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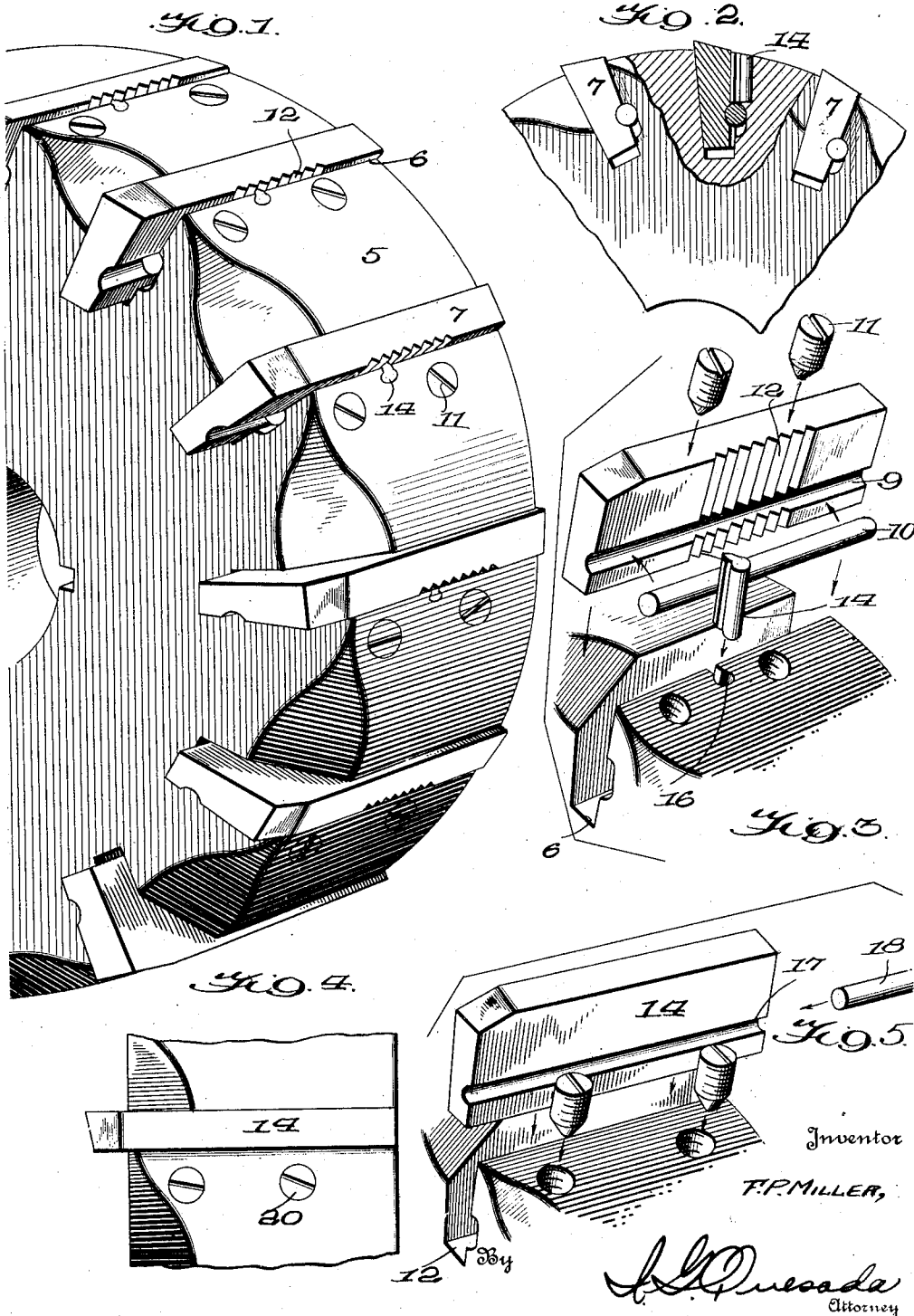
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ROTARY CUTTER

Filed July 30, 1926

2 Sheets-Sheet 1



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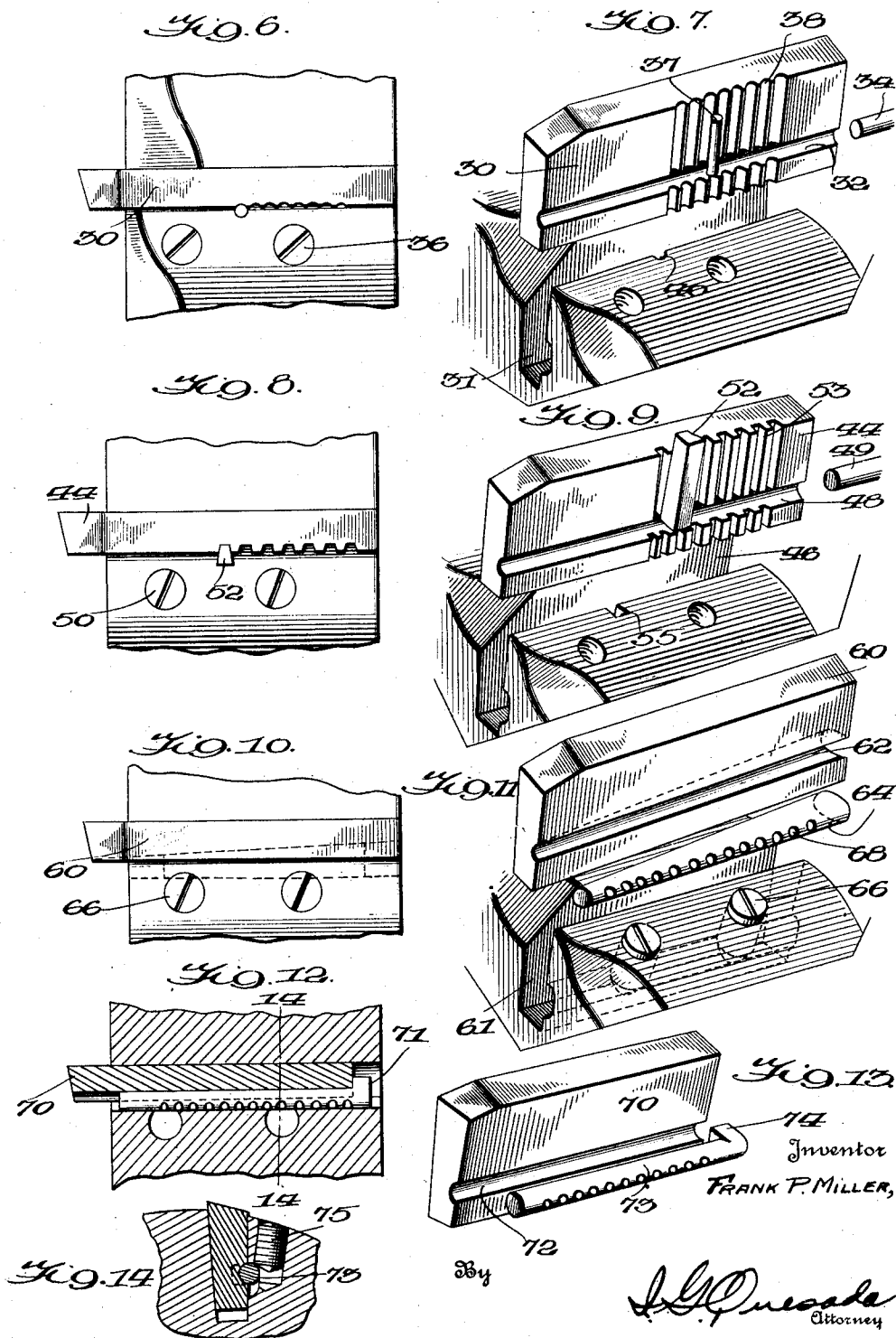
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UNITED STATES PATENT OFFICE

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ROTARY CUTTER

Application filed July 30, 1926. Serial No. 125,956.

This invention relates to rotary cutters such as milling cutters, reamers, boring bars and counter bores and has for an important object the provision of simple means whereby the blades thereof may be positively anchored in place to withstand the strain to which the same are subjected in use.

More specifically an important object is to provide an inserted blade rotary cutter in which the walls of the slots converge slightly toward the bottom of the slots and in which the blades are slightly wedge shaped so that when the blades are secured in place they will be positively held against radial and longitudinal shifting.

A further object is to provide a rotary cutter having novel fastening means by which the blades may be expeditiously adjusted and locked in place.

Other objects and advantages will be apparent during the course of the following description.

In the accompanying drawings forming a part of this application and in which like numerals are employed to designate like parts throughout the same,

Figure 1 is a fragmentary perspective of a rotary cutter embodying the invention.

Figure 2 is a fragmentary end elevation of the improved rotary cutter, parts being in section.

Figure 3 is a group perspective illustrating one of the blades and the holding and adjusting means therefor.

Figure 4 is a fragmentary plan view illustrating a slight modification of the invention.

Figure 5 is a group perspective illustrating the blade and the holding means therefor shown in Figure 4.

Figure 6 is a fragmentary plan view illustrating another mechanical expression of the invention.

Figure 7 is a group perspective illustrating the blade and the holding and supporting means therefor shown in Figure 6.

Figure 8 is a fragmentary plan view illustrating a further modification of the invention.

Figure 9 is a group perspective illustrating

the blade and the holding and fastening means therefor shown in Figure 8.

Figure 10 is a fragmentary plan view illustrating another form of invention.

Figure 11 is a group perspective illustrating the blade and the supporting and fastening means therefor shown in Figure 10.

Figure 12 is a detail sectional view illustrating a still further modification of the invention.

Figure 13 is a group perspective illustrating the blade and the holding means therefor shown in Figure 12.

Figure 14 is a detail sectional view taken on line 14—14 of Figure 12.

In the drawing the numeral 5 designates the body of a milling cutter, a reamer or the like which body is provided with an annular series of slots 6 for the reception of blades 7.

Attention is especially invited to Figure 2 which illustrates that the side walls of the slots 6 converge at angles of approximately five degrees and that the side walls of the blades correspondingly converge so that the blades may be firmly wedged in place in such a manner that the blades are amply able to withstand the strain to which the same are subjected. Figure 2 illustrates that the inner edges of the blades are at all times spaced from the bottom walls of the slots so that blades may be firmly wedged in place by a means to be described.

In carrying out the invention the sides of the blades may be longitudinally grooved as indicated at 9 to partially receive locking pins 10, the locking pins being forced inwardly and laterally by one or more set screws 11. The inner ends of the set screws are provided with conical ends which, when forcibly engaged with the locking pins 10, will move the same inwardly and laterally into binding engagement with the blades, whereby to move the blades inwardly in substantially radial directions to wedge the blades in place. When the blades are thus forced inwardly the same will have binding engagement with the side walls of the slots and will be positively held against radial and endwise shifting.

Reference to Figure 3 will show that each

blade 7 is grooved or serrated transversely as shown at 12 for engagement by the laterally projecting rib at one side of a locking key 14. The body of the locking key 14 extends through the enlarged portion of a keyhole groove 16 in one side wall of the slot 6 while the rib at one side of the key extends entirely through the restricted portion of the slot 16 and is received in one of the transverse grooves 12, whereby the end thrust on the blade is effectively transmitted to the body. It will be seen that the rib at one side of the key 14 is engaged by the side walls of the restricted portion of the keyhole groove 16 whereby the key is held against turning under the influence of end thrust on the blade.

In the form of invention illustrated in Figures 4 and 5 the side walls of the slots may converge slightly toward the bottom walls of the slots and the side walls of the blades 14 may correspondingly converge so that the blades may be snugly fitted in the slots. In carrying out this form of invention one side of each blade 14 may be grooved longitudinally as indicated at 17 for the reception of a locking pin 18, the locking pin, of course, being forced into binding engagement with the blade by one or more set screws 20 or other suitable fastening devices. In this form the key 24 is not employed.

Attention is now invited to Figures 6 and 7 which illustrate that the sides of the blades 30 may converge slightly to correspond to the similar inclination of the side walls of the slots 31, so that the blades may be firmly wedged into place. In this form of invention one side of the blade may be grooved longitudinally as indicated at 32 for the reception of a locking pin 34, the locking pin being adapted to be driven inwardly and laterally and into binding engagement with the blade 30 by set screws 36 or other suitable fastening devices.

The end thrust on each blade 30 is transmitted to the body of the cutter by a cylindrical key 37, the blade being grooved transversely as indicated at 38 to partially receive the key. One side wall of the slot 31 may be grooved as shown at 40 for the reception of the key 37 and it is believed to be obvious, especially by reference to Figure 6, that the key 37 will effectively transmit the thrust on the blade 30 to the body and that the multiplicity of grooves 38 will provide for adjustment of the cutter.

In the form of invention illustrated in Figures 8 and 9 the sides of the blade 44 may converge slightly toward the inner edge thereof to correspond to the similar inclination of the side walls of the slot 46, whereby the blade may be firmly seated. Of course the blade 44 at no time engages the bottom wall of the slot 46.

One side of the blade 44 is grooved longitudinally as shown at 48 to partially receive

a locking pin 49 adapted to be driven laterally and inwardly into binding engagement with the blade by set screws 50 or other suitable fastening devices. The end thrust on the blade 44 is effectively transmitted to the body through the medium of a wedge shaped key 52, a portion of which is selectively received in one of the transverse grooves 53 in one side of the blade, while the remaining portion of the key 52 is received in a dove-tail groove 55 in one side wall of the slot 46. The key 52 provides an especially effective thrust transmitting means by which the blades are firmly held in place during use. The grooves 53 conform in cross-sectional formation to the cross-sectional formation of that portion of the wedge shaped key 52 which they receive to avoid looseness between the parts.

In the form of invention illustrated in Figures 10 and 11 the side walls of the blade 60 may converge slightly toward the inner edges thereof to correspond to the inclination of the side walls of the slot 61 and the blade may have one side provided with a longitudinal groove 62 which gradually deepens toward the rear end thereof for the reception of a locking key 64. The locking pin 64 gradually increases in lateral dimension toward one end thereof to fill the gradually deepening groove 62 and to positively avoid endwise movement of the blade 60 under the influence of the strain to which the same is subjected.

The locking pin 64 may in turn be held in place by set screws 66 or other suitable fastening devices, the forward portions of which are tapered and are selectively engaged with notches 68 in the adjacent side of the locking pin 64. It is believed to be clear that the tightening of the set screws 66 or other suitable fastening devices, will move the pin 64 laterally into binding engagement with the blade, whereby the blade is firmly anchored in place.

In the form of invention shown in Figures 12 to 14 inclusive, the sides of the blade 70 may converge toward the inner edge thereof to correspond to the inclination of the side walls of the slot 71, whereby a wedging fit is provided for the blade.

Figure 13 illustrates that one side of the blade 70 is grooved as indicated at 72 to partially receive a locking pin 73, the rear portion of which is provided with a right angle bend to define a shoulder or abutment 74, adapted to be flatly engaged with the rear end of the blade 70 to hold the blade against endwise shifting. Figure 12 admirably illustrates this point.

The locking pin 73 is, in turn, forced into binding engagement with the blade 70 by fastening devices 75 in the nature of set screws or the like. Figure 14 clearly shows that the forward portions of the fastening devices are conical and will force the lock-

ing pin 73 into firm binding engagement with the adjacent portion of the blade 70, to positively hold the blade in place against radial and endwise shifting. When the pin 5 73 is thus locked in place, the abutment 74 will positively back the blade and hold the same against endwise movement in one direction.

Having thus described the invention, what 10 is claimed is:

1. A rotary cutter comprising a body having slots provided with converging side walls, blades in said slots and having converging side walls adapted to flatly engage the 15 converging side walls of said slots, a side wall of each slot and a side wall of each blade being provided with an opposed longitudinal groove, locking means in the grooves, and set screws engaging said locking means 20 to force said blade inwardly into binding engagement with said converging side walls, the inner edges of said blades being free and constantly spaced from the bottom walls of said slots.

2. A rotary cutter comprising a body having slots, blades in said slots, one of the side walls of said slots being provided with keyhole grooves having restricted portions, and 25 locking keys in said grooves and having lateral ribs extending through the restricted portions of the keyhole grooves and having locking engagement with said blades, the sides of said restricted portions having engagement with said ribs to hold the ribs 30 against turning.

3. A rotary cutter comprising a body having slots, one of the side walls of which are provided with grooves having restricted portions, blades in said slots and being provided with grooves, and locking keys snugly 35 received in the grooves in the side walls of said slots and having lateral ribs snugly extending through the restricted portions of said grooves and into the grooves in the side walls of said blades.

4. A rotary cutter comprising a body having slots, one of the side walls of which are provided with grooves having restricted portions, blades in said slots and being provided with grooves, and locking keys in the 40 grooves in the side walls of said slots and having lateral ribs snugly extending through the restricted portions of said grooves and into the grooves in the side walls of said blades, and separate locking means for said 45 blades.

5. A rotary cutter comprising a body having a slot, one side wall of which is provided with a substantially radial dove-tail groove, 50 a blade in said slot and having a dove-tail groove, and a wedge-shaped locking key snugly received in the first and second named grooves and transmitting end thrust on the blade to the body.

6. A rotary cutter comprising a body hav-

ing a slot, one side wall of which is provided with a substantially radial dove-tail groove, a blade in said slot and having a dove-tail groove, a wedge-shaped locking key received in said grooves and transmitting end thrust 70 on the blade to the body, and additional locking means for holding said blade in place.

7. A rotary cutter comprising a body having a slot, one side wall of which is provided with a dove-tail groove opening out through 75 the periphery of the body, a blade in said slot and having a dove-tail groove, a wedge-shaped locking key received in said grooves and transmitting end thrust on the blade to the body, and additional locking means hold- 80 ing said blade in place, the sides of said blade and the sides of said slots converging toward the bottom of the slot.

8. A rotary cutter comprising a body having a slot, a blade in said slot and having a 85 longitudinal groove gradually deepening toward the rear end thereof, and a locking pin partially received in said longitudinal groove and gradually increasing in lateral dimension only toward the rear end thereof, 90 the radial dimension of the pin being substantially unchanged throughout.

9. A rotary cutter comprising a body having a slot, a blade in said slot and having a longitudinal groove gradually deepening 95 toward the rear end thereof, and a locking pin partially received in said longitudinal groove and gradually increasing in lateral dimension only toward the rear end thereof the radial dimension of the pin being sub- 100 stantially unchanged throughout, and fastening means for said pin, the sides of said blade and the sides of said slot being correspondingly inclined.

In testimony whereof I affix my signature. 105
FRANK P. MILLER.

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