C. G. TREFETHEN.

GRINDING MACHINE.

APPLICATION FILED MAR. 2, 1908.

923,464.

Patented June 1, 1909.

4 SHEETS—SHEET 1.

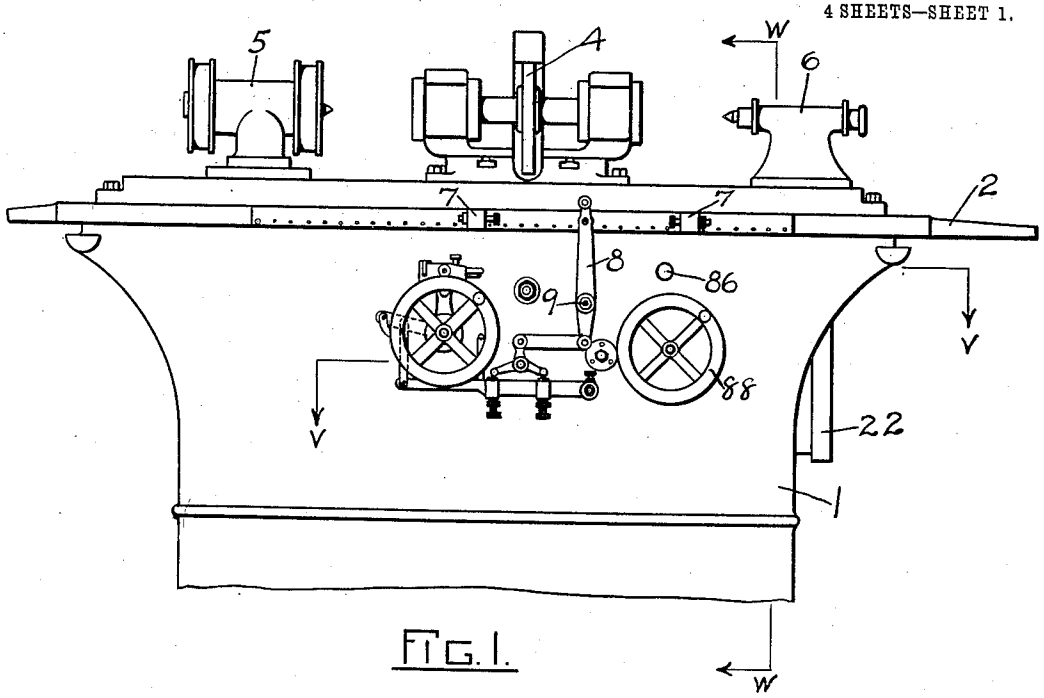


FIG. 1.

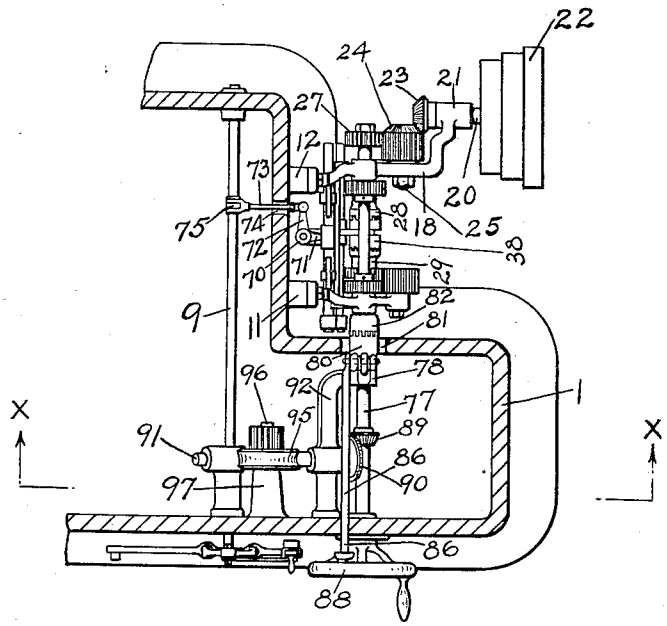


FIG. 2.

WITNESSES.

Albert G. Piecenkowski.

Robert E. Lamphear.

INVENTOR.

Charles G. Trefethen

By Donald E. Bellows.

ATTORNEY.

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4 SHEETS—SHEET 2.

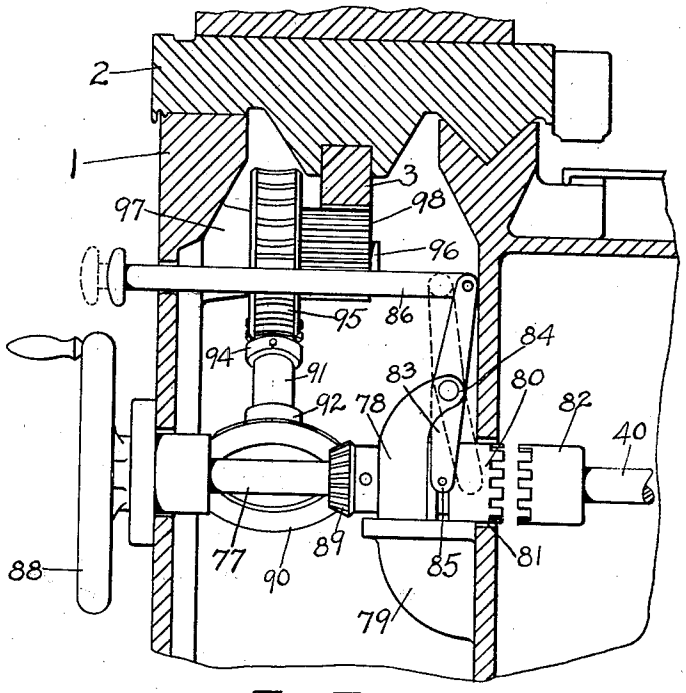


FIG. 3.

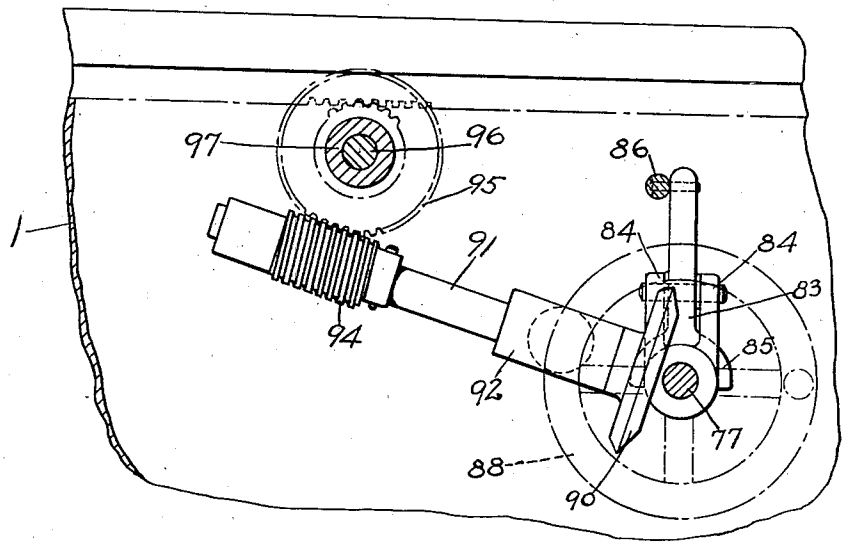


FIG. 4.

WITNESSES.

Albert G. Przygenhowski.

Robert E. Lamphear.

INVENTOR.

Charles G. Trefethen

By Horatio E. Bellows

ATTORNEY.

C. G. TREFETHEN.

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APPLICATION FILED MAR. 2, 1908.

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4 SHEETS—SHEET 3.

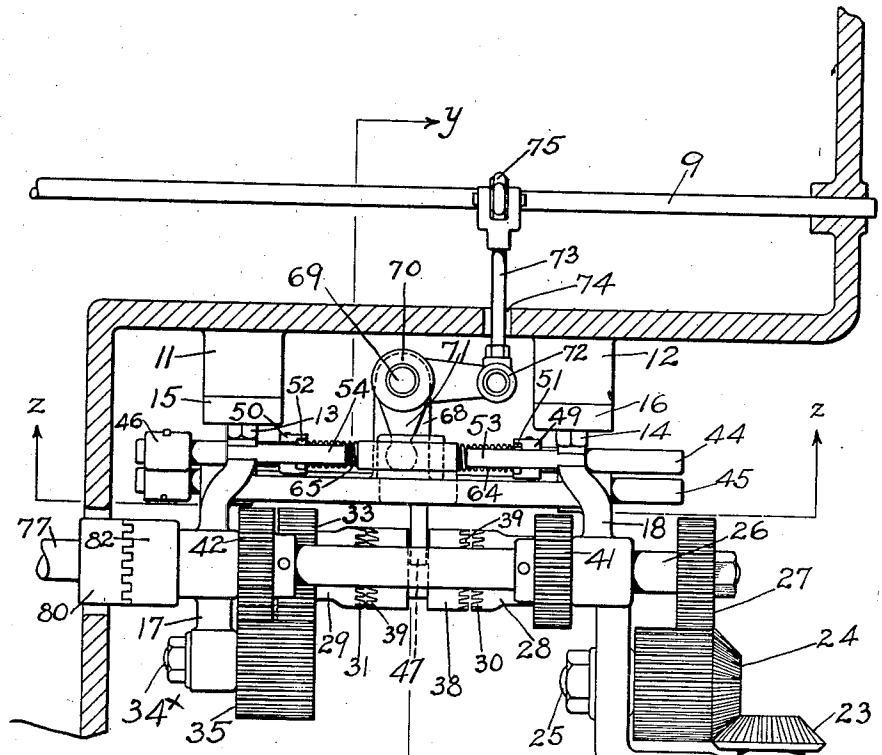


FIG. 5.

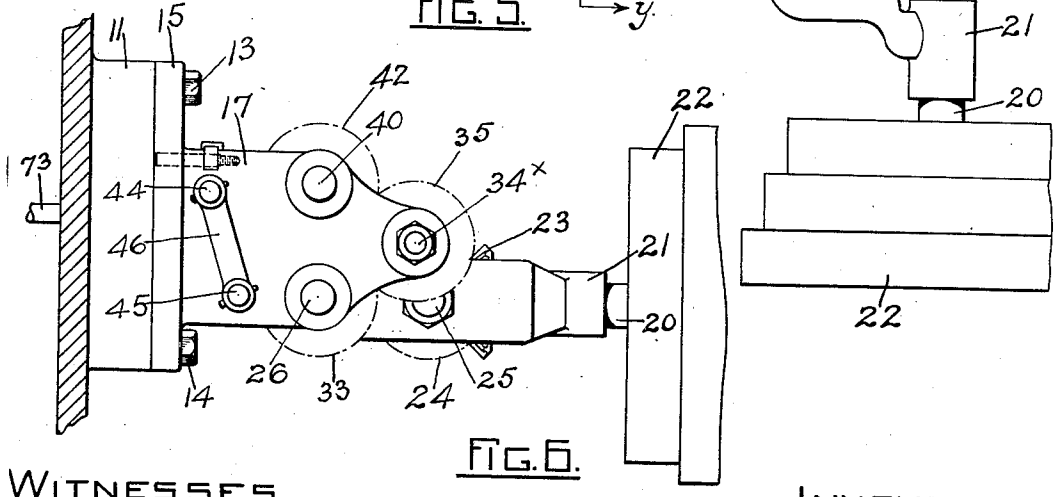


FIG. 6.

WITNESSES.

Albert G. Riegenthaveki.

Robert E. Lamphear.

INVENTOR.

Charles G. Trefethen

By Horatio E. Bellows

ATTORNEY.

C. G. TREFETHEN.

GRINDING MACHINE.

APPLICATION FILED MAR. 2, 1908.

**923,464.**

Patented June 1, 1909.

4 SHEETS—SHEET 4.

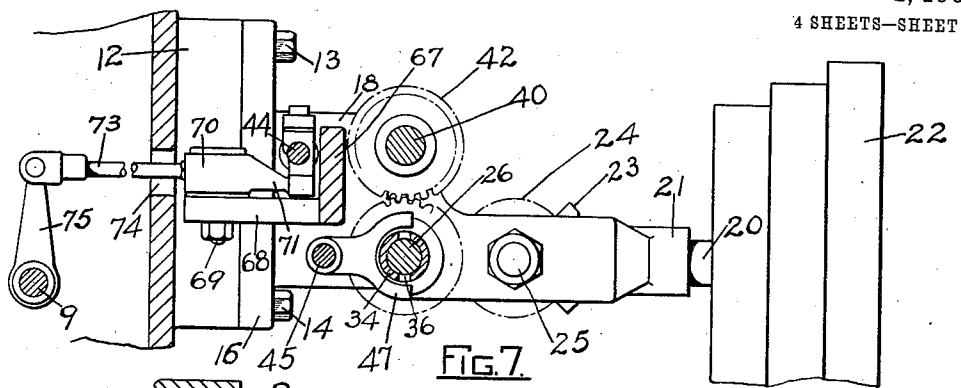


FIG. 7.

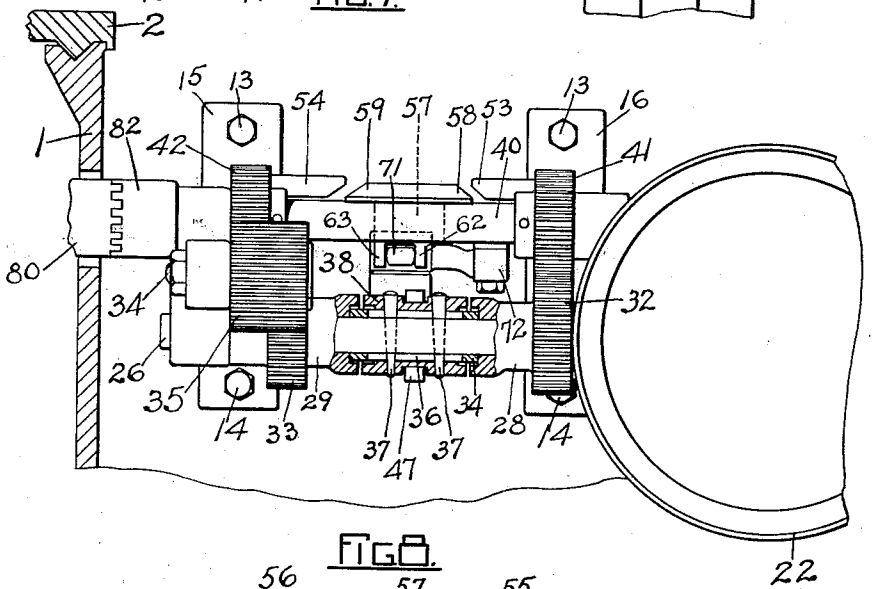


FIG. 8.

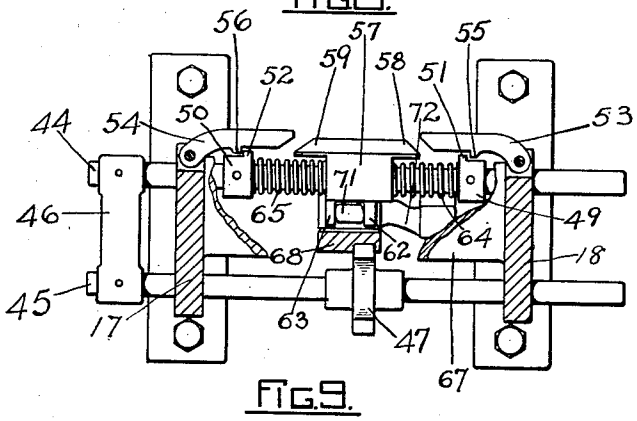


FIG. 9.

WITNESSES.

Albert G. Piegenthowski

Robert E. Lamphear.

INVENTOR.

Charles G. Trefethen

By Horatio E. Bellows

ATTORNEY.

# UNITED STATES PATENT OFFICE

CHARLES G. TREFETHEN, OF PROVIDENCE, RHODE ISLAND, ASSIGNOR TO ATLAS MACHINE TOOL COMPANY, A CORPORATION OF MAINE.

## GRINDING-MACHINE.

No. 923,464. Specification of Letters Patent. Patented June 1, 1909.

Application filed March 2, 1908. Serial No. 418,787.

*To all whom it may concern:*

Be it known that I, CHARLES G. TREFETHEN, a citizen of the United States, residing at Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Grinding-Machines, of which the following is a specification.

My invention relates particularly to the mechanism for reversing the longitudinal travel of the bed or platen of grinding machines.

The essential objects of my invention are to provide a compact driving and reversing mechanism capable of assemblage in a bracket independently of the machine frame; to provide driving and reversing means which will operate with precision, accuracy, simplicity, and uniformity.

Other objects and advantages will be hereinafter pointed out and claimed.

To the above ends essentially, my invention consists in the construction and combination of parts hereinafter set forth, and illustrated in the accompanying drawings, wherein,

Figure 1 is a front elevation of the upper portion of a grinding machine containing my improved mechanism. Figs. 2 and 3, sections of the same on lines *v v* and *w w* respectively of Fig. 1. Fig. 4, a section on *x x* of Fig. 2. Fig. 5, an enlarged section of a portion of the machine on line *v v* of Fig. 1, showing the reversing mechanism in plan elevation. Fig. 6, an end elevation of the reversing mechanism. Fig. 7, a section of the same on line *y y* of Fig. 5. Fig. 8, a front elevation of the reversing mechanism partly in section, and Fig. 9, a partial section on line *z z* of Fig. 5.

Like reference characters indicate like parts throughout the views.

The form of machine body, bed, and attachments may be of any preferred construction. The form thereof herein shown comprises the frame, 1, reciprocating table, 2, table rack, 3, grinding wheel, 4, and head and foot stocks, 5 and 6, all mounted in a usual or convenient manner. The table or platen 2 has the usual adjustable dogs, 7, adapted to alternately contact, as the platen reciprocates with the reversing lever, 8, fixed to the rock shaft, 9, transversely mounted in the frame.

Upon the side of the frame is a bracket comprising the studs or projections, 11 and 12, to whose faces are fixed by bolts, 13 and 14, respectively, plates, 15 and 16, carrying bracket arms, 17 and 18, respectively. Upon this bracket the driving and reversing mechanism is mounted, consisting of a shaft, 20, mounted in a bearing, 21, upon the end of the extended end of arm, 18. This shaft has a driving pulley, 22, upon one end and a bevel gear, 23, upon the other end. The latter meshes with a broad gear, 24, mounted upon a stud, 25, in the arm, 18. A shaft, 26, is slidably mounted in the lower part of the bracket arms, having fixed to its outer end a spur gear, 27, which meshes with and is driven by gear, 24. Loosely mounted upon the shaft, 26, adjacent the bracket arms, are two clutch members or sleeves, 28 and 29, provided respectively upon their opposite inner ends with teeth, 30 and 31, and upon their outer ends with spur gears, 32 and 33 respectively. Loose upon the shaft, 26, is a spacing sleeve, 34, for the clutch sleeves, provided with longitudinal slots, 36, to permit free play therethrough of securing pins, 37, which rigidly unite the shaft with the central clutch member, 38. The teeth 39 of this clutch member, are beveled in outline, as are the teeth, 30 and 31, with which they are adapted to engage. It will be noted that any movement of the clutch member, 38, either longitudinal or rotary, is imparted to the shaft, 26. Loosely mounted in the bracket arms, 17 and 18, above and parallel to the shaft, 26, is a shaft, 40, upon which are spur gears, 41 and 42. The gear 41 meshes with gear 32. Mounted on a stud, 34ˣ, upon the arm, 17, is a broad spur gear, 35, which meshes with gears, 33 and 42.

The clutch shifting mechanism comprises two rods, 44 and 45, mounted to slide in the arms, 17, 18, one above the other. Two of their adjacent ends are rigidly connected by a rod, 46, the whole constituting a sliding yoke. Fixed to the lower rod, 45, is a clutch fork, 47, which engages the clutch member, 38. Upon the rod, 44, are fixed two dogs, 49 and 50, each having a vertical lug, 51 and 52 respectively. Pivoted at their outer ends to the arms, 17 and 18, are horizontally disposed oppositely directed latches, 53 and 54, each provided intermediate its length with a projection, 55 and 56, respectively, adapted to register with the lugs, 51 and 52, and having inclined end surfaces. Slidably

mounted on the rod, 44, is a block, 57, having lateral extensions or arms, 58 and 59, upon its upper portion, terminating in inclined faces. Fingers 62 and 63 project downwardly from the block, 57. Upon the rod, 44, intermediate the block and pressing against each dog, are helical springs, 64 and 65. Upon a transverse portion, 67, of the bracket frame which connects the bracket arms is a rearwardly projecting horizontal plate, 68, upon which is pivoted by a pin, 69, a bell crank lever, 70, whose forward arm, 71, extends between the block fingers, 62 and 63, and whose lateral arm, 72, is pivoted to a rod, 73, traversing an opening, 74, in the frame, and which is in turn pivoted to a rock lever, 75, fixed to the rock shaft, 9, through which motion is imparted to the clutch operating mechanism.

The driving connections between the platen and driving mechanism are within the frame, and comprise a shaft, 77, which is journaled in the frame and in a bearing, 78, upon a bracket, 79, and which has a clutch member, 80, splined to its end extending through an opening, 81, in the frame, and adapted to engage a clutch member, 82, fixed to shaft, 40. The lever, 83, of clutch, 80, is pivoted to bracket lugs, 84, and has a fork, 85 upon its lower end. Its upper end is connected to a shifting rod, 86, slidably mounted in and projecting in front of the frame. In broken lines in Fig 3, the engaged position of the shifting rod and clutch lever are shown. Upon the shaft, 77, is a hand wheel, 88, also a gear, 89, which meshes with a gear, 90, upon a shaft, 91, mounted in a bracket, 92, fixed in the frame. The shaft, 91, is provided with a worm, 94, engaging a worm wheel, 95, which is mounted on a rotatable shaft, 96, in a stud, 97, upon the frame. A pinion, 98, fixed to shaft, 96, engages the platen rack, 3, which is operated by the shaft, 40, through the connections just described.

The operation of the driving mechanism of shaft, 40, is as follows: When the clutch member, 38, is in engagement with the sleeve, 28, the shaft, 40, is driven in one direction through the gear, 27, shaft, 26, gears 32, and 41. When the clutch member, 38, is shifted into engagement with sleeve, 29, the shaft, 40, is driven in an opposite direction through gear, 27, shaft, 26, gear 33, reversing gear, 35, and gear, 42, respectively. Thus the platen, 2, is reciprocated when the clutch members, 80 and 82, are engaged as shown in Fig. 5. When it is desired to move the platen by hand, the clutches, 80 and 82, are manually separated by the shifting rod, and the shaft, 77 is turned by the hand wheel, 88.

The clutch shifting mechanism is actuated by the reciprocating platen, 2, whose dogs, 7, alternately contact with the lever, 8, and rock the shaft, 9, and lever, 75, thereby swinging the lever, 70, whose arm reciprocates the sliding block, 57. The yoke, 44, 45, 46, which carries the clutch fork, 47, is reciprocated as follows: As the platen advances and the block, 57, moves to the right, it compresses spring, 64, until the platen approaches the end of its travel and the arm, 58, contacts with and raises latch, 53, thereby disengaging lug, 51, and projection, 55. The energy stored in the spring, 64, thereupon suddenly and forcibly throws the dog, 49, and yoke to the right, insuring a quick and sure connection of the clutch teeth. When the platen reverses and the arm, 71, travels back to the left, a similar operation of spring, 65, takes place upon the dog, 50, while the latch, 53, falls into its original locked relation with the dog, 49.

It should be noted that the slotted sleeve, 34, upon clutch shaft, 26, serves to keep the loose clutch sleeves, 28 and 29, interspaced regardless of the position of the clutch member, 38.

It will be further observed that the driving and shifting mechanism is wholly carried by the bracket exterior of the frame, which facilitates construction, application, and repair of the parts.

A novel feature of the machine resides in the operative connections between the platen, 2, and the driving shaft, 77, comprising the worm shaft, 91, worm 94, and worm wheel, 95; which parts eliminate the use of a train of spur gears, whose teeth have a tendency to produce an uneven advance of the platen. The described connections insure a steady movement of the platen essential to perfect results in grinding operations.

What I claim is,

1. In a grinding machine, the combination with the frame and reciprocating platen, of a bracket upon the exterior of the frame and provided with studs, plates fixed to said studs and carrying bracket arms, one of said arms having an extension, a driving shaft mounted in a bearing upon the end of said extension, a shaft loosely mounted in the bracket arms above and parallel with the driving shaft, gears on said shafts, a clutch member mounted for either longitudinal or rotary movement and constructed to impart motion to the driving shaft, and driving connections between the platen and driving mechanism disposed within the frame of the machine.

2. In a grinding machine, the combination with the frame and reciprocating platen, of a bracket upon the exterior of the frame and provided with studs, plates fixed to said studs and carrying bracket arms, one of said arms having an extension, a driving shaft mounted in a bearing upon the end of said extension, a shaft loosely mounted in the bracket arms above and par-

allel with the driving shaft, gears on said shafts, a clutch member mounted for either longitudinal or rotary movement and constructed to impart motion to the driving shaft, spacing sleeves for the clutch members driving connections between the platen and driving mechanism disposed within the frame of the machine, and clutch shifting mechanism mounted to slide in said bracket arms.

3. In a grinding machine, the combination with the frame, platen and driving shaft, of a rack upon the platen, a bevel gear upon the driving shaft, a bracket upon the frame, a shaft mounted in the bracket, a worm upon the second shaft, a bevel gear upon the worm shaft engaging the first bevel gear, a stud upon the frame, a shaft rotatably mounted in the stud, and a worm wheel and a pinion each fixed to the last mentioned shaft, the worm wheel engaging the worm, and the pinion engaging the rack.

In testimony whereof I have affixed my signature in presence of two witnesses.

CHARLES G. TREFETHEN.

Witnesses:

HORATIO E. BELLOWS,

JOSEPH E. BURNS.