

R. D. ACKLEY & M. C. ABBEY.

MILLING MACHINE.

APPLICATION FILED AUG. 2, 1909.

1,055,964.

Patented Mar. 11, 1913.

4 SHEETS-SHEET 1.

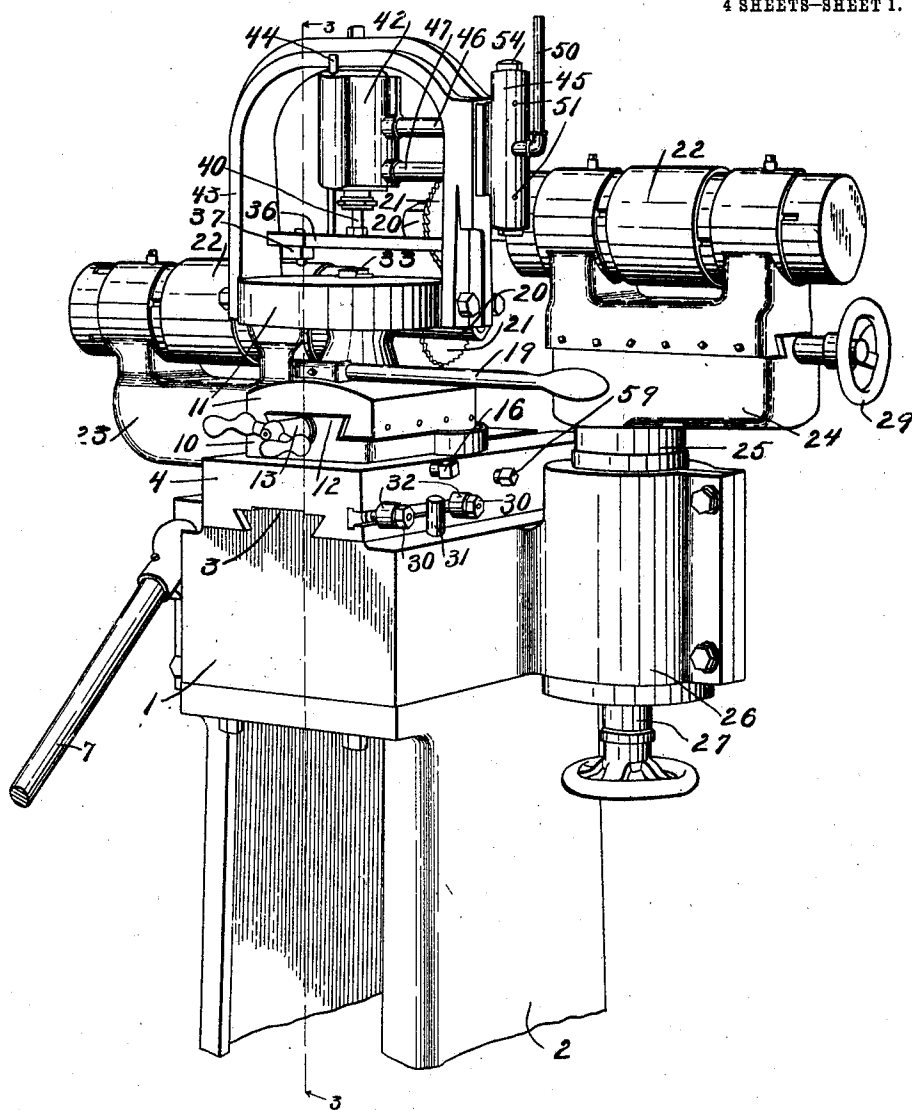


Fig. 1.

Witnesses
F. Gertrude Tallman
Elopa E. Braden

384

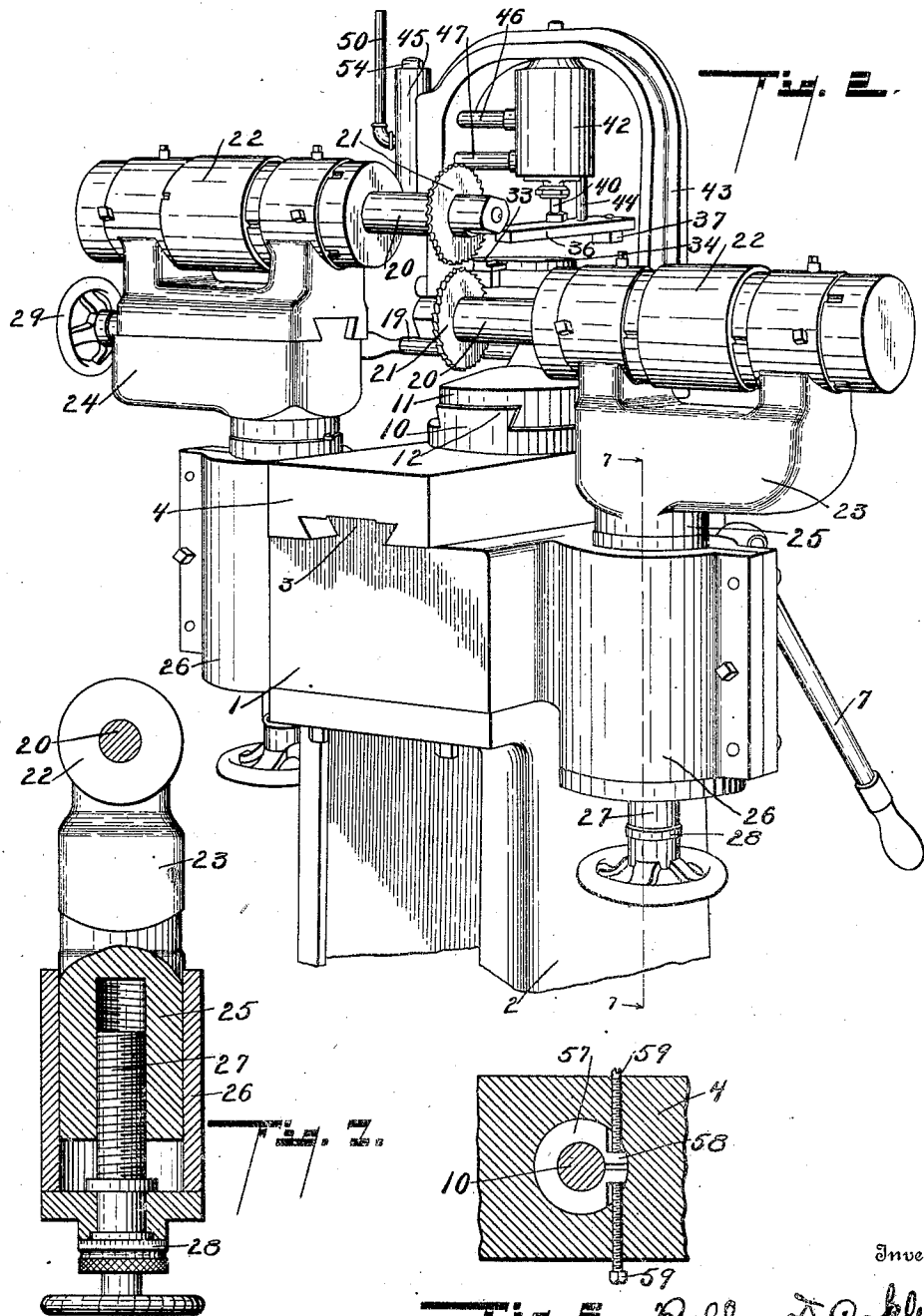
Inventors
Rollin D. Ackley
and Martin C. Abbey
Chapman & Earl
Attorneys

R. D. ACKLEY & M. C. ABBEY.
MILLING MACHINE.
APPLICATION FILED AUG. 2, 1909.

1,055,964.

Patented Mar. 11, 1913.

4 SHEETS—SHEET 2.

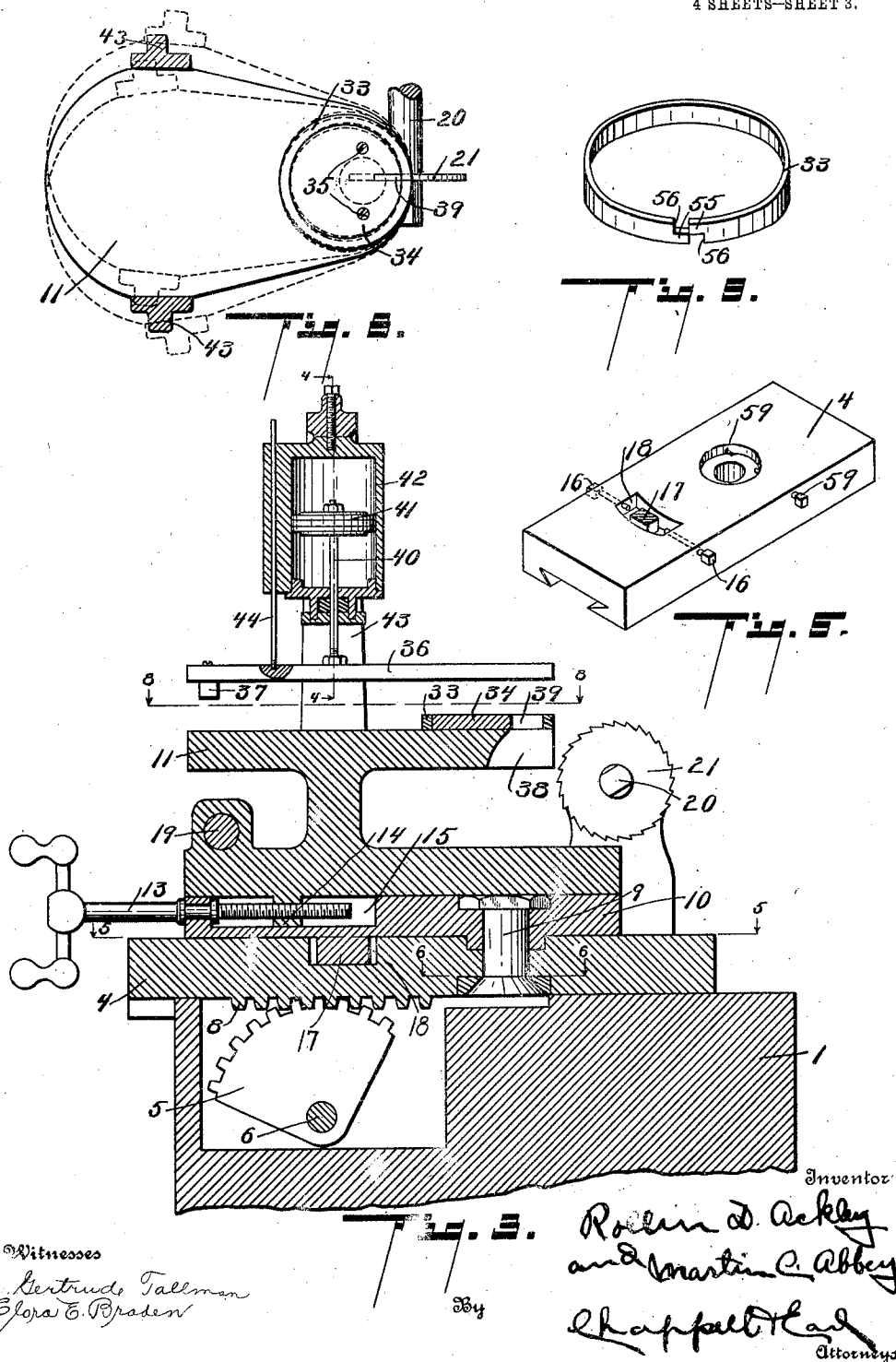


Witnesses
F. Gertrude Tallman
O. E. Braden

Inventors
Rolland Ackley
and Martin C. Abbey
Chapell & Co.
Attorneys

APPLICATION FILED AUG. 2, 1909.

4 SHEETS--SHEET 3.



R. D. ACKLEY & M. C. ABBEY.

MILLING MACHINE.

APPLICATION FILED AUG. 2, 1909.

1,055,964.

Patented Mar. 11, 1913.

4 SHEETS—SHEET 4.

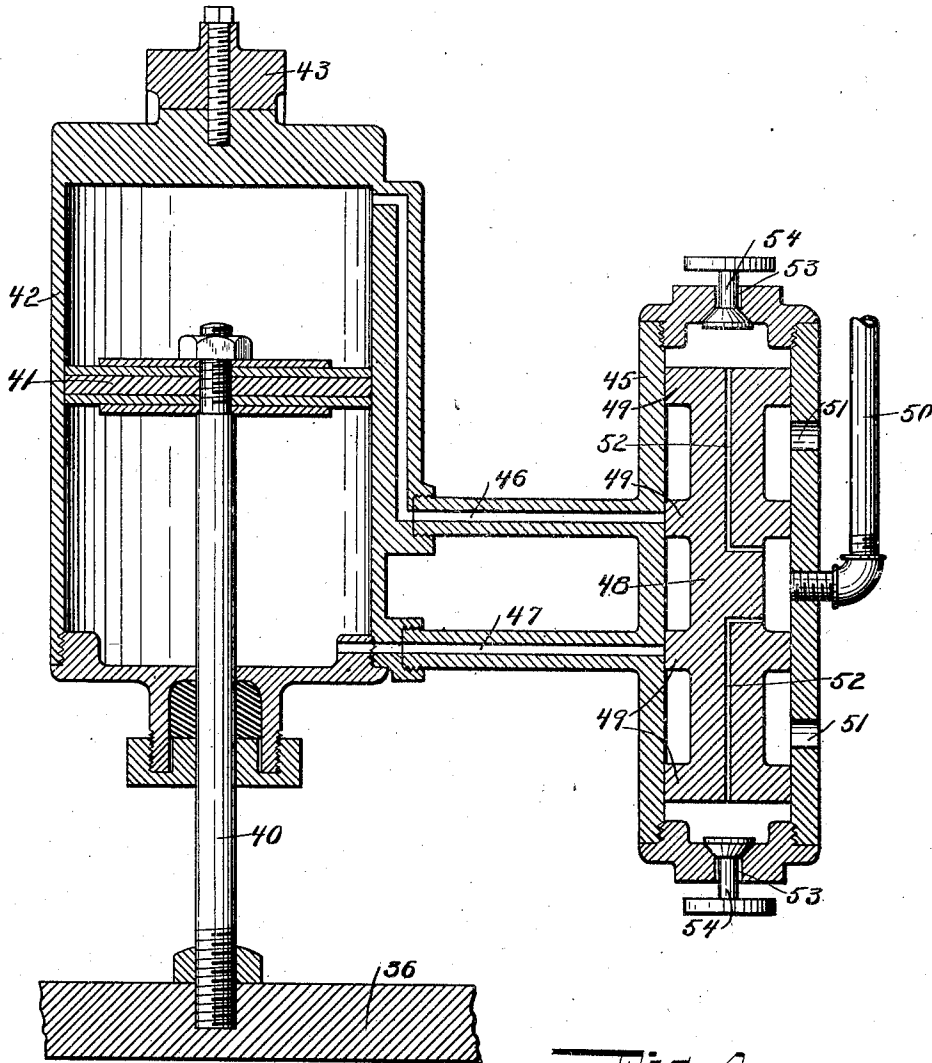


Fig. 4.

Witnesses

F. Gertrude Tallman
Gloria E. Braden

Inventors

Rollin D. Ackley
and Martin C. Abbey

By

Rappell Rand

Attorneys

UNITED STATES PATENT OFFICE.

ROLLIN D. ACKLEY AND MARTIN C. ABBEY, OF BATTLE CREEK, MICHIGAN.

MILLING-MACHINE.

1,055,964.

Specification of Letters Patent.

Patented Mar. 11, 1913.

Application filed August 2, 1909. Serial No. 510,777.

To all whom it may concern:

Be it known that we, ROLLIN D. ACKLEY and MARTIN C. ABBEY, citizens of the United States, residing at Battle Creek, Calhoun county, Michigan, have invented certain new and useful Improvements in Milling-Machines, of which the following is a specification.

This invention relates to improvements in milling machines.

The main objects of the invention are: First, to provide an improved milling machine, which is especially adapted for use in the manufacture of packing rings for pistons, and the like, it being possible to produce substantially perfect rings thereby, without hand work. Second, to provide an improved milling machine by the aid of which split rings, such as piston packing rings, may be quickly and economically produced. Third, to provide an improved structure of the class described which may be easily and accurately adjusted for the manufacture of such rings of different diameters.

Further objects, and objects relating to structural details, will definitely appear from the detailed description to follow.

We accomplish the objects of our invention by the devices and means described in the following specification.

The structure described constitutes one effective embodiment of our invention. Other embodiments would be readily devised by those skilled in the art.

The invention is clearly defined and pointed out in the claims.

A structure embodying an effective and preferred embodiment of the features of our invention is clearly illustrated in the accompanying drawing, forming a part of this specification, in which:

Figure 1 is a front perspective view of a structure embodying the features of our invention, a portion of the base being broken away. Fig. 2 is a rear perspective view thereof, a portion of the base being broken away. Fig. 3 is an enlarged detail vertical section, taken on a line corresponding to line 3—3 of Fig. 1. Fig. 4 is an enlarged detail vertical section, through the pneumatic clamp actuating cylinder and its control valve, taken on a line corresponding to line 4—4 of Fig. 3, the parts being diagrammatically arranged. Fig. 5 is a perspective view

of the base portion of the work table, partially in section, on a line corresponding to line 5—5 of Fig. 3. Fig. 6 is a detail section taken on a line corresponding to line 6—6 of Fig. 3, showing the means for applying friction to the work table pivot. Fig. 7 is a detail vertical section, taken on a line corresponding to line 7—7 of Fig. 2, showing the means for vertically adjusting the cutters. Fig. 8 is a horizontal section, taken on a line corresponding to line 8—8 of Fig. 3, showing details of the work table. Fig. 9 is a perspective view of a packing ring produced by our improved machine.

In the drawing, the sectional views are taken looking in the direction of the little arrows at the ends of the section lines, and similar numerals of reference refer to similar parts throughout the several views.

Referring to the drawing, the carriage bed 1 is supported on a suitable pedestal 2. The bed 1 is provided with a way 3 for the carriage 4, which is reciprocatingly mounted thereon. The carriage feed preferably consists of a segment 5 on the shaft 6, which is provided with a hand lever 7, the carriage being provided with a rack 8 with which the segment meshes. The work table is mounted on the carriage by means of the pivot 9, the pivot preferably being secured to the base portion 10 of the table. The pivot 9 is located toward the front edge of the table. The top portion 11 of the table is adjustably mounted upon the base portion 10, the base portion 10 being preferably provided with a way 12 for the top portion,—see Fig. 1. The top portion 11 is adjusted through the screw 13, which is revolubly mounted on the base portion 10 to engage a downwardly-projecting lug 14 on the top portion, a slot 15 being provided in the base portion for the lug,—see Fig. 3. By this arrangement, the top portion may be adjusted relative to the table pivot 9, thus increasing or diminishing its eccentricity, as described. The movement of the table on its pivot is preferably controlled by adjustable stops 16, a downwardly-projecting stop 17 on the table being arranged to coact therewith, the carriage being slotted at 18 to receive this stop,—see Figs. 3 and 5. The stops 16 are preferably in the form of set screws, as illustrated. The table is swung on its pivot by means of the lever 19,—see

Fig. 1. The spindles 20 of the cutters 21 are preferably arranged to be adjusted laterally and axially relative to each other. The spindles are provided with suitable pulleys 22 and are carried by suitable bearing supports, as 23 and 24, which are adapted to be vertically adjusted, the adjustment being preferably accomplished by providing the supports with shanks 25 which are arranged in the clamp-like arms 26 on the table bed, the shanks being tapped to receive the adjusting screws 27, which are provided with micrometer or gage nuts 28. These parts, being of common construction, will be readily understood. The support 24 is preferably axially adjustable, it being made up of two adjustably related parts, provided with an adjusting screw 29. As this feature is also one of common construction and will be readily understood, we do not illustrate or describe the same in detail herein, as any vertical adjustment of the cutters relative to each other will answer the purpose.

To enable the operation of the machine to be more rapid and to prevent accidents, such as injury to the work, the work carriage 4 is preferably provided with a pair of adjustable stops 30 on the carriage to engage with the fixed stop 31 on the carriage bed. The stops 30 are preferably provided with cushions 32. These stops prevent any unnecessary movement in the stroke of the carriage, as will be obvious.

In operation, the ring 33 to be cut is placed upon the table 11, a work holder 34 being preferably provided. This work holder is preferably in the form of a round disk or plate of proper size to fit the ring. This holder is detachably secured as by means of the screws 35, which are countersunk into the plate so as not to interfere with the clamp 36. When the machine is to be adjusted for cutting rings of different diameters, this work holder is removed, and a holder of proper diameter to fit the rings to be cut placed upon the table. As the work holder 34 is at the forward end of the table, the clamp 36 is preferably provided with a supporting block 37 of the same thickness as the work holder, thus relieving the clamp of strain when it is clamped down upon the work.

The table is cut away at 38, and the work holder is notched at 39 to receive the cutters. The clamp 36 is preferably pneumatically operated. We preferably accomplish this by mounting the clamp on the rod 40 of the piston 41. The piston cylinder 42 is supported on the yoke-like frame 43, which is carried by the table. A guide rod 44 is preferably provided for the clamp, the rod being arranged vertically through a hole provided therefor in the cylinder 42. The delivery of air to the cylinder 42 is preferably controlled through a valve con-

sisting of the valve casing 45, which is connected by the passages 46 and 47 to the ends of the cylinders 42. In the casing 45 is a valve 48 having four spaced heads 49 thereon. The air supply pipe 50 is connected to the casing 45 at a central point between the passages 46 and 47, and within the stroke of the central heads. The valve casing is provided with two exhaust ports 51, which are always between the end heads and the adjacent central or inner heads. The valve 48 is provided with a pair of passages 52 opening at the ends thereof and between the central pair of heads. At the ends of the valve casing are exhaust ports 53, which are controlled by the inwardly-opening valves 54. By this arrangement, as the valve 48 is shifted, the ends of the cylinder 42 are alternately connected to the air supply pipe 50 and to one of the exhaust ports 51.

When it is desired to operate the clamp, the top valve 54 is opened, which, allowing the air to escape from that end of the valve through the port 51, varies the pressure on the valve and causes the same to shift upwardly, thereby connecting the passage 46 with the air supply and the passage 47 with the exhaust. To release the clamp, the bottom control valve 54 is opened, allowing the air to escape from the lower end of the piston casing 45, which varies the pressure on the valve and causes it to shift downwardly admitting the air to the lower end of the cylinder 42 and thus raising the clamp.

In preparing for the work, the spindles are adjusted so that the lap in the ring can be cut to the desired width. In operation, the work table having been adjusted to the diameter of ring to be cut, the work is placed on the holder and the clamp actuated. The work table is then shifted against one of the stops 16 and the carriage advanced and retracted. The work table is then shifted against the other stop 16 and the carriage again advanced and retracted. This completes the operation of splitting the ring and forming the overlapping portions 55 thereof, the angle of the ends of the overlaps and of the shoulder portions 56 being perfectly cut so that no further work is required.

The cutters are so adjusted that their inner faces, or the inner edges of the teeth are in the same plane, so that the ring is severed and cut away to form the overlaps and the opening portions cut on the same angle by the two operations. When it is desired to cut rings a different diameter, the top or work holder portion of the table is adjusted through the screw 13 so that the work, such as rings of different diameters, is properly supported to be swung into proper position relative to the cutter. Heretofore, it has been the practice, in the manufacture of these rings, to cut the notches forming the

overlaps on a machine,—first, one notch and then the other, by separate operations,—and then finish by hand, which required skill and considerable time, and was also very tiring labor on account of the necessity of frequently collapsing the ring to test the same. By our improved machine, when the same is once adjusted, as many rings of a given size can be cut as desired, without further adjustment, and the work does not require any particular skill.

To prevent the parts becoming accidentally shifted, we preferably provide a brake or friction device for the table consisting of a friction ring 57 arranged upon the head of the pivot 9, the ring being split on one side and provided with laterally-projecting ears 58 with which the set screws 59 engage, so that, by adjusting the same, the ring may be clamped upon the head of the pivot to secure the desired friction.

As previously stated, our improved milling machine enables the rapid production of packing rings, and further the rings may be said to be perfectly formed, so far as the joint thereof is concerned.

Our invention has the further advantage of being quite simple and economical in structural details.

We have illustrated our improvements in an embodiment which we have found practical in use. We are, however, aware that our improvements are capable of very great modification in structural details, but we deem it unnecessary to illustrate such modifications in order to fully disclose our invention, and we wish to be understood as claiming the same in the form illustrated as well as broadly within the scope of the appended claims.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent is:

1. The combination with a cutter, of a reciprocating work carriage; a work table; a pivot on said carriage for said work table, said work table comprising a base portion arranged on said pivot and a top portion arranged on said base portion to be adjusted thereon transversely relative to said pivot; adjustable stops for limiting the throw of said table on its said pivot; and a work clamp carried by said top portion of said work table whereby the work is supported to permit its being presented to said cutter in different positions.

2. The combination with a cutter, of a reciprocating work carriage; a work table; a cylindrical plate-like work holder removably secured to said table, having slots in one side thereof; a work clamp; a detachable supporting block therefor, said block being the same thickness as said work holder; a clamp frame carried by said table; and a pneumatic actuating means for said

clamp plate carried by said frame and connected to said plate between said block and said work holder.

3. The combination of an upper and a lower cutter arranged in different vertical planes, of a work feed carriage mounted to travel in a plane between and at right angles to the axes of said cutters, a work table comprising a base portion pivoted on said carriage, the axis of the pivot being at right angles to the plane of travel of the carriage, a top portion arranged on said base portion to be adjusted toward and from said pivot in a plane at right angles thereto, stops for limiting the swing of said work table on its pivot, and a work clamp carried by the top portion of said table.

4. The combination of an upper and a lower cutter arranged in different vertical planes, of a work feed carriage mounted to travel in a plane between and at right angles to the axes of said cutters, a work table comprising a base portion pivoted on said carriage, the axis of the pivot being at right angles to the plane of travel of the carriage, a work holder top portion for said table mounted on said base portion to be adjusted thereon in a plane at right angles to the axis of the said pivot, and adjustable stops for limiting the swing of the said work table on its said pivot, whereby the table may be shifted from one stop to the other on succeeding feed movements of the carriage to present the work to said cutters, for the purpose specified.

5. The combination of a cutter; a work feed carriage mounted to travel to and from the cutter and in a plane substantially at right angles to the axis of said cutter; a work table comprising a base portion; a pivot on said carriage for said work table disposed substantially at right angles to the plane of travel of the carriage, the base portion of the table being mounted on said pivot; a work holder portion mounted on said base portion to be adjusted thereon transversely relative to its said pivot; stops for limiting the throw of said table on its said pivot, said table being freely movable between said stops; and a work clamp carried by said work holder portion of said work table whereby the work table may be shifted from one of said stops to the other on succeeding feeding movements of the carriage to present the work to the cutter at different angles.

6. The combination of a cutter, a work feed carriage mounted to travel to and from the cutter and in a plane substantially at right angles to the axis of said cutter; a work table comprising two members, one of which is pivotally mounted on said work carriage, to swing in a plane substantially parallel to the plane of travel of the carriage, the other being adapted to support

the work and being mounted on the pivotally supported member to be adjusted thereon transversely relative to its pivot and in a plane parallel to the plane of travel of the carriage; and stops for limiting the swing of the table on its pivot, said table being freely movable on its pivot between such stops.

In witness whereof, we have hereunto set our hands and seals in the presence of two witnesses.

ROLLIN D. ACKLEY. [L. S.]
MARTIN C. ABBEY. [L. S.]

Witnesses:

HARRY J. STRINGHAM,
LORELI N. CURTIS.