No. 612,239. Patented Oct. 11, 1898.

C. L. GROHMANN & L. E. HARPER.

MACHINE FOR DRESSING METALS OR OTHER MATERIALS.

(Application filed Nov. 4, 1897.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.

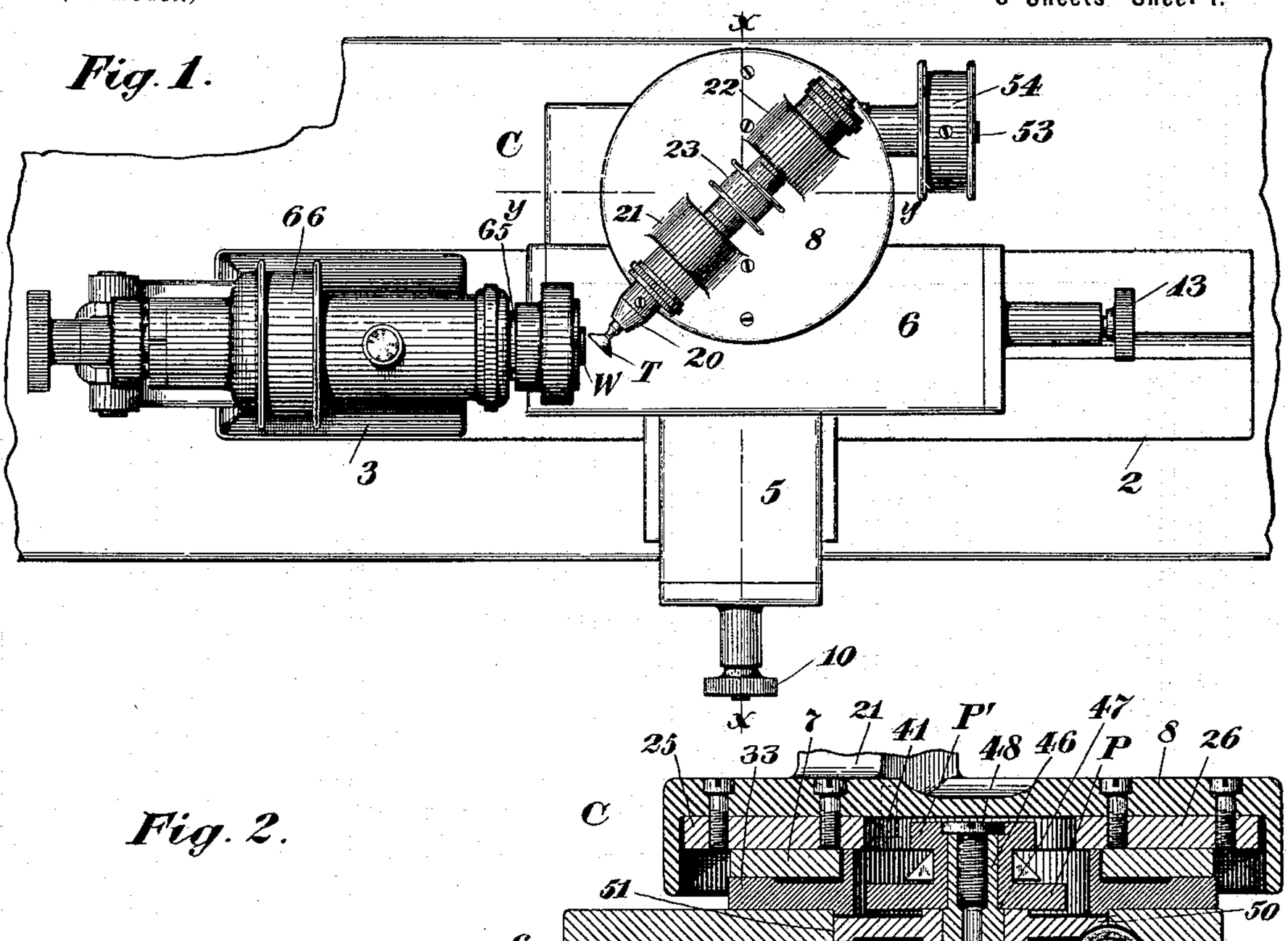


Fig. 2.

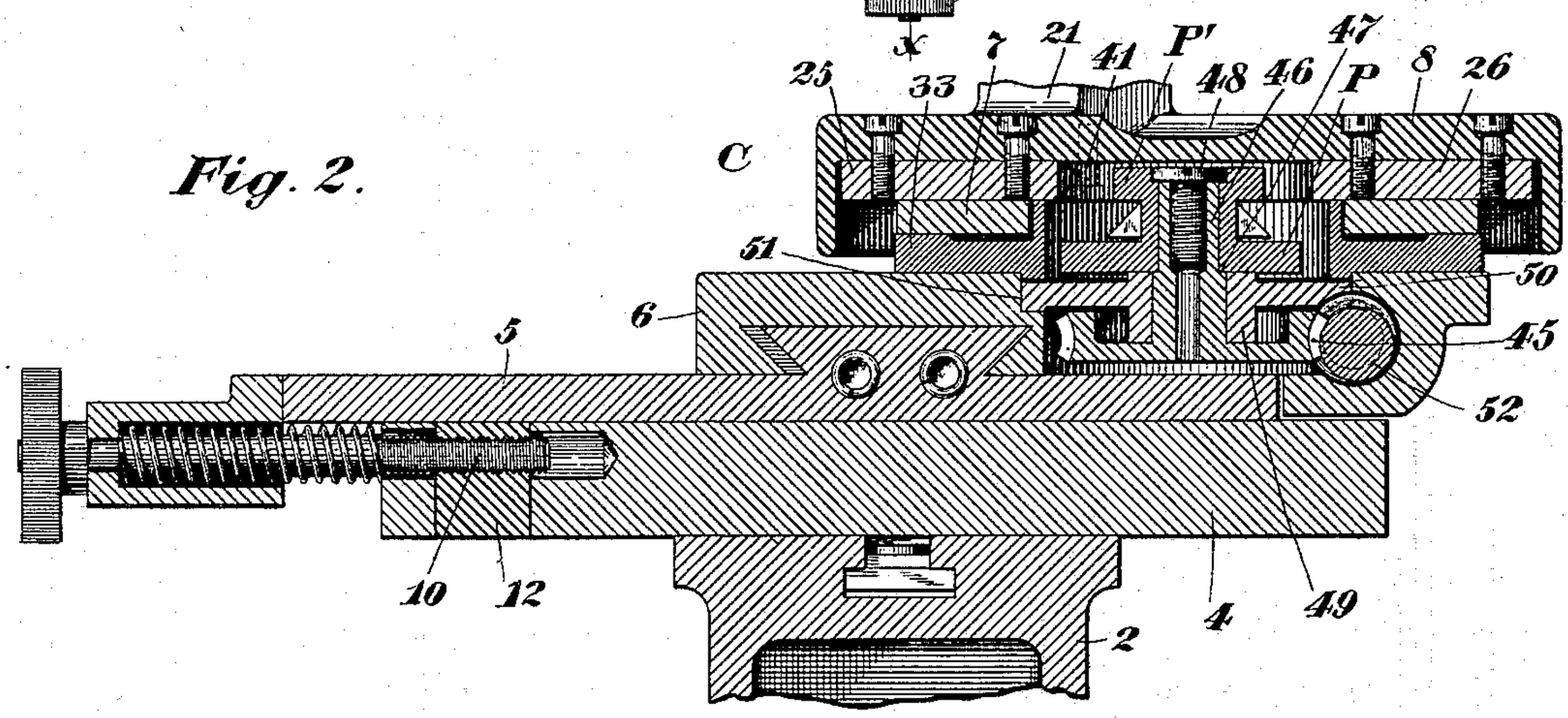
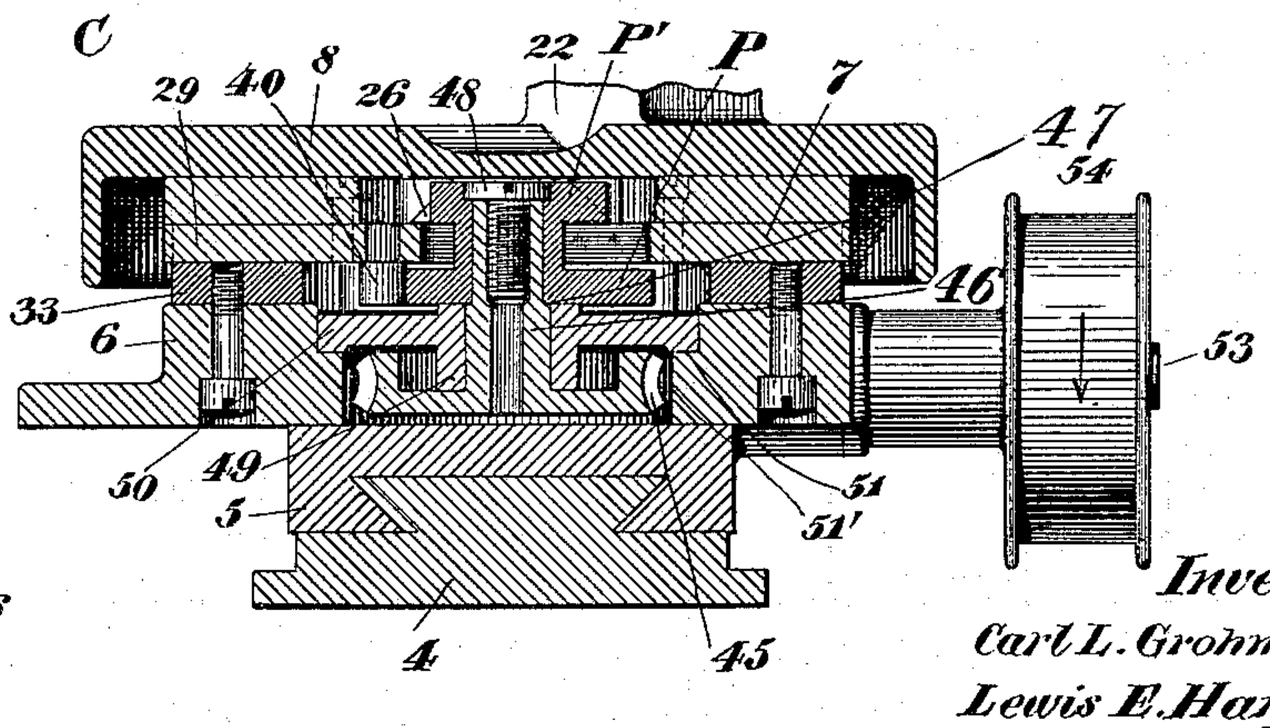


Fig. 3.



Witnesses

F. G. Hewitt

Fred. J. Dole

Inventors:

Carl L. Grohmann,

Lewis E. Harper,

By their Attorney

F. A. Richards.

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Fig. 4.

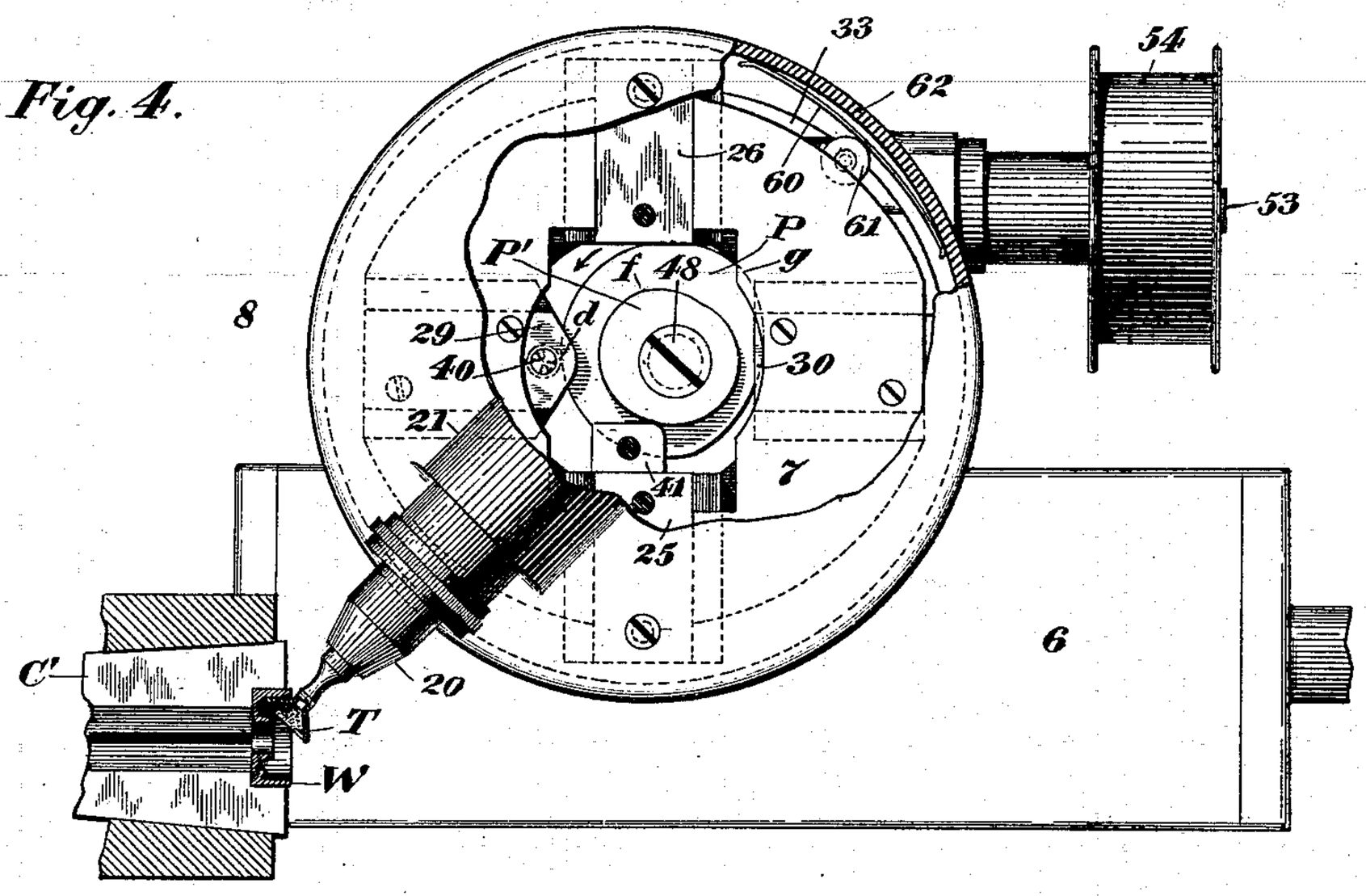
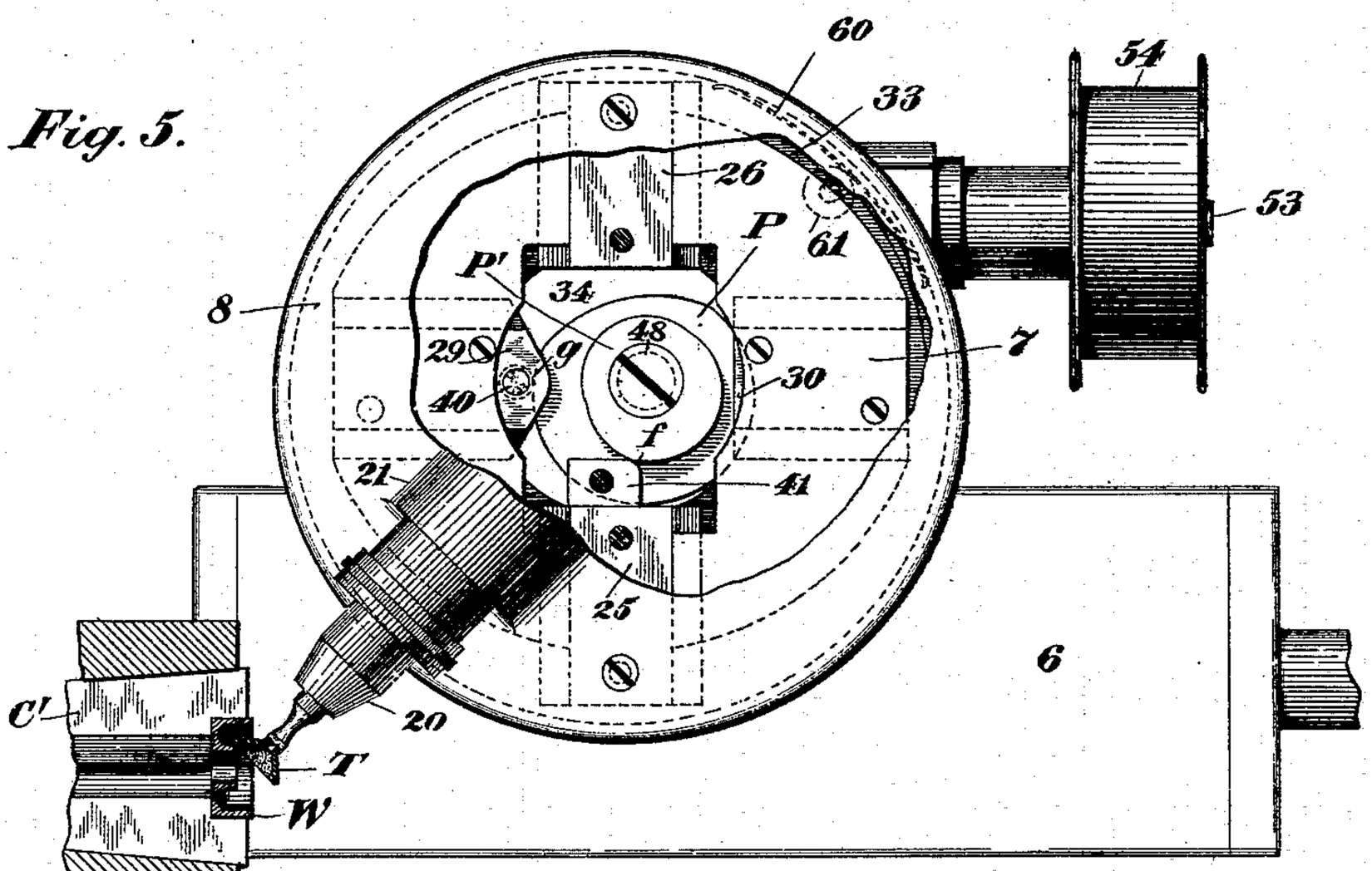


Fig. 5.



Witnesses:
P. G. Hewitt
Fred. J. Dole.

Inventors:
Carl L. Grohmann,
Lewis E. Harper,
By their Attorney
F. A. Richards.

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Fig. 6.

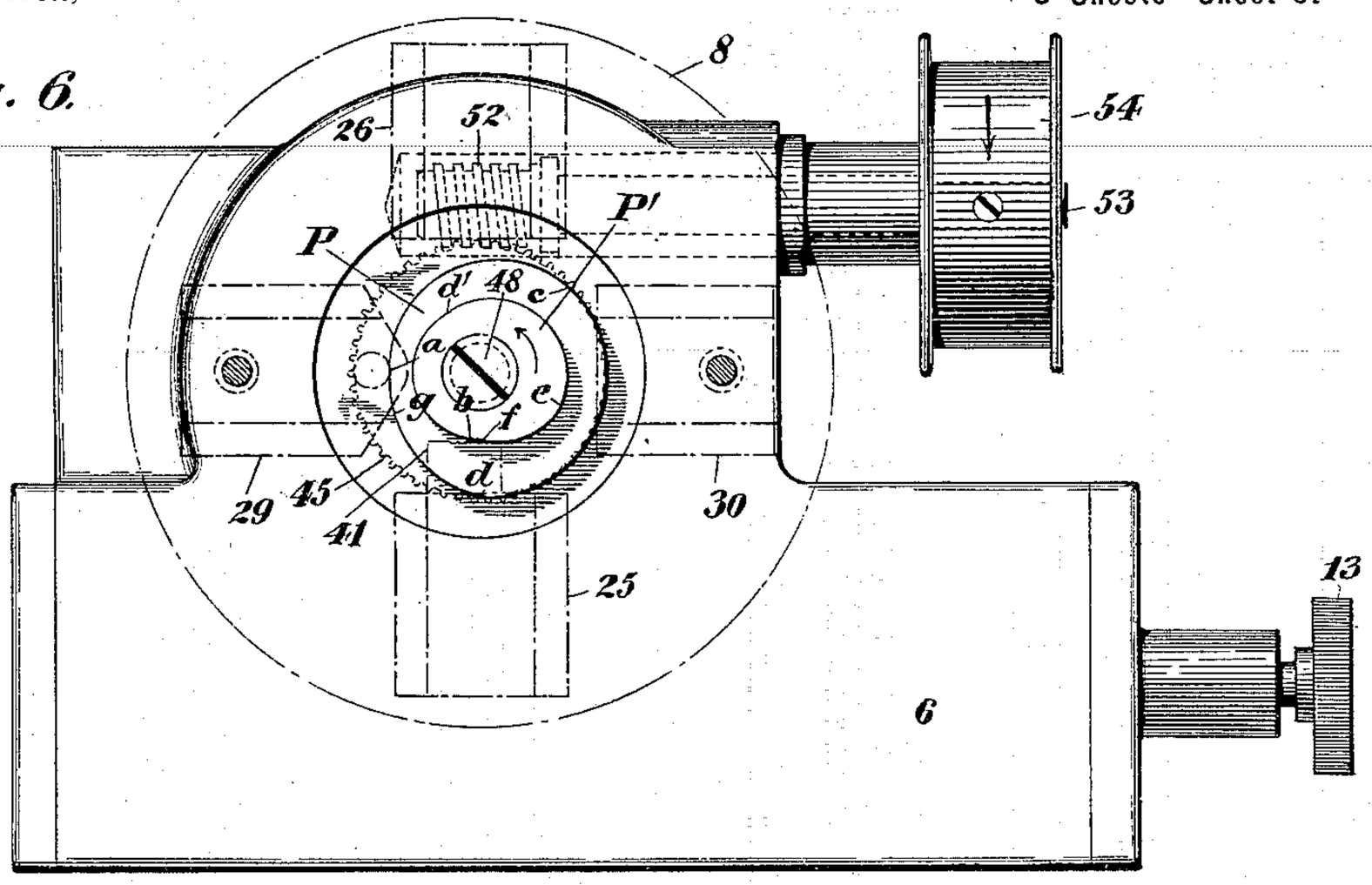


Fig. 7.

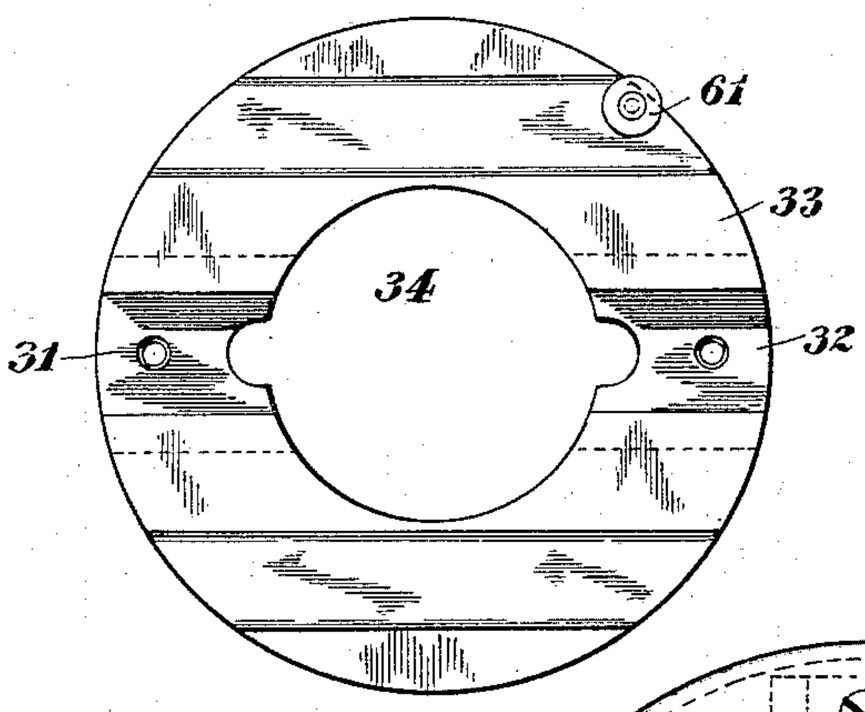


Fig. 8.

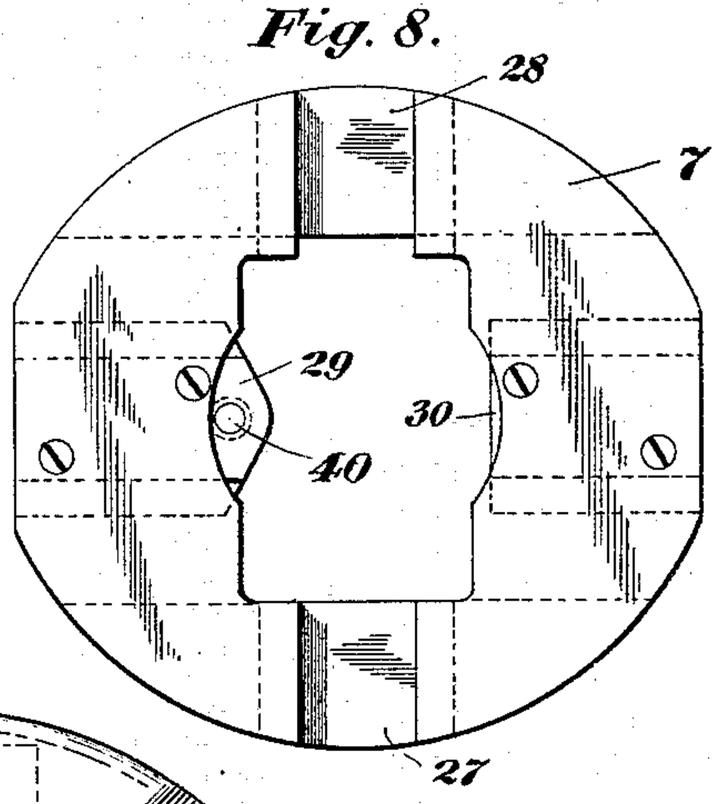
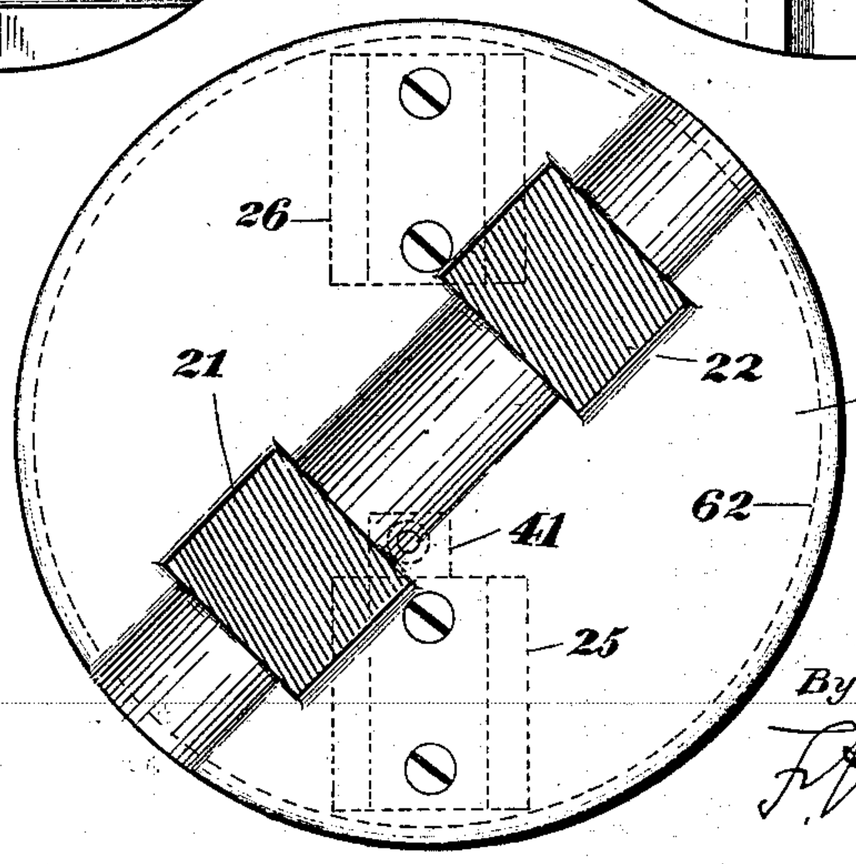


Fig. 9.



Witnesses
F. G. Hewitt.
Fred. J. Dole.

Inventors:
Carl L. Grohmann,
Lewis E. Harper,
By their Attorney
F. A. Richards.

UNITED STATES PATENT OFFICE.

CARL L. GROHMANN AND LEWIS E. HARPER, OF HARTFORD, CONNECTICUT.

MACHINE FOR DRESSING METALS OR OTHER MATERIALS.

SPECIFICATION forming part of Letters Patent No. 612,239, dated October 11, 1898.

Application filed November 4, 1897. Serial No. 657,360. (No model.)

To all whom it may concern:

Be it known that we, CARL L. GROHMANN and LEWIS E. HARPER, citizens of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Machines for Dressing Metal or other Material, of which the following is a specification.

This invention relates to machines for dressing metal or other material; and the object thereof is to provide an improved and efficient machine of this character for dressing or grinding articles of various shapes with uniform accuracy and finish, said machine being particularly adapted for finishing work of irregular form.

Our improved machine includes as one of its features a plurality of superposed slides supported for movement in different directions and independent patterns coöperative with and acting against the respective slides, the patterns being constructed to cause the tool, preferably mounted on the upper slide, to travel through a path conforming to the outline of the work to be dressed, and this path may follow straight, curvilinear, or other lines, in accordance with the patterns employed.

The tool-carriage comprehends a plurality of superposed slides, which may be five in number, in which case the three lower slides are preferably hand-operable to secure the necessary adjustment of the tool, which in the present case is a grinding device for dressing off the interiors of cups or boxes for containing the bearing-balls of bicycles. The grinding-tool is mounted on the topmost slide of the series, which, with the next adjacent slide, is positively driven to effect the operation of the tool in the proper direction. In the present case the line taken by the tool is an irregular one, said tool first following a straight line, then a curvilinear, and finally a straight line diagonal to the first-mentioned line, in which it returns to its primary position, such motion of the tool being obtained by a plurality of independent patterns, which are operated in some convenient manner and which constitute drivers for actuating the respective slides and by reason of which the grinding-tool is caused to travel in the desired direction. The patterns are removably mounted in position and may be detached and others substituted, whereby the course of the tool may be made to conform to the character of the work to be dressed.

In the drawings accompanying and forming part of this specification, Figure 1 is a plan view of a grinding-machine embodying our present improvements. Fig. 2 is a transverse central section of the tool-carriage, taken in the line $x\,x$, looking in the direction of the arrow, Fig. 1. Fig. 3 is a sectional view taken in the line $y\,y$, Fig. 1, in a plane at right angles to the line $x\,x$. Figs. 4 and 5 are plan views of the carriage, portions of the slides being broken away to illustrate the internal mechanism, said figures also showing, in section, the work and the mode of operation of the tool thereon. Fig. 6 is a plan view of the carriage with the topmost slides removed. Fig. 7 is a plan view of the support or track upon which the under of the two power-driven slides is mounted for reciprocation, and Figs. 8 and 9 are similar views on the two upper or power-driven slides.

Similar characters designate like parts in all the figures of the drawings.

The various parts of the machine may be supported in any convenient manner. For this purpose we have represented a longitudinal bed 2, having near one end a bearing 3, which sustains the chuck or work-holding device.

The tool-carriage C is mounted for movement along the upper face of the bed 2, and it consists of a plurality of superimposed slides 4, 5, 6, 7, and 8. The slide 4 is preferably held in a fixed position on the bed 2 when the parts are assembled, the necessary adjustment of the tool, which is carried by the topmost slide 8, being obtained by the manipulation of the transversely-reciprocative slides 5 and 6. The lowermost slide 4 is clamped to the bed of the machine in some convenient manner. The adjustment of the slide 5 crosswise of the bed 2 is secured by the ordinary feed-screw 10 on said slide, which screw works in a fixed nut 12 on the slide 4, the adjustment of the slide 6 transversely of the slide 5 being obtained by a similar feed-screw 13, working in a fixed nut (not shown) in said slide 5.

Our improved machine, as hereinbefore set forth, embodies as one of its features a plurality of superposed transversely-reciprocative slides and independent patterns coöperative with and acting against the respective slides, said patterns being preferably movable in unison and actuated by power, by reason of which a tool supported upon one of said slides is caused to move in a direction corresponding with the outline of said patterns.

The topmost slide 8 carries the tool, which consists in the present case of a grinding device T, secured in some suitable manner to the spindle or shaft 20. Said spindle or shaft is diagonal to the work-spindle. It is preferably mounted in the posts 21 and 22 on the upper side of the slide 8, and it carries the pulley 23, which may be driven by a belt, (not shown,) such mechanism serving as a simple means for rotating the tool-spindle. The upper slide 8 has near its opposite sides the depending blocks or tongues 25 and 26, (see Fig. 9,) working in the grooves or channels 27 and 28, respectively, in the upper face of the slide 7, Fig. 8, the latter being equipped with similar bearing-blocks or tongues 29 and 30, adapted to work in corresponding grooves 31 and 32, respectively, in the support or track 33, rigidly secured to the upper side of the slide 6.

The stationary support or track 33, upon which the slide 7 is mounted, is centrally apertured, as at 34, to admit of the operation of the patterns or templets.

The grooves or ways 31 and 32 on the support or track 33 are at right angles to the grooves or ways 27 and 28, which several grooves receive the respective slide-blocks on the slides 7 and 8, by reason of which the slides can be operated in transverse directions.

The patterns for the respective slides are designated by P and P′, and they are preferably operable in unison and about the same axis, and for this purpose they are conveniently made integral. Said patterns consist, preferably, of rotary cams, the under pattern or cam P being adapted to engage the depending projection or pin 40 on the slide-block 29 and the upper pattern or cam P′ being adapted to engage the offset or extension 41 on the slide-block 25. The two patterns may be in one piece and are also rotary, and for operating the same any suitable means may be employed. For this purpose we have illustrated the worm-gear 45 having upon its center the vertical stud or spindle 46, adapted to pass through a bore or seat formed at the proper place in the hub of the two patterns, the latter when in working position resting upon the stop or shoulder 47 on the spindle. The two patterns are held upon their support by a screw 48 in threaded engagement with the stud 46, the head of the screw serving to bind said patterns firmly against the stop-shoulder 47.

The worm-gear 45 is supported in the hub or bearing 49 of the disk 50, which rests upon the shoulder 51 on the wall of the aperture 51′, formed in the slide 6. When the parts are assembled, as shown in Fig. 2, the head of the screw 48 in addition to holding the pattern in place on the stud maintains the worm-gear 45 in proper position. The gear 45 is driven by the worm 52 on the shaft 53, said shaft carrying at its opposite end the pulley 54, which may be driven by a belt, (not shown,) the belt serving to rotate the pulley in the direction of the arrow in Fig. 6 and the patterns in the direction indicated by a second arrow in said figure, whereby when the two patterns are operated they will by reason of their action against the slides cause the tool to follow the desired path.

In the present case the rotary patterns P and P′, respectively, cause the tool, by imparting certain feed movements to the two slides, to travel first along a straight line, at which time one of the patterns operates, then along a curvilinear line, when they simultaneously operate both slides, and, lastly, along a diagonal line, during which period both cams serve to return the tool to its primary or retracted position.

It is apparent that patterns of various shapes could be substituted for those illustrated to obtain the movement of the tool in any direction. In fact, the tool could readily describe a circle by properly shaping the patterns. To facilitate the changing of the patterns, they are made removable, as hereinbefore described.

In Fig. 6 the two cam-patterns are represented in their primary positions, the points *a* and *b*, respectively, thereof being in contact with the two slides, which, as indicated by dotted lines in said figure, are in their retracted positions. When the two cams rotate, the under cam is constructed to actuate the under slide for a predetermined distance, and during this period the upper slide remains stationary relatively to the under, the upper cam-pattern P′ being of such construction as to produce this result, or, in other words, that part of the cam which passes in contact with the upper slide while the lower cam is traveling against the under slide to feed the latter forward is concentric with its axis. When the lower cam is thus operated, the tool T is advanced forwardly in a straight line. As it is then desired to have the tool describe an arc following the interior contour of the work, the two slides will be simultaneously and independently transversely operated, that portion of the cam P between the points *c* and *d* serving to operate the under slide, while the cam P′ serves to operate the upper slide between the points *d′* and *e* thereon, the rise of the cams being such that the tool is caused to follow a curved path. When the tool passes out of contact with the work on its forward or working stroke, the points *f* and *g* of the two cams will be opposite the two slides, but not in contact with the same,

means independent of the cams being furnished to return the tool to its initial position by transversely and simultaneously operating the two cams, the construction being such that the tool is caused to follow a line at an acute angle to its first-mentioned line and is thereby returned to the place from which it started.

The means illustrated for returning the slides to their primary positions consists of a spring acting, preferably, against a fixture on the track or support 33 and also against the upper slide, the pressure by the spring against said slide being in a direction oblique to the planes of transverse movement of the two slides, so that each is moved relatively and transversely to the other and is returned to its normal retracted or outer position. The spring illustrated for operating the slides is designated by 60, it bearing at its middle against the stop or roll 61, mounted on the upper face of the track or support 33 at a point midway between the planes of operation of the two slides, the opposite ends of the spring fitting against the depending annular flange 62 on the upper slide 8. (See Figs. 4 and 5.)

When the tool T passes out of contact with the work, the concentric portions of the two cams P and P′ will be opposite the pin 40 and the offset 41 on the slides 7 and 8, respectively, but will not be in contact therewith, by reason of which the elongated spring 60 by acting against the upper slide will cause it, and consequently the lower slide, to recede simultaneously in transverse directions, by reason of which the tool T on the upper slide follows a line angular to that first taken on its working stroke.

As hereinbefore stated, the tool is adapted for dressing various kinds of work, either interior or exterior.

For the purpose of illustrating the operation of the tool we have shown it operating upon a cup or box for containing bicycle bearing-balls, the inside of said cup being of irregular form and partly curvilinear. The work or cup is designated by W, and it is clamped in the chuck C′, secured to the spindle or shaft 65. The spindle 65 is mounted in the bearing 3 on the bed 2, and it carries at a convenient point the pulley 66, around which a belt (not shown) may be passed to drive the spindle and preferably in a direction reverse to that of the tool-spindle 20, as is customary. In operation the work W will be set and clamped in the chuck C′, after which the worm-shaft 53 will be turned by the attendant to bring the tool to its extreme retracted position, after which the under slides 5 and 6 will be manipulated to carry the tool substantially in contact with the work, with the periphery of said tool in line with the inside face of the work. When the tool is properly positioned, the several shafts will be started in operation, by reason of which the tool will be caused, through the patterns P and P′ acting against the slides 7 and 8, to follow a path conforming to the shape of the interior of the work W.

Having described our invention, we claim—

1. The combination, with a pair of transversely-reciprocatory slides one of which is mounted upon the other, of a support for the lower slide, and a pair of independent patterns in position to impart advancing movements to the slides, one of said patterns being adapted to coöperate with one slide, and the other pattern coöperating with the other slide.

2. The combination, with a pair of transversely-reciprocatory slides one of which is mounted upon the other, of a support for the lower slide; a pair of independent patterns in position to impart advancing movements to the slides, one of said patterns being adapted to coöperate with one slide, and the other pattern coöperating with the other slide; and means independent of the patterns for returning the slides to their primary positions.

3. The combination, with a pair of transversely-reciprocatory slides one of which is mounted upon the other, of a support for the lower slide; a pair of independent patterns in position to impart advancing movements to the slides, one of said patterns being adapted to engage one slide, and the other pattern being adapted to engage the other slide; means independent of the patterns for returning the slides to their primary positions; and mechanism for rotating said patterns.

4. The combination, with a plurality of superposed slides supported for reciprocation in different directions, of independent patterns coöperative with, and acting against, the respective slides; a stop; and a spring bearing against the stop and also against one of the slides.

5. The combination, with a plurality of superposed slides one of which has a depending flange, said slides being supported for reciprocation in different directions, of independent patterns coöperative with, and acting against, the respective slides; a fixed stop; and a spring bearing against said stop and flange.

6. The combination, with a support or track having grooves, of a slide provided with tongues fitting in said grooves and also having grooves; a second slide mounted on the first-mentioned slide and provided with tongues reciprocative in the last-mentioned grooves; a tool mounted on the upper slide; a plurality of patterns coöperative with, and acting against, the respective slides; a stop on the support or track at a point midway between the planes of movement of the two slides; and a spring in position to act against said stop and also against the upper slide.

7. The combination, with two transversely-reciprocatory slides one of which is mounted upon the other, of a support for the lower side, and a pair of independent removably-mounted rotary patterns in position to impart ad-

vancing movements to the slides, one of said patterns being adapted to coöperate with one slide and the other pattern coöperating with the other slide.

8. The combination, with a plurality of slides supported for movement in transverse directions, of a plurality of independent patterns; a driver having a shouldered stud upon which the patterns are mounted; a screw seated in the stud, the head of the screw serving to hold the patterns in place against the shoulder on the spindle; and means for operating the driver.

9. The combination, with a plurality of slides supported for movement in transverse directions, of a plurality of independent patterns operable for actuating the respective slides; a driver having a shouldered stud upon which the patterns are mounted; a bearing for supporting the stud; a screw seated in the stud, the head of the screw serving to hold the patterns in place against the shoulder on the spindle, and also to hold the driver in position; and means for operating the driver.

CARL L. GROHMANN.
LEWIS E. HARPER.

Witnesses:
RICHD. F. DOW,
HENRY BISSELL.