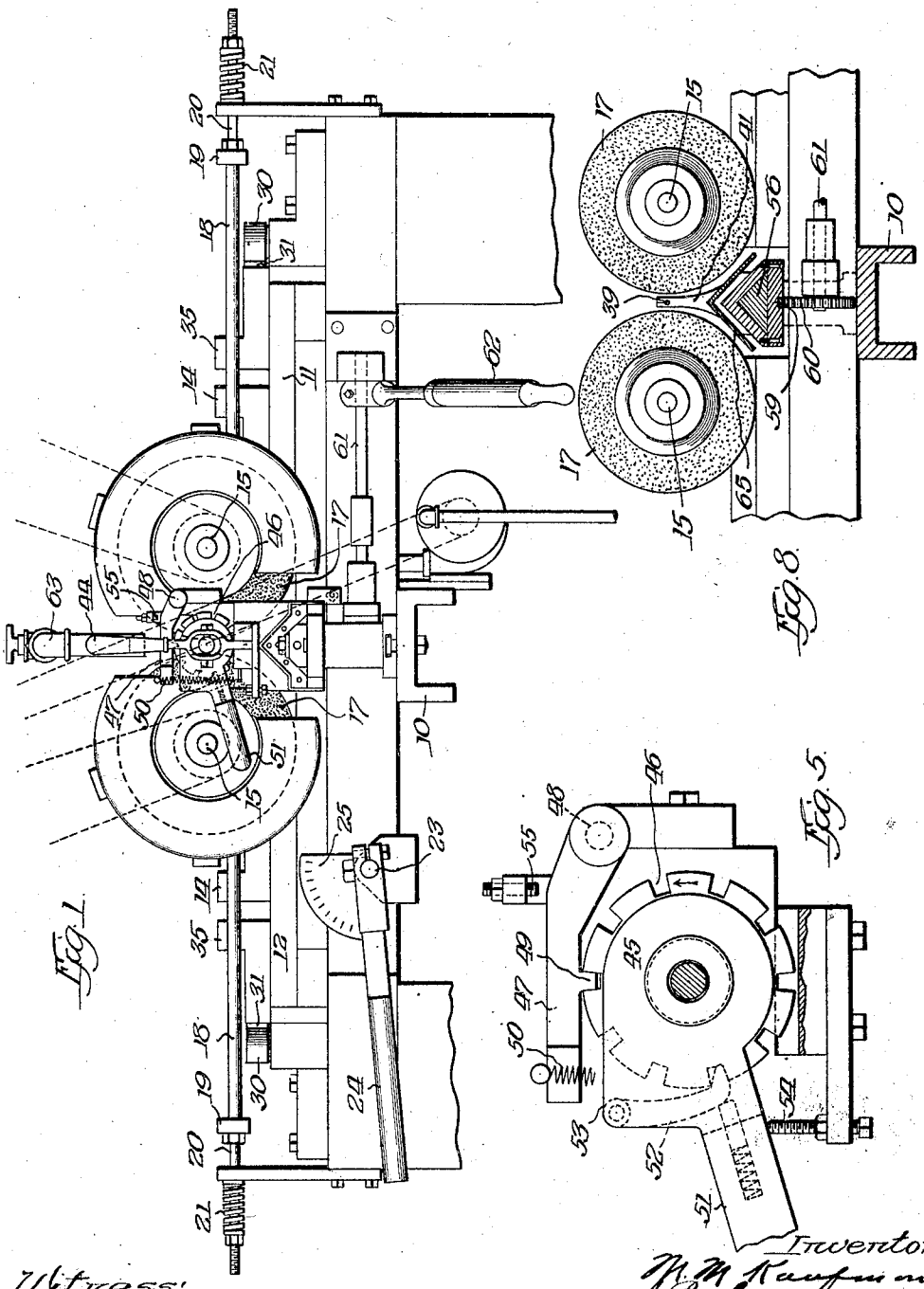


Fig. 1

Fig. 3

Fig. 5

Witness:

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M. M. KAUFMANN ET AL

GRINDING MACHINE

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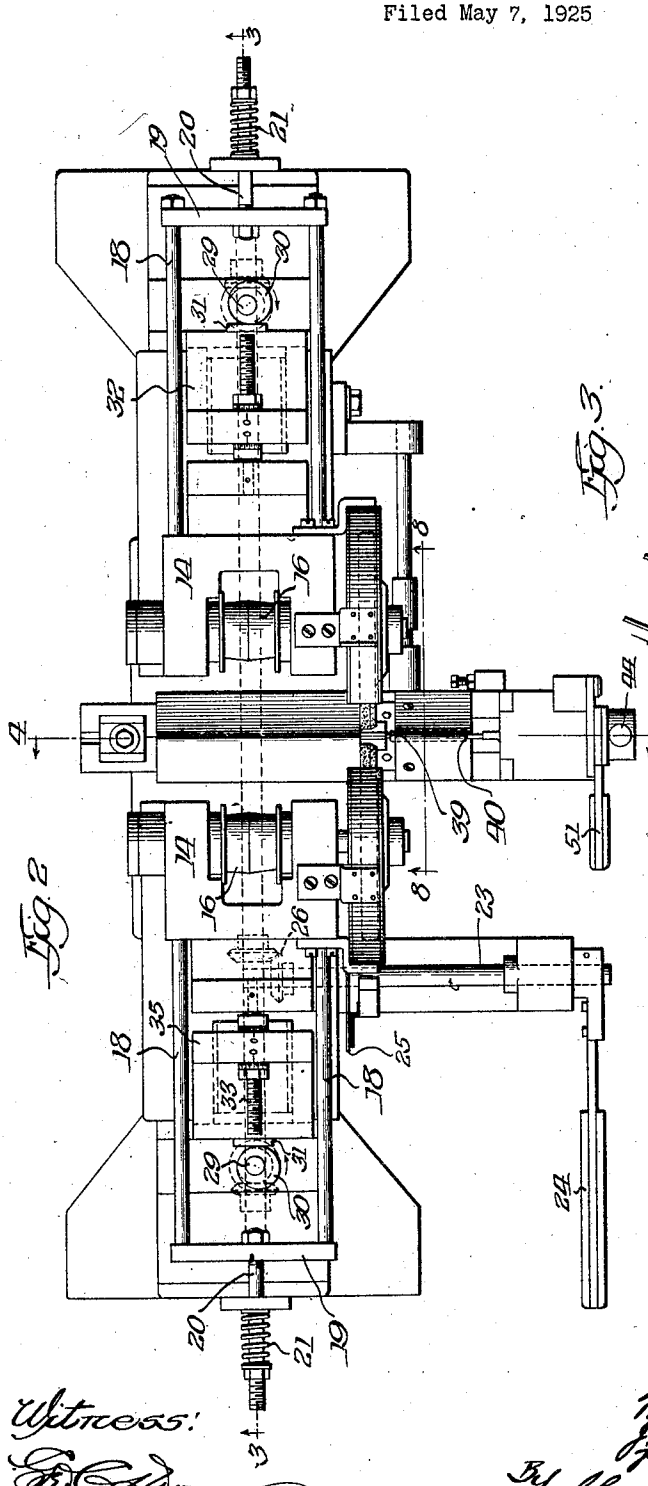


Fig. 2.

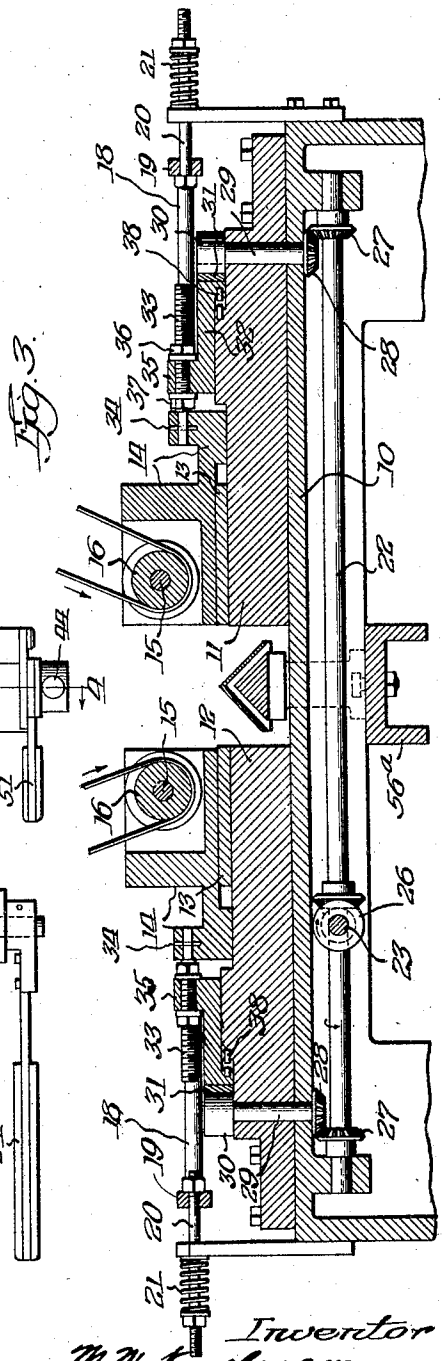


Fig. 3.

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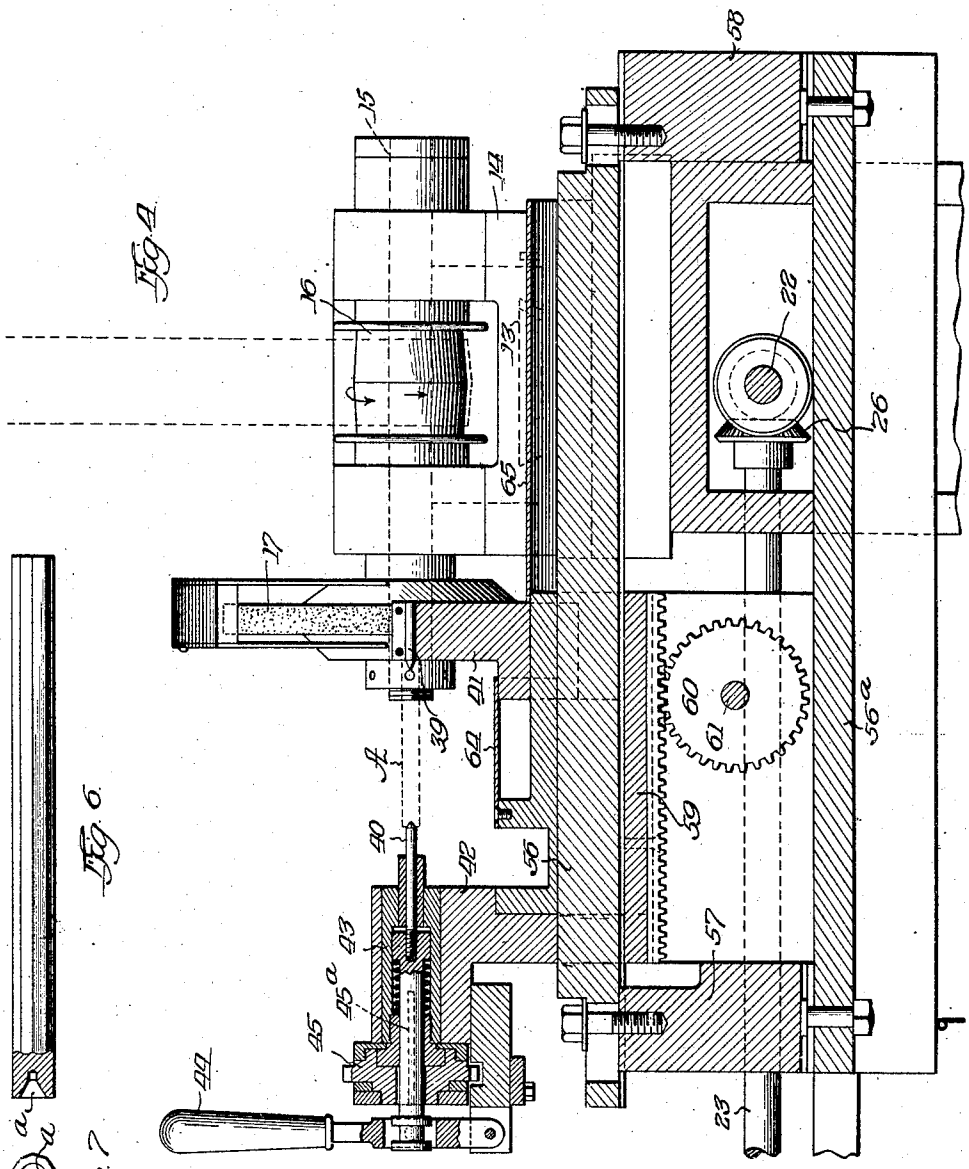
F. C. Delf

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March 1, 1927. M. M. KAUFMANN ET AL 1,619,736

GRINDING MACHINE

Filed May 7, 1925 3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE.

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GRINDING MACHINE.

Application filed May 7, 1925. Serial No. 23,596.

Our invention relates to grinding machines and particularly to a machine adapted to simultaneously grind two of the polygonal sides of a pencil body or barrel.

The pencils of a certain well-known type have bodies composed of a phenolic condensation product such as bakelite. This product is very hard, and where the bodies are to be transparent or translucent, it is necessary to grind the material to the desired shape, inasmuch as it cannot be molded.

The machine of our invention is intended to accomplish the grinding operation very quickly, accurately and simply. Two sides are simultaneously ground, the grinding wheels rotating in opposite directions, thus avoiding the necessity for grasping the blank firmly to prevent its rotation. A further advantage in the machine is that it permits the bodies to be ground completely from end to end, the blank being held merely by centralizing spindles. Suitable means are provided for insuring accuracy and facility in operation and these will be hereinafter described.

The invention will be more readily understood by reference to the accompanying drawings, in which:

Fig. 1 is an end view of the machine constructed in accordance with our invention,

Fig. 2 is a plan view thereof,

Fig. 3 is a longitudinal sectional view taken on the line 3—3 of Fig. 2.

Fig. 4 is a sectional view taken on the line 4—4 of Fig. 2.

Fig. 5 is an enlarged detail elevation of the indexing means for controlling the position of the blank;

Figs. 6 and 7 are side and end views respectively of the finished pencil body; and,

Fig. 8 is a sectional view on the line 8—8 of Fig. 2.

The machine comprises a base or bed 10, on which the operating mechanism is mounted. Supported on the base are plates 11, 12, each carrying a slideway 13, for co-operation with a slide 14. Mounted on each slide, in suitable bearings, is a shaft 15, and a belt pulley, 16. On the overhung end of the shaft, 15, is mounted the grinding wheel 17.

As best shown in Fig. 2, the slides 14 have yoke rods 18 projecting rearwardly therefrom, the ends of the rods being joined by a cross piece 19. A bolt 20, and spring 21, tend to move the slide rearwardly. It will be noted that the parts described are duplicated on opposite sides of the machine.

Mounted beneath the bed plate is a horizontal shaft 22, and a right angularly disposed shaft 23, having an operating handle 24, connected thereto, as shown in Fig. 1. An indicating sector 25, having graduations thereon, is mounted adjacent to the handle, 24, in order to provide a visual indication of the extent of movement of the handle. Bevelled gears 26, connect the two shafts 22, 23, while at the ends of the shaft 22 are provided bevelled gears 27 that engage with bevelled gears 28, fixed to vertical shafts 29, each carrying a cam, 30, at its upper end, the cam engaging, through a wear plate 31, with a block 32. This block is connected to the slides 14, by means of a threaded bolt 33, one end of which is held by a pin 34, in the slide 14, the threaded portion of the bolt extending through an apertured extension 35, on the block 32, and being held by means of graduated nuts 36, 37, on opposite sides of the extension. This provides for accurate adjustment of the slide 14 and the grinding wheels, the graduations on the nuts assuring accurate positioning of the two slides when such adjustment is necessary in order to change the diameter of the pencil bodies or compensate for wear on the grinding wheels. Stop pins 38, provided on the stationary and movable parts obviate wear at other points of contact.

The mechanism just described provides for the necessary advancing and retracting of the grinding wheels following the insertion and removal of a blank. The blank is held between the spindles 39, 40, carried respectively by a tail stock 41 and a head stock 42. The spindle 40, the end of which is squared, is carried by a spring pressed plunger 43, mounted in the head stock and adapted for reciprocation by means of the handle 44. The plunger is slidable relative to and rotatable with an indexing wheel 45, by means of a spline 45^a, Fig. 4.

The wheel, 45, best shown in Fig. 5, has notches 46, in its periphery, the number of notches corresponding to the number of sides of the polygonal body to be ground. If an octagonal barrel is to be produced, the wheel will have eight notches, whereas if a decagonal body is to be produced, it will have ten

notches, as shown. The position of the wheel is controlled by means of the arm, 47, pivoted at 48, and carrying a tooth or pawl, 49, adapted to enter one of the grooves, 46. The arm is held downward by means of the spring 50. The wheel is rotated by means of the arm 51, carrying the pawl 52, the end of which enters one of the notches, 46, and a portion 53 of which arm is adapted to contact and raise the arm 47 to lift the tooth 49, out of engagement. Thus, at the point where the tooth 49 is out of engagement, the pawl 52 will drop into the next notch, and a reversal of movement of the arm 51, will effect rotation of the wheel in a counter-clockwise direction. Adjustable stops, 54, 55, control the extent of oscillation of the arms 47 and 51.

The means for effecting longitudinal movement of the blank relative to the grinding wheels is best shown in Fig. 8. The head and tail stocks are supported on a triangular slide 56, supported at its ends on the vertical posts 57, 58, secured to a base 56a. The stocks are joined at a point underneath the triangular slide 56, by means of the rack 59. A wheel 60, is fixed to a shaft 61, and is actuated by means of the arm, 62, best shown in Fig. 1. By this means, the head and tail stocks are caused to reciprocate and to move the blank A, indicated in dotted lines in Fig. 4, across the grinding faces of the wheels.

It will be noted by the arrows in Fig. 3, that the grinding wheels rotate in opposite directions and thus there is no tendency of the blank to rotate. We thereby avoid the necessity for rigidly holding the blank except so far as the squared end of the spindle, 40, effects such holding.

A pipe, 63, for supplying a grinding liquid, is shown in Fig. 1. Guards or aprons, 64, 65, serve to deflect the liquid and the waste material from the grinding operation.

The operation is as follows: A blank, indicated by dotted lines in Fig. 4, and designated "A", has been provided with centering recesses in its ends, the recesses being shown in the ground bodies illustrated in Figures 6 and 7. The blank is inserted by bringing one of its ends into contact with the fixed spindle or pointed pin, 39; its other end being engaged with the squared end of the spindle 40, by retracting the spindle under the influence of the lever or handle 44. Assuming the grinding wheels are rotating, the spacing thereof is adjusted by moving the arm 24, and under ordinary circumstances, the handle will be moved only partly through the permissible arc of movement as indicated by the sector. This provides for the roughing cut. With the grinding wheels so positioned, the operator actuates the arm 62 and causes travel of the stocks and blank between the grinding wheels, the tail stock 41, as best shown in Fig. 8 being narrower than the width of a finished pencil body. Due to the large capacity of the grinding wheels, the cutting action is very rapid, the blank being rapidly passed forward and back to its original position.

As soon as the blank is out of the plane of rotation of the grinding wheels, the arm 51 is raised to its limit, thereby disengaging the holding pawl 49 and permitting the pawl 52 to engage with another notch, whereupon the return movement of the arm 51 rotates the wheel 45 and plunger 45a, thus rotating the blank through 72 degrees. Assuming a ten-sided pencil body is being ground four additional roughing cuts are made as described, all without changing the adjustment of the arm 24. When the ten sides have thus been roughly ground, the arm 24 is thrown to its extreme right-hand position, thus moving the grinding wheels to their closest point as determined by the adjustment of the nuts 36, 37. The finishing cuts are thereupon made and the pencil body is complete.

Preferably grinding wheels of relatively large size are employed with the result that the ground surfaces are so nearly plane as to be unobjectionable, in other words, the slight curvature is imperceptible to the eye. The bodies are then, except for a small amount of polishing, in a finished condition.

The operation of the machine is very simple the only opportunity for variation being in the extent of the roughing cut. As to all other operations, the limits are fixed and no opportunity for error exists.

Obviously the exact form and arrangement of parts is not essential and we do not wish to be limited except as indicated in the appended claims.

We claim:

1. A machine for grinding the sides of polygonal objects, comprising, in combination, a bed, a pair of slides thereon, grinding wheels mounted on said slides, means for simultaneously moving said slides and grinding wheels toward and from each other, spindles for holding the work, means for effecting bodily reciprocation of said spindles and work laterally relative to the reciprocation of the slides, and means for rotating the spindles and work by a step by step movement.

2. A machine for grinding the sides of polygonal objects, comprising, in combination, a bed, a pair of slides thereon, grinding wheels mounted on said slides, means for simultaneously moving said slides and grinding wheels toward and from each other, head and tail stocks, means for holding work between said stocks, means for effecting reciprocation of said stocks and work across the grinding faces of said wheels, and means

for rotating the work by a step by step movement to present different faces to the wheels.

3. A machine for simultaneously grinding two sides of a polygonal blank comprising, in combination, a bed, a pair of grinding wheels in opposed relation, means on said bed for effecting bodily movement of the grinding wheels toward and away from each other, a pair of stocks, means for holding a blank in centered relation between the stocks, means for effection reciprocation of the stocks whereby to move the blank longitudinally across the faces of the grinding wheels, means for rotating the grinding wheels in opposite directions and means for effecting a step by step movement of the work.

4. A machine for simultaneously grinding two sides of a polygonal blank, comprising in combination, a bed, a pair of grinding wheels in opposed relation, means on said bed for effecting bodily movement of the grinding wheels toward and away from each other, a pair of stocks, means for holding a blank in centered relation between the stocks, means for effecting reciprocation of the stock whereby to move the blank longitudinally across the faces of the grinding wheels, means for rotating the grinding wheels in opposite directions, and means for manually turning the blank to present different faces to the grinding wheels.

5. A machine for simultaneously grinding two sides of a polygonal blank comprising, in combination, a bed, a pair of grinding wheels in opposed relation, means on said bed for effecting bodily movement of the grinding wheels toward and away from each other, a pair of stocks, means for holding a blank in centered relation between the stocks, means for effecting reciprocation of the stocks whereby to move the blank longitudinally across the faces of the grinding wheels, means for rotating the grinding wheels in opposite directions, and means for manually effecting step by step rotation of the blank to present different faces to the grinding wheels.

6. A machine for simultaneously grinding two sides of a polygonal blank comprising, in combination, a bed, a pair of grinding wheels in opposed relation, means on said bed for effecting bodily movement of the grinding wheels toward and away from each other, a pair of stocks, means for holding a blank in centered relation between the stocks, means for effecting reciprocation of the stocks whereby to move the blank longitudinally across the faces of the grinding wheels, spindles carried by said stocks, one of said spindles being longitudinally slidable, and means for effecting step by step rotation of one of said spindles in order to present different faces of the blank to the grinding wheels.

7. In a machine of the class described, the combination of a bed, a pair of grinding wheels mounted thereon with capacity for bodily movement toward and away from each other, a manually operable arm for effecting movement of the said wheels within predetermined limits, a pair of spindles adapted to receive a blank therebetween, manually operable means for effecting reciprocation of the spindles and blank across the grinding faces of the opposed grinding wheels, and manually operable means for rotating said blank in predetermined step-by-step relation.

8. A grinding machine comprising, in combination, a pair of opposed grinding wheels, manually operable means for fixing the relative separation of the wheels within predetermined limits, means for holding a blank, manually operable means for longitudinally moving said blank across the faces of said grinding wheels whereby the sides of the blank are ground throughout the length of the blank, and manually operable means for effecting step-by-step angular movement of the blank to present different faces to the grinding wheels.

9. A grinding machine comprising, in combination, a pair of opposed grinding wheels, manually operable means for fixing the spacing of the wheels within predetermined limits, means for holding a blank, manually operable means for longitudinally moving said blank across the faces of said grinding wheels whereby the sides of the blank are ground throughout the length of the blank, manually operable means for effecting step-by-step angular movement of the blank to present different faces to the grinding wheels, said last named means including a pawl and ratchet mechanism.

In testimony whereof we have affixed our signatures.

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