

T. LUND.
GANG CUTTING DEVICE.
APPLICATION FILED MAY 22, 1909.

1,060,688.

Patented May 6, 1913.

4 SHEETS-SHEET 1.

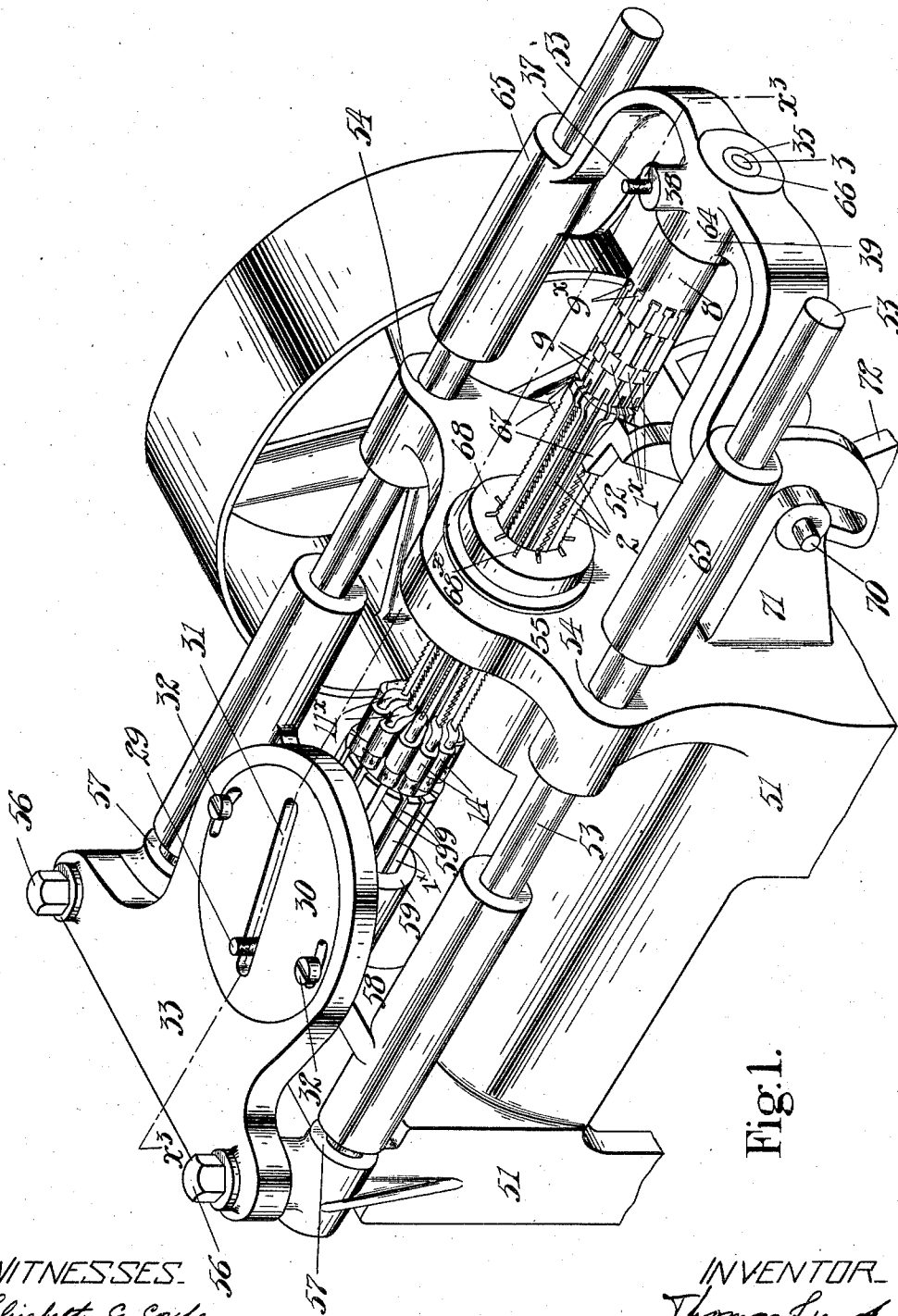


Fig. 1.

WITNESSES:
Elijah C. Coyle
Edith C. Hollbrook

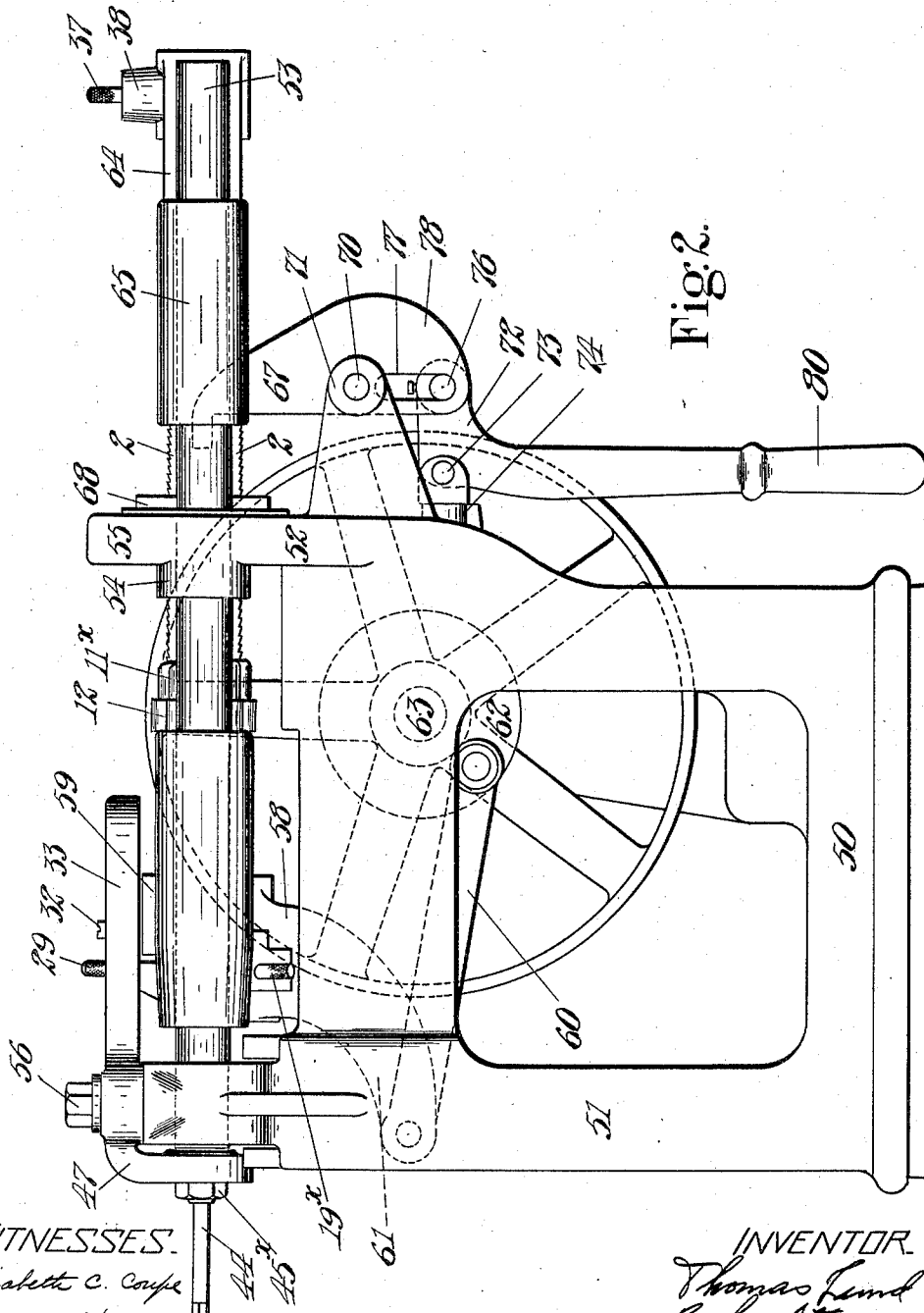
INVENTOR
Thomas Lund
By his Attorney,
Nelson W. Howard

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4 SHEETS—SHEET 2.



WITNESSES.

Elizabeth C. Coupe

Edith C. Hollbrook

INVENTOR.

Thomas Lund
By his Attorney,
Nelson W. Howard

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4 SHEETS—SHEET 3.

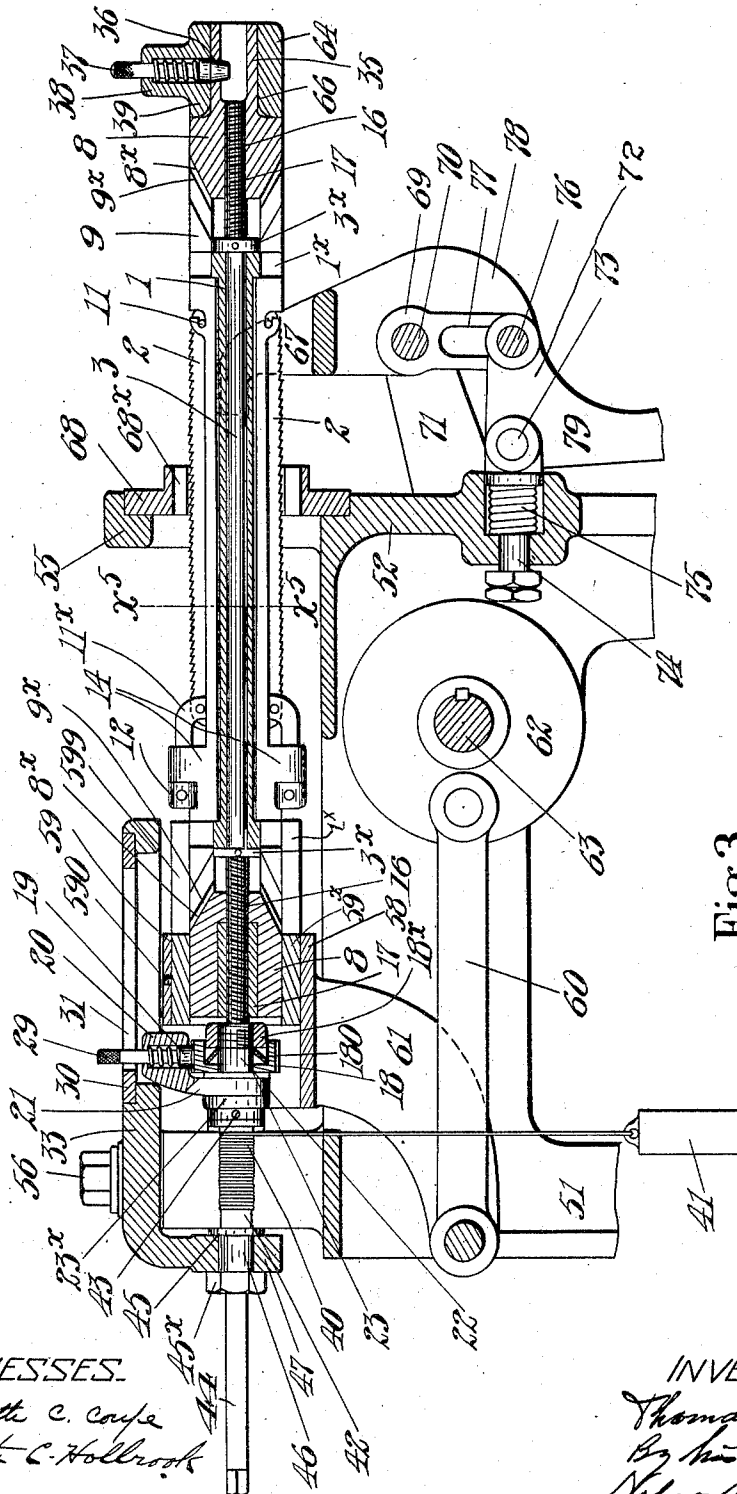


Fig. 3.

WITNESSES.

Elyakette C. Coupe
Edith C. Hollbrook

INVENTOR.

Thomas Lund
By his Attorney,
Nelson W. Howard

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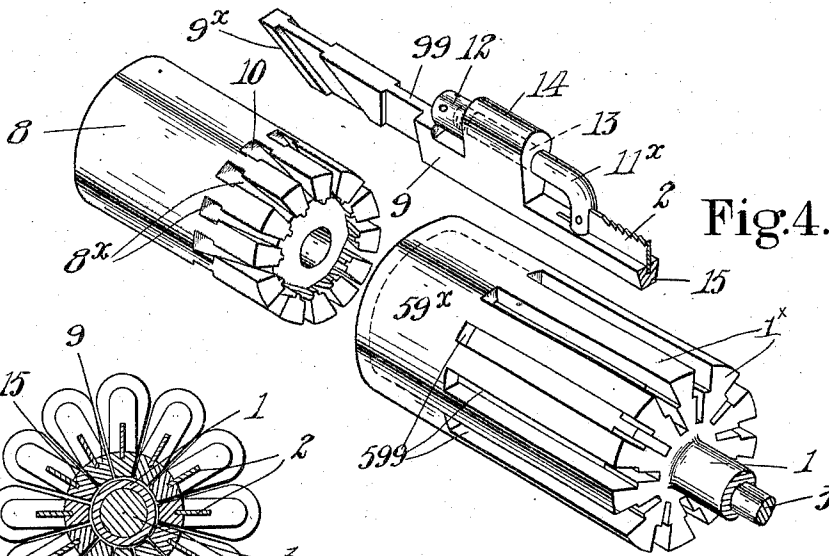


Fig. 4.

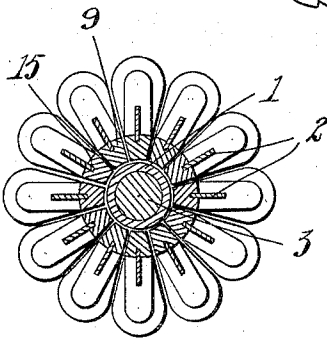


Fig. 5.

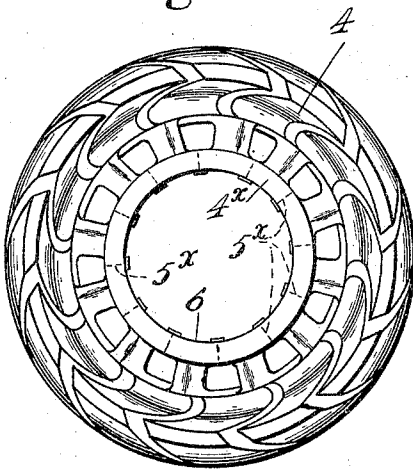


Fig. 7.

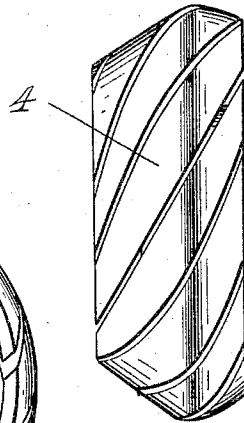


Fig. 8.

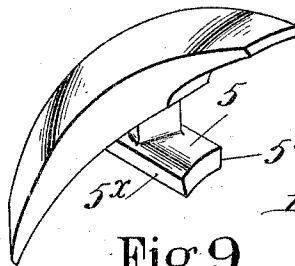


Fig. 9.

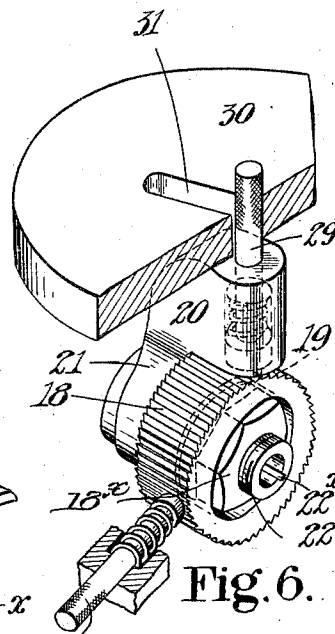


Fig. 6.

WITNESSES.

Elizabeth C. Coups
Edith C. Hollbrook

INVENTOR.

Thomas Lund
By his Attorney
Nelson H. Kordick

UNITED STATES PATENT OFFICE.

THOMAS LUND, OF BEVERLY, MASSACHUSETTS, ASSIGNOR TO UNITED SHOE MACHINERY COMPANY, OF PATERSON, NEW JERSEY, A CORPORATION OF NEW JERSEY.

GANG CUTTING DEVICE.

1,060,688.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, THOMAS LUND, a citizen of the United States, residing at Beverly, in the county of Essex and State of Massachusetts, have invented certain Improvements in Gang Cutting Devices, of which the following description, in connection with the accompanying drawings, is a specification, like reference characters on the drawings indicating like parts in the several figures.

This invention relates to machines for dividing into a plurality of parts, or cutting slots in, or similarly treating, articles of metal, wood and other materials, and is of particular utility when embodied in a machine for dividing an annular metal blank into symmetrical sections to be used in the formation of the so-called rotary hammers, or whirl-like devices used in finishing certain parts of shoes, as for example in burnishing heels, although I contemplate the utilization of my invention in any field for which it may be adapted by the nature of my improvements.

An important object of my invention is to provide means to carry on the cutting operation simultaneously and symmetrically at a plurality of regions, working outward from the central aperture of such a ring-shaped blank as that just described, and to accomplish this substantially radial cut, I prefer to provide a gang of cutting or working members, such as saws, grouped upon a suitable holder in annular arrangement parallel with a central longitudinal rod or supporting axis which constitutes the operating member of the gang-cutter and is arranged to reciprocate within the central aperture of the metal casting or blank which is to be divided, suitable means being preferably provided to cause gradual expansion of the respective saws in substantially radial directions during their working stroke in order to produce a drawing cut deeper and deeper with successive strokes and ultimately to sever completely the material of the blank from its center to its periphery.

Among other objects of notable importance is the provision of means to permit adjustment readily of the expanding mechanism and to indicate visually its adjusted position and the action which may be expected therefrom; also the provision of

mechanism acting automatically when released to return the working members to their initial position, in readiness to pass into a second blank in position to start the dividing action.

Still other features include means for holding positively and firmly near each end, the saw blades, or other working members, throughout their range of adjustive movement, and for insuring symmetrical adjustment during such movement; also suitable means for holding the work firmly during its treatment and for permitting ready removal of the completed work and its replacement by a fresh blank.

The various features of my invention will be illustrated and described fully in the accompanying drawing and specification and pointed out in the claims.

In the drawings: Figure 1 is a view in perspective of a gang-saw machine in the construction of which my invention has been embodied; Fig. 2 is a view of the same in side elevation on a somewhat reduced scale; Fig. 3 is a view in vertical, longitudinal section of the machine shown in Fig. 1, taken on the line x^3-x^3 ; Fig. 4 is a fragmentary view of parts of the reciprocating gang-saw device shown separately, in perspective; Fig. 5 is a transverse, vertical section on a somewhat larger scale, of the gang-saw, on the line x^5-x^5 , Fig. 3, looking from right to left; Fig. 6 is a fragmentary detail view in perspective of the device provided to actuate the saw-expanding mechanism; Figs. 7 and 8 are views in rear and side elevation respectively of the whirl-like blank for a segmental, rotary hammer, constituting one form of work-piece which may be treated advantageously in my improved machine; and Fig. 9 shows in perspective one of the hammer segments after severance, separate from the other segments.

In the working device constituting the embodiment of my invention selected for illustration and description to enable ready and complete understanding of my improvements, the part designated by the reference numeral 1 is a holding member which in accordance with my invention in its preferred form is surrounded with working members 2, which may be of any suitable form, and may be arranged in any suitable relation to each other, and as one convenient arrange-

ment are illustrated as grouped in annular relation about an axial operating rod or member 3.

The working members consist, in the instance illustrated, of saws arranged radially with respect to the rod 3 and equidistant from each other, their cutting edges being presented outwardly, in this instance, inasmuch as one of the principal uses of the machine chosen for description is to divide annular blanks of the type shown at 4 (see Figs. 7 and 8) into sections such as that shown at 5 in Fig. 9, which when assembled are used to form a rotary hammer particularly useful for burnishing heels of shoes. The cuts made by the saws in the instance illustrated are at the regions marked 5* in Figs. 7 and 9, being indicated by dotted lines in Fig. 7. This division can be accomplished most effectively by working at a plurality of regions simultaneously and symmetrically from the central aperture 6 outward, to sever the annular portion 4* of the blank completely into a plurality of segments, and accordingly I prefer to provide means for gradually advancing the several saws 2 radially and for holding them firmly during said adjustive advancement and at each operative stage thereof, such means taking any suitable form. As one convenient form of holding and adjusting means, I have illustrated hubs, cones or similar expanding members or devices 8, mounted to move co-axially along the rod 3, and having grooves 8* (see Figs. 3 and 4) parallel with the longitudinal axis of the cutting device, one for each of the saws, there being preferably such a cone at each end of the gang, and in each groove I prefer to provide a mount or carrier 9 having a flanged head 9* fitting snugly within an enlarged portion 10 of the groove (see Figs. 1, 3 and 4) the latter being undercut along each edge of the groove near its bottom, and the direction of the groove being on an incline extending outwardly and upwardly away from the ends of the saws, so that when the cones or hubs are caused to approach toward each other the tendency of the heads is to ride upward and outward along the inclined bottom of the grooves 8*, advancing the several saws outward radially.

I prefer to provide suitable means to hold the saws individually in proper tension upon their mounts, such means being of any suitable form. One convenient form of such means may consist (see Fig. 3) of a pin and slot connection 11 near one end of each of the mounts for the saws respectively, and a tension hook or bolt 11* with adjusting nut 12, of well known form, for the other end of each saw, the bolt passing (see Fig. 4) through a hole or slot 13 in the part 14 of the mount. By unscrewing the nut, the adjacent end of the saw will be released and

the other end may readily be withdrawn from its pin, the curved slot 11 being open for that purpose. Suitable channels 15 will preferably be provided in the mounts for the saw blades, the walls of these channels standing on each side of the respective saws, so that the latter will not buckle nor be distorted when they are in operation.

As one convenient form of means to accomplish the expansive adjustment of the working members progressively, I have shown the cones as seated (see Fig. 3) upon threaded portions 16 of the rod 3, the axial bores 17 of the cones being threaded to cooperate with the threaded rod-portions, and these threads running oppositely at the respective ends of the gang, so that when the rod is rotated the cones will approach each other or retreat in accordance with the direction of the rotation.

Suitable positioning means, such as the collars 3* may be secured to the rod, as by set screws, to retain in adjusted position the holder 1, and the latter will preferably have separating devices such as the radial projections 1*, formed as integral heads, to intervene between the mounts 9 and serve as guides therefor, when they are expanded by rotation of the rod.

The mounts may have a reduced portion 99 respectively to enter between the radial projections 1* and the shoulders at each side of this reduced portion to prevent longitudinal movement of the mount relatively to the holder, insuring radial movement under the action of the cones. As one convenient form of means to accomplish this rotation I have shown (see Figs. 3 and 6) near the left hand end of the rod a ratchet wheel 18 secured by a jam nut 18* and ring 180 upon a sleeve 22 splined at 22* (see Fig. 6) upon the rod 3, the sleeve being thus connected rotatively with the rod, but being free to move thereon longitudinally. To operate the wheel 18 I have provided an actuating pawl 19 mounted reciprocatingly at 20 within an arm extending from a collar 21 secured in position to rotate about the rod and held by collars 23, 23*, and a set-screw collar 43.

As one convenient form of support for the working device above described I have shown a frame comprising a base 50, side-uprights 51, and an end upright 52, with bearing rods 53 extending through apertures 54 in a bridge-piece 55 carried by the upright 52, the ends of the rods 53 being secured suitably as by cap screws 56 within sockets 57 in the side-uprights 51. A cross head 58 is mounted to reciprocate on the rods 53, and the rod 3 is connected to it at 59, which designates a sleeve forming part of the cross-head, while 59* designates an auxiliary sleeve or bushing best seen in Fig. 4, this being secured suitably to the sleeve

59, as by a screw 590, (see Fig. 3) and having guide grooves or slots 599 in which the mounts 9 can play as they are expanded and contracted. This auxiliary bushing serves to impart strength and rigidity to the working device, but is not essential to the successful operation of my invention.

Suitable means may, and preferably will, be provided to actuate the working device backward and forward, such as the connecting rod 60 extending from arms 61 below the sliding cross-head 58 to a crank disk 62 upon the shaft 63, the latter being the prime mover of the machine, and deriving its power from any suitable source (not shown). Another cross-head 64, having slides 65 mounted on the rods 53 carries the other end of the rod 3 in a manner to be described more in detail hereinafter.

As the rod 3 is moved backward and forward carrying with it the pawl 19, the latter is actuated to move the ratchet wheel 18 by successive engagement with one or more of the peripheral teeth of the latter, a spring latch 19* (see Fig. 2) serving to prevent retrograde movement of the ratchet wheel. The actuation of the pawl 19 is accomplished preferably by means which in accordance with an important possible feature of my invention will indicate visually the degree of throw which the pawl is giving to the saws through the medium of the mechanism already described. To accomplish this visual indication, I have shown the pawl 19 as having a tail piece 29 extending upward, and for engagement with this tail piece I prefer to provide a plate 30 having a slot 31 to pass the tail piece, the plate being movable around its central axis to vary the angular relation of the slot relatively to the axis of the rod 3, suitable fastening means such as the cap screws 32 serving to hold the plate in adjusted position, these screws being tapped into a bridge-piece 33, secured to the side-uprights 51 by the cap-screws 56. The outer end of the rod 3 may be secured to the cross-head 64 by any means sufficiently strong to afford proper resistance to the strain to which the apparatus is subjected, and as one convenient form of such support I have shown (see Fig. 3) the outer cone 8 as having an extension 35 notched at 36 to receive the lower end of a spring latch 37 mounted in a socket 38 in the central boss 39 of the cross-head 64, the latter being bored at 66 to receive the extension 35 as an easy slip fit, the latch uniting the parts firmly. This union will preferably be a removable one, so that when it is desired to operate upon annular work pieces such as the article shown in Figs. 7 and 8, the end of the rod may be freed to pass into the central aperture of the article. To release the rod 3, the spring latch 37 may be easily grasped by the operator and lifted or

raised out of the engagement with the notch 36. I prefer to provide also means acting automatically when released to rotate the rod 3 in reverse direction to that of its rotation by the pawl, and thus to separate the cones 8 and retract the mounts 9 and saws 2 until the latter assume their normal contracted position shown in Fig. 3, ready to pass into the central aperture of one of the ring-like blanks 4 constituting the work-pieces. Any suitable means may be provided for this purpose, and as one convenient form of such means, I have shown a flexible cable 40, provided with a weight 41 at its free end, and arranged to wind upon a spool 42, seated upon a squared extension 44 of the rod 3, the rod being arranged to move co-axially within the sleeve and spool, but causing rotation of the latter when rotated by the pawl 19, winding up the cable.

When the operator releases the rod 3 from the control of the pawls 19 and by pulling the latter out from the ratchet wheel 18, the weight 41 runs off the cable 40 and rotates the rod 3, retracting the saws 2.

Preferably the spool 42 will be provided with a collar 45 and nut 45* to hold it in place within a bearing 46 in the depending bracket 47 of the bridge-piece 33.

In accordance with another feature of my invention I prefer to provide means to hold the work-piece firmly in place for treatment by the gang-saw or other working-device, and any suitable form of retainer may be used. A convenient form for clamping annular work-pieces in place is shown at 67 (see Figs. 1 and 3) which designates the fork of a yoke constructed and arranged to engage with the ring part 4* of the work-piece 4 after the same has been slipped over the disconnected cone 8 and along the gang into working position against the annular boss 68 constituting the work-seat, the same being carried by the bridge member 55 supported by the end upright 52 of the frame.

The retainer yoke 67 is shown in Fig. 3 as having a cross-bearing member 69 mounted to rotate on a shaft 70 carried by brackets 71 extending from the frame upright 52, and to operate the retainer I have shown a bell-crank lever 72 pivoted at 73 upon a bearing stud provided with an adjusting bolt 74 and compression coil spring 75, one arm of the bell-crank lever being connected loosely by a pin 76 and slot 77 with the depending arm 78 of the retainer yoke, while the other arm 79 of the bell-crank is shown (see Fig. 2) as formed into a handle 80. When in the position shown in Figs. 2 and 3, the force of the spring 75 is exerted at its maximum to hold the fingers 67 yieldingly, but with a strong pressure, against the ring 4* and the latter against its seat 68. The seat 68 may, and preferably will, have radial slots 68* to clear the saws 2 and still furnish

proper resistance to the drag of the saws on the work.

In starting to operate the machine, the parts being at rest in the position illustrated in Fig. 3, the handle 80 is drawn toward the right and causes the bell-crank lever 72 to force inward the lower arm 78 of the retainer yoke, swinging the fingers 67 away from the seat 68, to clear the same, as shown in Fig. 1, and the latch 37 having been withdrawn, the cross-head 64 is pulled outwardly to free the outer cone 8 and rod 3, the cross-head being preferably still supported upon the bearing rods 53, and one of the annular work-pieces 4 is slipped along the gang until its ring 4^x fits in place against the boss 68, and the handle 80 is returned to the position shown in Figs. 2 and 3 to swing the retainer fingers 67 into retaining engagement with the work-piece, where they are held with a yielding, but very strong pressure by the spring 75. Then the cross-head 64 is caused to slide upon the cone extension 35 until the spring latch 37 snaps into the notch 36, and the shaft 63 is started, causing the gang of saws 2 to reciprocate, through the medium of the crank disk 62, connecting rod 60, arms 61 and cross head 58.

With each reciprocation of the gang, as the rod 3 moves toward the left in Fig. 3, the cam plate 30 throws over the pawl 19 toward the observer, and the pawl sets up the ratchet wheel 18 one or more teeth according to the angular position of the slot 31, and the ratchet wheel rotates the rod 3, which in turn, by its threaded portions 16 draws together the cones 8, and these force outward the mounts 9 and saws 2, causing the latter to act radially at the regions 5^x upon the inner wall of the annular work-piece ring 4^x in a succession of genuine drawing saw cuts, for the saws are preferably moved radially as they cut, and thus move progressively radially outward until the blank ring 4^x has been completely severed and the blank 4 divided into segments 5, or the desired depth of cut has been effected.

The return cable escapement may then be released by pulling out the latch 19 and the latch 19^x, and the weight 41 unwinds the cable 40 and returns the rod 3 rotatively to its original position, separating the cones 8, and retracting the saws 2 into close proximity to the rod 3, after which the work-piece may be replaced by another blank, and the operation repeated.

Having illustrated and described my invention thus fully, and suitable means for carrying the same into effect, it will be understood that I do not limit myself to the specific materials and construction selected for illustration and description, nor in general otherwise than as set forth in the claims, read in connection with this specification.

I claim—

1. A gang-saw for machines of the class described; said gang-saw comprising a plurality of saws grouped in approximately annular relation, with their cutting edges presented outwardly, each of said saws being respectively movable bodily into a plurality of parallel positions.

2. A gang-saw for machines of the class described; said gang-saw comprising a plurality of saws grouped in approximately annular relation; means to reciprocate said saws longitudinally; and means to advance automatically the cutting edges of said saws at times.

3. A gang-saw for machines of the class described; said gang-saw comprising a plurality of saws grouped in approximately annular relation; means to reciprocate said saws longitudinally; and means to advance automatically the cutting edges of said saws at times, during the cutting stroke.

4. A gang-saw for machines of the class described; said gang-saw comprising a plurality of parallel saws grouped in approximately annular relation, with their cutting edges presented outward radially; means to reciprocate said saws longitudinally; and means to increase automatically and simultaneously the effective cutting radius of said saws.

5. In a machine of the class described; the combination with a gang-saw comprising a plurality of saws; of means to advance automatically the cutting edges of said saws; and means to retract said saws automatically.

6. A gang working-device of the class described; said device comprising a plurality of working members grouped with their working portions presented outwardly; means to reciprocate said device to cause simultaneous working action by said members; and means to increase automatically and simultaneously the effective working radius of said members.

7. In a machine of the class described; an axially reciprocable operating member; a gang of saws grouped in annular relation around said operating member; means to actuate said operating member reciprocatingly; means to cause radial movement of said saws outward respectively; and means to support the work in position to be operated upon by said saws respectively.

8. In a machine of the class described; a reciprocating gang of cutting members; means to support a work-piece of annular shape surrounding said gang; means to support said gang on each side of said work-piece and to cause the same to reciprocate operatively therewithin; and means to permit withdrawal of said work-piece and its replacement by another work-piece of annular shape.

9. In a machine of the class described; a frame, provided with bearings; a working device provided with a plurality of cross-heads mounted to reciprocate upon said bearings, and means to disconnect one of said cross-heads from said working member to permit the application of a work-piece of annular shape to surround said cutting member.

10. A machine of the class described; comprising a frame, provided with ways; a plurality of cross-heads mounted to slide on said ways; a working device constructed and arranged to be connected operatively with said cross-heads; and means to permit disconnection of said device from one of said cross-heads while the latter remains on said ways, to allow the emplacement of an annular work-piece upon said working device.

11. In a machine of the class described; a frame provided with a plurality of bearing rods, an operating rod provided with a cross-head mounted to slide upon said bearing rods; said cross-head being connected with said operating rod; a working device comprising a gang of working members mounted about said operating rod, the latter being arranged axially within said gang, another cross-head mounted to slide also upon said bearing rods and having a socket to receive said operating rod; and a spring latch mounted upon said cross-head and arranged to engage and connect said rod with said cross-head for co-reciprocation at times; said latch being manually withdrawable to disconnect said cross-head from said rod and permit the application to said rod of a work-piece of annular shape.

12. In a machine of the class described; the combination with a reciprocating gang cutter, of a support for a work-piece; a retainer having a portion constructed and arranged to engage said work-piece, and a lever connected operatively with said retainer and provided with a manual actuating device, said lever having a spring tending normally to hold said retainer against said work-piece and the latter against said support.

13. In a machine of the class described; the combination with a reciprocating gang cutter, of a support for a work-piece; and means to retain said work-piece in position for operative treatment; said retaining means comprising a yoke member mounted pivotally upon said frame and having a plurality of fingers to engage said work-piece, and a bell-crank lever connected operatively with said yoke member and provided with a manual actuating device, said bell-crank lever being mounted pivotally upon a forked fulcrum pin or bolt provided with adjusting nuts and having a spring tending normally to hold said fulcrum in the extreme outward

position permitted by said nuts, to hold said work-piece firmly in place on its support.

14. In a machine of the class described; a gang cutter comprising a plurality of cutting members; an axially arranged operating member provided with expanding members movable coaxially on said operating member; means to cause said expanding members to approach each other; means to withdraw said expanding members; and connections between said expanding members and cutting members acting upon approach of said expanding members to advance the cutting edges of said cutting members, said means acting upon withdrawal of said expanding members to retract said cutting members.

15. In a machine of the class described, a gang cutter comprising a plurality of cutting members; an axially arranged rod provided with cones movable coaxially on said rod; means to cause said cones to approach each other; means to withdraw said cones; and connections between said cones and cutting members acting upon approach of said cones to advance the cutting edges of said cutting members, said means acting upon withdrawal of said cones to retract said cutting members.

16. In a gang working-device of the class described; an operating member; a plurality of mounts constructed and arranged respectively each to receive a working member; and means on said operating member engaged with said mounts and operable to act positively upon said mounts respectively for their advancement, retraction, and maintenance in adjusted position, relatively to the longitudinal axis of said working-device.

17. In a gang working-device of the class described; an operating member; a plurality of mounts constructed and arranged respectively each to receive and support rigidly a working member; and means on said operating member engaged with said mounts and operable to act positively upon said mounts respectively for their simultaneous and symmetrical advancement, in different, substantially radial, planes, and their retraction, and maintenance in adjusted position, relatively to the longitudinal axis of said working device.

18. A working device of the class described; comprising an operating member; and a mount constructed and arranged to carry a tool; one of said members having a portion provided with an inclined undercut groove, and said other member having a portion provided with an inclined flange to enter, and be engaged positively with the walls of said groove; means to cause relative motion between said members to effect advancement and retraction of one of them relatively to the line of movement; and means

acting to hold said members positively in adjusted position.

19. A working device of the class described; said device comprising a holder having substantially radial guide projections; an operating member rotatable axially within said holder, and having an extended threaded portion; means to maintain said operating member in adjusted longitudinal position within said holder; a mount having a seat for a tool, said mount having also a guide neck or portion to lie between said guide projections, straight shoulders to maintain it in longitudinal position on said holder, and an inclined, flanged operating head; and an expanding member having a threaded bore to receive, and cooperate with, said threaded portion of said operating member and having an inclined undercut groove to receive said operating head.

20. A working device of the class described; said device comprising a sleeve-like holder having substantially radial separator projections with intervening guide slots, and an axial bore; an operating rod rotatable in said bore, with retaining means to prevent its longitudinal movement in said bore, and threaded extensions; expanding members with threaded bores seated on said extensions respectively, and having inclined, undercut grooves; a plurality of mounts having extended shanks with tool-seats respectively, and inclined, flanged operating heads, near each end, to enter said grooves cooperatively and necks with guide-shoulders to lie in said guide-slots and be engaged with said guide-projections respectively; rotation of said rod in one direction serving to approach said expanding members and force said mounts outward and reverse rotation serving to retract said mounts.

21. In a machine of the class described; a cross-head provided with a seat; a working device provided with an expansible gang of working members; an expanding member, and means to operate the same to expand said gang; and a bushing member intermediate and to connect said expanding member and seat, said bushing member having openings to pass parts of said working members.

22. An expanding member for working devices of the class described; said member having a series of annularly disposed peripheral slots, the walls of said slots forming guides, and said walls being undercut respectively to form inclined operating grooves larger than said slots.

23. A mount for working devices of the class described; said mount comprising a tool-seat, a straight guide-neck having a guide-shoulder, and an operating-head having a flanged portion inclined relatively to said guide-shoulder, said mount being adapted to move bodily with said tool for adjust-

ment of said tool relatively to the working device as a whole.

24. A mount for working devices of the class described; said mount comprising an elongated shank having an inclined operating head near each end, and a medially arranged tool-seat, said mount being movable bodily radially with said tool for adjustment of the latter.

25. A mount for working devices of the class described; said mount comprising an elongated shank having an inclined flanged operating head near each end, a medially arranged seat recessed to receive a tool, and having tool retaining means consisting of a curved slot near one of said heads, an apertured abutment near the opposite head; and a guide neck with guide-shoulders adjacent to one of said heads.

26. In a machine of the class described; a gang-saw comprising a plurality of saws grouped in approximately annular relation with their cutting edges presented outwardly, each of said saws having an attaching pin near one end and an attaching bolt and nut near its other end; an axially arranged operating rod within said gang and having oppositely threaded portions; expanding cone-members, having threaded bores seated cooperatively upon the threaded portions of said rods, and having undercut inclined grooves; a holder sleeve upon said rod, and individual mounts for said saws, said mounts being carried by said holder and said mounts having longitudinal body-slots to receive the backs of said saw blades, curved open-ended retaining slots to receive said attaching pins, the walls of said slots serving to engage and hold said pins, abutments pierced to pass the threaded shanks of said bolts, and adjusting heads at each end to enter said cone grooves cooperatively.

27. In a machine of the class described; a frame having a base, an upright frame member provided with a bridge supporting a plurality of bearing-rods and with a seat for a work-piece intermediate said bearing rods; a plurality of cross-heads mounted slidably upon said rods; an actuating shaft mounted in bearings in said frame and a crank and connecting rod to transmit motion from said shaft to reciprocate one of said cross-heads; an operating rod connected with said actuated cross-head and extending from it toward said other cross-head; means to connect said other cross-head removably with the other end of said operating rod, the latter having threaded portions; cones with threaded bores mounted upon said threaded portions of said rod and having their coned portions facing each other and provided with undercut grooves; a holder sleeve member mounted between collars on said rod and having slots to receive mounts for saw blades; saw-blade mounts mounted in said

slots and having body grooves and retaining means for saw blades, said mounts having also head-portions with inclined projecting flanges to enter operatively said undercut grooves in said cones; saw blades in said grooves respectively; a ratchet wheel mounted upon said rod and connected non-rotatively therewith; an arm mounted to rotate about said rod adjacent said ratchet wheel; a spring pawl carried by said arm, a slotted disk mounted rotatively upon an overhanging bracket of said frame; means to retain said disk in adjusted position to cause oscillation of said pawl and progressive rotation by it at times of said rod to expand said saw-blades by drawing together said cones through the threaded engagement therewith by said rod; a spool upon said rod and a flexible member arranged to be wound upon said spool, the same being connected non-rotatively therewith, but permitting axial movement of said rod within said spool; means acting normally upon said flexible member to unwind it and thereby to turn said rod in reverse direction to retract said saw-blades and return the same to normal position; and means to control the action of said flexible member.

28. In a machine of the class described; the combination with a gang cutter comprising a plurality of cutting members and means to adjust said cutting members, of actuating means for said adjusting means, said actuating means comprising a ratchet

wheel, a pawl to engage said ratchet wheel, and a cam plate having a cam slot arranged to pass the tail-piece of said pawl, said cam plate being mounted rotatably upon the frame of the machine in position to cause oscillation of said pawl and actuation by it of said ratchet wheel upon reciprocation of said gang device.

29. In a machine of the class described; the combination with a reciprocating gang cutter; an axially arranged operating rod therefor and means to rotate said rod progressively in one direction to adjust said cutting members; of a flexible member surrounding said rod and operating at times to rotate said rod automatically in the opposite direction to return said cutting members to their original normal position prior to adjustment.

30. The combination with a gang working-device of the class described; comprising a plurality of working members, and means to expand the same in a substantially radial direction; of a work seat having slots to clear said members as the latter are expanded during their action upon the work-piece.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

THOMAS LUND.

Witnesses:

CHESTER E. ROGERS,
LEONARD M. JOHNSON.