O. BAUER.

UNIVERSAL STONEWORKING MACHINE.

APPLICATION FILED OCT. 20, 1914.

1,146,684.

Patented July 13, 1915.

2 SHEETS—SHEET 1.

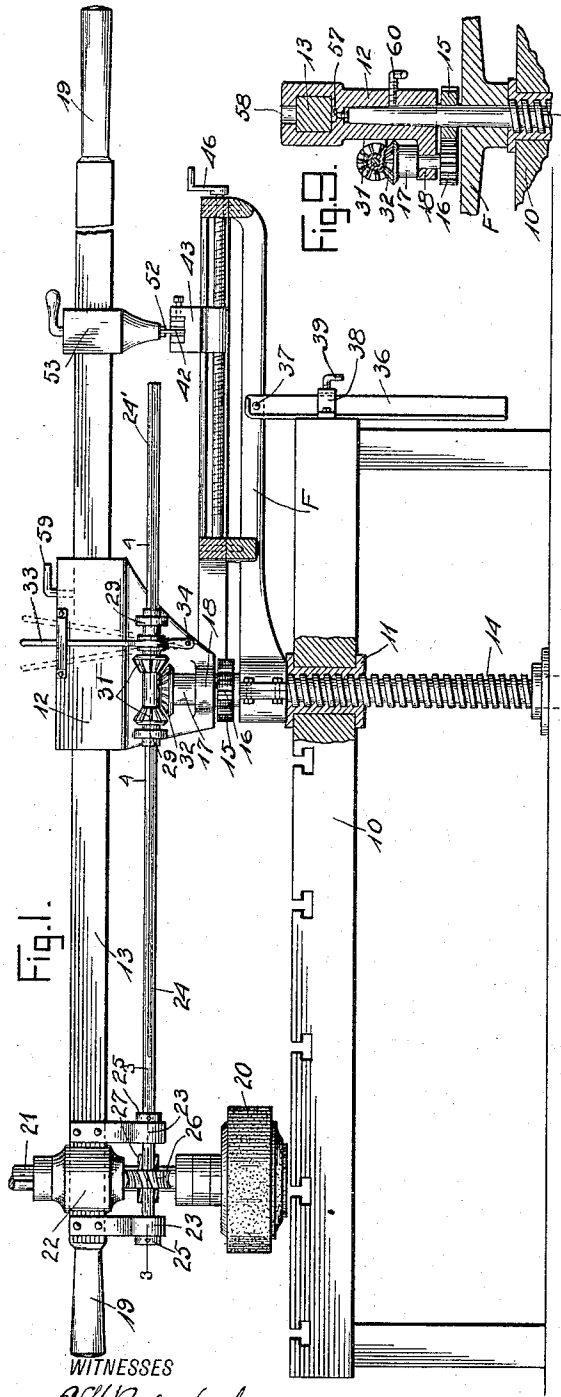


Fig. 1.

Fig. 2.

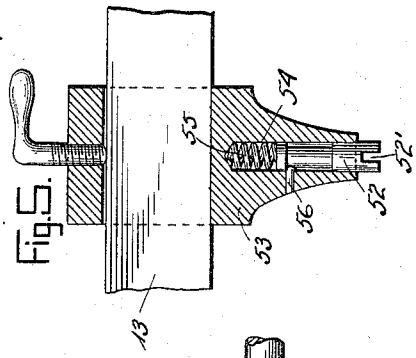


Fig. 5.

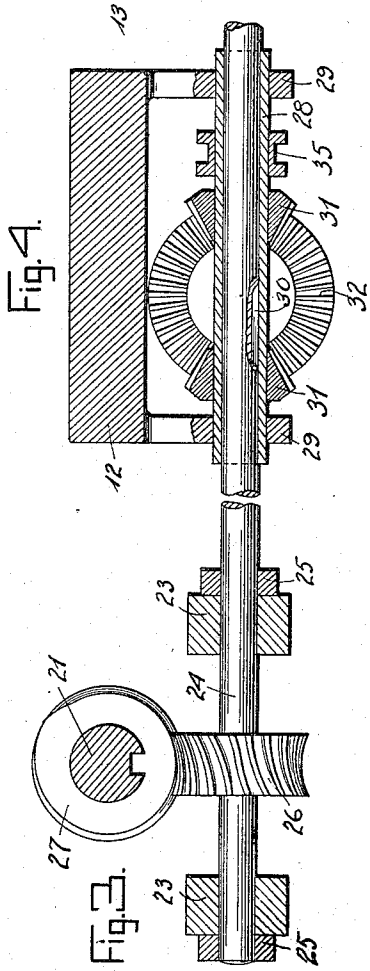


Fig. 4.

Fig. 3.

WITNESSES

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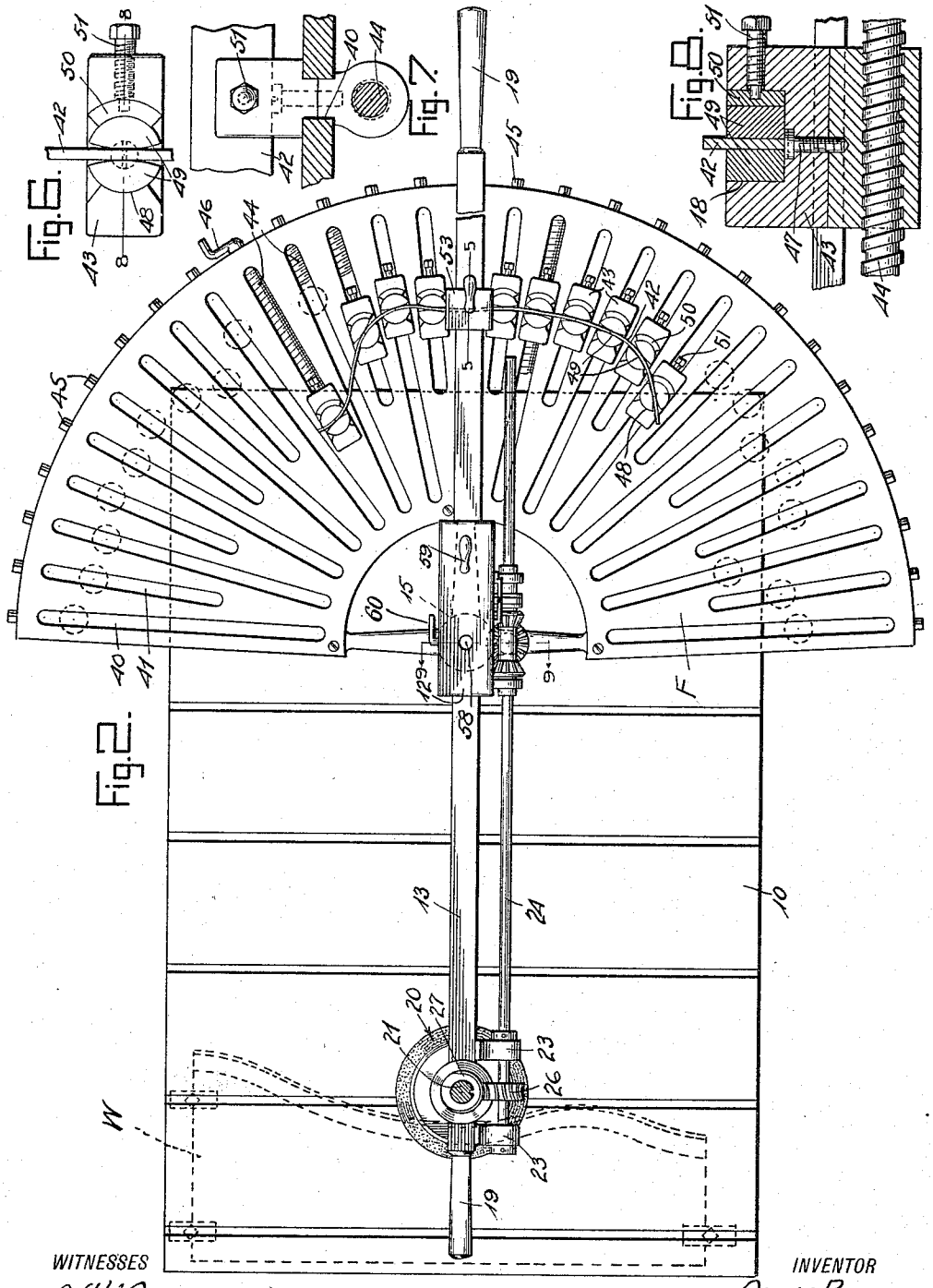


Fig. 2.

Fig. 6.

Fig. 7.

Fig. 8.

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UNIVERSAL STONEWORKING-MACHINE.

1,146,684. Specification of Letters Patent. Patented July 13, 1915.

Application filed October 20, 1914. Serial No. 867,578.

To all whom it may concern:

Be it known that I, OSCAR BAUER, a citizen of the United States, and a resident of the city of New York, borough of Brooklyn, in the county of Kings and State of New York, have invented a new and Improved Universal Stoneworking-Machine, of which the following is a full, clear, and exact description.

This invention relates to machines used by lapidaries or stone workers, and has particular reference to machines for grinding irregular surfaces in a precise and uniform manner irrespective of the number of pieces to be made or finished.

Among the objects of the invention, therefore, is to provide a universally movable support for a grinding wheel, the same being adapted to be operated at a high rate of speed from any source of power, and a means coöperating therewith to cause the grinding wheel to follow any desired outline to which the work is to be finished.

The foregoing and other objects of the invention will hereinafter be more fully described and claimed and illustrated in the drawings forming a part of this specification in which like characters of reference indicate corresponding parts in all the views, and in which—

Figure 1 is a side elevation of a preferred embodiment of the invention, parts being in section; Fig. 2 is a plan view of the same; Figs. 3 and 4 are horizontal sectional details on the corresponding lines of Fig. 1; Fig. 5 is a vertical sectional detail on the line 5—5 of Fig. 2; Fig. 6 is a detail plan view of an adjustment mechanism for the guide member; Fig. 7 is an end view of the same looking toward the left in Fig. 8; Fig. 8 is a vertical section on the line 8—8 of Fig. 6; and Fig. 9 is a vertical section on the line 9—9 of Fig. 2.

The several parts of the device may be made of any suitable materials, and the relative sizes and proportions, as well as the general design of the mechanism, may be varied to a considerable extent without departing from the spirit of the invention hereinafter more fully described and specifically claimed.

At 10 I show a work table of any suitable construction and secured therein is a vertical nut 11 having an internal thread.

At 12 I provide a bracket through which a bar 13 of rectangular cross section is slidably fitted for movement in horizontal planes or in parallelism with respect to the table. I show a horizontal frame F, shown best in Fig. 2, the same being substantially semi-circular in form above the center of which the aforesaid bracket 12 is supported, the bracket being adapted to rotate around the axis of said horizontal frame F. 14 indicates a main supporting and adjusting screw located within said nut 11 and around the axis of which the bracket 12 is adapted to swing. Said screw has connected to it a gear 15 meshing with a pinion 16 secured upon the lower end of a vertical shaft 17 journaled in a bearing 18 at one side of the bracket 12. The bar 13 is provided with any suitable form of handle 19 at either end whereby the operator may either swing the bar around the vertical axis of the screw 14 and frame F, or push it longitudinally through the bracket 12 in either direction.

The grinding wheel 20 is secured in the lower end of the power shaft 21 adapted to be rotated at high speed from an electric or air motor mounted upon the upper end of the shaft and not shown, or by means of belts or pulleys of any suitable distant power. Said shaft 21 is journaled in a bearing 22 adjacent one end of the bar 13, and extending laterally from said bar on opposite sides of the bearing 22 are bearings 23 in which a countershaft 24 is journaled parallel to the bar 13. Said countershaft is held from longitudinal movement independently of the bar by means of collars 25 or other suitable means coöperating with the bearings 23. Between the bearings a worm wheel 26 is secured to the countershaft and is in constant mesh with the worm 27 secured rigidly to the power shaft 21. It will be understood, therefore, that the countershaft is shiftable bodily with and always is parallel to the bar 15, and while the shaft 21 rotates at high speed the countershaft is rotated therefrom at a slow speed through said worm gearing.

At 28 is shown a sleeve slidable longitudinally and rotatable in a pair of bearings 29 extending laterally from the bracket 12 and on the same side thereof as the bearing 18. The countershaft is provided with a keyway 24′ into which a spline 30 from the sleeve extends and providing for free slidable movement of the countershaft or the sleeve independently of each other and for the rotation of the sleeve from said

countershaft. The countershaft and sleeve accordingly are operated continuously when the machine is in operation. A pair of pinions 31 are secured to the sleeve on opposite sides of the axis of the shaft 17 and the gear 32 carried by the upper end of the shaft 17 lies between said pinions and is adapted to be out of contact with both of them or in mesh with either of them, depending upon the position of the sleeve which is adapted to be reciprocated in its bearings 29 by means of a lever 33 pivoted at its lower end to the bracket at 34 and embracing a collar 35 secured to the sleeve. When the lever is in the neutral position shown in Fig. 1, the gear 32 is out of contact with the pinions 31 and the shaft 17 is hence idle. When, however, the lever is shifted to either of the dotted line positions, the corresponding pinion 31 will be made to engage and drive the gear 32 causing the rotation of the pinion 16, gear 15 and screw 14 and hence the corresponding up or down adjustment of the frame F, bracket 12, bar 13 and grinding wheel. In addition to the parts already described, I may use one or more braces 36 connected at 37 to the frame F and slidable through clamps 38 connected to the table 10, each of said braces 36 being adapted to be set in adjusted position for steadying the mechanism by means of a clamping screw 39.

The frame F is shown provided with a series of radial slots 40 and 41, the slots 40 being longer than the others and arranged in alternation therewith. The purpose of these slots is to provide means for adjusting and holding in any desired adjusted position or form a flexible metallic guide 42, the same having coöperation with the operating bar 13 for reproducing any desired number of uniform shapes or pieces of work. The means I prefer to employ for adjusting and locking the guide strip 42 is shown particularly in Figs. 6, 7 and 8, the same comprising a block 43 for each of the slots, the same being adjustable longitudinally thereof and hence toward or from the center of the frame by means of a screw 44 having a polygonal outer end or head 45 for the application of a suitable key or wrench 46. Each of the blocks 43 is made preferably in two parts which meet within the slot and secured together by means of a screw or bolt 47. This screw 47 serves not only, therefore, to connect the two parts of the blocks together, providing an easy manner of assemblage, but also may be used as a means for truing the guide strip or parts associated therewith. The upper portion of the block is provided with a cylindrical bearing 48 in which two substantially semi-cylindrical bearing blocks 49 are journaled for rotation around a vertical axis, said axis being shown as coincident with the axis of the screw 47. These bearing blocks are spaced from each other far enough to receive the guide 42 between them and the opposing faces of said blocks are flared to allow free adjustment of the guide within the blocks. The blocks considered together are rotatable around their axis within the bearing 48, permitting the desired change in form of the guide and the sliding of the guide between the bearing blocks. A filler 50 is fitted against one of the bearing blocks and is adjustable by means of a screw 51 in order to provide the desired tension between the bearing blocks and the guide. As shown in Figs. 7 and 8, the guide extends above the several adjusting devices, and a shoe 52 of any suitable nature carried by a holder 53 coöperates with the upper edge of the guide whereby the bar 13 to which the holder is adjustably clamped is directed according to the work to be done. The shoe is preferably of the form shown in Fig. 5, being extended into a socket 54 against a spring 55 and held from displacement by means of a pin 56. The shoe is provided with a notch 52′ into which the guide extends.

The operation of the machine may be briefly set forth as follows in view of the preceding description of the parts: When a number of similar pieces of work of uniform shape are to be made or finished, the operator will use a form or pattern shown at W corresponding to the shape desired to be made. The holder 53 being locked at any convenient point along the bar, the grinding wheel 20 will be moved along the pattern from one end to the other, and while it is being so moved step by step, and the bar is rotated in a horizontal plane around the axis of the screw 14, the several blocks 43 will be adjusted along the slots 40 and 41 at uniform distances from the corresponding points of the pattern opposite and through said screw axis. In other words, the length of the bar measured from the axis of the shoe 52 through the axis of the screw 14 to the point of contact between the grinding wheel and work W is always the same so long as the holder 53 remains fixed at the same point upon the bar. The several positions, therefore, of the grinding wheel along the pattern or work, the bar 13 swinging around its vertical axis, will determine the points at which the several blocks 43 must be set so as to fix the flexible metallic guide 42 in definite position to reproduce any desired number of pieces of work of uniform shape. For the manipulation of the bar 13, the operator may operate either handle 19 as may be found most desirable. Usually, however, I prefer to manipulate the bar from the end adjacent the grinding wheel in making the first piece as, for instance, in cutting a block of stone or marble to a cer-

tain outline marked thereon, while subsequently for forming duplicate blocks of work from the same pattern determined by the position in which the guide 42 is set, I grasp the handle opposite the grinding wheel.

As shown in Fig. 9, the bar supporting bracket 12 is pivoted upon the upper end of the supporting screw 14, said end being somewhat tapered to insure a proper steady coöperation between the bracket and the screw. I provide, however, a screw 57 carried by the bracket and adapted to bear with its end against the point of the screw to offset any tendency of the bracket to bind upon the pivot provided by the screw 14. Access is had to the screw 57 through a hole 58 in the top of the bracket, the bar 13 being removed for this purpose. As shown in Fig. 2, I employ a set screw 59 for locking the bar from longitudinal movement through the bracket, which is desirable at times as, for instance, when desiring to operate the grinding wheel in the arc of a circle. I also employ a set screw 60 operating through the bracket 12 and serving to lock said bracket from rotation upon the screw. In other words, by setting the screw 60 I may rotate the screw to hoist or lower the same and the bracket by power applied through the bar 13 directly.

The term "grinding" as used herein is to be interpreted in its usual meaning in stone working or stone cutting establishments, having reference to the cutting or the shaping of the stone as distinguished from the finishing or polishing of a previously formed surface.

In the practice of this invention the grinding or cutting wheel is operated at a high speed of from twenty-three hundred to twenty-five hundred revolutions per minute, and because of such high speed and the fact that the wheel itself may be of twelve to fifteen inches in diameter and of considerable weight, it is essential that it be secured to a rigid shaft in order to prevent gyrating or wabbling.

I am aware that polishing machines have been proposed heretofore having some of the characteristics of my invention, but, so far as I have observed, the polishing tool in all cases is adapted to operate against a flat surface perpendicularly to the axis of the tool and with the tool connected to its shaft by a pivot or universal joint. Hence, such previous machines are by no means adapted for cutting irregular or molded surfaces and especially in which the cutting or grinding action takes place on the edge or periphery of the grinding wheel having a surface precisely complemental to the surface to be formed.

I claim:

1. The combination of a vertical support, a bracket carried by said support, a bar carried by said bracket and movable therewith around the vertical axis of said support and slidable in horizontal directions through the bracket, a grinding wheel journaled in a fixed bearing in said bar and carried thereby during all adjustments of the bar, a horizontal frame, a flexible guide member arranged above and in a plane parallel to said frame, means to fix the guide member to the frame in any desired shape within the plane of the guide member, and a shoe carried by the bar and coöperating with said guide member, substantially as set forth.

2. In a machine of the character set forth, the combination of a support having a vertical axis, a semi-circular frame connected to and concentric with said support, said frame having a series of radial slots, a bar supported above said support and movable around the axis thereof, means to cause said support to raise or lower the bar and frame, means to prevent rotation of the frame, said bar being slidable transversely of its axis of rotation, a grinding wheel carried by the bar on one side of its axis of rotation, a shoe carried by the bar on the other side of its axis of rotation above said frame, a flexible guide member with which said shoe coöperates, and means to clamp the guide member to the frame along said slots in various forms, substantially as and for the purposes set forth.

3. In a stone working machine, the combination of a support having a fixed vertical axis, a frame connected with said support and lying in a plane perpendicular to said axis, said frame having a series of radial slots formed therein, a grinding wheel, a bar controlling the position of the grinding wheel and movable transversely of and also around said support axis, a guide shoe carried by the bar above the frame, a flexible guide member coöperating with said shoe, and a series of blocks movable along said slots and holding said guide member in any desired form, substantially as set forth.

4. In a stone working machine, the combination of a support having an axis, a frame associated with the support and lying in a plane perpendicular to its axis, means to prevent rotation of the frame, a bar arranged opposite the end of said support and slidable transversely of its axis and rotatable therearound in a plane parallel to the frame, a grinding wheel supported in a fixed bearing in said bar, a guide shoe secured to the bar remote from the grinding wheel, a guide member between the bar and the frame along which said shoe is adapted to operate during the rotation of the bar, and means carried by the frame serving to fix the guide bar in any desired shape according to the work to be performed by the grinding wheel, substantially as set forth.

5. The combination with a table and a nut fixed therein, a rotary supporting screw journaled in said nut and having a vertical axis, a semi-circular frame embracing said screw lying in a plane parallel to the table, means acting between the frame and the table to prevent rotation of the frame, a grinding wheel above the table, a bar supported above the screw and movable around the axis thereof, means supporting the grinding wheel upon the bar, said bar and grinding wheel being shiftable in lines perpendicular to the axis of the screw, a guide member above the frame, means to adjust the guide member in any desired shape in a plane parallel to the frame, a guide shoe carried by the bar coöperating with said guide member, the distance between the centers of the wheel and the guide shoe remaining constant during the complete operation of the machine on any number of similar pieces of work, and means operated directly from the grinding wheel shaft to cause rotation of the supporting screw for vertical adjustments of the grinding wheel and frame.

6. The combination of a vertical supporting screw, a grinding wheel having a shaft parallel to said screw, a bar having a bearing in which said grinding shaft is journaled, said bar being supported above the screw and movable around the axis thereof and also slidable transversely of said axis, a worm surrounding and secured to the grinding wheel shaft, a countershaft, journaled in fixed bearings parallel to the bar, a worm wheel secured to the countershaft and meshing with said worm whereby the countershaft is rotated at slow speed from the wheel shaft, and gearing between the countershaft and supporting screw serving to cause the rotation of the countershaft to act to elevate or lower the screw irrespective of the position of the bar and wheel with respect to the axis of the screw, substantially as set forth.

7. The combination of a vertical supporting screw, a power shaft parallel thereto, a grinding wheel carried by the power shaft, a bar above the screw and movable around the axis thereof and also slidable perpendicularly to said axis, said bar having a bearing in which said power shaft is journaled, a countershaft carried in fixed position with respect to the bar and movable therewith, means to drive the countershaft directly from the power shaft, a sleeve slidable upon the countershaft, a pair of pinions secured to the sleeve in spaced relation to each other, a gear located between said pinions and adapted to be free therefrom or to mesh with either of them, a shaft carrying said gear and parallel to the screw, and constantly meshing gear members connected to the shaft and screw respectively whereby the screw is adapted to be rotated in either direction to raise and lower the bar and grinding wheel from said countershaft irrespective of the relative positions of the grinding wheel and screw, substantially as set forth.

8. The combination with a work table and a nut fixed therein, of a rotary supporting screw threaded in said nut through the table, said screw having a smooth cylindrical neck adjacent its upper end, a frame embracing said neck and arranged parallel to the table, means providing for vertical movement of the frame but preventing the rotation thereof around the screw, a bracket swiveled to the upper end of the screw, a power shaft arranged parallel to the screw, a grinding wheel secured to the lower end of said shaft, a bar slidable in said bracket and rotatable therewith around the axis of the screw, said bar having said power shaft journaled therein, a countershaft extending along one side of the bracket parallel to the bar, means to drive the countershaft from the power shaft, a shaft at one side of the bracket having its axis in the same vertical plane as the axis of the countershaft, gear members secured to the last mentioned shaft and screw respectively, and shiftable gear devices between the countershaft and last mentioned shaft whereby rotation of the countershaft in a constant direction may result in the rotation of the screw to either hoist or lower the bar and the grinding wheel irrespective of the relative positions of the grinding wheel and screw.

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

OSCAR BAUER.

Witnesses:
GEO. L. BEELER,
PHILIP D. ROLLHAUS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."