(No Model.) 4 Sheets—Sheet 1.

G. W. KIRSTEN.

GRINDING MACHINE.

No. 595,125. Patented Dec. 7, 1897.

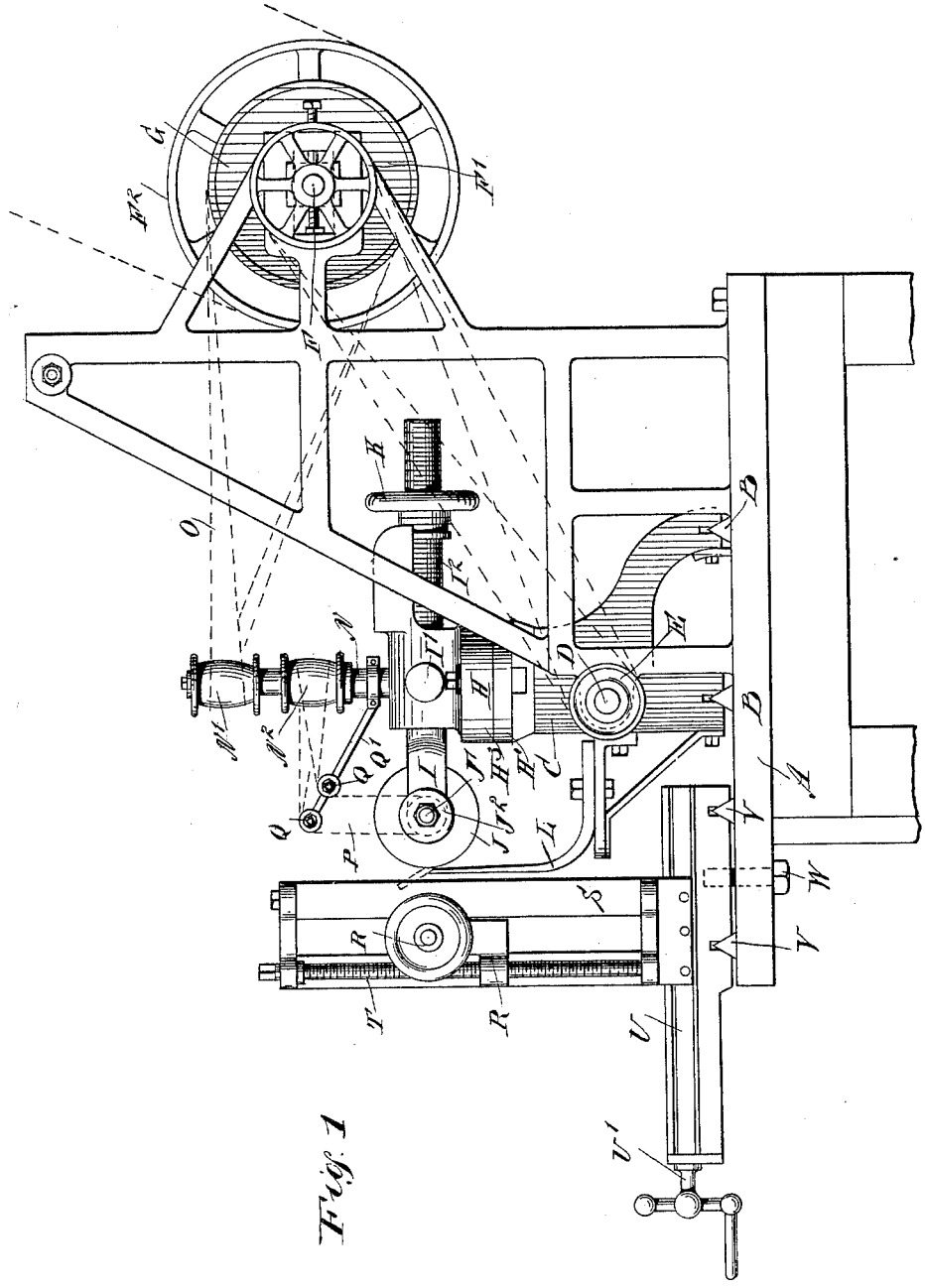


Fig. 1

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G. W. KIRSTEN.

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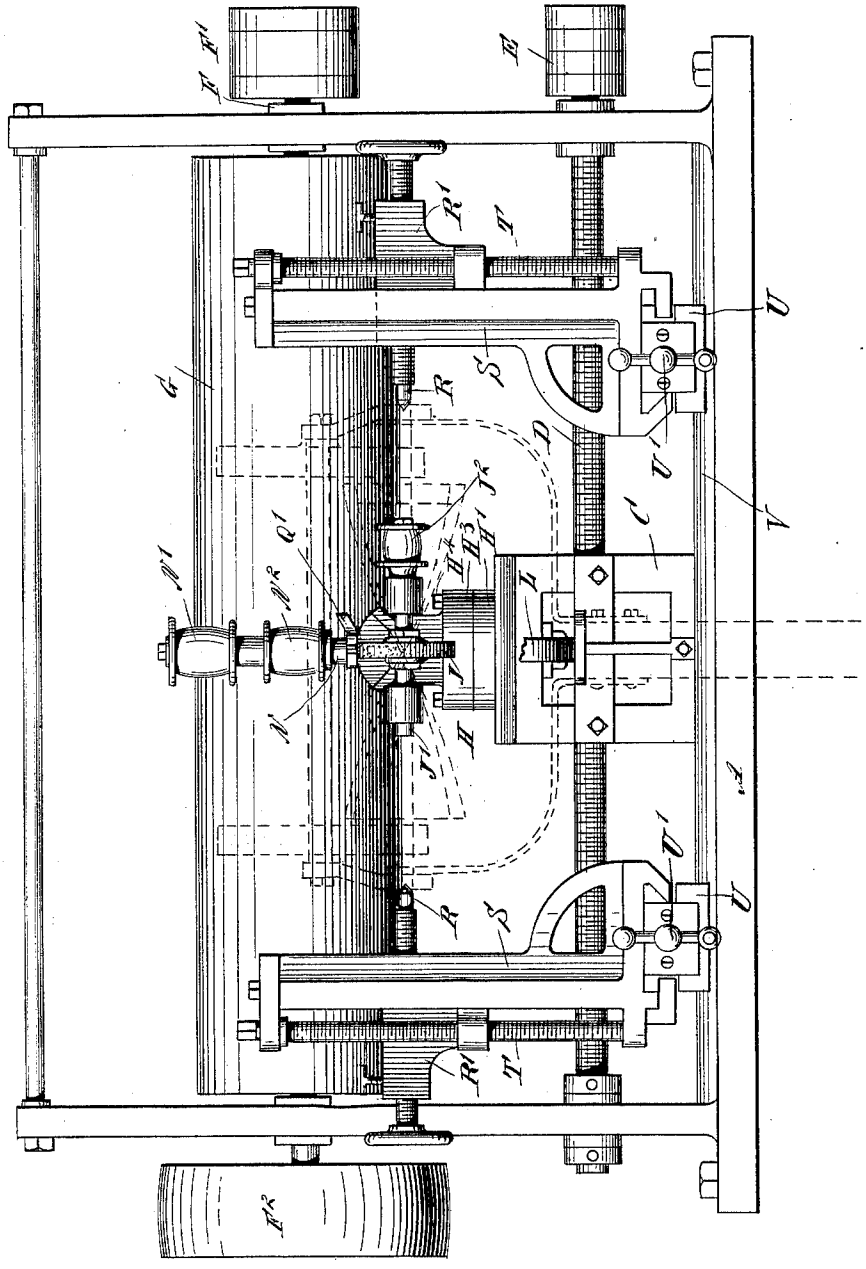


Fig. 2.

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G. W. KIRSTEN.

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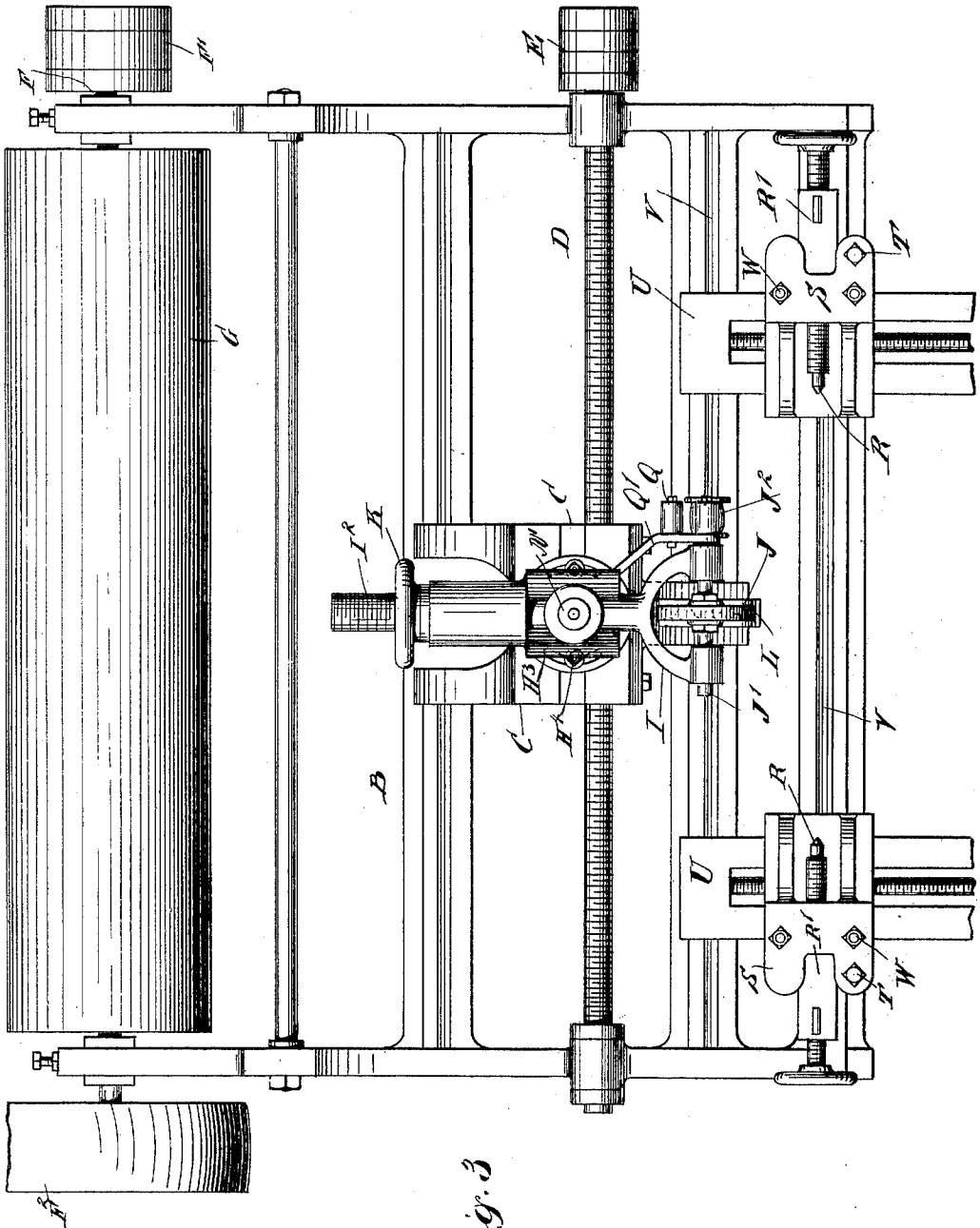


Fig. 3.

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G. W. KIRSTEN.

GRINDING MACHINE.

No. 595,125. Patented Dec. 7, 1897.

Fig. 4

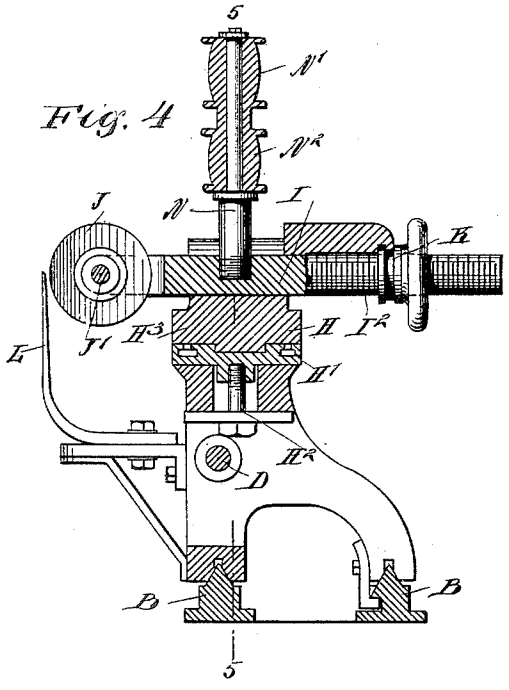


Fig. 5

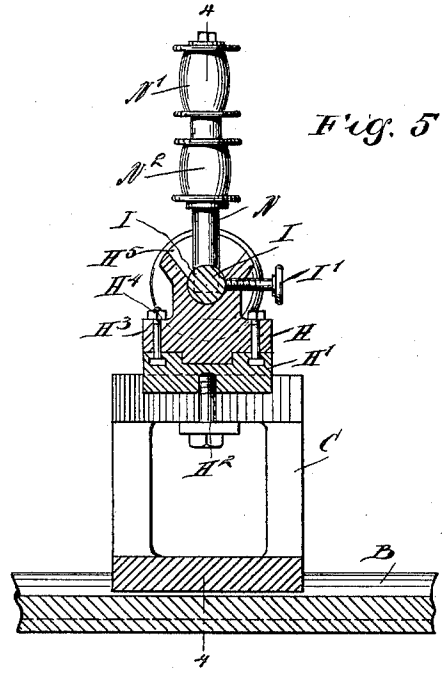


Fig. 6

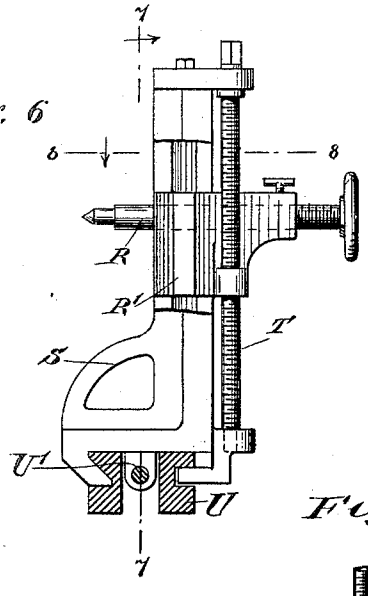


Fig. 7

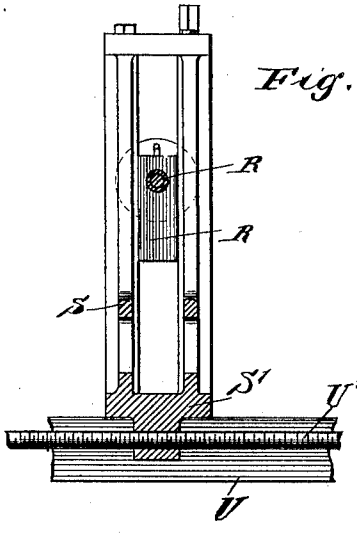
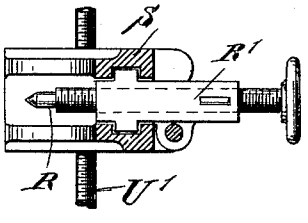


Fig. 8



WITNESSES:

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UNITED STATES PATENT OFFICE.

GEORGE WM. KIRSTEN, OF WEST ORANGE, NEW JERSEY.

GRINDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 595,125, dated December 7, 1897.

Application filed April 17, 1897. Serial No. 632,563. (No model.)

To all whom it may concern:

Be it known that I, GEORGE WM. KIRSTEN, of West Orange, in the county of Essex and State of New Jersey, have invented a new and Improved Grinding-Machine, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved grinding-machine more especially designed for grinding spherical or curved surfaces and twists of various kinds and arranged to properly support and adjust the work and to hold the grinding-wheel in the desired position, according to the shape intended to be given to the cutting edge.

The invention consists principally of a grinding-wheel holder adapted to be turned on the carriage to bring the wheel into an inclined position relative to the work.

The invention also consists of certain parts and details and combinations of the same, as will be fully described hereinafter and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is an end elevation of the improvement. Fig. 2 is a front elevation of the same. Fig. 3 is a plan view of the same. Fig. 4 is a transverse section of the grinding-wheel and its support, the section being taken on the line 4 4 of Fig. 5. Fig. 5 is a sectional elevation on the line 5 5 of Fig. 4. Fig. 6 is a front elevation of the work-holder, with part in section and part broken out. Fig. 7 is a transverse section of the same on the line 7 7 of Fig. 6, and Fig. 8 is a sectional plan view of the same on the line 8 8 of Fig. 6.

The improved grinding-machine is mounted on a suitably-constructed frame A, adapted to be fastened to a bench or other foundation, and on the said frame are formed or secured the longitudinally-extending guideways B, on which is mounted to travel longitudinally the carriage C, engaged by the usual feed-screw D, mounted to turn in suitable bearings in the frame A and provided at one end with pulleys E, connected by straight or cross belts with pulleys F', secured on the driving-shaft F, journaled on the rear part of the main frame A and provided with a driving-pulley F^2, connected by a belt with suitable machinery to impart a rotary motion to the said shaft F and by the pulleys F' and belts to the pulleys E, so as to turn the feed-screw D to move the carriage C forward or backward on its guideways B. On the shaft F is also secured the drum G for driving the grinding-wheel, as hereinafter more fully described.

On the carriage C is clamped a head H, formed with a face H', resting on the carriage C and adapted to be clamped thereto by a clamping-bolt and washer H^2, as plainly illustrated in Figs. 4 and 5. On the face H' is mounted to turn the bearing H^3, adapted to be fastened in place after suitable adjustment has been made by bolts H^4, as shown in Figs. 4 and 5.

In the bearing H^3 of the head H is mounted to be turned and to be adjusted laterally the holder I, formed at its front end with a fork, in the members of which is journaled the spindle J' of the grinding-wheel J, made of emery or other suitable material. The rear end of the holder I is formed with a screw-thread I^2, on which screws a nut K, mounted to be turned in suitable bearings formed on the rear end of the bearings H^3, so that the holder I can be adjusted laterally to bring the peripheral surface of the grinding-wheel J in proper relation to the work. The holder I is adapted to be fastened in place in the bearing H^3 by a set-screw I', which when loosened permits of turning the said holder I so as to move the grinding-wheel J into an inclined position, according to the nature of the cutting edge to be formed on the work.

On the holder I is secured an upwardly-extending stud N, extending through a slot H^5 in the bearing H^3, and on the outer end of the said stud are journaled the pulleys N' and N^2, of which the pulley N' is connected by a belt O with the drum G, previously mentioned, so that when the said drum rotates with the driving-shaft F a rotary motion is transmitted by the belt O to the pulleys N' N^2. Over the pulley N^2 passes a belt P, also passing idlers Q, journaled on a bracket Q', secured to the stud N, the belt then passing around a pulley J^2, secured on the spindle J', carrying the grinding-wheel J, as previously described. Thus the rotary motion

of the pulleys N′ N², derived from the main driving-shaft, is transmitted by the belt P to the pulley J², so as to revolve the grinding-wheel J at the time a forward or backward movement is given to the carriage C, supporting the said grinding-wheel by the means above mentioned.

Close to the front edge of the wheel J extends the free end of a horn L, secured to the carriage C and moving with the same, the said horn serving to turn spiral knife-blades—for instance, of mowing-machines—in case such blades are ground by the wheel J.

The work to be operated on by the grinding-wheel is hung on centers R, held longitudinally adjustable in bearings R′, fitted to slide vertically in standards S, and raised or lowered therein by feed-screws T, journaled in the said standards and engaging nuts on the bearings R′. The standards S in turn are fitted to slide transversely on carriages U, each held adjustable longitudinally on guideways V, formed on top of the frame A in front of the guideways B, as plainly illustrated in the drawings. The carriages U are provided with feed-screws U′. Clamping-bolts W serve to fasten the carriages U in place after the same have been adjusted—that is, moved toward or from each other, according to the length of the work.

Now in case it is desired to grind the spiral knives of a mowing-machine, for instance, the entire mowing-machine is hung with the shaft of the cutting-wheel upon the centers R, which are adjusted longitudinally by screwing in the bearings R′, so as to support the mowing-machine and to permit free turning of the mowing or cutting wheel. The centers R are raised or lowered by adjusting the feed-screws T, so as to bring the said centers approximately in a horizontal plane with the spindle J′ of the grinding-wheel J. The standards S, carrying the centers of the mowing-machine, are adjusted laterally by turning the feed-screws U′ of the carriages U to move the cutting edge of each spiral blade close to the peripheral surface of the grinding-wheel J, the latter being at one end of its travel, so as to start at one end of the spiral cutting-blade. When the main shaft F is now rotated and a rotary motion is transmitted to the feed-screw D, then the carriage C moves longitudinally and the grinding-wheel J is rotated from the drum G, as previously explained, so that the wheel J grinds an edge on the spiral blade of the mowing-machine wheel or cutter, the latter being turned by the horn L as the carriage C travels to one side. Now when it is desired to give a concave cutting edge to the blade, the holder I is turned in its bearing H³ to move the cutting-wheel into an inclined position relative to the edge on the blade.

It is evident that by the arrangement described spherical and curved surfaces and twists of various kinds can be readily ground and any desired shaped edge given to the blade without requiring any skill on the part of the operator, who is only required to adjust the work on the centers and adjust the grinding-wheel vertically according to the edge desired.

It is further evident that by adjusting the bearing H³ on its face H′ the holder I for the grinding-wheel can be swung around according to the work under treatment.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent—

1. A grinding-machine provided with a carriage adapted to travel forward and backward, a head held adjustably thereon, a holder carrying the grinding-wheel and mounted to be turned in the said head, and means for adjusting the said holder laterally in the said head, substantially as shown and described.

2. In a grinding-machine, the combination with a carriage, and a head held thereon, of a holder loosely mounted in the head and having its rear end screw-threaded, a nut on the holder and mounted in the bearing of the holder, and a set-screw for locking the holder in its bearing, substantially as described.

3. A grinding-machine provided with a carriage adapted to travel forward and backward, a head held adjustably thereon, a holder carrying the grinding-wheel and mounted to be adjusted axially and laterally in the said head, and means substantially as described for rotating the said grinding-wheel journaled in the holder, substantially as set forth.

4. A grinding-machine comprising a carriage, a feed-screw for the said carriage, a head held adjustably on the said carriage, a grinding-wheel holder held adjustably in the said head, centers for supporting the work in front of the said grinding-wheel; and means for adjusting the said centers vertically and transversely, as set forth.

5. A grinding-machine provided with a work-holder comprising longitudinal guideways, carriages held longitudinally adjustably thereon and adapted to be secured thereto, standards held laterally adjustably on the said carriages, bearings held vertically adjustably on the said standards, and centers longitudinally adjustable in the said bearings, substantially as shown and described.

6. In a grinding-machine, the combination of a holder mounted to turn, a grinding-wheel mounted in said holder, and provided with a pulley on its spindle, pulleys carried by the holder, means for operating the pulleys, and a belt passing from one of the said pulleys to the pulley on the spindle of the grinding-wheel, substantially as described.

7. In a grinding-machine, the combination with a support, of a holder mounted in the support and provided with a stud projecting through a slot of the bearing of said holder, a grinding-wheel mounted in the holder and provided with a pulley on its spindle, a pul-

ley on the stud of the holder, means for operating the said pulley, and a belt passing around the pulley and the pulley of the grinding-wheel, substantially as described.

8. In a grinding-machine, the combination with a driving-shaft, a carriage, and a feeding device for the carriage operated from the driving-shaft, of a holder mounted to turn in a bearing in the carriage and provided with a laterally-projecting stud extending through a slot in said bearing, a grinding-wheel mounted in the holder and provided with a pulley on its spindle, pulleys on the stud of the holder, a belt passing around one of the pulleys and a pulley on the driving-shaft, and a belt passing around the other pulley of the said stud and the pulley on the grinding-wheel spindle, substantially as described.

9. A grinding-machine, comprising a supporting-frame, a driving-shaft mounted therein, a carriage mounted on the frame, means for moving the carriage from the driving-shaft, a grinding-wheel holder mounted in the carriage and held laterally and axially adjustable therein, a grinding-wheel mounted in the holder, means for operating the grinding-wheel from the driving-shaft, adjustable centers in front of the grinding-wheel, and a horn between the centers and the grinding-wheel, substantially as herein shown and described.

GEORGE WM. KIRSTEN.

Witnesses:
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