T. L. HARKINS.

CIRCULAR PLANER.

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1,381,550.

Patented June 14, 1921.

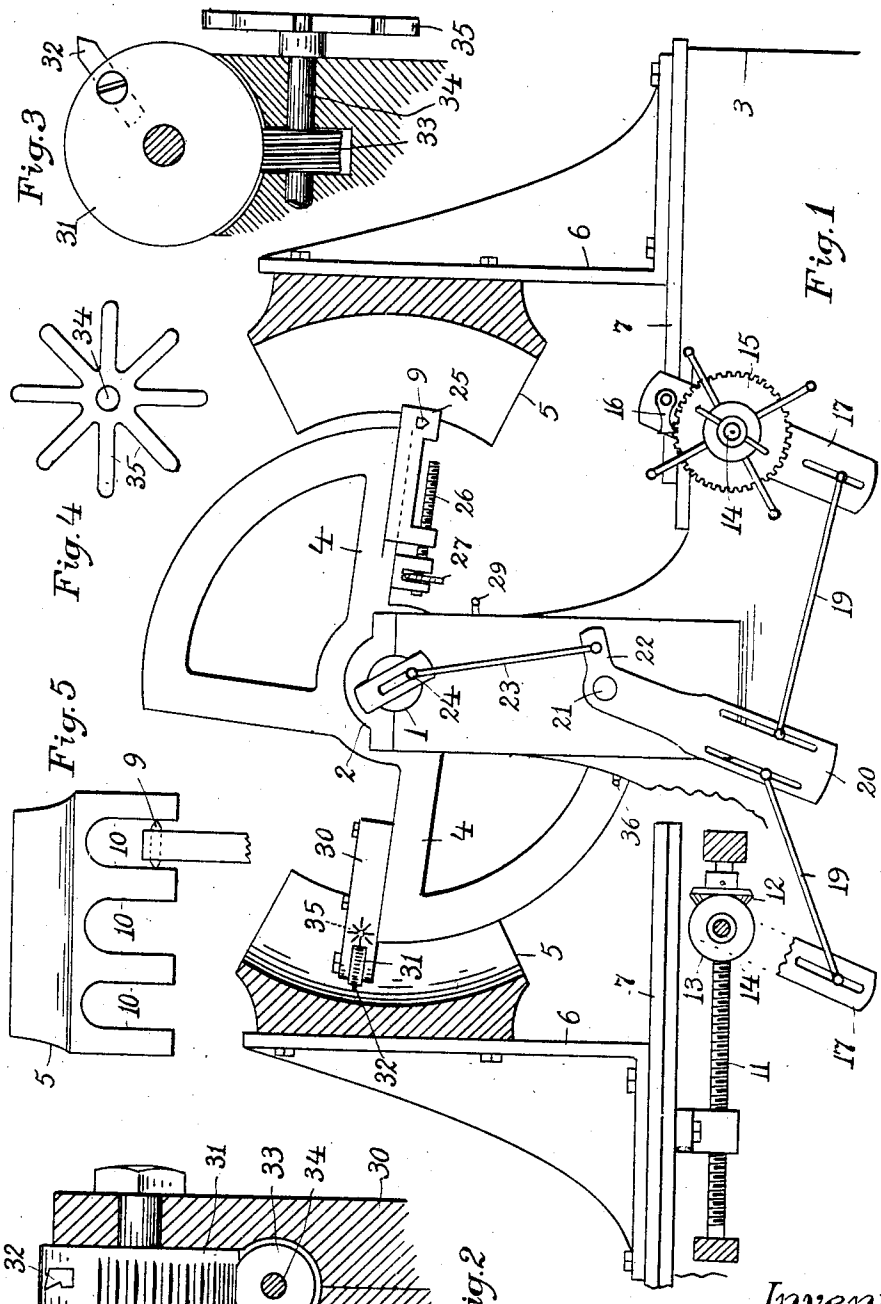


Fig. 1

Fig. 3

Fig. 4

Fig. 5

Fig. 2

Inventor,

Thomas L. Harkins;

By A. B. Upham,

Attorney.

UNITED STATES PATENT OFFICE.

THOMAS L. HARKINS, OF BOSTON, MASSACHUSETTS.

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To all whom it may concern:

Be it known that I, THOMAS L. HARKINS, a citizen of the United States, and a resident of Boston, in the county of Suffolk and Commonwealth of Massachusetts, have invented certain new and useful Improvements in Circular Planers, of which the following is a full, clear, and exact specification.

The object of this invention is the construction of improved means for planing arcuate grooves in cast metal to be used in the work of vulcanizing repaired sections of pneumatic tires. These grooves or seats are customarily U-shaped in cross section, having flat sides and a half-round bottom, and in planing the same I prefer to provide two different types of revolving cutting tools, one of which is adapted to cut the flat sides, and the other the half-round bottom.

In the drawings forming part of this specification, Figure 1 is a side elevation of a planing machine embodying my improvements, parts thereof being represented as broken away. Fig. 2 is a detail view in section of the bottom-planing device. Fig. 3 is another sectional view of the same. Fig. 4 is a view of the star-wheel. Fig. 5 is an end view of a casting containing the grooves to be planed.

Referring to Fig. 1, the power-driven shaft 1 is supported in suitable bearings 2 carried by standards rising from the planer frame 3. Upon this shaft are mounted one or more segments or arms 4 designed to carry the cutting tools. As shown, there are two of these segments located in the same plane transversely of the shaft, and there may be as many segments, or even more, as there are grooves in the casting to be planed, Fig. 5 showing three of the grooves.

I prefer to have two of these castings 5 being planed at the same time in order to double the speed of the work, each being bolted to the vertical member of a knee 6 carried by a planer bed 7.

Upon each segment 4 is attached a cutting tool, one tool 9 extending parallel with the shaft 1 for cutting both flat surfaces of a groove 10 simultaneously, as indicated in Fig. 5. This tool 9 may be advanced in two ways, either by a step-by-step movement given to the planer bed 7 which carries the casting, or by radially feeding the tool itself, and I prefer to construct the machine for both methods.

For the first-named feeding movement, each bed is controlled by a feed screw 11 rotated by bevel gears 12, 13, the shaft 14 of the latter gear having a ratchet wheel 15 engaged by a detent 16. This detent is oscillated by an arm 17 connected by a rod 19 to an elbow 20 fulcrumed at 21, the shaft arm 22 of this elbow being joined by a rod 23 to a crank pin 24 at the end of the shaft 1. By throwing the detents 16 out of engagement with the ratchet wheels 15, the planer beds are held stationary, but by permitting their engagement the planer beds are given a step-by-step movement.

When the tool 9 itself is fed, the bed 6 is made stationary by disengaging the detent 16, and the tool is mounted in a tool post 25 slidable radially on the frame 4 and which is moved by means of a feed screw 26 having a star wheel 27 engaging at every rotation with a fixed pin 29. By having both ends of the tool 9 suitably sharpened, or by providing two oppositely projecting tool points, both flat surfaces of a groove 10 are planed simultaneously and the work correspondingly hastened.

For planing the half-round bottom of the groove 10, the other segment or frame 4 is provided with a block 30 firmly bolted thereto, and rotatably carrying in its outer end a more or less complete spur wheel 31 from which radially projects a tool 32, and also rotatably supported in the block 30 is a worm 33 meshing with the spur or worm wheel 31, the shaft 34 of the worm having a star wheel 35 on its outer end adapted to meet a stationary pin 36 during the rotation of the segment and thereby to give the tool a step-by-step turn through an arc of ninety degrees, starting at one flat face of the groove and terminating at its opposite one.

In this manner, while one tool is planing the flat surfaces of a groove 10 in each of two castings, the other tool is planing their half-round sections, thus doing the work rapidly, and well.

What I claim is:

1. A means for cutting a groove partially circular in cross section, comprising a driven shaft, a radial arm rigid with said shaft, a rotatable member carried at the end of said arm, means for giving it a step-by-step rotation, and a cutting tool held by said member, the axis of rotation of said member being tangential to the latter's circle of rotation about said shaft.

2. A means for cutting a groove partially circular in cross section, comprising a block having a slot in its outer end, a toothed wheel rotatably supported in said slot, a worm meshing with said toothed wheel, a star wheel turning with said worm, means for relatively moving said toothed wheel and a body to be grooved in the direction of said wheel's axis, a device for periodically engaging and partially rotating said star wheel, and a cutting tool carried by said toothed wheel.

3. A means for planing a grooved body, comprising a rotative arm and means for its propulsion, a tool rest slidable radially thereon, a cutting tool projecting laterally from the tool rest, a feed screw engaging said tool rest, a star wheel mounted on said screw, and a stationary member disposed to engage and partially revolve said star wheel during said arm's rotation.

4. A means for planing the flat sides of a U-shaped groove, comprising a driven shaft, an arm rotating therewith, a tool rest slidable longitudinally on said arm, a cutting tool projecting from opposite sides of the tool rest, and means for shifting the tool rest along said arm.

5. A rotary planer comprising a frame, a shaft rotatably supported by the frame, planer beds at each side of said shaft movable toward and from the same, a knee carried by each planer bed, means for attaching to each knee a body in which are grooves to be planed, means for forcibly rotating said shaft, a plurality of arms radially projecting from said shaft, two being opposite to each other but in the same plane, a cutting tool carried by one of said arms and means for feeding it longitudinally thereon, and a cutting tool carried by the other of said arms having means for feeding it angularly.

In testimony that I claim the foregoing invention, I have hereunto set my hand this twenty-first day of February, 1920.

THOMAS L. HARKINS.