The present invention pertains to a novel fixture for milling slots in oil control piston rings of the type used in the internal combustion engine industries.

The primary object of the present invention is to devise a piston ring slot milling machine which is a complete and separable unit capable of being attached to practically any type of milling machine and which may be driven by a belt or separate motor. The unit is designed to receive a series of rings mounted upon removable sleeves, the slots being then milled in the entire series at one operation or simultaneously by providing a number of cutters in series which corresponds with the number of sleeves mounted upon the sleeve. Indexing means is also provided to uniformly space the slots, the present invention providing automatic means to insure precision in the spacing thereof.

With the above and other ends in view the invention consists in the matters hereinafter set forth and more particularly pointed out in the appended claims, reference being had to the accompanying drawings in which

Figure 1 is a perspective view of a milling machine equipped with the present fixture;

Fig. 2 is a top plan view of the present fixture;

Fig. 3 is a side elevation of the fixture, being partly broken away and in cross section; and

Fig. 4 is a fragmentary detail of the indexing mechanism.

Like characters of reference are employed throughout to designate the corresponding parts.

The numeral 1 indicates in general a milling machine having a rotatable cutter arbor 2 upon which a series of cutters 3 are mounted. The usual over-arm 4 and work table 5 are provided and it is upon the work table that the present fixture is mounted.

The fixture comprises a base plate 6 which is secured upon the work table 5, the base being provided with bearings 7 to pivotally support a rocker arm 8. The rocker arm 8 carries a shaft 9' upon which is freely mounted a plate 9 and a ratchet wheel 10 is secured to the shaft. Adjacent the ratchet wheel there is provided a spindle 11 upon which removable sleeves carrying the piston rings 11' are mounted as clearly illustrated in Fig. 1 of the drawings. A pawl 12 is pivotally mounted upon the plate 9 and is provided with a spring 13 which holds it in contact with the ratchet wheel 10 so that by rocking the plate 9 the pawl causes rotation of the ratchet which also causes rotation of the shaft 9 and the piston rings 11 which are mounted on the spindle.

A rod 14 is pivotally connected at one end to the ears 15 which are formed on the rocker arm by means of the pin 16 which projects outwardly beyond the ears to provide a stop limiting the rocking movement of the plate 10 in one direction. The opposite end of the rod 14 projects through a post 17 that is formed on the base 6 and nuts are provided to engage the outside of the post and in this manner a positive limit to the amount of rocking movement of the rocker arm is provided. A compressed spring 19 is positioned between the rocker arm 8 and the post 17 to exert pressure normally tending to force the rocker arm outwardly on its pivot.

A ratchet arm 20 is pivotally mounted in ears 21 adjacent the back of the base 6 and the upper end thereof is connected by means of the connecting rod 22 to the plate 9 so that rocking of the rocker arm 20 causes the plate 9 to pivot until it comes in contact with the pin 16, this contact causing the pull of the connecting rod to be exerted upon the rocker arm 8 and cause pivotal movement thereof. To rock the rocker arm 20 a cam 23 is provided on the outer end of the shaft 24 which extends through the casing 25, rotary movement being transmitted from the shaft 26 to the shaft 24 by means of the gears 27 and 28 which are integrally secured to respective shafts. A worm wheel 29 is loosely mounted upon the shaft 26 and meshes with a worm 30 on the shaft 31 having the pulley wheel 32 adapted to provide a driving connection to any suitable source of power.

To provide a driving connection between the worm wheel 29 and the shaft 26 there is formed a ratchet faced boss 33 on the wheel and adjacent this boss and keyed to the shaft 26 is provided a ratchet faced disk 34 and when these two ratchet faces are in mesh a driving connection is formed between the worm 29 and the shaft 26 is provided. It is necessary however that the driving connection should be broken at times and therefore the shaft 26 is mounted so that it may slide longitudinally within a sleeve 35 and a spring 36 tends to normally hold the above described ratchet faces in contact with each other. To break the driving connection there is provided a pivoted lever 37 which operates a sliding wedge 38 which engages the end of the shaft 26 and moves it longitudinally against the pressure of the spring 36, at the same time moving the disk 30 away from the boss 33.

In operation the spring 19 forces the rocker...
arm 8 outwardly and away from the cutters 3 while the series of rings 11' are mounted upon the spindle 11. The lever 37 is then drawn outwardly to remove the wedge 38 from the end of the shaft 26 and the spring 36 then forces the shaft 26 longitudinally so that the ratchet faced disk 34 contacts or meshes with the ratchet faced boss 33 and rotation is imparted from the driven shaft 31 to the shaft 26. The gears 28 and 29 cause rotation of the shaft 25 and the cam 23, rotation of the cam causing the rocker arm 20 to be pivoted to the position illustrated in Fig. 3. The connecting rod 22 causes the rocker arm 8 to be drawn inwardly so that the rings 11' on the spindle 11 are drawn into contact with the cutters 4 and are nestled thereby.

When the pressure of the cam 23 is removed from the rocker arm 20 it takes a reverse movement due to pressure exerted by a coiled spring 28, causing the plate 9 to be pivoted and the pawl 12 to be moved up to the next notch on the ratchet wheel 10. The spring 19, in the meantime, again forces the rocker arm 8 to pivot away from the cutters. As the cam 23 again forces the rocker arm 20 backwardly the connecting rod 22 causes the plate 9 to pivot until it comes in contact with the slot 16 on the pin 14 and this pivot causes the ratchet wheel to be partially rotated and the rings 11' to be indexed for the next cutting operation.

Although a specific embodiment of the present invention has been illustrated and described it is to be understood that various changes may be made in the details of construction without departing from the spirit of the invention and such changes are contemplated.

What I claim is:

1. The combination with a milling machine having a rotatable Arbor supporting a series of cutters, of a spindle supporting rocker arm pivotally mounted adjacent said Arbor and adapted to carry a series of piston rings, a cam operated rocker arm connected to said first named rocker arm to rock the latter to intermittently bring rings into contact with said cutters, and means operated by said cam operated arm for partially rotating said spindle between each of said rocking movements.

2. The combination with a milling machine having a rotatable Arbor supporting a series of cutters, of a spindle supporting rocker arm pivotally mounted adjacent said Arbor and adapted to support a series of piston rings, a cam operated rocker arm connected to said first named rocker arm to rock the latter to intermittently bring said rings into contact with said cutters, and a ratchet and pawl mechanism operated by said cam operated arm for partially rotating said spindle between each of said rocking movements.

3. A fixture for milling machines having a rotatable Arbor for supporting a plurality of disk like cutters comprising in combination, a pivoted arm, a rotatable spindle carried by said arm and adapted to support a plurality of disk like cutters, resilient means normally holding said arm out of engagement with said cutters, a ratchet wheel keyed to said spindle, a plate loosely mounted on said spindle and limited in pivotal movement relative thereto, a pawl carried by said plate and engaging said ratchet, a rockable arm, a connecting rod between said rockable arm and said plate, a rotatable cam adapted to move said arm in one direction, and a spring adapted to move said arm in the opposite direction.

5. A piston ring slotting machine comprising a rotatable Arbor adapted to support a plurality of disk like cutters, a rocker arm pivotally mounted adjacent said Arbor, a spindle pivotally mounted in said rocker arm and adapted to support a plurality of piston rings, said rocker arm being located so that rocking movement thereof causes said rings to engage said cutters, resilient means normally holding said rocker arm away from said cutters, a ratchet wheel keyed to said spindle, a plate loosely mounted on said spindle adjacent said ratchet wheel, rigid means projecting outwardly from said rocker arm and adapted to be engaged by said plate in a manner to limit the movement thereof relative to said spindle, a pawl carried by said plate and engaging said ratchet, a second rocker arm pivotally mounted adjacent said ratchet wheel, rigid means projecting outwardly from said rocker arm and adapted to be engaged by said plate in a manner to limit the movement thereof relative to said spindle, a pawl carried by said plate and engaging said ratchet, and a reciprocating rod connected to said plate in a manner whereby the initial pressure by said link on said plate causes said pawl to partially rotate said rings and continued pressure causes said plate to engage said limiting means and cause rocking movement of said arm.

6. A piston ring slotting machine comprising a rotatable Arbor adapted to support a plurality of disk like cutters, a rocker arm pivotally mounted adjacent said Arbor, a spindle pivotally mounted in said rocker arm and adapted to support a plurality of piston rings, said rocker arm being located so that rocking movement thereof causes said rings to engage said cutters, resilient means normally holding said rocker arm away from said cutters, a ratchet wheel keyed to said spindle, a plate loosely mounted on said spindle adjacent said ratchet wheel, rigid means projecting outwardly from said rocker arm and adapted to be engaged by said plate in a manner to limit the movement thereof relative to said spindle, a pawl carried by said plate and engaging said ratchet, and a reciprocating rod connected to said plate in a manner whereby the initial movement in one direction causes said pawl to partially rotate said ratchet and spindle and continued movement causes said plate to engage said limiting means and rock said arm.

7. The combination with a rotatable Arbor supporting a plurality of cutters, of a rocker arm, a rotatable spindle supported on said arm and having means for clamping a series of work elements thereon, yieldable means normally urging pivotal movement of said rocker arm away from said cutters, and a crank operated ratchet and pawl mechanism connected to said spindle and adapted upon operation thereof to respectively partially rotate said spindle and move said rocker arm to carry said work into contact with said cutters.

8. The combination with a rotatable Arbor having a series of concentric cutters thereon, of a rocker arm pivotally mounted adjacent said Arbor, a spindle rotatably mounted in said rocker arm and having means for clamping a series of work elements thereon, a member connected to
said spindle and rocker arm so that initial movement thereof partially rotates said spindle and continued movement imparts rocking movement to said rocker arm, and a cam for imparting movement to said member, said cam being adapted to cause rapid initial movement of said member and more gradual continued movement.

9. The combination with a rotatable arbor having a series of concentric cutters thereon, of a rocker arm pivotally mounted adjacent said arbor, a spindle rotatably mounted in said rocker arm and having means for clamping a series of work elements thereon, a member having a lost-motion connection with said rocker arm, means for reciprocating said member, and means for connecting said member to said spindle to rotate the latter during the lost-movement of said member, said means for reciprocating said member including a cam adapted to reciprocate said member rapidly during said lost-motion period.

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